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THE IMPLEMENTATION OF SMOKING CESSATION CARE IN GENERAL PRACTICE

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The implementation of smoking cessation care in general practice

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THE IMPLEMENTATION OF SMOKING CESSATION CARE IN GENERAL PRACTICE

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1

General introduction

Custome lothsome to the eye, hatefull to the nose, harmefull to the braine, dangerous to the lungs, and in the blacke stinking fume thereof, neerest resembling the horrible Stigian smoke of the pit that is bottomelesse.

King James I of England
1566 - 1625

The history of smoking starts in the Americas and dates back to as early as 5,000 BC.[1] Native Americans not only used tobacco for religious and recreational purposes, it was also often part of rituals such as healing practices. Experienced medicine men used tobacco as a painkiller for ear- and toothache. In addition, a mix of tobacco and local vegetation was thought to be a particularly good remedy for tuberculosis and asthma. With the arrival of Europeans in the sixteenth century, the consumption, cultivation, and trading of tobacco quickly spread. Tobacco smoking was then adopted for pleasure or as a socializing tool. With the modernization of cigarette consumption, adverse health effects became increasingly noticeable.

The first formal statistical evidence on the association between tobacco and lung cancer was identified in Germany in the late 1920s.[2] Thereafter, scientific studies on the health effects of smoking continued, and British epidemiologists published the clear relationship between smoking and cancer in the British Medical Journal in 1954.[3] After years of intensive research this resulted in a wide recognition of the negative influence of tobacco smoking on overall health. Political action against the usage of tobacco was prompted and resulted in multiple governmental policies which were all aimed at the discouragement of tobacco usage. Nowadays, it is widely recognized that tobacco smoking is one of the largest contributors to non-communicable disease, primarily including cancers, cardiovascular and chronic lung diseases, which account for 63% of all deaths worldwide.[4] For this reason, the World Health Organization (WHO) indicates the tobacco epidemic as one of the biggest public health threats the world has ever faced.[5]

Proven (cost-)effectiveness of many tobacco control measures has led to substantial political involvement in all parts of the world. In 2003, the Framework Convention on Tobacco Control of the WHO summarized these measures into a policy package called 'MPOWER' which has currently been ratified by 177 countries. The six evidence-based measures include: 1) *M*onitoring tobacco use and prevention policies, 2) *P*rotecting people from the hazardous effects of tobacco smoke, 3) *O*ffering help to smokers who want to quit, 4) *W*arning people for the dangers of tobacco, 5) *E*nforcing bans on tobacco advertising, and 6) *R*aising

taxes on tobacco. Despite substantial progress in many countries – a third of the world's population is now covered by at least one of these measures – tobacco use continues to be the leading global cause of preventable death.[4]

The global prevalence of daily tobacco smoking was approximately 18.6% in 2012; 31.3% for men and 6.2% for women aged 15 years and older.[6] Prevalence rates are substantially higher in developing countries than in developed countries. At the beginning of the 21st century, 80% of the approximately one billion smokers worldwide live in low- and middle-income countries, such as Armenia, Indonesia, and Russia, where daily smoking among men rises up to 54.0%, 55.8%, and 48.8%, respectively.[6] In Northern and Western Europe, North America and the Western Pacific region, tobacco use is on a decline. However, a still relatively high prevalence of tobacco smoking is measured in the Netherlands when compared to other developed countries; 22.4% of Dutch adults aged 15 years or older smoked in 2012, compared to only 18.4% in New Zealand, 17.2% in the United States, 15.9% in Iceland, and 12.3% in Sweden.[6]

SMOKING CESSATION

The UN High-Level Meeting on Non-Communicable Diseases in New York identified tobacco control as the "most urgent and immediate priority" intervention to reduce the prevalence of non-communicable diseases.[7] However, smokers report substantial difficulties when attempting to give up smoking; smoking is more than an ingrained habit. The substance nicotine, which is present in all types of cigarettes, has a highly addictive character and is known to elicit reinforcing effects, such as relaxation, reduced stress, enhanced vigilance, improved cognitive function, mood modulation, and lower body weight. In addition, smokers report negative reinforcing effects of nicotine which refer to withdrawal symptoms in the context of physical dependence, such as nervousness, restlessness, irritability, anxiety, impaired concentration, impaired cognitive function, increased appetite, and weight gain.[8;9]

Yet the positive health effects of giving up smoking are instantly noticeable: blood pressure and pulse rate stabilize within 20 minutes, carbon monoxide levels in blood drops within eight hours, and the ability to smell and taste is enhanced within 48 hours. Excessive risks of coronary heart diseases and lung cancer death rates are decreased by 50% within one and five years after cessation, respectively.[10;11] In general, the advantages of smoking cessation outweigh the disadvantages.

Therefore, it may come as no surprise that, overall, 80% of the smokers report their willingness to quit in the nearby future.[12;13] The percentage of smokers reporting a quit attempt in a given year is estimated to range from 28-46%.[12-14] Without any support most relapses occur within eight days after the quit attempt due to nicotine craving and insufficient plans regarding how to cope with these moments of craving or temptation.[15] Evidence-based behavioural support delivered by healthcare professionals, nicotine replacement therapy (NRT), and stop-smoking medication can assist smokers and facilitate smoking abstinence.[16] In recent years, a series of randomized controlled trials, reviews, and reviews of reviews have been performed on the effectiveness of various types of smoking cessation interventions. The following interventions were found to significantly benefit long-term quit rates compared to no intervention or a placebo: tailored (written) quit smoking advice[17-19], individual (telephone) counseling[18-22], group behavioural interventions[18;19], tailored self-help interventions[18;20], pharmacotherapy, including bupropion[18;19;23;24], varencline[24], nortriptyline[19;23-25], multiple types of NRT[18;19;24;26;27], as well as a combination of behavioural interventions and pharmacotherapy.[28;29] Additionally, meta-analyses show the cost-effectiveness of different forms of cessation support, such as NRT[26;30], stop-smoking medication[31;32], telephone counseling[26;33-35], and face-to-face (motivational interviewing) cessation interventions[36], when compared to unsupported cessation.

GENERAL PRACTICE

In the Netherlands, every citizen has to be registered with a general practitioner (GP). When encountering a health problem patients first visit their GP, who is freely accessible and acts as a gatekeeper for specialized medical care.[37] Nearly 80% of the total population visits their GP on a yearly basis with an average of four visits each year.[37-39] The standard general practice in the Netherlands consists of 2,350 patients and an average consultation has a length of ten minutes[40], which results in considerable time pressure and workload for GPs. To reduce the workload of GPs and improve the quality of care for chronically ill patients, with a special focus on lifestyle counseling, practice nurses (PNs) were introduced in Dutch general practice in 1999.[41] PNs work under the supervision of GPs, manage their consultations independently, and base their clinical practice on guidelines developed by the Dutch College of General Practitioners (NHG) and on other multidisciplinary guidelines. The collaboration between GPs and PNs provides a good basis for identifying smokers, motivating them to quit, and delivering effective quit smoking support.

Guideline on smoking cessation care

The first Dutch multidisciplinary guideline for the treatment of tobacco dependence in health care was published in 2004.[42] Subsequently, the NHG developed the first guideline for the treatment of tobacco dependence in general practice in 2007.[43] This guideline is based on the widely accepted 5A-Model.[44-48] The model recommends GPs to actively *Ask* patients about their smoking behaviour. If a patient smokes, GPs are urged to provide a patient-tailored *Advise* to quit, which emphasizes the relevance of quitting and provides a direct link with the current health status of the patient. Evidence shows that this intervention is time-efficient and can increase cessation rates with 2-3% compared to unassisted quit rates.[49;50] Although this effect may seem small from a clinician's point of view, it has the potential to result in substantial positive effects on public health level if systematically provided.

Regardless of the smoker's motivation to quit, GPs are recommended to provide the patient with information on the possibilities of quit smoking support in general practice and offer them a follow-up appointment. The GP can also provide the patient with educational leaflets. GPs are further recommended to *Assess* the patient's willingness to quit and register the smoking status and degree of the patient's quit intention systematically in the electronic patient record. Patients who indicate their unwillingness to quit are asked their permission to discuss smoking cessation during a future consultation.

If patients do indicate their willingness to quit, the guideline urges GPs to directly *Assist* them with intensive quit smoking support, which anticipates both psychological and physiological withdrawal symptoms. Previous unsuccessful quit attempts are evaluated and potential difficult moments are summarized in a quit plan which describes how the patient will cope with these moments in advance. The GP should assess the patient's degree of nicotine dependence in order to evaluate suitable pharmacological support such as NRT, bupropion, nortriptyline, or varenicline. According to the guideline, patients who contemplate smoking cessation are assisted with a behavioural intervention aimed at increasing their level of motivation. During this intervention, the guideline recommends GPs to discuss the experienced advantages and disadvantages of smoking, alongside the advantages of quitting. An essential component of this intervention is the exploration of the barriers to cessation, such as fear of failure, craving, and weight gain. The guideline informs GPs how to deal with these often mentioned barriers. Finally, GPs are recommended to *Arrange* a follow-up appointment or a referral to the PN or external quit smoking support if they are short on time and resources to provide the quit smoking support themselves.

Studies have shown that a successful implementation of the 5A-Model for smoking cessation care in general practice reduces smoking rates in patients compared to no intervention.[46-48] Nevertheless, the introduction of innovations in healthcare, such as the 5A-Model for the treatment of tobacco dependence in Dutch general practice, is widely known to be a complex process.[51]

IMPLEMENTATION GAP

A study published in 2010 found that, over the years, lifestyle counseling has been given more priority in Dutch general practice.[53] Nevertheless, smoking is currently discussed in only a minority of all consultations (8.3%).[53] In addition, around 80% of all smokers and 40% of smokers who discuss smoking with their GP do not receive a quit smoking advice.[54] With regard to more intensive quit smoking support, GPs do not routinely refer their patients to PNs or external quit support.[53;55] Also, these professionals apply motivational interviewing techniques only to a minor extent.[53;55] Apparently, a substantial gap exists between the evidence-based knowledge on the treatment of tobacco dependence and real-world practices of primary care professionals.

GPs report numerous factors that influence their uptake of clinical guidelines for smoking cessation care. Figure 1 depicts a five-level social-ecological model in order to better understand these factors. This model looks beyond the individual GP and considers the complex interplay between all factors that influence the implementation of smoking cessation care in general practice. These factors are related to the GP, patient, organization, community, and public policy.

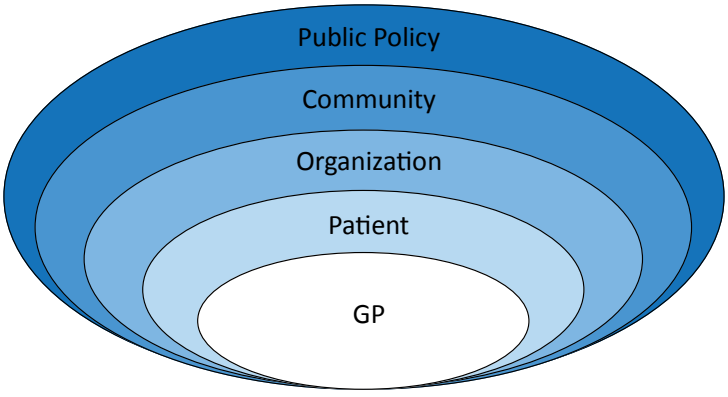

Figure 1. Social-ecological model: a theoretical framework depicting levels that influence the implementation of smoking cessation guidelines in general practice

GP level

The first level of the model identifies GP-related determinants of implementation, including GPs' attitudes and beliefs, such as doubts regarding the (cost-) effectiveness of routinely intervening on their patients' smoking behaviour[56-58], a lack of sufficient skills to deliver quit smoking support[56;57;59] or low confidence in these skills[57], and a lack of health education or training.[58-61]

Patient level

The second level comprises patient-related determinants of implementation, including the absence of smoke-related complaints[59;62], reluctance of the patient to discuss smoking cessation[63-65], a high nicotine dependence, and a lack of motivation to quit.[56;58-60] This level also includes the interaction between GPs and patients which may influence the likelihood of a successful implementation of smoking cessation care. These factors include GPs' fear for resistance of patients[56;66], unpleasant personal experiences[57], and concerns about the doctor-patient relationship.[58]

Organization level

The third level addresses determinants of implementation within the general practice, including a lack of time[56-58;60], the presence of a PN, and availability of quit smoking interventions within the own organization.[56]

Community level

The fourth level of the social-ecological model includes determinants of implementation within the community. These include a lack of overview of health promoting programmes in the community, a lack of accessible and affordable quit smoking programmes, and a lack of collaboration between general practices and hospitals.[56]

Public policy level

The fifth level looks at broader societal determinants that help to create a climate in which the delivery of smoking cessation care in general practice is facilitated. The most important factors include a lack of or unclearness regarding the reimbursement for quit smoking support[56;67] and a lack of financial compensation for the delivery of quit smoking care.[56;58;60]

FACILITATION OF GUIDELINE IMPLEMENTATION

A number of theoretical frameworks have been developed in order to assess implementation processes, explain implementation problems, and inform implementation interventions.[68-74] Several of these frameworks integrate behaviour change theories that can be used to design implementation interventions.[74;75] The field of psychology includes an extensive body of evidence regarding such theories to predict and change human behaviour. In the past decade, researchers in this field have acknowledged that clinical behaviour of healthcare professionals can be regarded as a form of human behaviour.[75-79] Therefore, a growing number of interventions that aim to facilitate guideline implementation in healthcare integrate such behaviour change theories. These theory-driven interventions aim to improve guideline-recommended clinical behaviours of healthcare professionals, thereby increasing the number of patients who receive care according to these guidelines.

AIM OF DISSERTATION

The overall aim of this dissertation is to examine the implementation of guideline-recommended smoking cessation care in general practice. The five-level socio-ecological model is the conceptual framework that guides this dissertation. All empirical studies adress one or more factors related to the GP, patient, organization, community, or public policy level, which determine the implementation of smoking cessation care in general practice. *Chapter two* discusses the results of a meta-analysis on the effectiveness of training health professionals in smoking cessation care. *Chapter three* addresses the effectiveness of a pragmatic, practice-tailored training programme for GPs in which several determinants of implementation were targeted. *Chapter four* examines whether action planning among GPs is an effective strategy to increase the provision of guideline-recommended smoking cessation care. *Chapter five* discusses the extent to which smokers express negative statements about quitting when primary care professionals provide guideline-recommended smoking cessation care. Additionally, this chapter examines the degree to which smokers' negative statements about quitting impede or facilitate the use of guideline-recommended smoking cessation care by GPs and PNs. Finally, *chapter six* discusses the results of a population-based study on the effects of two national tobacco control interventions (the introduction of the GP guideline for smoking cessation care in 2007 and the introduction of full health insurance coverage for stop-smoking programmes in 2011) on GP

prescriptions of stop-smoking medication and on smoking prevalence in the Netherlands.

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Training health professionals in smoking cessation care

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ABSTRACT

Background

Cigarette smoking is one of the leading causes of preventable death worldwide. There is good evidence that brief interventions from health professionals can increase smoking cessation attempts. A number of trials have examined whether skills training for health professionals can lead them to have greater success in helping their patients who smoke.

Objectives

To determine the effectiveness of training health care professionals in the delivery of smoking cessation interventions to their patients, and to assess the additional effects of training characteristics such as intervention content, delivery method and intensity.

Search methods

The Cochrane Tobacco Addiction Group's Specialised Register, electronic databases and the bibliographies of identified studies were searched and raw data was requested from study authors where needed. Searches were updated in March 2012.

Selection criteria

Randomized trials in which the intervention was training of health care professionals in smoking cessation. Trials were considered if they reported outcomes for patient smoking at least six months after the intervention. Process outcomes needed to be reported, however trials that reported effects only on process outcomes and not smoking behaviour were excluded.

Data collection and analysis

Information relating to the characteristics of each included study for interventions, participants, outcomes and methods were extracted by two independent reviewers. Studies were combined in a meta-analysis where possible and reported in narrative synthesis in text and table.

Main results

Of seventeen included studies, thirteen found no evidence of an effect for continuous smoking abstinence following the intervention. Meta-analysis of 14 studies for point prevalence of smoking produced a statistically and clinically significant effect in favour of the intervention (OR 1.36, 95% CI 1.20 to 1.55, p=

0.004). Meta-analysis of eight studies that reported continuous abstinence was also statistically significant (OR 1.60, 95% CI 1.26 to 2.03, p= 0.03). Healthcare professionals who had received training were more likely to perform tasks of smoking cessation than untrained controls, including: asking patients to set a quit date (p< 0.0001), make follow-up appointments (p< 0.00001), counseling of smokers (p<0.00001), provision of self-help material (p< 0.0001) and prescription of a quit date (p< 0.00001). No evidence of an effect was observed for the provision of nicotine gum/replacement therapy.

Conclusions

Training health professionals to provide smoking cessation interventions had a measurable effect on the point prevalence of smoking, continuous abstinence and professional performance. The one exception was the provision of nicotine gum or replacement therapy, which did not differ between groups.

INTRODUCTION

Every year approximately 5.4 million people die from tobacco-related diseases, translating to 1 in every 10 deaths among adults worldwide.[1] Approximately 80% of those deaths are from people living in less developed countries and by 2030 this figure will increase to more than 8 million per year if no action is taken.[1] If current trends continue on this trajectory, an estimated 500 million people alive today will be killed by tobacco. In the 27 countries that form the European Union, over 25% of cancer deaths and 15% of all deaths can be attributed to smoking . Smoked tobacco is known to cause up to 90% of all lung cancers and is a significant risk factor for strokes and fatal heart attacks. In addition, tobacco use is linked to the development and treatment of many oral diseases[2;3] including oral cancer, delayed wound healing and peridentitis contributing to loss of teeth and edentulism.[4;5]

Description of the intervention

Health professionals are at the forefront of tobacco epidemics as they consult millions of people and can encourage them to quit smoking.[6] In developed countries, more than 80% of the population will see a primary care physician at least once a year, with doctors perceived to be influential sources of information on smoking cessation.[6-8] It has been reported that most dentists and dental hygienists believe the lack of skills and training is a significant barrier to effectively providing tobacco cessation interventions into routine care.[4;9-11]

Providing training in smoking cessation care is one possible method for increasing the number and quality of delivered interventions by primary care health professionals, and a variety of training methods are available.[12-14] To date, individual studies have shown an effect of training on physician's activities, but there have been doubts about the extent to which this translates into changes in patient behaviour and actual smoking abstinence.[15-17] Training health professionals to deliver smoking cessation messages has been known to increase the frequency with which interventions are offered to patients in the clinical context.[18]

How the intervention might work

Provision of advice and support to smokers by healthcare professionals in primary care settings has been shown to be the most cost-effective preventive service and has a small but significant effect on cessation rates.[19-21] Even though these rates appear low from the perspective of many clinicians, they could translate into a substantial public health benefit if consistently provided, as approximately 70-80% of adults have contact with a health care practitioner, usually in primary care, at least once each year.[6-8;22] It is therefore disappointing that despite ongoing developments in this field worldwide, the number of patients who report receiving advice on smoking cessation from health professionals is still low.[23]

Why it is important to do this review

On a worldwide scale, tobacco use currently costs hundreds of billions of dollars each year.[24] Data on the global impact of tobacco is incomplete, however it is known to be high, with annual tobacco related health care costs being US$81 billion for the USA, US$7 billion for Germany and US$1 billion for Australia.[25]

The first systematic review on this topic was published over a decade ago and showed that training health professionals to provide smoking cessation interventions had a positive effect on professional performance. However, there was no strong evidence that it changed smoking behaviour of patients.[26] Since then, a number of new trials have examined whether specific skills training for health professionals leads them to overcome frequently mentioned barriers and to have greater success in helping their patients to quit smoking.

We therefore systematically identified and reviewed the evidence from new published randomized controlled trials that have studied the effects of training and supporting health care professionals in providing smoking cessation advice. Furthermore, we assessed the effects of training characteristics, such as the content, setting, and intensity.

Objectives

The aim of this review was to assess the effectiveness of training health care professionals to deliver smoking cessation interventions to their patients, and to assess the effects of training characteristics (such as contents, setting, delivery and intensity).

METHODS

Criteria for considering studies for this review

Types of studies

We considered only randomized controlled trials.

Types of participants

We considered trials in which the unit of randomization was a healthcare practitioner or practice, and that reported the effects on patients who were smokers.

Types of interventions

We considered interventions in which healthcare professionals were trained in methods to promote smoking cessation among their patients. To be included in the review studies had to have allocated healthcare professionals to at least two groups (including one which received some form of training) by a formal randomization process. Studies that used historical controls were excluded. We included studies that compared a trained group to an untrained control group, and studies that examined the effectiveness of adding prompts and reminders to training.

Types of outcome measures

The primary outcome measure was abstinence from smoking six months or more after the start of the intervention, assessed as:

- point prevalence (defined as not smoking at a set period (e.g., seven days) prior to the follow-up), and
- continuous abstinence (defined as not smoking for an extended/prolonged period at follow-up)

The strictest available criteria to define abstinence were used. In studies where biochemical validation of cessation was available, only those participants who

met the criteria for biochemically confirmed abstinence were regarded as being abstinent. Those lost to follow-up were regarded as being continuing smokers. Secondary 'patient level' outcome measures included process variables such as the number of smokers who were:

- asked to set a date for stopping (quit date)
- given a follow-up appointment
- counselled
- given self-help materials
- offered nicotine gum/replacement therapy
- prescribed a quit date, and
- cost effectiveness for interventions.

Secondary 'physician level' outcome measures include the number of referrals made (to local smoking cessation services). To be included in the review, studies had to assess changes in the long term smoking behaviour of patients. Studies which only assessed the effect of training on the consultation process were excluded.

Search methods for identification of studies

We identified potentially relevant study reports from the Cochrane Tobacco Addiction Group Specialised Register. This Register includes reports of trials and other evaluations of interventions for smoking cessation and prevention, based on regular highly sensitive searches of multiple electronic databases including MEDLINE, EMBASE, PsycINFO and CENTRAL, and hand searches of conference abstracts. For details of search strategies and dates see the Cochrane Tobacco Addiction Group Module in the Cochrane Library. The most recent search of the Register was in March 2012. Records were identified from the Register as potentially relevant if they included the free text terms 'training' or 'trained' or the MeSH keywords 'Education, Premedical' or 'Education, Professional' or 'Inservice Training' or 'Physician's Practice Patterns' or 'Dentist's Practice Patterns' or 'Delivery of Health Care' or 'Comprehensive Health Care' or 'Critical Pathways' or 'Disease Management' or the EMBASE indexing terms 'clinical education' or 'continuing education provider' or 'continuing education' or 'medical education' as indexing terms. We conducted an additional search of MEDLINE (via OVID, to 2012 Feb week 5) exploding the same MeSH keywords in combination with the terms for smoking cessation and controlled trials used in the regular search of MEDLINE for the Specialised Register. Records included definite and probable reports of randomized trials, and reviews.

Data collection and analysis

Selection of studies

Two reviewers (KC, MV) pre-screened all study reports identified from the Specialised Register (limited to papers published after 1999 for this update). Articles were rejected if the title and/or abstract did not meet the inclusion/exclusion criteria. In instances where the study could not be categorically rejected, the full text was obtained and screened. Reference lists of screened articles were scanned for other potentially relevant articles. Two reviewers then independently assessed the relevant studies for inclusion (KC and MV), with discrepancies resolved by consensus.

Data extraction and management

A combination of two reviewers independently extracted data from published reports (KC, MV, and MB). Disagreements were resolved by referral to a third party. No attempt was made to blind any of these reviewers to either the results of the primary studies or the intervention the subjects received. The data extraction process identified information on the following design characteristics:

- Country and setting of study
- Description of training delivery method, duration, content
- Number of therapists (intervention, control, post randomization dropouts)
- Number of patient participants (intervention, control, losses to follow-up in each condition), method of identification/enrolment
- Number of patients per therapist (range and/or average)
- Description of intervention and control conditions
- Definition of abstinence for smoking cessation outcome(s), duration of follow-up, method of biochemical validation if used
- Secondary outcomes reported

Data was extracted and entered into Review Manager for the following outcome variables, where reported:

- Point prevalence abstinence at longest follow-up (preferred outcome for meta-analysis is continuous or sustained abstinence)
- Continuous or sustained smoking abstinence at longest follow-up
- Cost effectiveness analysis for intervention

We also extracted data on process outcomes where reported. These included patient reported or documented delivery of interventions, such as: setting a quit date, making a follow-up appointment, number of smokers counselled, provision of self-help materials, prescription of nicotine replacement therapy and/or prescription of a quit date.

Assessment of risk of bias in included studies

Two reviewers independently assessed the full text versions of all included papers for risk of bias using the Cochrane Handbook guidelines, using a domain-based evaluation.[27] In addition, extra criteria developed by the Cochrane EPOC Group (2009) were used to address potential sources of bias related to clustering effects. These domains included sequence generation, allocation concealment, blinding for participants, blinding for outcome assessors, incomplete outcome data, selective reporting, imbalance of outcome measures at baseline, comparability of intervention and control group characteristics at baseline, protection against contamination, selective recruitment of participants and any other sources of potential biases. The risk of bias was assessed for each domain as 'high risk', 'low risk', and 'unclear risk' (using the guidelines from Table 8.5.c of the Cochrane Handbook[27]). Two of three reviewers (KC, MV or MB) independently assessed the included studies for risk of bias. Conflicts were resolved by consensus or by referring to a third party if disagreement persisted.

Unit of analysis issues

The trials included in the review used cluster randomization. Outcomes relate to individual patients whilst allocation to the intervention is by provider or practice, and ignoring this may introduce unit of analysis errors. Using statistical methods which assume for example that all patients' chances of quitting are independent ignores the possible similarity between outcomes for patients seen by the same provider. This may underestimate standard errors and give misleadingly narrow confidence intervals, leading to the possibility of a type 1 error. All trials were expected to be cluster randomized studies, with analysis performed at the level of individuals whilst accounting for the clustering in the data. This was performed by using a random effects model for pooled meta-analysis as recommended in the Cochrane Handbook (Chapter 16.3.3)[27] and checked by a statistician (AE). For those studies which did not adjust for clustering the actual sample size was replaced with the effective sample size (ESS), calculated using a rho= 0.02.[28] Trials may use a variety of statistical methods to investigate or compensate for clustering; we have recorded whether studies used these and whether the significance of any effect was altered. In instances where the studies appeared

homogenous via a combination of the statistical I^2 test in addition to homogeneity expressed in the visual inspection of a Funnel plot we meta-analysed using a fixed effect model. However in the presence of significant heterogeneity (as defined below under 'Data Synthesis') the random effects model was used. In the case of multi-arm trials each pair-wise comparison was included separately, but with shared intervention groups divided out approximately evenly among the comparators. However, if the intervention groups were deemed similar enough to be pooled, the groups were combined using appropriate formulas in the Cochrane Handbook.[27]

Dealing with missing data

Missing participant data were evaluated on an available case analysis basis as described in Chapter 16.2.2 of the Cochrane Handbook.[27] Missing standard deviations were addressed by imputing data from the studies within the same meta-analysis or from a different meta-analysis as long as these use the same measurement scale, have the same degree of measurement error and the same time periods (between baseline and final value measurement, as per Chapter 16.1.3.2 of the Cochrane Handbook)[27]. Where statistics essential for analysis were missing (e.g. group means and standard deviations for both groups are not reported) and could not be calculated from other data, we attempted to contact the authors to obtain data. Loss of participants that occurred prior to performance of baseline measurements was assumed to have no effect on the eventual outcome data of the study. Losses after the baseline measurement were taken were assessed and discussed. Studies that had more than 30% attrition (i.e., deaths and withdrawals) were reported in text only and excluded from the meta-analysis. We made an attempt to contact all authors for verification of methodological quality, classification of the intervention(s) and outcomes data. We attempted to contact the second author if we were unsuccessful in contacting the first author.

Assessment of heterogeneity

The review was expected to have some heterogeneity due to factors such as differing characteristics of clinics, practices and medical surgeries, differences in intervention characteristics and varying measurement tools used to assess outcomes. The Chi^2 and I^2 statistic[27] were used to quantify inconsistency across studies. The presence of significant heterogeneity was further explored through subgroup analyses. These were conducted for:

- 'treatment type' (e.g., counseling alone, counseling plus nicotine replacement therapy, counseling plus request for additional appointments, etc.)
- 'treatment intensity' (number of sessions)
- 'treatment intensity' (total exposure)
- 'mode of delivery' (e.g., face-to-face, group sessions or both)
- 'behavioural change techniques' (e.g., prompting, providing feedback, use of behavioural change theories)
- 'type of professional being trained' (e.g., dentist, doctor, health care worker etc.)
- 'length of follow-up' (i.e., >6 to <9 months, >9 to <12 months, >12 to <24 months), and
- 'risk of bias' (i.e., high risk of bias for: < 2 domains, 3 – 5 domains, 6 - 8 domains or > 9 domains).

The likelihood of false positive results among subgroup analyses increase with the number of potential effect modifiers being investigated.[27] As such we have adjusted these analyses using a Holm-Bonferroni method using $\alpha = 0.05$.

Assessment of reporting biases

With the inclusion of more than ten included studies, potential reporting biases were assessed using a funnel plot. Asymmetry in the plot could be attributed to publication bias, but may well be due to true heterogeneity, poor methodological design or artefact. Contour lines corresponding to perceived milestones of statistical significance (p= 0.01, 0.05, 0.1 etc.) were applied to funnel plots, which may help to differentiate between asymmetry due to publication bias from that due to other factors.[27]

Data synthesis

For dichotomous outcomes the fixed effect model with an odds ratio (OR) was calculated with 95% confidence interval (CI), which was synthesised using inverse variance. However for outcomes with greater than 10 included studies a test for heterogeneity was conducted using a combination of two methods. If heterogeneity was found (defined as the I^2 test >60% and visual inspection of the funnel plot indicating no clustering of large or small studies) the random effects model was used in place of the fixed effect model, as suggested by the Cochrane Handbook (Section 9.5.2 and 9.5.3).[27] Reasons for heterogeneity are further explored in the discussion. When studies appeared homogenous, the meta-analysis was redone using the fixed effect model.

For continuous outcomes, a fixed effect model with a weighted mean difference (WMD) or standardised mean difference (SMD) with 95% confidence intervals were calculated as appropriate. However, in the presence of significant heterogeneity (as defined above) the random effects model was used in place of the fixed effect model.

Sensitivity analysis

Sensitivity analysis was conducted on studies with an unclear or high risk of bias for sequence generation and/or allocation concealment.

RESULTS

Description of studies

Table 1 (p. 58) shows the characteristics of included studies.

Results of the search

Of 381 articles screened, 17 studies met all of the inclusion criteria (see Figure 1).

Included studies

Design

All 17 included studies used a randomized controlled trial design with clustering and eleven studies also adopted nesting of participants within practices/hospitals.[4;15;17;29-35] One study incorporated a 2x2 factorial design with randomization to: training plus incentive, training plus medication, training plus incentive and medication or usual care.[12]

Sample sizes

In total 28,531 patients were assessed at baseline (following randomization) with 21,031 remaining in the studies at final follow-up. Authors report a total of 1,434 individual health professionals recruited at baseline (across a known 260 practices) with follow-up available for 1,204. Sample sizes for individual studies were medium to large, with the smallest number of patients (randomized at baseline) found in the Wang 1994 study (n= 93) and the largest in the Kottke 1989 study. The smallest sample at follow-up remained with the Wang 1994 study (n= 82), and the largest remained with the Kottke 1989 study (n= 5266). At the health professional level, the Hymowitz 2007 study had the largest number of residents randomized at baseline (n= 275) and follow-up (n= 235) and likewise, Wang 1994

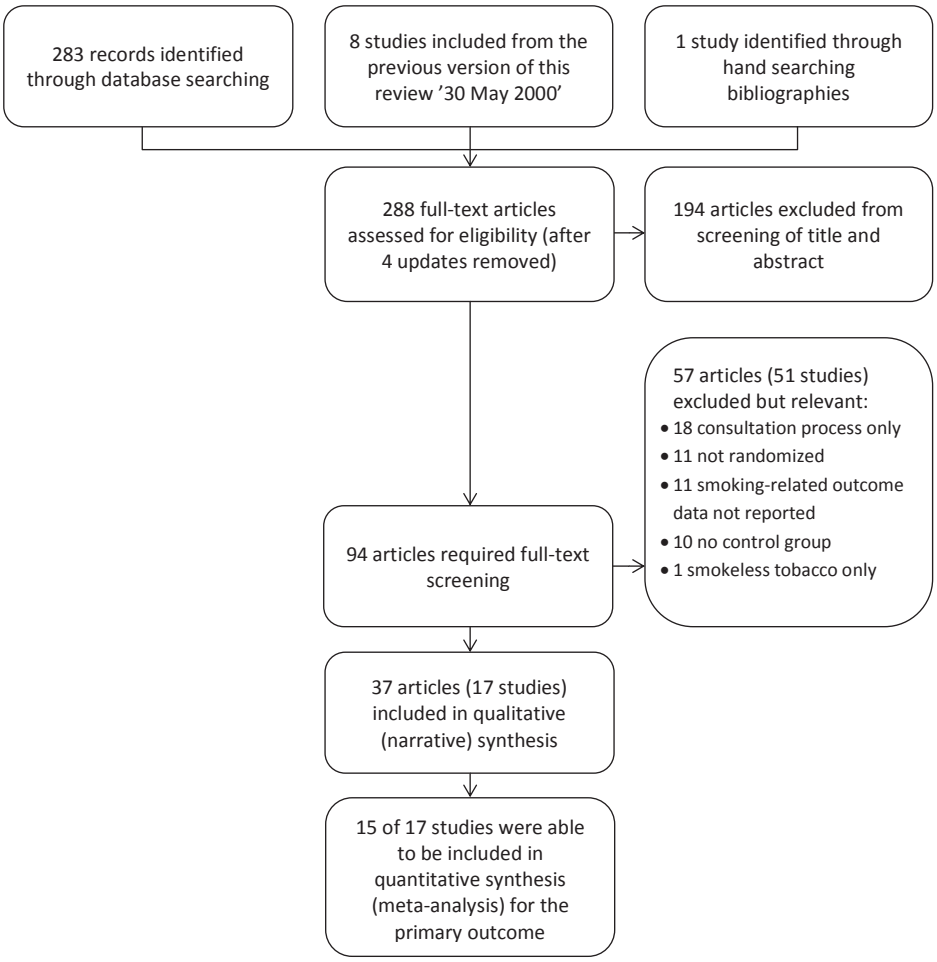

Figure 1. Study flow diagram

had the smallest number of residents at baseline and follow-up (n= 27 for both). Seven studies also reported baseline cluster sizes at the practice level: Lennox 1998 (n= 16); Sinclair 1998 (n= 62); Swartz 2002 (n= 50); Joseph 2004 (n= 20); Hymowitz 2007 (n= 16); Twardella 2007 (n= 82); and Gordon 2010 (n= 14).

Setting

Eleven of the 17 studies were conducted in the USA, one in Canada[34], one in Taiwan[36], one in Scotland[37], one in the United Kingdom[35], one in Switzerland[38] and one in Germany.[12] Two studies were performed in a dentistry setting[4;30], whilst the remaining 15 were conducted within primary care clinics, HMO (Health

Maintenance Organisation) medical centres[15;39], VAMC's (Veterans Affairs Medical Centres)[40] and one in a pharmacy setting.[37]

Participants

At the health professional level, two studies were performed with dentists[4;30], six studies included only primary care physicians[12;15;17;29;33;34], two studies were conducted with residents[31;38], three studies incorporated a combination of primary care physicians and internists[15;32;36], one study used pharmacists[37], whilst the remaining three studies used a combination of health professionals including physicians, nurse practitioners, physician assistants, psychologists, pharmacists and other health visitors.[35;39;40]

The individual patients in 16 of the 17 included studies were those visiting their health professional during the recruitment phase of each study. They were recruited during standard GP, dentist or outpatient visits, emergency department visits or from waiting rooms. The Hymowitz 2007 study was the only one to perform the training in a paediatric setting, targeting the parents/guardians of children visiting 16 primary care clinics.[31]

Interventions

Treatment type

Six studies provided patients with a counseling plus nicotine replacement therapy intervention arm.[12;29;30;34;37;40] The two Cohen et al studies had a second intervention arm of counseling plus a reminder for physicians to ask about smoking (chart prompt), and a third intervention arm combining the counseling, nicotine replacement therapy and chart prompt.[29;30] Another study[12] also had three intervention arms: counseling plus nicotine replacement therapy; counseling plus a monetary incentive to the physician following study completion per successful smoke-free participant (€130); and a counseling plus nicotine replacement therapy plus incentive arm. The Wilson 1988 study had two intervention arms in addition to usual care: counseling and nicotine gum (as mentioned above) and a second arm of nicotine gum plus usual care (i.e., physicians were not trained in counseling).[34] Three studies included multiple intervention methods to curtail smoking including counseling, nicotine replacement therapy, request for additional follow-up appointments and provision of self-help materials[4;15;16], whilst one study combined three of those four (counseling, nicotine replacement therapy, and self-help materials.[38] Five studies used counseling alone[32;33;35;36;39] and two studies used counseling with the addition of self-help materials.[17;31]

Treatment intensity

The level of training intensity for health professionals ranged from one 40-minute session in the Unrod 2007 study, to four or five day long sessions in the Joseph 2004 study. Nine studies had a training session for one day or less: Wilson 1988 (four hours), Cohen (Dent) 1989 (one hour), Cohen (Doc) 1989 (one hour), Kottke 1989 (6 hours), Lennox 1998 (one day), Sinclair 1998 (two hours), Twardella 2007 (two hours), Unrod 2007 (40 minutes) and Gordon 2010 (three hours). Four studies had two separate sessions: Strecher 1991 (two, one hour sessions scheduled two weeks apart), Wang 1994 (two sessions of unknown duration), Cornuz 2002 (two, four hour training sessions scheduled two weeks apart) and Swartz 2002 (two, 20 minute training sessions and another session of unknown duration, where residents were able to practice counseling techniques with standardised patients). Four studies had three or more sessions: Cummings (Priv) 1989 and Cummings 1989 both had three, one hour sessions over a four to five week period, Hymowitz 2007 had four, one hour sessions, four times a year and Joseph 2004 had four to five, day long sessions within six months.

Mode of intervention delivery

Three different modes of intervention delivery were used being groups sessions, one-on-one or a combination of the two. Two studies only used one-on-one sessions[33;40], eleven studies delivered the intervention in a group setting only[4;12;15;17;31;32;34-37;39] with an eighth study using group delivery as the primary mode, however doctors who were unable to attend received a private session in their office.[15] Finally three studies used both modes of intervention delivery[29;30;38], with health professionals in the two Cohen et al studies provided the option of a group or individual session.[29;30]

Theoretical model - behavioural change technique

Nine studies used behavioural change theories to underpin the intervention techniques. These included the 'stages of change' (also known as the transtheoretical) model[12;17;32;35-38] and the '5A' (Ask, Assess, Advise, Assist and Arrange) approach.[4;33] Three studies incorporated prompting or reminders to ask about tobacco use[29-31] and four provided feedback to the health providers, for example number of patients counselled.[33;38-40]

Type of professional being trained

Two studies only focused on dentists[29;30], one focused on pharmacists[37], and the remaining fourteen studies all involved doctors. Five of these fourteen studies included doctors still undergoing training, either residents[31;32;36;38] or a combina-

tion of physicians and internists.[15] Three other studies included training to other health care workers as well as doctors: Lennox 1998 also involved nurses and other health visitors; Swartz 2002 also trained nurse practitioners, physicians assistants and other health professionals; and, in addition to doctors, Joseph 2004 included nurses, psychologists and pharmacists.

Length of follow-up

Eight studies reported follow-up periods between six and nine months post intervention[4;29;30;32;33;35-37], eleven studies presented 12 month follow-up data[4;12;15;17;29;30;34;36;38-40] and two studies assessed extended follow-up periods of 14 months[35] and four years.[31] However, only two-year post intervention data was available for Hymowitz 2007 at the time of writing.

Outcomes

Smoking abstinence was assessed in all included studies through self-report of either continuous abstinence (no smoking for an extended period of time) or point prevalence (for example, no smoking for seven days prior to the time of outcome collection). Of the eight studies that reported continuous abstinence, six also reported a point prevalence measure of abstinence.[4;15;16;34;35;37] Ten of the included studies used biochemical validation through either exhaled carbon monoxide[29;30;32;38], serum cotinine[12;17], saliva cotinine[33;34] or a combination of exhaled carbon monoxide and serum cotinine.[15;16] A number of secondary outcomes measures were reported by some studies including: patients asked to set a quit date; patients asked to make a follow-up appointment; number of smokers counselled; number of smokers receiving self-help material; number of smokers receiving nicotine gum/replacement therapy; and number of smokers prescribed a quit date. Two studies reported n-values as a total across both intervention and control arms[29;30] and six studies reported n-values as percentages, which had to be transformed into whole numbers.[31;33;34;38-40] As such there is likely to be some small variance between actual n-values and those reported in these analyses, but this is not significant. Seven studies had multiple intervention arms, which were considered similar enough to be pooled together, two in the Wilson 1988, Kottke 1989 and Wang 1994 studies and three intervention arms in the Cohen (Dent) 1989, Cohen (Doc) 1989, Strecher 1991 and Twardella 2007 studies. One study did not report the n-value for subjects at randomization, and hence this was calculated based on the number eligible for study and the number at follow-up.[32] The Kottke 1989 study reported all outcome data as continuous variables, as such it was unable to be pooled in the meta-analyses. Smoking related outcomes

in the Hymowitz 2007 study were unable to be pooled as only change scores from baseline were presented.

Excluded studies

Sixty-five studies (71 articles) were excluded for the following reasons: 21 included consultation process only, 18 did not include a control group, 13 failed to measure smoking related outcome data, 12 were considered to be inadequately randomized and one only reported on smokeless tobacco use.

Risk of bias in included studies

Key methodological features are summarised in Figure 2.

Random sequence generation (selection bias)

Five studies reported adequate methods of sequence generation[12;15;31;33;38], two had inadequate methods[17;32] whilst the remaining ten did not provide enough information to assess risk of bias for sequence generation and were hence judged to be at unclear risk in this category. Adequate methods included the use of a random number generator or coin toss, whilst unclear methods were described as being 'random' in design, however methods were not described. The Kottke 1989 study required some physicians to be re-assigned due to inappropriate allocation methods during assignment. For the Strecher 1991 study appropriate randomization did not occur as residents were randomly assigned by clinic half-day session to one of four groups, which risks introducing bias. All 17 trials used cluster randomization, with five studies inadequately accounting for potential clustering effects in the data, requiring manual clustering adjustments.[15-17;34;36] Only two studies[17;31] reported outcome data at the level of randomization. No authors reported that differences in the method of analysis affected the results.

Allocation concealment (selection bias)

Allocation concealment was unclear in all 17 included studies as authors did not describe methods of allocation concealment. Authors of the Lennox 1998 study report that physicians were randomly and blindly allocated to control or intervention groups, however the methods were not described. Another study mentioned that an independent research assistant concealed the result of randomization until two weeks before the intervention, when residents were provided with details about training sessions, however, methods of concealment were again not reported.[38]

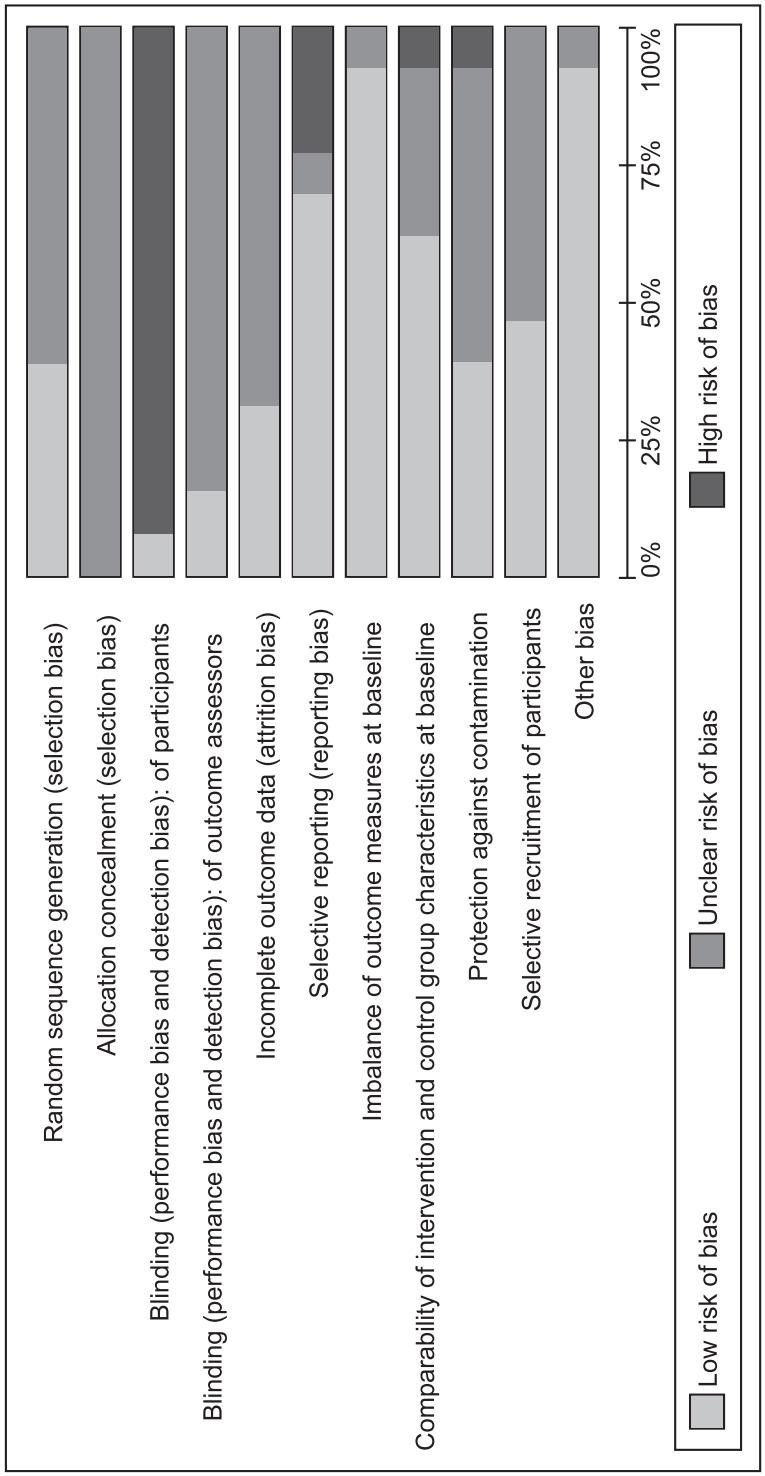

Figure 2. Risk of bias graph: review authors' judgement about each risk of bias presented as percentages across all included studies

Blinding of participants (performance bias and detection bias)

Only one study reported adequately blinding participants to the intervention[38], as residents were not informed about the aim of the trial and were advised only that a survey on cardiovascular risk factors and prevention would be conducted. Authors announced that a training programme in clinical prevention that included sessions on smoking cessation and management of dyslipidemia was being conducted. Authors also report that patients were blinded to the aim of the study and group allocation of their physician. Due to the nature of the intervention, blinding of participants was not possible for the remaining 16 studies. An attempt was made to blind physicians in the Unrod 2007 study, with physicians learning their group assignment only after signing the informed consent, however they were not blinded during the study intervention period and follow-up.

Blinding of outcome assessors (performance bias and detection bias)

Three studies reported methods blinding of outcome assessors that we judged at low risk of bias. Authors of Cummings (Priv) 1989 stated that 'outcome assessors were blinded', authors of the Joseph 2004 study report interviewers collecting patient outcomes were blinded to subject treatment status and authors in the Strecher 1991 study report that telephone interviewers, who were blinded to residents' and patients' group assignments, obtained the patient reports. The remaining 14 studies did not report any attempts to blind outcome assessors and as such are unclear for this category.

Incomplete outcome data (attrition bias)

Incomplete outcome data was adequately addressed in three studies[4;15;16] and unclear in the remaining 14 studies. The Cummings (Priv) 1989 and Cummings 1989 studies reported that missing data was accounted for in analyses, whilst the Gordon 2010 study reported the use of multiple imputation procedures to account for missing data with participants lost to attrition discussed in the text. All unclear studies failed to mention if there was any missing outcome data and if so, how this was addressed when reporting results.

Selective reporting (reporting bias)

Selective reporting was evident in three studies[4;31;33], unclear in three studies[17;32;36] and not detected in the remaining eleven studies. Although all pre-specified outcomes were addressed in the four year follow-up for the Hymowitz 2007 study, the authors mention that outcome data for year one was omitted in order to provide a 'cleaner look' at the progress of the data. In the Unrod 2007 study, smoking abstinence from baseline to follow-up (an outcome that would be expected to

have been assessed in this study) was not reported. The Gordon 2010 authors report that secondary participant outcomes were examined with no significant differences on any variables, and that therefore they were not presented in the publication. Also, receipt of intervention was reported in text as percentages, however no information regarding this outcome was reported for the control.

Imbalance of outcome measures at baseline

One study did not report data for baseline smoking and made no mention of statistical analyses to potentially adjust for any imbalances[36], as such the risk of bias category was assessed as unclear. All remaining studies adequately addressed imbalances of outcome measures at baseline. Thirteen studies accounted for baseline imbalances through analysis of covariance, regression analyses or other analysis techniques, whilst three studies reported outcomes at baseline to be similar across groups and as such did not require adjustment.[16;35;37]

Comparability of intervention and control group characteristics at baseline

Five studies had unclear comparability between intervention and control groups at baseline[12;15;29;30;34] and the remaining twelve studies adequately addressed any differences found between groups via appropriate analysis methods.

Protection against contamination

Two studies reported contamination.[4;32] In Gordon 2010, authors reported contamination due to a tax increase on cigarettes in New York, which resulted in a drop in smoking prevalence from1 8.4% in 2006 to 15.8% in 2008. Authors believed that this tax increase contributed to the unusually high rate of smoking cessation in the usual care patients, thereby affecting the relative impact of the intervention. Authors of the second study, Strecher 1991, mention that "all four groups worked closely with one another at each site", leading to the possibility of contamination, however they also state that "…the effects appeared to be slight." Nine studies had unclear risk of bias for contamination with insufficient information to permit a judgement of yes or no, whilst the remaining six studies reported no potential contamination during the study period.[15-17;34;35;38]

Selective recruitment of participants

Although no studies were identified as having selectively recruited participants, this could not be completely ruled out for eleven studies, which were determined to have an unclear risk of bias for this outcome.[4;12;15;17;29;30;32;34;36;37;39] The sampling frames in these studies were unclear and as such, generalisability is of

a potential concern. The remaining six studies adequately reported recruitment methods and were determined as having a low risk of bias.

Other bias

No other biases were identified for the 17 included studies.

Effects of interventions

Intervention effectiveness was assessed in all seventeen included studies through smoking prevalence, as well as through multiple secondary outcomes. All data were analysed as per the pre-defined methodology outlined in the Methods section. For a summary of intervention effectiveness for each of these outcomes see Table 2.

Overall summary of smoking behaviour

Four out of 13 studies detected significant intervention effectiveness in training health professionals to influence point prevalence of smoking in their patients at primary follow-up.[4;12;29;38] Out of the eight studies reporting continuous abstinence at primary follow-up, only one reported a statistically significant effect in favour of the intervention.[4] Fifteen of the 17 included studies (the exceptions being Kottke 1989 and Hymowitz 2007) could be included in a meta-analysis for the primary outcome of smoking (see Appendix 1: Analysis 1.1a and 1.1b). Using a fixed effect model there was a statistically and clinically significant effect in favour of the intervention for point prevalence abstinence (OR 1.36, 95% CI 1.20 to 1.55, 14 trials, I^2 = 57%) and continuous abstinence (OR 1.60, 95% CI 1.26 to 2.03, 8 trials, I^2 = 59%). Using only the stricter outcome of continuous abstinence for studies reporting both types of cessation, a pooled estimate for all 15 trials gave a similar estimate (OR 1.60, 95% CI 1.35 to 1.89, I^2 = 55%, data not displayed). Since the heterogeneity in this analysis approached the level at which we proposed a random-effects model we did a sensitivity analysis; the point estimates were similar and the wider confidence intervals continued to exclude no effect. The trial contributing most evidently to the heterogeneity, particularly for the continuous outcome, was Lennox 1998 in which the point estimates for both abstinence outcomes favoured the control group. Two studies could not be included in the meta-analyses. In the Kottke 1989 study at one year follow-up almost half of the participants in each group who were smoking at baseline reported quit attempts for at least 24 hours during the previous year, with a mean duration of cessation of two months. No differences between the three groups were identified. For the Hymowitz 2007 study there was an increase in the special training condition of reported quitting during the past year of 3.8% (an

Table 2. Summary of findings for the main comparisons

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)**
	Assumed risk	Corresponding risk			
	Control	Training health professionals			
Point prevalence of smoking cessation self-report and some biologically validated Follow-up: 6 to 14 months	78 per 1000	107 per 1000 (88 to 131)	OR 1.41 (1.13 to 1.77)	13459 (14 studies)	⊕⊕⊕⊖ **moderate**[1,2]
Continuous smoking abstinence self-report and some biologically validated Follow-up: 6 to 14 months	27 per 1000	42 per 1000 (28 to 62)	OR 1.59 (1.05 to 2.42)	9443 (8 studies)	⊕⊕⊕⊖ **moderate**[1,2]
Number of smokers counselled self-report Follow-up: 6 to 48 months	465 per 1000	664 per 1000 (578 to 739)	OR 2.28 (1.58 to 3.27)	8531 (14 studies)	⊕⊕⊖⊖ **low**[1,3]
Patients asked to make a follow-up appointment self-report Follow-up: 6 to 12 months	166 per 1000	400 per 1000 (233 to 593)	OR 3.34 (1.52 to 7.30)	3114 (7 studies)	⊕⊖⊖⊖ **very low**[1,2,3]
Number of smokers receiving self-help material self-report Follow-up: 6 to 48 months	134 per 1000	351 per 1000 (227 to 500)	OR 3.51 (1.90 to 6.47)	4925 (9 studies)	⊕⊖⊖⊖ **very low**[1,2,3]
Number of smokers receiving nicotine gum/replacement therapy self-report Follow-up: 12 to 48 months	312 per 1000	416 per 1000 (283 to 563)	OR 1.57 (0.87 to 2.84)	5073 (9 studies)	⊕⊕⊖⊖ **low**[1,3]

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI). **CI:** Confidence interval; **OR:** Odds ratio

High quality: Further research is very unlikely to change our confidence in the estimate of effect

Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate

Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate

Very low quality: We are very uncertain about the estimate

[1] Unclear methods of sequence generation and allocation concealment in the majority of studies and all studies had inadequate blinding of participants

[2] Wide confidence intervals around the estimate of effect

[3] Significantly large amounts of heterogeneity were observed (I-squared >90%)

8.5% increase over baseline levels), however the change from baseline failed to achieve statistical significance. Among parents associated with standard training, the change was only 0.8%.

As per pre-specified methodology, a funnel plot examined the primary outcome of smoking cessation using contour lines to assess the presence of reporting biases. No publication biases were identified (Figure 3).

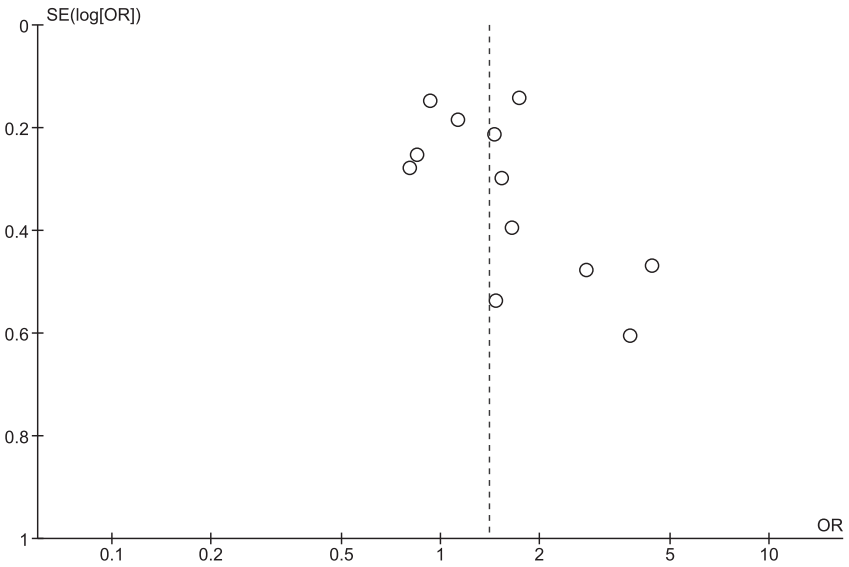

Figure 3. Funnel plot of comparison: the effect of training health professionals on patient smoking cessation (outcome: point prevalence of smoking cessation)

Overall summary of secondary outcomes

Asked to set a quit date for stopping (quit date)

Nine studies reported the effect of training health professionals on the number of patients being asked to set a quit date, eight of which could be included in the meta-analysis producing a significant result (random effects OR 4.98, 95% CI 2.29 to 10.86; see Appendix 1: Analysis 1.2). Only three of the seven studies crossed the line of no effect[32;38;39] but there was a very high level of heterogeneity (I^2 = 90%) suggesting that not all interventions had the same impact on this outcome. Subgroup analyses suggest that some of the heterogeneity might be due to whether or not the patient intervention included an offer of NRT. The two studies that reported this outcome and did not include NRT showed no difference between groups.[32;39] The other studies showed more consistent evidence that

intervention increased numbers although the size of effect remained variable. Contrary to what might have been expected, the studies where training took only a single session[29;30;34] had higher effect sizes compared to the five studies using multiple sessions. Duration of training was similar for the three sub-groups being examined as was intervention delivery via one-on-one compared to group sessions. There was a large amount of variability between the use of prompting and provision of feedback, however this difference was not significant. Intervention delivery by a doctor (six studies) or dentist (one study) produced a larger effect size compared to delivery by a healthcare worker[39], which may also explain some of the heterogeneity. When comparing follow-up periods, studies reporting between six and nine months[29;30;32] and between nine and 12 months (seven studies) produced similar effect sizes and large amounts of variability. Studies judged to be at lower risk of bias were more likely to show evidence of an effect (seven studies) compared to studies with between three and five categories rated at high risk of bias[32], however the between group analysis did not suggest that this was a source of heterogeneity.

Given a follow-up appointment

There was a significant increase in the intervention arm for patients being asked to make a follow-up appointment, as reported in seven studies available for meta-analysis (random effects OR 3.34, 95% CI 1.51 to 7.37; see Appendix 1: Analysis 1.3), although significant heterogeneity was observed (I^2 =92%). When comparing interventions using NRT with those that used counseling alone, an I^2 of 96% was observed, meaning any results from a pooled analysis would be too unreliable. As such only a visual analysis of odds ratios and confidence intervals are presented, showing similar variability between sub-groups. Subgroup analyses for treatment intensity suggest that some of the heterogeneity might be due to whether or not the training sessions were single or multiple. Two studies that employed single sessions[33;34] were more likely to show an effect (although variability was observed), compared to five studies using multiple sessions, which produced a smaller effect estimate with less variability. When comparing the duration of the training, significant heterogeneity was once again observed between groups, with studies presenting large amounts of variability, resulting in a pooled estimate being unreliable for comparison. There was little difference between delivery by one-on-one compared to group sessions, and due to significant heterogeneity (I^2=96%) the pooled comparison of prompting and provision of feedback was not possible, although a visual display shows variability is mostly due to the Unrod 2007 study. Similar to other outcomes, delivery of the intervention by a doctor (assessed in seven studies) meant that more

patients were likely to have a follow-up appointment compared to intervention delivery by a healthcare worker (one study), however the Swartz 2002 study was present in both sub-groups as the intervention included delivery by both a doctor and healthcare worker, as such a statistical between group comparison was not performed. Reporting of results at different follow-up periods were similar between sub-groups, although the five studies with follow-up between nine and 12 months had similar distributions with the exception of the Wilson 1988 study, which significantly favoured the intervention and had wide confidence intervals. No between group differences were observed for quality of the studies.

Counselled

Fourteen of the fifteen studies reporting on the number of smokers counselled were meta-analysed. Overall, a statistically and clinically significant effect in favour of the intervention was observed (OR 2.28, 95% CI 1.58 to 3.27, $p< 0.00001$; see Appendix 1: Analysis 1.4), assessed using the random effects model due to significant heterogeneity ($I^2= 93\%$). An investigation into the causes of heterogeneity found no differences between counseling with and without nicotine replacement therapy, however implementation via multiple sessions or single sessions did produce between group differences, with a larger effect size for single session delivery. Duration of intervention delivery also produced significant differences with total exposure of between 40 minutes and two hours producing a larger effect size compared to durations of between two and four hours and greater than four hours. Mode of intervention delivery (one-on-one compared to group sessions) produced very similar effect sizes, as did the provision of feedback and prompting to aid intervention delivery by the health professional. The type of health professional being trained may contribute to the heterogeneity with the one study evaluating dentists[30] producing a larger effect size compared to those with doctors and other health professionals which showed a more conservative effect with narrow confidence intervals. When examining follow-up periods, there was a slightly larger effect and more variability in the studies reporting results between six and nine months compared to results between nine and twelve months and 12 and 24 months. No sub-group differences were observed when analysing studies based on risks of bias.

Given self-help materials

The number of smokers receiving self-help material increased significantly in favour of the intervention for the nine studies able to be included in the meta-analysis (OR 3.52, 95% CI 1.90 to 6.52, $p< 0.0001$; see Appendix 1: Analysis 1.5). Provision of cessation materials in the Hymowitz 2007 study, which could not

be included in the meta-analysis, did increase significantly across both groups over the four year study period when compared to baseline values (intervention 28.8%, control 17.6%) however, this interaction was not statistically different between groups. The other study unable to be meta-analysed[17] also produced a statistically significant effect ($p< 0.001$). Significant heterogeneity was observed in the meta-analysis ($I^2= 91\%$) which was explored through subgroup analyses. The type of treatment did not show a significant difference between groups, although the counseling plus nicotine replacement therapy group did have a larger effect size compared to counseling alone. Likewise, no differences were observed for single compared to multiple session delivery or duration of delivery, although the Cornuz 2002 study with a total exposure over four hours did produce a very large effect with wide confidence intervals. No differences were observed for the mode of intervention delivery or provision of prompting or feedback to aid health professionals in the provision of self-help materials. The one study[39] which included healthcare workers for intervention delivery produced less of an effect compared to the pooled result of studies using doctors. No difference between sub-groups was observed for length of follow-up although studies identified as having less risk of bias did have a larger effect size compared to those with larger amounts of bias.

Offered nicotine gum/replacement therapy

Nine studies were pooled to assess the number of smokers receiving nicotine gum/replacement therapy. The meta-analysis did not produce evidence of an effect (OR 1.57, 95% CI 0.87 to 2.84, p= NS; see Appendix 1: Analysis 1.6), but significant heterogeneity was detected ($I^2=91\%$). The Hymowitz 2007 study also assessed this outcome with few parents in either condition reporting that residents prescribed nicotine replacement therapy (intervention 7.6%, control 5.9%). An exploration into the possible sources of heterogeneity found no difference between interventions containing counseling with or without nicotine replacement therapy, however surprising results were observed with much larger effect sizes for single session intervention delivery compared to multiple session, which could account for some of the heterogeneity. No differences were observed between sub-groups for treatment intensity, mode of intervention delivery, use of feedback or prompting, type of professional being trained or length of follow-up. However studies with less risk of bias did produce larger effect sizes compared to studies with three to five sources of bias identified, which could also contribute to some of the observed heterogeneity.

Prescribed a quit date

Only three studies reported on smokers being prescribed a quit date.[16;32;34] Pooling these together produced a statistically and clinically significant effect in favour of the intervention (OR 14.18, 95% CI 6.57 to 30.61, p< 0.00001; see Appendix 1: Analysis 1.7) with minimal observed heterogeneity. As such, sub-group analyses were not necessary for this outcome.

Cost effectiveness of interventions

Cost effectiveness data was presented in one study[38], with the incremental cost of the intervention reported to amount to (U.S.) $2.58 per consultation by a smoker. When considering 'cost per life-year saved', this translated to (U.S.) $25.40 for men and $35.20 for women, with one-way sensitivity analyses yielding a range of $4.00 to $107.10 in men and $9.70 to $148.60 in women. The Joseph 2004 study reported that the dollar spent per 1000 primary care patients did increase in the intervention sites and decrease in control sites, however this was not significant. Number of referrals made. No studies reported on the number of referrals made to local smoking cessation services.

Statistical analyses and cluster adjustments

All 17 studies used a cluster randomized design for practical reasons, with the unit of randomization being the health care practitioner or practice. However, in 15 of the 17 studies patients were the unit of analysis. Hymowitz 2007 and Kottke 1989 were the exceptions, reporting outcomes at the level of randomization (the doctor/resident). The majority of studies that reported outcomes at the level of patient accounted for potential clustering effects within their reported results, with four studies (three in the late 1980's[15;16;34] and one in the mid-1990's[36]) being the exceptions. The two Cummings et al studies did perform clustering analyses, however they were not included in the published results as they were seen to have had no effect on the final outcome. As such, the data for these studies were manually adjusted for potential clustering effects as per the pre-specified methodology outlined in the unit of analysis issues section of this review.

Sub-group analyses

Multiple sub-group analyses have been considered as per the predefined methodology to further explore heterogeneity. When considering these outcomes the level of statistical significance should be considered at p<0.01, to account for potential false positive results (as per the Bonferroni adjustment described Assessment of heterogeneity), which increase with the number of potential effect modifiers being investigated. Total study confidence intervals were as-

sessed at the 99% level for all sub-group analyses. Significant heterogeneity was determined through a combination of the I^2 statistic (I^2 >60%), Chi^2 statistic and visual inspection of the Forest plots, and was present for all outcomes with the exception of 'Smoking cessation at longest follow-up' and 'Number of smokers prescribed a quit date' where significant heterogeneity was not identified. In the presence of heterogeneity based on the I^2 statistic of > 96%, the pooled estimate has been removed, as the outcomes are considered too different to be combined in meta-analysis. Likewise, when a comparison contained the same study in different sub-groups, the pooled estimate was not used.

DISCUSSION

Summary of main results

Seventeen completed studies (total 28,531 subjects) assessed the benefits of interventions to train health professionals to provide smoking cessation initiatives to their patients. Whilst some methodological variations occurred between studies in relation to intervention, delivery mode, type of health professional and duration, they were all aimed at training health professionals to help their patients stop smoking. The primary outcome of smoking cessation was presented in pooled meta-analyses as point prevalence (14 studies) and continuous abstinence (eight studies). A statistically and clinically significant effect in favour of the intervention was observed for both of these outcomes at final follow-up (see Table 2 for a summary of findings for the main comparison). All secondary outcomes (with one exception) produced a statistically and clinically significant effect in favour of the intervention at final follow-up. These outcomes include asking patients to set a quit date, asking patients to make follow-up appointments, counseling of smokers, provision of self-help material and prescription of a quit date. No evidence of an effect was observed for the secondary outcome of providing patients with nicotine gum/replacement therapy. No studies were able to be meta-analysed to assess the cost effectiveness of interventions.

Overall completeness and applicability of evidence

In the context of current practice, this review should be used to provide readers with an outline of what interventions have a proven effect, and where resources need to be directed for future investigations. Studies which incorporated multiple intervention components such as provision of nicotine replacement therapy, requests for follow-up appointments and provision of self-help material were more likely to be successful than those with interventions of counseling alone.

Surprisingly, health professionals who were trained using only a single session and in a group setting were just as likely if not more likely to have patients quit smoking as those being trained with multiple delivery sessions and one-on-one training (i.e., face to face with the trainer). Similarly, the duration of training for the health professional of between 40 minutes to two hours was just as effective, and in some cases more so, than a duration of greater than two hours. Studies with multiple follow-up periods and closer monitoring of outcomes by investigators (including the provision of feedback) were more successful than those of lesser intensity. Smoking cessation interventions delivered by a doctor or dentist were more likely to produce successful quit attempts than those delivered by other health care workers. To ensure methodological rigour, future studies should aim to incorporate the following into the study design:

- Report patient level outcomes (e.g., smoking cessation) as well as health professional outcomes (e.g., physician report of number of smokers counselled) rather than providing details only relating to the consultation process
- Adequate methods of randomization and allocation concealment
- Report smoking related outcome data both pre and post intervention
- Incorporate a control group which adequately matches the demographic characteristics of the intervention population.

Quality of the evidence

Study quality was a potential issue in this review with many of the studies being of unclear methodological design. It is extremely difficult to blind participants in relation to what intervention they will be receiving, as there are two levels to consider: the health professional and the patient. All 17 included studies had unclear allocation concealment whilst only five studies adequately reported methods of random sequence generation, two had a high risk of bias with the remaining ten studies being unclear. Overall, the body of evidence identified permits a moderately robust conclusion regarding the objectives of this review, with 17 included studies (28,531 participants). Evidence presented in the summary of findings table (Table 2) was downgraded to take into account:

- limitations in design: methods of randomization, allocation concealment and/or blinding were not described or inadequate for the majority of studies assessing the particular outcome (-1)
- Inconsistencies: significant heterogeneity (-1)
- Imprecision: only few participants in few studies available to assess the outcome (-1)

Potential biases in the review process

A potential bias in the review process is exclusion of studies examining interventions that train health professionals in smoking cessation that are of questionable methodological design. This review does sacrifice inclusion of some relevant information, however the trade-off is a meta-analysis of higher quality evidence on which future investigations can be based. Some of the pertinent information from these studies is discussed below under agreements and disagreements with other studies or reviews though results should be interpreted with caution. Another limitation to the review is the under-reporting of the intervention for included studies. This means that some studies may have indeed included additional intervention components that, had we known they existed, would have led us to classify the study differently within the sub-groups. One key strength of the review process to address potential biases is the use of two experienced and independent review authors who assessed the studies for risk of bias, although this can do little to account for biases which occur in the methodological designs of the included studies.

Agreements and disagreements with other studies or reviews

A compilation of systematic reviews and surveys of key informants were published as a special edition in the journal 'Drug and Alcohol Review' in 2009, relating to the education and training of health professionals and students in tobacco, alcohol and other drugs.[41] The first published survey of 21 key informants from eight countries found a high level of consistency in the content of the smoking cessation interventions, with 72% of programmes using the 5 A's (Ask, Assess, Advise, Assist, Arange) model, 64% using the stages of change (trans-theoretical) model, 84% including pharmacotherapies, with 84% having some reference to clinical practice guidelines.[6] Only five of the seventeen included studies in our review had reference to any particular behavioural change technique, however it is quite likely that the majority of studies are based around some kind of theoretical behavioural change context, which is not reported in the publication. These results are similar to those reported elsewhere.[41] The authors identified a lack of interest (with other continuing education topics considered to be a higher priority) and lack of funding for interventions to be the major barriers for the uptake and sustainability of training programmes.[6] Some possible solutions were provided to address these barriers including raising awareness of the importance of smoking cessation for the health of patients and incorporating education on smoking cessation into vocational courses for specialties. Another systematic review of postgraduate smoking cessation training for physicians in 28 European countries found nine studies which met all of the inclusion criteria containing a

total of 170 postgraduate training programmes.[42] The key implications reported by the authors were that postgraduate training in smoking cessation may not be reaching physicians and was not rigorously evaluated. To combat this problem multiple authors suggest that future research needs to incorporate methods of disseminating effective educational activities with the intention of increasing participation.[42;43] It is also imperative that health professional organisations advocate for the systematic implementation of comprehensive tobacco cessation training programmes to increase the number of patients receiving tobacco cessation interventions.[44] Another study using direct observation of physician-patient encounters found similar results and concluded that strategies are needed to assist physicians to incorporate systematic approaches that will standardise smoking cessation care.[45] In this investigation, discussions around tobacco were more common in practices that utilised standard forms for recording smoking status and during new patient visits. Interestingly, the authors also found that discussions around tobacco use occurred less often among physicians in practice for more than 10 years and with older patients[45], which is similar to an observational study by Bertakis et al. investigating the factors associated with physician discussion of tobacco use with patients.[46] Considerable resistance was also observed in a cohort of physicians receiving academic detailing to promote tobacco-use cessation counseling in dental offices. Dental staff members (including receptionists, office managers, dental assistants and dental hygienists) were reluctant to participate in the interventions due to increased paperwork, having to deal with uncooperative patients, and the perception that only a few patients use tobacco anyway and that counseling does not work.[38;47] However, the resistance observed did decrease as follow-up visits progressed and staff became more comfortable with the intervention and the procedures involved. This evidence suggests that through the provision of first-hand experience prior to guiding patients through the same process, physicians may feel more comfortable in implementing smoking cessation interventions into standard practice, which has the potential to be highly cost-effective. One of the included studies by Cornuz et al. reported that training residents in smoking cessation counseling is very cost-effective and may be more efficient than the majority of currently accepted tobacco control interventions.[38] This has also been supported by more recent systematic reviews and investigations.[19-21] As such, the provision of counseling, advice and/or offers of assistance to the patient has the potential to significantly increase the number of quit attempts, which subsequently has the potential to reduce health related costs as well as morbidity and mortality associated with ongoing chronic tobacco use. The previous version of this Cochrane review included eight studies with six finding no effect of intervention.

The authors also stated that effects of training on process outcomes increased if prompts and reminders were used, however they concluded that there was no strong evidence that training health professionals to provide smoking cessation interventions changed smoking behaviour. With the addition of nine studies (more than half the initial number of inclusions), the findings of this review have now changed to support the training health professionals in smoking cessation interventions.

CONCLUSIONS

Implications for practice

Overall, a moderately large amount of methodologically rigorous evidence has been presented to support the effectiveness of training health professionals in smoking cessation. The following programme characteristics could be considered for individuals involved in future clinical practice initiatives:

- Combination of multiple intervention components including the provision of counseling, offer of follow-up appointments, setting or being prescribed a quit date and provision of self-help material
- A one-off group training session for health professionals of between one to two hours duration, providing there is adequate follow-up and monitoring of progress. This will need to include provision of follow-up feedback to health professionals and resources such as patient self-help materials, with consideration given to other intervention components as mentioned above.
- Consider organisational factors to ensure that smoking cessation messages are reliably delivered. Training can be expensive, and simply providing programmes for health care professionals, without addressing the constraints imposed by the conditions in which they practise, is unlikely to be a wise use of health care resources.

Implications for research

Multi-component investigations incorporating new pharmacological interventions for smoking cessation (such as varenicline tartrate and bupropion) or other cessation aids (such as electronic cigarettes) alongside physician training should be considered to determine if any additional benefit in long-term abstinence can be obtained. Future research needs to ensure that adequate methodological rigour is met with considerations relating to:

- Sequence generation and allocation concealment
- Demographics and comparability of the control comparison
- Reporting of smoking related outcome data
- Collection of data both pre and post intervention implementation.

So as to enable interventions to be replicated in clinical practice, it is also important that authors of future trial reports describe the content of the training in sufficient detail, for example detailing the educational methods, strategies and theories used to train the professionals.

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Table 1. Characteristics of included studies

Cohen (Dent) 1989	
Methods	*Country:* United States of America, Indianapolis area *Design:* Randomized controlled trial; Nested; Clustered *Objective:* To improve the effectiveness of dentists helping their patients quit smoking *Methods of analysis:* A generalized linear model was used to analyse the results of the quit-smoking rates and a scale-factor was used to reflect the expected extra variance in quit rates caused by between-dentist variability; Chi-squared statistic based on changes in the deviance function for a series of nested models was used to test for main effect and interactions; Two-way analyses of variance were calculated on the weighted data for the amount of time spent in counselling patients about their smoking *Clustering adjustment made:* Yes - Generalised linear model allowed a scale-factor to reflect the extra variance expected to be inflated due to variability between dentists *Significance of cluster adjustment:* Not reported
Participants	*Therapist description:* Dentists *Eligible for study:* n= 54 *Randomized:* n= 50 *Completed:* Gum n= 9, reminder n= 10, gum & reminder n= 12, control n= 13 (total n= 44) *Age:* Not reported *Gender:* Not reported *Patient description:* n= 1027 patients from American private dental practices *Eligible for study:* n= 1027 *Randomized:* n= 1027 *Completed:* n= 647 *Age:* Mean = 37.1 (SD ± 10.4) (total population only) *Gender:* Males= 43.2% males (total population only)
Interventions	*Setting:* American private dental practices *Training of those delivering the intervention to the health professional:* Not reported *Intervention description:* Three intervention groups: Training & nicotine gum, training & reminder (chart prompt), combined training with prompt & nicotine gum *Control description:* Training alone (advice, quit date, follow up check); Dentists provided a booklet containing the four-step care protocol and were encouraged to counsel their patients who were smokers *Duration of intervention:* One hour *Intervention delivered by:* General dentist *Intensity:* One lecture
Outcomes	*Pre-specified outcome data:* Point prevalence of cessation at 12 months; Number advised to quit; Number asked about setting a quit date *Follow-up period:* Twelve months total: 6 months (defined as the smoking status determined at any visit that occurred at least 3 months after the initial appointment but not more than 9 months); 12 months (defined as the smoking status determined at any visit that occurred at least 9 months and 1 day and up to 15 months after the initial visit)
Notes	*Process measures:* Outcomes reported in Cohen 1987; Patients not having a visit during the 6 or 12 month periods were assumed to be smokers *Validation:* Expired carbon monoxide The three intervention groups were combined for meta-analyses to produce the single 'Intervention' sample

Cohen (Doc) 1989	
Methods	*Country:* United States of America *Design:* Randomized controlled trial; Nested; Clustered *Objective:* Evaluation of a RCT of interventions designed to improve effectiveness of physicians and dentists in helping their patients quit smoking *Methods of analysis:* Analysis of variance performed on percentages; Stepwise multiple regression analyses performed using the weighted number of minutes as the criterion to determine the extent to which the amount of counselling time was a function of the health professionals' initial attitudes and habits; Chi-squared analysis used to test main effects and interactions; Generalised linear interactive modelling (GLIM) software used *Clustering adjustment made:* Yes - Generalised linear model allowed a scale-factor to reflect the extra variance expected to be inflated due to variability between physicians *Significance of cluster adjustment:* Not reported
Participants	*Therapist description:* n= 112 primary care physicians (including n= 97 physicians in training) *Eligible for study:* Not reported *Randomized:* Total= 97 internal medicine residents and 15 faculty general internists *Completed:* Total= 97 internal medicine residents and 15 faculty general internists *Age:* Not reported *Gender:* Not reported *Patient description:* n= 1420 patients receiving primary care, not selected by motivation to quit *Eligible for study:* Participation refusal rate was 9.7% of all eligible patients contacted *Randomized:* n= 1420 *Completed:* n= 1091 medical patients *Age:* 18 to 64 years; Mean = 46.2 + 11.6 years *Gender:* Male= 37%; Female= 63%
Interventions	*Setting:* General medicine (primary care) clinic of a city-county teaching hospital in the USA *Training of those delivering the intervention to the health professional:* Registered internist *Intervention description:* Three intervention groups: Training & nicotine gum, training & reminder (chart prompt), combined training with prompt & nicotine gum *Control description:* Training alone (advice, quit date, follow up check); Physicians provided a booklet containing the four-step care protocol and were encouraged to counsel their patients who were smokers *Duration of intervention:* One-hour lecture or personalised instruction *Intervention delivered by:* David M Smith, registered internist *Intensity:* One, one hour lecture maximum
Outcomes	*Pre-specified outcome data:* Point prevalence of abstinence at 12 months; Patients who did not have an appointment in the period regarded as smokers; Rates also reported giving returnees as denominator; Number advised to quit; Number asked about setting a quit date; Had their doctor talked to them about smoking *Follow-up period:* Six and 12 months (12 months defined as patients visited 9 and 15 months after the initial visit)
Notes	*Process measures:* Outcomes reported in Cohen 1987; Patients not having a visit during the 6 or 12 month periods were assumed to be smokers *Validation:* Expired carbon monoxide The three intervention groups were combined for meta-analyses to produce the single 'Intervention' sample

Cornuz 2002	
Methods	*Country:* Geneva and Lausanne, Switzerland, Europe *Design:* Randomized controlled trial; Clustered *Objective:* To assess the efficacy of an educational program based on behavioural theory, active learning methods, and practice with standardized patients in helping patients abstain from smoking and changing physicians' counselling practices *Methods of analysis:* To compare baseline characteristics of patients and physicians' practices between groups, the authors used the chi-quare or Fisher exact tests for categorical data and the t-test or Wilcoxon rank-sum test for continuous data; To test the effectiveness of the training on the outcomes, the authors performed a logistic regression with generalized estimating equation to stratify by clinic and adjust for clustering on residents; Intention-to-treat analysis was performed for abstinence from smoking, in which smokers lost at follow-up were considered to be continuing smokers; Because smoking abstinence was validated in a sub sample of the study participants, the authors used simulation to perform sensitivity analysis of the likelihood of smoking cessation *Clustering adjustment made:* Yes - to test the effectiveness of the training on the outcomes, the authors performed a logistic regression with generalized estimating equation to stratify by clinic and adjust for clustering on residents *Significance of cluster adjustment:* Not reported
Participants	*Therapist description*: Resident physicians; All residents were at the end of postgraduate training in general internal medicine or family medicine *Eligible for study:* n= 35 *Randomized:* Intervention n= 17; Control n= 18 *Completed:* Intervention n= 17; Control n= 18 *Age:* Median 31 years *Gender:* 18 females and 17 males *Patient description:* Patients aged 16 to 75 years who consulted one of the outpatient clinics for a follow-up or an emergency visit *Eligible for study:* n= 1456 *Randomized:* Intervention n= 115; Control n= 136 *Completed:* Intervention n= 77; Control n= 100 *Age:* Range 16 to 75 years; Mean + SD: Intervention 35.1 + 14 years; Control 36.9 + 15 years *Gender:* Intervention = 63% male; Control= 57% male

Interventions	*Setting:* Two general internal medicine clinics of the university hospitals of Lausanne and Geneva, Switzerland; Both sites are public service clinics that provide adult ambulatory care to approximately 25,000 outpatient visits per year Training of those delivering the intervention to the health professional: Teachers are two authors, who are experienced physicians active in both clinical practice and teaching; Both were previously trained in smoking cessation counselling through a Master of Public Health course and are considered as national experts in smoking cessation *Intervention description:* The training program is based on 5 principles: 1) recent evidence-based content on tobacco use and cessation, 2) behavioural theory (stage-of-change model), 3) pharmacological therapy, 4) educational methods focusing on active skills training, and 5) tobacco control context; Session 1: Video-clips observations, interactive workshops and role plays; Sessions 2: practice with standardized patients; At the end of the first session, participants received a set of documents (reference manual, two algorithms of counselling strategies and pharmacological therapy, record sheet for consultations with smokers, brochures for patients and patient instructions for NRT) *Control description:* Training in management of dyslipidaemia with equal contact time to the intervention; This course taught residents about through the Swiss guidelines on screening for and diagnosis/management of high blood levels of cholesterol; Residents that were trained in smoking cessation attended the lesson on dyslipidaemia 4 months later, and vice versa *Duration* of intervention: Two, 4 hour sessions scheduled 2 weeks apart Intervention delivered by: Not specified though face-to-face workshops took place *Intensity:* Two, half-day sessions; Total contact time 8 hours
Outcomes	*Pre-specified outcome data:* Self-reported abstinence from smoking, 1 week point prevalence of abstinence; score of overall quality of counselling based on use of 14 counselling strategies; patient willingness to quit; and daily cigarette consumption; socio-demographic data, cardiovascular risk factors, smoking history, nicotine dependence, smoking intervention *Follow-up period:* Twelve months
Notes	*Process measures:* None reported *Validation:* Exhaled carbon monoxide testing at one clinic
Cummings (Priv) 1989	
Methods	*Country:* United States of America *Design:* Randomized controlled trial; Nested; Clustered *Objective:* To test if physicians who are trained to use the 'Quit for Life' (QFL) program are more effective in helping patients to quit smoking *Methods of analysis:* Chi-squared test for proportions and t-tests for means; Multiple logistic regression (for proportions) and ordinary least-squares (for means) and calculated adjustment rates from the partial slopes associated with a dummy variable; Individual patients were the unit of analysis *Clustering adjustment made:* No adjustment to presented data but separate analyses tested clustering effects *Significance of cluster adjustment:* Clustering effects were tested in separate analyses; These adjustments had no discernible effect on significance levels and did not alter the conclusion

Participants	*Therapist description:* Primary care physicians in private practice *Eligible for study:* n= 844 *Randomized:* Intervention n= 31; Control n= 28 *Completed:* Intervention n= 20; Control n= 18 *Age:* Not reported *Gender:* Intervention females n= 4; Control females n= 2 *Patient description:* n= 916 smoking patients not selected by motivation to quit *Eligible for study:* Not reported *Randomized:* Intervention n= 470; Control n= 446 *Completed:* Intervention n= 360; Control n= 364 *Age:* Intervention mean = 43 years; Control mean = 45 years *Gender:* Intervention mean = 53%; Control mean = 61%
Interventions	*Setting:* Private primary care internal medicine and family practice (primary care) in San Francisco, USA; Local hospitals at times that fit with the schedules of the participating physicians; Four who were unable to attend the second sessions received the training privately in their office *Training of those delivering the intervention to the health professional:* Not described *Intervention description:* Training (personalised advice, quit date, one follow up visit, self help materials and nicotine gum) *Control description:* Normal care (no training) *Duration of intervention:* Three, one hour seminars *Intervention delivered by:* Internist or psychologist *Intensity:* Three, one hour seminars; second seminar one or two weeks after the first; third seminar four to twelve weeks later
Outcomes	*Pre-specified outcome data:* Demographic characteristics; smoking history; how much do you want to quit smoking; how confident are you that you will not be smoking one year from now; pressure to quit from family and friends; was smoking discussed; did you receive a self-help booklet; did you receive a follow-up appointment about smoking *Follow-up period:* Twelve months
Notes	*Process measures:* None reported *Validation:* Expired carbon monoxide and serum cotinine Manual adjustment for potential clustering effects performed in the meta-analyses for primary outcome data
Cummings 1989	
Methods	*Country:* San Francisco, California, United States of America *Design:* Randomized controlled trial; Clustered *Objective:* To test whether physicians who receive a continuing education program about how to counsel smokers to quit would counsel smokers more effectively and have higher rates of long-term smoking cessation among their patients that smoke *Methods of analysis:* Chi-square for proportions and t-tests for means were used for significance measures; Binomial test for difference between paired proportions used to calculate confidence intervals for changes in attitudes and self-reported counselling practices of physicians in the experimental group before and after training; To analyse differences between the groups in patient reports about physicians counselling and rates of abstinence, large-sample difference-of-proportions and difference-of-means tests were used; To determine significance of intervention among those patients who had the greatest desire to quit, an interaction was tested between assignment to the experimental or control group and the smoker's rating of his or her desire to quit; Multiple logistic regression analysis used to determine significance for specific counselling strategies by experimental group physicians for abstinence levels *Clustering adjustment made:* No - The individual patient was the unit of analysis for these results; However, patients were clustered by physician and physicians were clustered by work station; "…Therefore for simplicity, we present the results with the patient as the unit of analysis" *Significance of cluster adjustment:* Not reported

Participants	*Therapist description:* Physicians *Eligible for study:* n= 189 internists *Randomized*: n= 81; Control n= 41; Intervention n= 40 *Completed:* n= 81; Control n= 41; Intervention n= 40 *Age:* Not reported *Gender:* Control: 27% female; Intervention 30% female *Patient description:* *Eligible for study*: n= 2056; Control n= 1032; Intervention n= 1024 *Randomized:* n= 2056; Control n= 1032; Intervention n= 1024 *Completed:* n= 2012; Control n= 1008; Intervention n= 1004 *Age:* Control 45 years; Intervention 46 years *Gender:* Control 53% female; Intervention 58% female
Interventions	*Setting:* Four Health Maintenance Organisation (HMO) medical centres in northern California Training: Three, one hour group tutorials *Training of those delivering the intervention to the health professional:* Not stated but delivered by internist or psychologist *Intervention description:* Training (personalised advice, quit date, one follow up visit, self help materials and nicotine gum) *Control description:* Normal care (no training) *Duration of intervention:* Three sessions over a five to fourteen week period *Intervention delivered by:* Internist or psychologist *Intensity:* Three, one hour sessions
Outcomes	*Pre-specified outcome data:* long-term abstinence from smoking (≥ 9 months); Number of smokers counselled; Asked to set a quit date; Asked to make a follow up appointment; Number receiving self help materials; Number receiving nicotine gum; Number of smokers prescribed a quit date *Follow-up period:* Point prevalence abstinence at 12 months
Notes	*Process measures:* None reported *Validation:* Expired carbon monoxide and serum cotinine Manual adjustment for potential clustering effects performed in the meta-analyses for primary outcome data
Gordon 2010	
Methods	*Country:* United States of America *Design:* Randomized controlled trial; Nested; Clustered *Objective:* With consideration to the oral health effects associated with chronic tobacco use, the dental visit provides a "teachable moment" during which the dental team can relate oral health and systemic problems to tobacco use and provide evidence-based brief interventions to patients who use tobacco in lower socio-economic areas *Methods of analysis:* Analysis of variance with clinics as a random, nested factor within condition and patients nested within clinic for both outcomes, for all participants, and within each racial/ethnic group; Logistic regression used for baseline measures of tobacco use with condition included as a covariate *Clustering adjustment made:* Yes: ICC and analysis of variance with nesting *Significance of cluster adjustment:* Not reported

Participants	*Therapist description:* Federally funded public health dental clinics in lower socio-economic areas *Eligible for study:* Not reported *Randomized:* Intervention n= 7 practices; Control n= 7 practices *Completed:* Intervention n= 7 practices; Control n= 7 practices *Age:* Not reported *Gender:* Not reported *Patient description:* Dental patients aged 18 years and older who were seen for a non-emergency visit to the clinic and were self-identified current tobacco users (within the past 7 days) *Eligible for study:* n= 2751 completed informed consent and baseline survey *Randomized:* Intervention n= 1434; Control n= 1203 *Completed:* Six weeks Intervention n= 1214; Control n= 1026; 7.5 months Intervention n= 990; Control n= 885 *Age:* Total sample only: Mean = 40.5 $\pm$ 12.6 years *Gender:* Total sample only: Female= 45.8% n= 1508
Interventions	*Setting:* Baseline survey completed in the clinic and were mailed follow-up surveys at 6 weeks and 7.5 months (lower socio-economic areas) *Training of those delivering the intervention to the health professional:* Not reported *Intervention description:* '5A approach' (Ask, Advise, Assess, Assist and Arrange): Ask - ask all patients about their tobacco use at every visit; Advise - relating the oral effects of tobacco use to the patients' oral health status and advising patients to quit tobacco; Assess - setting a quit date, discussing pharmacotherapy, providing free self-help materials and free nicotine replacement therapy; Arrange - arranging for follow-up by mail or phone for patients setting a quit date; Each intervention practice was provided with a supply of nicotine patches and lozenges, as well as printed patient self-help materials and information on the local tobacco quit line, which providers were asked to give to all tobacco-using patients *Control description:* Usual care - delayed intervention control; Following the study period control clinics received the in-service workshop and received all the intervention materials *Duration of intervention:* One workshop *Intervention delivered by:* Dentists, dental hygienists and dental assistants *Intensity:* One, 3 hour workshop
Outcomes	*Pre-specified outcome data:* Tobacco cessation, reduction in tobacco use, number of quit attempts, change in readiness to quit, number of cigarettes smoked per day, level of nicotine dependence *Follow-up period:* Seven and a half months (6 months post-enrolment plus a 6 week grace period)
Notes	*Process measures:* Intervention subjects only - 66.5% reported receiving the reading materials and the majority of patients reported reading them (96.7%); 16.9% reported using nicotine replacement therapy and 10.9% reported receiving quit line counselling *Validation:* No bio-chemical validation n-values re-calculated for meta-analysis to permit intention-to-treat analysis for primary outcome data
Hymowitz 2007	
Methods	*Country:* United States of America *Design:* Randomized controlled trial; Nested; Clustered *Objective:* The primary aim of the study was to compare the effects of the two training conditions on resident tobacco intervention as measured by annual resident tobacco survey and OSCEs, baseline, and end-of-study patient and parent/guardian tobacco surveys, and a survey of program graduates who enter paediatric practice *Methods of analysis:* Due to training site being the unit of randomization, analyses were based on aggregated data rather than on individuals; Likert scales were calculated as means; Two-stage mixed model relationship was used for waves of residents at baseline and 2 year follow-up *Clustering adjustment made:* No – However data were analysed based on aggregated data to account for unit of analysis issues; authors state that this will provide "…an unbiased estimate of the intervention effect and standard error." (also known as a 'mean analysis') *Significance of cluster adjustment:* Not reported

Participants	*Therapist description:* Paediatric residents undergoing training in the New York/New Jersey metropolitan area *Eligible for study:* n= 16 Paediatric residencies; n= 2069 Residents *Randomized:* n= 16 residency training programs; 3rd year residents n= 140 in intervention arm; n= 135 in control arm *Completed:* n= 14 residency training programs; 3rd year residents n= 136 in intervention arm; n= 99 in control arm *Age:* Approximately 33 years of age for overall population; Intervention mean = 32.3 ± 5.1 years; Control mean = 33.7 ± 5.7 years *Gender:* Intervention female= 69.1%; Control female= 59.3% *Patient description: Parent/Guardian:* Parents of the patients visiting the primary care clinics *Eligible for study:* n= 1770 *Randomized:* Intervention n= 849; Control n= 776 *Completed:* Intervention n= 724; Control n= 617 *Age:* Overall= 29.88 ± 8.65 years *Gender:* Female= 85.8% *Patient description: Children:* Patients (children) visiting the primary care clinics *Eligible for study:* n= 550 *Randomized:* Intervention n= 255; Control n= 300 *Completed:* Intervention n= 255; Control n= 300 *Age:* Intervention 14.89 ± 1.84 years; Control 15 ± 2.16 years *Gender:* Intervention female= 55.3%; Control female= 60%
Interventions	*Setting:* New York/New Jersey metropolitan area; Continuity clinic (primary care clinic) served as the venue for resident tobacco-intervention activities *Training of those delivering the intervention to the health professional:* Not specified *Intervention description:* Special training – 'Solutions for Smoking' was the main teaching tool; Also provided with assistance with clinics (e.g., take-home educational and behavioural-change materials available in the waiting areas, anti-tobacco posters, marking charts of smokers etc); Packets of educational and behavioural materials designed for mothers of newborns, adolescent smokers, parents who smoke etc.; Seminar series provided opportunities to distribute program materials, highlight key concepts and aspects of the background material, and utilise role-laying to help residents acquire interviewing, counselling and tobacco-intervention skills; Power point presentations were used during these seminars on environmental tobacco smoke, smoking cessation and prevention of smoking onset and solutions for smoking audio/visual vignettes to demonstrate and model state-of-the-art counselling and intervention skills *Control description:* Standard training – Background reading material that included the clinical practice guideline 'Treating Tobacco Use and Dependence' and 'American Academy of Pediatrics Statement on Tobacco'; A manual entitled 'Clinical Interventions to Prevent Tobacco Use by Children and Adolescents'; A journal article on approaches to tobacco prevention and control in clinic and office settings; Standard training sites did not receive assistance with clinic mobilisation or have access to companion intervention material; They did receive pamphlets and related material to facilitate intervention on tobacco; Seminar also conducted the same as the intervention group with the exception of vignettes to demonstrate counselling and intervention skills *Duration of intervention:* One hour seminars, four times per year *Intervention delivered by:* Unclear, though the manuscript mentions 'training directors'; Seminars delivered by senior investigators from the New Jersey Medical School *Intensity:* One hour seminars, four times per year
Outcomes	*Pre-specified outcome data:* Primary outcome measures included changes in resident tobacco intervention activities and skills in the area of environmental tobacco smoke, tobacco-use prevention and tobacco-use cessation; Demographic information, knowledge and attitudes about tobacco prevention and control, tobacco-intervention activities during the past year, use of specific tobacco-intervention skills and strategies, and beliefs about the efficacy of tobacco intervention in patients and parents *Follow-up period:* Four years in total; Outcome data for participants only published for 2 year follow-up
Notes	*Process measures:* Sixty percent of residents in the special training condition reported review of 'Solutions for Smoking', although a higher proportion attended the seminar series (80%) and had access to companion intervention material in the clinic *Validation:* No bio-chemical validation

Joseph 2004	
Methods	*Country:* United States of America *Design:* Randomized controlled trial; Clustered *Objective:* To test the effect of modest intensity, practical systems changes that might increase the delivery of smoking cessation treatment within VAMCs (Veterans Medical centres); Authors hypothesized that an intervention addressing common barriers to delivery of smoking cessation treatment at the organisation level (as opposed to provider or patient level) might be an effective strategy to improve compliance with guideline recommendations; The trial was designed to test the effectiveness of this intervention *Methods of analysis:* McNemar odds on change to assess differences in the change between intervention groups; Pearson chi-squared statistic to compute the significant of the resulting odds ratio between the intervention and control group; Differences in smoking cessation rates were determined via the Pearson Goodness-of-Fit chi-squared statistic; Change scores were used for continuous variables and the relative difference in change was measured using the Wilcoxon rank sum test; Logistic regression was used for binary outcomes; SAS glimmix macro was used to incorporate the design effect and allow for the binary outcome *Clustering adjustment made:* Yes - SAS glimmix macros used to incorporate the design effects *Significance of cluster adjustment:* Not reported
Participants	*Therapist description:* Physicians, nurses, psychologists and pharmacists were present at the training meeting *Eligible for study:* n= 164 VAMCs (Veteran Medical Centres) nationwide *Randomized:* Intervention n= 10; Control n= 10 *Completed:* Intervention n= 10; Control n= 10 *Age:* Not reported *Gender:* Not reported *Patient description:* A random selection of patients who had seen their primary care provider (at VAMCs) within 6 weeks were phoned for baseline surveys; Current smokers were identified and underwent 1 year follow-up also via phone *Eligible for study:* Cohort n= 5793; Eligible n= 5367 *Randomized:* Intervention n= 2112; Control n= 2142 *Completed:* Intervention n= 641; Control n= 783 *Age:* Baseline - Intervention 64.6 years; Control 63.1 years; Follow-up - Intervention 64.9 years; Control 63.8 years *Gender:* Baseline (male) - Intervention 96.1%; Control 95.3%; Follow-up - Intervention 95.8%; Control 98.0%
Interventions	*Setting:* Veterans Affairs Medical Centers (VAMCs) *Training of those delivering the intervention to the health professional:* Registered nurse who was trained in smoking cessation methods and had considerable administrative experience within Veteran Affairs *Intervention description:* Intervention sites received 5 copies of the AHCPR Smoking Cessation Guideline for distribution; Plus a multi-component intervention designed to increase implementation of 3 specific Guideline recommendations: 1) documentation of tobacco use status in the medical record 2) delivery of intervention to all smokers and 3) liberal use of smoking cessation medications; The organisational support included a training meeting, site visits and a study interventionist at the co-ordinating site in Minneapolis; Removal of formulary restrictions were encouraged for smoking cessation aids as were the requirements for attendance at a cessation class to access pharmacotherapies; Bupropion SR was suggested as an addition to formulary; However approaches were individualised for each site *Control description:* Control sites also received 5 copies of the AHCPR Smoking Cessation Guideline for distribution *Duration of intervention:* Authors state intervention lasted through a 6 month period, however level of exposure for participants not specified *Intervention delivered by:* Registered nurse face-to-face through 2 to 3 site visits within the first 6 months to communicate with directors of primary care, pharmacy service chiefs, smoking cessation co-ordinators and primary care nurses, as well as the 2 day training meeting *Intensity:* One, 2 day training meeting held in Minneapolis for the site-based principal investigator; Two to 3 day visit to each site by the interventionist within the first 6 months

Outcomes	*Pre-specified outcome data:* General health, smoking history/status, nicotine dependence, services provided at the last primary care visit, mood, alcohol use and demographics, provision of counselling, referred to a smoking cessation clinic, provided advice or medications and cessation discussed (documented in medical records) *Follow-up period:* Twelve months
Notes	*Process measures:* None reported *Validation:* No bio-chemical validation
Kottke 1989	
Methods	*Country:* United States of America *Design:* Randomized controlled trial, cluster *Objective:* "…the task of Doctors Helping Smokers was to be the development and testing of a program to help physicians incorporate currently identified smoking cessation intervention into their practice routine." Hypothesis: that physicians trained in a workshop would be more effective in helping their smoking patients quit than would similar volunteer physicians who received only patient education materials or a group of physicians that received no assistance *Methods of analysis:* Data presented as proportions were analysed with the chi-squared analysis; Data reported as means and SDs were analysed with analysis of variance; Life-table analysis used to examine relapse patterns of the patients who attempted to quit smoking *Clustering adjustment made:* Physicians unit of analysis; Multivariate regression used to adjust for confounding effects of differences among the groups of doctors and their patients *Significance of cluster adjustment:* Not reported
Participants	*Therapist description:* n= 109 family practitioners *Eligible for study; n-value:* 1110; n= 109 physicians returned postcards *Randomized; n-value:* Workshop group n= 27; No-assistance group n= 17; Materials group n= 22 *Completed; n-value:* Workshop group n= 27; No-assistance group n= 17; Materials group n= 22 *Age:* Workshop group 37.9 ± 9.7; No-assistance group 39.5 ± 7.7; Materials group 44.3 ±11.7 *Gender:* Workshop group F=22.2%; No-assistance group F=9.1%; Materials group f=11.8% *Patient description: n=* 1653 primary care smoking patients not selected by motivation to quit *Eligible for study; n-value:* Not reported *Randomized; n-value:* 6053 total (89.4% of patients whose names were submitted by the physicians) *Completed; n-value:* 87% of the n= 6053 were available for follow-up; 86.8%, 87.5% and 86.8% for the workshop, materials and no-assistance groups respectively *Age:* 18 to 70 years; Mean =slightly over 40 *Gender:* Two thirds women

Interventions	*Setting:* Private family practice (primary care) in Minnesota, USA; workshop site not described though likely centralised *Training of those delivering the intervention to the health professional:* Not described *Intervention description:* Two intervention groups: Materials group - physicians given self-help manuals to distribute; Workshop group - self-help manuals plus 6 hour group workshop *Control description:* Normal care *Duration of intervention:* Workshop group: 6-hour workshop given on two occasions. Workshop started in the morning with two presentations of 30-minutes about the effects of smoking, chronic disease and organisation for smoking cessation interventions; 1-hour presentation on doctor-patient intervention skills; 1-hour introduction to smoking cessation techniques; Two 1-hour small-group workshop sessions on counselling sessions and planning for smoking cessation interventions and 30-minutes for summary and discussion; Materials group: 100 copies of Quit-and-Win, a smoking cessation manual *Intervention delivered by:* Not described *Intensity:* Workshop: 6-hr workshop given on 2 occasions; Materials group: None; No assistance: None
Outcomes	*Pre-specified outcome data:* Physicians: Characteristics, knowledge, skills, confidence and beliefs about smoking cessation in relation to their performance during the trial Patients: demographics, smoking habits, health status, details about visit with physician, prevalence of smoking in their social environment and support received from spouse or others who were emotionally important to them; Four questions about extent tot which they felt in control of their life, the confidence they felt about handling personal problems, extent that "things were going [their] way," and the extent to which difficulties were piling up; serum cotinine levels *Follow-up period:* 12-months
Notes	*Process measures:* None *Validation:* Serum cotinine Not able to be meta-analysed due to unit of analysis being the practitioners instead of the individuals
Lennox 1998	
Methods	*Country:* United Kingdom *Design:* Randomized controlled trial; Nested; Clustered *Objective:* To assess the impact of the training intervention on both health professionals and smoking subjects *Methods of analysis:* Comparison of binary outcomes were analysed using the chi-squared test; Logistic and multiple regression analyses were carried out where appropriate for these outcome measures; Comparisons of continuous outcomes were analysed using t-tests and multiple linear regression; Confounders were adjusted including age, sex and deprivation score for the regression analysis as well as for indicators for the intervention group *Clustering adjustment made:* Yes - GLMM (Generalised linear mixed model) approach used for regression techniques which added the general practice as a random factor nested within the treatment groups to the other fixed-effect factors *Significance of cluster adjustment:* Regression techniques used to explore clustering effects for variables significant in individual level analyses; No significant difference in point prevalence of abstinence after adjustment

Participants	*Therapist description:* n= 16 general practices with training for doctors, nurses and health visitors *Eligible for study:* n= 26 practices *Randomized:* n= 16 practices *Completed:* n= 16 practices *Age:* Not reported *Gender:* Not reported *Patient description:* Smoking patients of the practices identified from questionnaires to random sample *Eligible for study:* Not reported *Randomized:* Number of patients surveyed: Intervention n= 6631; Control n= 6631; Number of patients responding: Intervention n= 5022; Control n= 5217; Number of smokers identified: Intervention n= 1381; Control n= 1207 *Completed:* Eight months - Intervention n= 941; Control n= 864; 14 months - Intervention n= 898; Control n= 795 *Age:* Not reported *Gender:* Not reported
Interventions	*Setting:* Primary care medical practices in Aberdeen, UK *Training of those delivering the intervention to the health professional:* Two authors conducted the training, one a senior health promotion officer experienced in group work with primary health care teams and the other a GP *Intervention description:* One day training workshop based on stages of change model *Control description:* Usual care control group *Duration of intervention:* Six identical one day training workshops were held within a three week period based on stages of change model *Intervention delivered by:* Two authors, one a senior health promotion officer experienced in group work with primary health care teams and the other a GP *Intensity:* One day training workshop
Outcomes	*Pre-specified outcome data:* Changes in attitudes, self-reported behaviour, change in readiness to change, cessation attempt made, point prevalence, continuous abstinence *Follow-up period:* Eight and 14 months post workshop for patient questionnaires
Notes	*Process measures:* Some subjects did not attend their practice during the study and therefore were not exposed to the effects of the training *Validation:* No bio-chemical validation n-values re-calculated for meta-analysis to permit intention-to-treat analysis for primary outcome data

Sinclair 1998	
Methods	*Country:* Scotland *Design:* Randomized controlled trial *Objective:* To evaluate a training workshop for community pharmacy personnel to improve their counselling in smoking cessation based on the stage-of-change model *Methods of analysis:*To demonstrate the differences between intervention and control groups, parametric tests (t-tests for quantitative variables) and non-parametric tests (Mann-Whitney tests for quantitative variables) were used. Multiple logistic regression was carried out for the binary outcomes of point prevalence at one month, and continuous abstinence at four and nine months, and to assess the effect of potential confounders *Clustering adjustment made:* Yes; authors mention that the effect of cluster randomization was assessed by firstly calculating the degree of intra-cluster correlation for each of the binary outcomes of abstinence. Secondly, regression techniques, adding the pharmacy as a random factor nested within the treatment groups to the other fixed effect factors, were considered leading to a generalised linear mixed model. The authors mention that intra-cluster correlations for the outcomes at each time point were calculated. The estimated values were less than 0.0001 and therefore negligible *Significance of cluster adjustment:* No; authors mention that trends in outcome were not affected by potential confounders or adjustment for clustering Setting: Residents and physicians in Family Medicine, Taiwan Training: Two lessons Randomization: Stratified by number of years in practice (method not stated)
Participants	*Therapist description:* *Eligible for study; n-value:* n= 76 pharmacies *Randomized; n-value:* Intervention n= 32 pharmacies; Control n= 30 pharmacies *Completed; n-value:* Intervention n= 32 pharmacies (specify: n= 94 (54 assistants, 40 pharmacists); Control n= 29 pharmacies *Age:* Not described *Gender:* Intervention: 54 female assistants; 25 female pharmacists; Control: not described *Patient description:* *Eligible for study; n-value:* n= 775 smokers *Randomized; n-value:* Intervention n= 224; Control n= 268 *Completed; n-value:* Intervention n= 159; Control n= 188 *Age:* Intervention 41.7 (17-74); Control 41.5 (17-77) *Gender:* Intervention 61.2% men; Control 62.7% men
Interventions	*Setting:* Eight workshops were scheduled with a choice of dates, times and location (Aberdeen or Elgin - the major population centres which are located 70 miles apart at opposite ends of the study area) *Training of those delivering the intervention to the health professional:* Not described *Intervention description:* Training in stages of change approach to smoking cessation *Control description:* Usual care *Duration of intervention:* two-hour workshop *Intervention delivered by:* Not described *Intensity:* One workshop
Outcomes	*Pre-specified outcome data:* self-reported point prevalence smoking cessation rates at one month; self-reported continuous abstinence from zero to four months and from zero to nine months; the pharmacy support process (registration, counselling and client record) *Follow-up period:* 1, 4, 9 months; Point prevalence of abstinence at 12 months No process outcomes
Notes	*Validation:* none n-values re-calculated for meta-analysis to permit intention-to-treat analysis for primary outcome data

Strecher 1991	
Methods	*Country:* United States of America *Design:* Randomized Controlled Trial; Factorial design; Nested; Cluster *Objective:* The study evaluated the effectiveness of training and prompting under realistic conditions, including: the use of simple and generalisable interventions; training conducted by existing faculty; and evaluation at several sites with residents from three primary care specialties *Methods of analysis:* Contingency tables with chi-squared tests, t-tests, and analysis of variance (ANCOVA) were used to investigate the pre-test equivalencies of the four groups and all outcomes for selected other variables; ANCOVA compared the effects of the two interventions, alone and in combination, whilst controlling for pre-test scores and physician speciality *Clustering adjustment made:* No *Significance of cluster adjustment:* N/A (Physician speciality adjusted for but not individual physician clustering effects)
Participants	*Therapist description:* 250 residents in internal medicine, family practice and paediatrics *Eligible for study; n-value:* 261 *Randomized; n-value:* 250; Tut (Tutilage) and Pro (Prompt) n= 66; Tut only n= 66; Pro only n= 60; Control n= 58 *Completed; n-value:* 234; Tut and Pro n= 62; Tut only n= 63; Pro only n= 55; Control n= 54 *Age:* Not reported *Gender:* Not reported *Patient description:* 937 patients from American primary care medical practice *Eligible for study; n-value:* 937; Tut and Pro n= 250; Tut only n= 243; Pro only n= 228; Control n= 225 *Randomized; n-value:* 843 *Completed; n-value:* 659; Tut and Pro n= 184; Tut only n= 156; Pro only n= 162; Control n= 157 *Age:* 17 to 75 years; Mean age = 45 years *Gender:* Female =63%
Interventions	*Setting:* American primary care residency programmes (physicians in training) *Training of those delivering the intervention to the health professional:* Not specified though one of the authors in each instance conducted the tutorial *Intervention description:* Three intervention groups: Tutilage only (minimal contact counselling); Prompt only (chart-reminder and advice sheet); Tutilage and Prompt *Control description:* Normal care *Duration of intervention:* Only held once, two sessions in total - the first included slide presentations the second group discussions *Intervention delivered by:* One of the authors, usually a clinic director or a faculty member conducted the tutorial *Intensity:* Tutorial: two sessions - initial one-hour long, second session two weeks later
Outcomes	*Pre-specified outcome data:* Self-administered questionnaires requesting self-reports on smoking-cessation counselling frequency, content, attitude and training; patients were asked about smoking habits and physicians advice to stop smoking *Follow-up period:* 6-months
Notes	*Process measures:* None *Validation:* Expired CO; Bio-chemical verification was obtained where possible The three intervention groups were combined for meta-analyses to produce the single 'Intervention' sample; n-values re-calculated for meta-analysis to permit intention-to-treat analysis for primary outcome data

Swartz 2002	
Methods	*Country:* United States of America *Design:* Randomized controlled trial; Clustered *Objective:* Primary goal of this study was to determine if in-person feedback intervention, compared to mailed feedback, would lead to a higher use of tobacco treatments by patients who smoke *Method of Analysis:* Odds ratios, 95% confidence intervals and p-values were calculated to evaluate intervention effects on patient and provider behaviour; Unadjusted models and models adjusted for age, insurance at baseline, practice speciality and region of the state were calculated using logistic regression; All analyses were completed with SAS statistical software *Clustering adjustments made:* Yes – survey logistic procedures *Significance of clustering:* Not reported
Participants	*Therapist description:* Primary care providers with practices of at least 75% internal medicine or family medicine clinicians providers combined with Medicaid and HMO panel size of at least 200 adults; n= 176 were physicians, n= 26 nurse practitioners, n= 20 physician assistants, n= 3 unknown classification *Eligible for study:* n= 150 practices; n= 230 providers within the 50 practices recruited were eligible *Randomized:* n= 50 practices; n= 225 providers *Completed:* n= 50 practices; n= 179 providers *Age:* Not reported *Gender:* Not reported *Patient description:* Patients were adults receiving primary care by a study practice aged 18 years and older who were seen within the prior year *Eligible for study:* n= 17318 identified as receiving primary care by a study practice; n= 11547 eligible *Randomized:* n= 7461 completed baseline survey; n= 1238 patients identified as smokers at baseline *Completed:* n= 807 reporting provider visit in the year proceeding follow-up; n= 516 smokers with baseline and follow-up surveys reporting one serious quit attempt *Age:* Intervention mean age= 41.9 years; Control mean age= 42.9 years *Gender:* Intervention male= 26.4%; Control male= 23.2%
Interventions	*Setting:* Maine Medicaid and Maine HMO, USA *Training of those delivering the intervention to the health professional:* Not reported *Intervention description:* Experimental study practices received two educational office sessions, with data feedback presented during the first visit; Second visit reinforced the guidelines and discussed office systems to improve tobacco treatment *Control description:* Control practices received information and feedback data by mail *Duration of intervention:* For the intervention: Two educational office sessions, the second occurred five months after the first *Intervention delivered by:* One nurse practitioner well-versed in motivational interviewing and tobacco guidelines *Intensity:* Twenty minute slide presentation followed by feedback and discussions for the first visit; Second visit discussions time not stated
Outcomes	*Pre-specified outcome data:* Reports of provider asking about tobacco, advice to quit, spending time talking about smoking or quitting, discussing tobacco treatment medications, and discussing counselling services or programs; Smokers were asked about serious attempts at quitting for 24 hours or longer, use of medication or counselling to aid quitting, and use of any tobacco in the previous week (7 day point prevalence) *Follow-up Period:* Fifteen to 18 months later which corresponded to 12 months following the practice intervention
Notes	*Process measures:* None reported *Validation:* No bio-chemical validation

Twardella 2007	
Methods	*Country:* Germany *Design:* Randomized controlled trial; Nested; Clustered; Factorial design 2x2 *Objective:* The aim of this study was to examine whether and to what extent structural changes could enhance promotion of smoking cessation in general practice. In particular, we aimed to investigate the effect of the following strategies on smoking cessation rates: (1) specific training of general practitioners in methods of promoting smoking cessation and a financial incentive to general practitioners for each recruited patient who successfully quits; and (2) specific training of general practitioners in promotion of smoking cessation and the cost-free prescription of drugs proved effective in supporting smoking cessation *Methods of analysis:* Primary end-point data were assessed on an intention-to-treat basis; smoking abstinence at 12 months was assessed using a mixed logistic regression model accounting for cluster randomization including a random effect for medical practice in the model; baseline imbalances between intervention arms were adjusted using multivariate analyses; the effect of drug use during follow-up, as recorded by general practitioners, was evaluated in a bivariate mixed logistic regression model *Clustering adjustment made:* Yes - mixed logistic regression model, using PROC NLMIXED in "SAS V8.1" (including a random effect for medical practice) *Significance of cluster adjustment:* Not reported
Participants	*Therapist description:* General practitioners in the Rhine-Neckar region located in southwest Germany *Eligible for study:* n= 174 met the inclusion criteria *Randomized:* Total= 94 general practitioners from n= 82 practices; Usual care: n= 21 therapists (20 practices); Training + incentive: n= 24 therapists (21 practices); Training + medication: n= 23 therapists (21 practices); Training, incentive + medication: n= 26 therapists (20 practices) *Completed:* n= 59 practices; Usual care: n= 14 practices; Training + incentive: n= 16 practices; Training + medication: n= 11 practices; Training, incentive + medication: n= 18 practices *Age:* Not reported *Gender:* Not Reported *Patient description:* Patients visiting the practices and who smoked at least 10 cigarettes per day and aged between 36 to 75 years, were recruited by participating general practitioners, irrespective of intention to quit smoking and conditional on written informed consent *Eligible for study:* n= 587 *Randomized:* n= 587; Usual care: n= 76; Training + incentive: n= 146; Training + medication: n= 144; Training, incentive + medication: n= 221 *Completed:* n= 488; Usual care: n= 61; Training + incentive: n= 123; Training + medication: n= 121; Training, incentive + medication: n= 183 *Age:* Range 36 to 75 years; <45 years: Usual care n= 30; Training + incentive n= 55; Training + medication n= 59; Training, incentive + medication n= 95; 45 to 54 years: Usual care n= 24; Training + incentive n= 63; Training + medication n= 44; Training, incentive + medication n= 86; > 55 years: Usual care n= 22; Training + incentive n= 28; Training + medication n= 41; Training, incentive + medication n= 40 *Gender:* Female: Usual care n= 38; Training + incentive n= 74; Training + medication n= 71; Training, incentive + medication n= 121

Interventions	*Setting:* Not reported *Training of those delivering the intervention to the health professional:* Not reported *Intervention description:* Three intervention groups: Training + incentive – Two hour cost-free group tutorial for general practitioners in methods of promoting smoking cessation including stages of change model, approaches for counselling in general practice and potential of pharmacological support; Financial remuneration of €130 after study completion per smoke-free participant; Training + medication – Same group tutorial as above plus general practitioners could offer cost-free prescription of drugs proved effective in supporting smoking cessation; Training, incentive + medication – All of the above *Control description:* Usual care *Duration of intervention:* A single 2 hour tutorial available at two session times *Intervention delivered by:* Not reported *Intensity:* Two Hour workshop
Outcomes	*Pre-specified outcome data:* Primary outcome measure - Self-reported point prevalence of smoking abstinence obtained at 12 months follow-up Second outcome measure - Continuous smoking abstinence for at least 6 months (183 days) at 12 months follow-up; Frequency of the use of methods to support smoking cessation among patients during the follow-up period as reported by general practitioners *Follow-up period:* Twelve months
Notes	*Process measures:* None reported *Validation:* Serum cotinine *Other:* Definition of abstinence - Participants were categorised as 'at least 6 months abstinent' if they were smoke free at 12 months follow-up, validated by serum cotinine, and, according to self-report, had stopped smoking at least 6 months before the date of follow-up The three intervention groups were combined for meta-analyses to produce the single 'Intervention' sample
Unrod 2007	
Methods	*Country:* United States of America *Design:* Randomized controlled trial; Nested; Clustered *Objective:* To bolster the rate at which physicians delivered smoking cessation services and to increase patients' quit rates *Methods of analysis:* Descriptive statistics for characterisation of sample at baseline; Pearson's chi-squared test and independent sample t-test to measure differences between groups; Hierarchic generalised linear model analysis of variance controlling for baseline variables used to measure physician performance; Abstinence analysed via generalised linear model *Clustering adjustment made:* Yes - Mixed linear modelling with physician as clustering variable used for smoking related outcomes *Significance of cluster adjustment:* Not reported
Participants	*Therapist description:* Primary care physicians recruited from the four largest metropolitan boroughs, Bronx, Brooklyn, Manhattan and Queens *Eligible for study:* n= 579 *Randomized:* Intervention n= 35; Control n= 35 *Completed:* Intervention n= 35; Control n= 35 *Age:* Mean = 51.1 ± 8.1 years (total population only) *Gender:* Males= 74% (total population only) *Patient description:* Patients in primary care physician waiting rooms who were identified as smokers *Eligible for study:* n= 5826 *Randomized:* Intervention n= 270; Control n= 248 *Completed:* Intervention n= 237; Control n= 228 *Age:* Intervention mean= 43.5 ± 14.7 years; Control mean= 42.8 ± 14.2 years *Gender:* Intervention 58% male; Control 64% male

Interventions	*Setting:* Training conducted during a 40 minute visit to the physicians' office *Training of those delivering the intervention to the health professional:* Not reported *Intervention description:* Physician training in brief smoking cessation counselling based on the 5As Clinical Practice Guideline algorithm; Patients and physicians provided with a one page report containing smoking-related information and recommendations based on the information provided during the patient assessment *Control description:* Physicians in the control condition were not given any training and were instructed to continue their usual smoking cessation practices; Patients completed the same assessments but did not receive the report (being the one page report characterising patients smoking habits) *Duration of intervention:* One session only *Intervention delivered by:* Health educator *Intensity:* One, 40 minute session
Outcomes	*Pre-specified outcome data:* Patients asked - Did your doctor… ask whether you smoke, ask whether you are ready to quit, advise you to quit smoking, help you to quit smoking, help you set goals about quitting, give you written materials about quitting, refer you to a quit smoking program, talk to you about quit-smoking medications, make a follow-up appointment to discuss smoking Primary outcome measure - 7 day point prevalence abstinence; Longest quit attempt (in days); Total number of 25 hour quit attempts, stage-of-change progression *Follow-up period:* Six months
Notes	*Process measures:* None reported *Validation:* For sub-group of participants - Saliva-cotinine test; Fourteen of 16 samples confirmed abstinence (88%) n-values re-calculated for meta-analysis to permit intention-to-treat analysis for primary outcome data
Wang 1994	
Methods	*Country:* Taiwan *Design:* Randomized Controlled Trial *Objective:* To assess the stages-of-change model in cigarette smoking and practice guidelines for practicing cigarette smoking cessation counselling in a short training program, designed to make physicians more willing to help their patients to quit smoking and increase success rates *Methods of analysis:* All data were analysed using either the chi-square or Fisher's exact tests *Clustering adjustment made:* No *Significance of cluster adjustment:* Not applicable

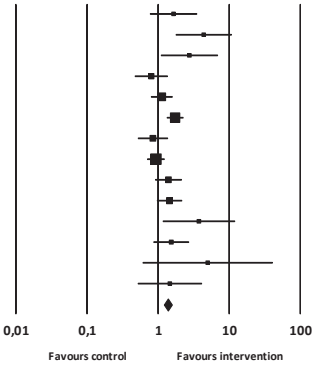
Participants	*Therapist description:* Residents and physicians in Family Medicine *Eligible for study; n-value:* Not reported *Randomized; n-value:* Group one: lessons n= 9, Group two: posters n= 9, Group three: usual care n= 9 *Completed; n-value:* Group one: lessons n= 9, Group two: posters n= 9, Group three: usual care n= 9 *Age:* Not reported *Gender:* Not reported *Patient description:* *Eligible for study; n-value:* Not reported *Randomized; n-value:* n= 93, Group one: n= 39, Group two: n= 26, Group three: n= 28 *Completed; n-value:* n= 82, Group one: n= 35, Group two: n= 24, Group three: n= 23 *Age:* Group one: <40 n= 14, 40-59 n= 17, ≥ 60 n= 8; Group two: <40 n= 14, 40-59 n= 8, ≥ 60 n= 4; Group three: <40 n= 7, 40-59 n= 12, ≥ 60 n= 9 *Gender:* Group one: male n= 38 female n= 1; Group two: male n= 24 female n= 2; Group three: male n= 27 female n= 1 Therapists: 27 physicians Patients: 93 patients
Interventions	*Setting:* Not reported *Training of those delivering the intervention to the health professional:* Not reported *Intervention description:* Two intervention groups: Training - stages of change model and practice guidelines; Poster - used as a reminder to give advice *Control description:* Usual care *Duration of intervention:* Group one: two lessons; Group two: provided with poster only; Group three: no intervention *Intervention delivered by:* Not reported *Intensity:* Group one: two lessons; Group two: provided with poster only; Group three: no intervention
Outcomes	*Pre-specified outcome data:* Demographic data, cigarette-smoking habits and health beliefs *Follow-up period:* 6-months; Point prevalence of abstinence at 12 months No process outcomes
Notes	*Validation:* None *Process measures:* None reported Manual adjustment for potential clustering effects performed in the meta-analyses for primary outcome data; The two intervention groups were combined for meta-analyses to produce the single 'Intervention' sample; n-values re-calculated for meta-analysis to permit intention-to-treat analysis for primary outcome data
Wilson 1988	
Methods	*Country:* Canada *Design:* Randomized controlled trial; Nested; Clustered *Objective:* To investigate the effects of a smoking cessation workshop on physician practices and on patients' smoking behaviour *Methods of analysis:* Analysis of covariance – Obtained by averaging patient values within the practice; Analysis of differences between groups – If there was no difference between the usual care and gum only groups (untrained cohorts) these would be combined and compared with the gum plus (trained cohort); Regression analysis performed on practice unit, adjusting for the effects of predictor variables and treatment *Clustering adjustment made:* No - None reported *Significance of cluster adjustment:* Not reported

Participants	*Therapist description:* Psysicians *Eligible for study:* n= 460 Family physicians *Randomized:* n= 90 Physicians *Completed:* n= 83 Physicians; Usual care n= 27; Gum only n= 29; Gum plus n= 27 *Age:* Usual care: Mean = 41.64 years; Gum only: Mean = 41.77 years; Gum plus: Mean = 40.57 years *Gender:* Usual care: Male 92.6%; Gum only: Male 93.1%; Gum plus: Male 81.5% *Patient description:* *Eligible for study:* Not stated as n-value; Participation consent rates were: Usual care 91%; Gum only 83%; Gum plus 76% *Randomized:* Not reported *Completed:* Usual care n= 601; Gum only n= 726; Gum plus n= 606 (total n= 1933) *Age:* <25 years: Usual care 22%; Gum only 19%; Gum plus 17%; 25 to 44 years: Usual care 50%; Gum only 54%; Gum plus 56%; ≥ 45 years: Usual care 27%; Gum only 27%; Gum plus 27% *Gender:* Male: Usual care 39%; Gum only 42%; Gum plus 33%
Interventions	*Setting:* Clinical practice setting – Participation during routine physician consultation; Based in Ontario, Hamilton *Training of those delivering the intervention to the health professional:* Not described; CME Protocol *Intervention description:* Two intervention groups: Gum only - Physicians instructed to approach patients in their usual manner about quitting smoking and to offer nicotine gum as an aid to quitting; Gum Plus Training - Gum in addition to training *Control description:* Usual care *Duration of intervention:* One, 4 hour training workshop to Gum plus physician cohort *Intervention delivered by:* Not described *Intensity:* Control - Not explicitly reported; Gum only - Not explicitly reported; Gum plus - One, 4 hour workshop for physicians; For patients - Use of gum, 1 to 6 follow up visits and quit dates
Outcomes	*Pre-specified outcome data:* Three month self-reported sustained abstinence prior to bio-chemically validated cessation at 12 months; smoking behaviour, cessation attempts and nicotine gum use measured by telephone interviews; Physicians performance measured by patient flow sheets and patient telephone exit interviews *Follow-up period:* Point prevalence of abstinence at 12 months
Notes	*Process measures:* None reported *Validation:* Salivary cotinine The two intervention groups were combined for meta-analyses to produce the single 'Intervention' sample; Manual adjustment for potential clustering effects performed in the meta-analyses for primary outcome data

Appendix 1. Forest plots of comparisons

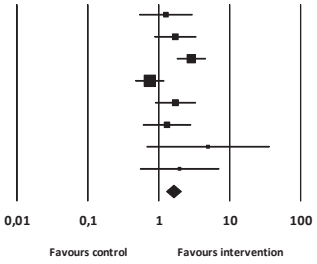
Analysis 1.1a. Smoking cessation at longest follow-up (point prevalence)

Study name	Events / Total		Statistics for each study			
	Intervention	Control	Relative weight	MH odds ratio	Lower limit	Upper limit
Cohen (Dent) 1989	39 / 771	8 / 256	2,8	1,65	0,76	3,58
Cohen (Doc) 1989	63 / 1065	5 / 355	1,7	4,40	1,76	11,03
Cornuz 2002	15 / 115	7 / 136	1,4	2,76	1,09	7,04
Cummings (Priv) 1989	26 / 386	30 / 364	7,0	0,80	0,47	1,39
Cumming 1989	67 / 837	60 / 840	13,4	1,13	0,79	1,63
Hymowitz 2007	158 / 1394	79 / 1155	18,7	1,74	1,31	2,31
Joseph 2004	32 / 280	39 / 295	8,2	0,85	0,51	1,40
Lennox 1998	100 / 1381	93 / 1207	22,5	0,94	0,70	1,25
Sinclair 1998	55 / 187	51 / 223	8,0	1,41	0,90	2,19
Strecher 1991	61 / 413	42 / 394	8,9	1,45	0,95	2,21
Swartz 2002	69 / 503	3 / 74	1,1	3,76	1,15	12,28
Twardella 2007	32 / 270	20 / 248	4,5	1,53	0,85	2,76
Unrod 2007	10 / 54	1 / 23	0,3	5,00	0,60	41,59
Wilson 1988	15 / 158	5 / 75	1,5	1,47	0,51	4,20
				1,36	1,20	1,55



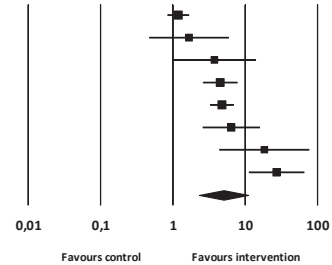
Analysis 1.1b. Smoking cessation at longest follow-up (continuous abstinence)

Study name	Events / Total		Statistics for each study			
	Intervention	Control	Relative weight	MH odds ratio	Lower limit	Upper limit
Cummings (Priv) 1989	12 / 386	9 / 364	8,0	1,27	0,53	3,04
Cummings 1989	22 / 837	13 / 840	11,2	1,72	0,86	3,43
Gordon 2010	74 / 1394	22 / 1155	20,2	2,89	1,78	4,68
Lennox 1998	32 / 1381	37 / 1207	34,2	0,75	0,46	1,21
Sinclair 1998	22 / 187	16 / 223	11,4	1,73	0,88	3,39
Strecher 1991	33 / 502	8 / 157	10,1	1,31	0,59	2,90
Twardella 2007	32 / 503	1 / 74	1,4	4,96	0,67	36,85
Wilson 1988	12 / 158	3 / 75	3,3	1,97	0,54	7,21
				1,60	1,26	2,03



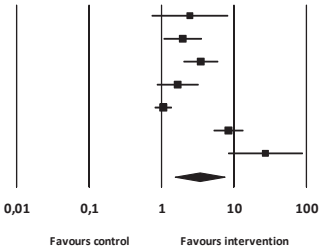
Analysis 1.2. Patients asked to set a quit date

Study name	Events / Total		Statistics for each study			
	Intervention	Control	Relative weight	MH odds ratio	Lower limit	Upper limit
Swartz 2002	343 / 413	317 / 394	14,7	1,19	0,83	1,70
Strecher 1991	16 / 156	3 / 47	10,8	1,68	0,47	6,02
Cornuz 2002	9 / 115	3 / 136	10,5	3,76	0,99	14,25
Cummings (Priv) 1989	84 / 218	18 / 148	14,1	4,53	2,58	7,95
Cummings 1989	146 / 388	39 / 348	14,6	4,78	3,23	7,07
Cohen (Dent) 1989	83 / 486	5 / 161	12,5	6,43	2,56	16,14
Wilson 1988	53 / 158	2 / 75	10,0	18,42	4,35	78,00
Cohen (Doc) 1989	275 / 816	5 / 273	12,7	27,25	11,12	66,78
				4,98	2,29	10,86



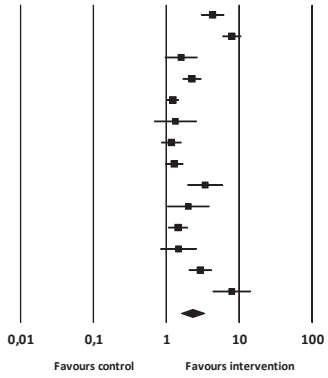
Analysis 1.3. Patient asked to make a follow-up appointment

Study name	Events / Total		Statistics for each study				MH odds ratio and 95% CI
	Intervention	Control	Relative weight	MH odds ratio	Lower limit	Upper limit	
Cornuz 2002	8 / 115	4 / 136	11,8	2,47	0,72	8,42	
Cummings (Priv) 1989	42 / 218	16 / 148	14,9	1,97	1,06	3,65	
Cummings 1989	59 / 388	17 / 348	15,2	3,49	1,99	6,12	
Strecher 1991	76 / 156	17 / 47	14,7	1,68	0,86	3,29	
Swartz 2002	164 / 413	151 / 394	16,1	1,06	0,80	1,41	
Unrod 2007	128 / 270	24 / 248	15,5	8,41	5,19	13,65	
Wilson 1988	84 / 158	3 / 75	11,9	27,24	8,23	90,13	
				3,34	1,51	7,37	



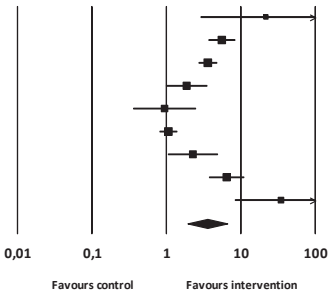
Analysis 1.4. Number of smokers counselled

Study name	Events / Total		Statistics for each study				MH odds ratio and 95% CI
	Intervention	Control	Relative weight	MH odds ratio	Lower limit	Upper limit	
Cohen (Dent) 1989	350 / 486	60 / 161	7,4	4,33	2,97	6,31	
Cohen (Doc) 1989	691 / 816	112 / 273	7,6	7,95	5,84	10,81	
Cornuz 2002	45 / 115	39 / 136	6,9	1,60	0,94	2,71	
Cummings (Priv) 1989	221 / 343	151 / 339	7,6	2,26	1,66	3,07	
Cumming 1989	392 / 783	352 / 785	7,9	1,23	1,01	1,50	
Hymowitz 2007	30 / 142	15 / 90	6,3	1,34	0,67	2,66	
Joseph 2004	165 / 280	162 / 295	7,5	1,18	0,85	1,64	
Lennox 1998	420 / 529	355 / 474	7,6	1,29	0,96	1,74	
Sinclair 1998	113 / 133	99 / 159	6,7	3,42	1,93	6,08	
Strecher 1991	114 / 156	27 / 47	6,3	2,01	1,02	3,96	
Swartz 2002	114 / 413	82 / 394	7,6	1,45	1,05	2,01	
Twardella 2007	257 / 377	32 / 54	6,7	1,47	0,82	2,64	
Unrod 2007	207 / 270	131 / 248	7,4	2,93	2,01	4,28	
Wilson 1988	123 / 158	23 / 75	6,5	7,95	4,28	14,74	
				2,28	1,58	3,27	



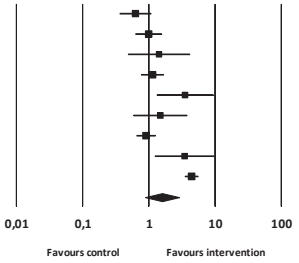
Analysis 1.5. Number of smokers receiving self-help material

Study name	Events / Total		Statistics for each study				MH odds ratio and 95% CI
	Intervention	Control	Relative weight	MH odds ratio	Lower limit	Upper limit	
Cornuz 2002	16 / 115	1 / 136	5,5	21,82	2,85	167,27	
Cummings (Priv) 1989	126 / 343	32 / 339	13,1	5,57	3,64	8,52	
Cumming 1989	195 / 783	66 / 785	13,5	3,61	2,68	4,87	
Hymowitz 2007	41 / 142	16 / 90	12,1	1,88	0,98	3,60	
Strecher 1991	19 / 156	6 / 47	10,3	0,95	0,35	2,53	
Swartz 2002	155 / 413	142 / 394	13,6	1,07	0,80	1,42	
Twardella 2007	107 / 377	8 / 54	11,4	2,28	1,04	4,99	
Unrod 2007	87 / 270	17 / 248	12,6	6,46	3,71	11,25	
Wilson 1988	77 / 158	2 / 75	7,9	34,70	8,23	146,30	
				3,52	1,90	6,52	



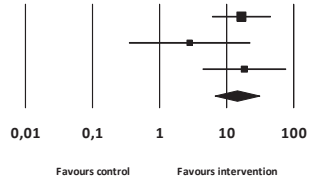
Analysis 1.6. Number of smokers receiving nicotine gum/replacement therapy

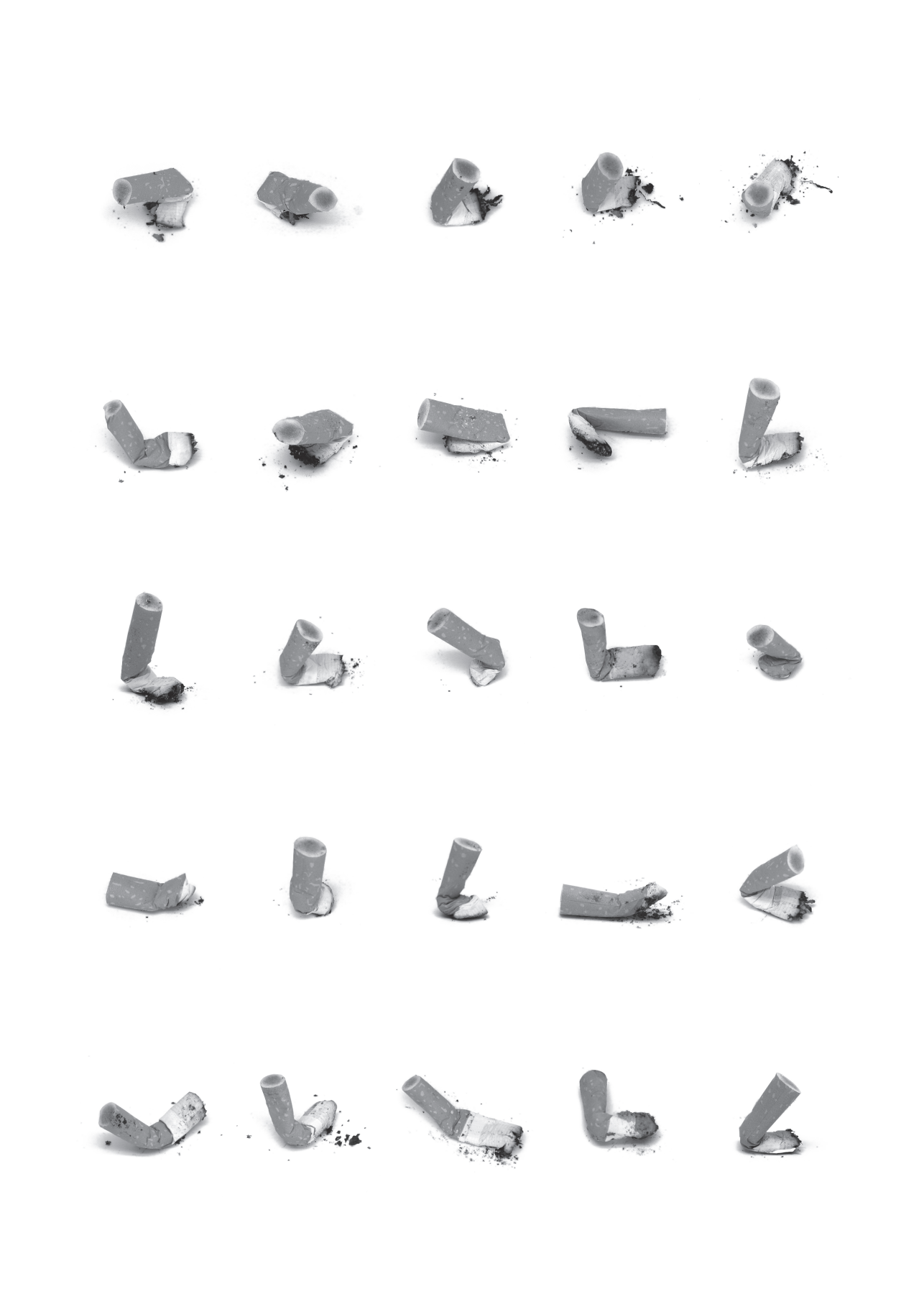
Study name	Events / Total		Statistics for each study			
	Intervention	Control	Relative weight	MH odds ratio	Lower limit	Upper limit
Cummings (Priv) 1989	29 / 218	29 / 148	11,8	0,63	0,36	1,11
Cumming 1989	40 / 388	36 / 348	12,2	1,00	0,62	1,60
Hymowitz 2007	11 / 142	5 / 90	9,1	1,43	0,48	4,25
Joseph 2004	59 / 280	56 / 295	12,4	1,14	0,76	1,71
Sinclair 1998	219 / 224	248 / 268	9,6	3,53	1,30	9,57
Strecher 1991	28 / 156	6 / 47	9,9	1,49	0,58	3,86
Swartz 2002	127 / 275	117 / 241	12,7	0,91	0,64	1,29
Twardella 2007	82 / 377	4 / 54	9,4	3,47	1,22	9,90
Wilson 1988	615 / 1064	108 / 458	12,9	4,44	3,47	5,69
				1,57	0,87	2,84



Analysis 1.7. Number of smokers prescribed a quit date

Study name	Events / Total		Statistics for each study			
	Intervention	Control	Relative weight	MH odds ratio	Lower limit	Upper limit
Cumming 1989	63 / 388	4 / 348	52,1	16,67	6,00	46,32
Strecher 1991	9 / 156	1 / 47	21,4	2,82	0,35	22,82
Wilson 1988	53 / 158	2 / 75	26,6	18,42	4,35	78,00
				14,18	6,57	30,61





3

One-hour training for general practitioners in reducing the implementation gap of smoking cessation care: A cluster-randomized controlled trial

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ABSTRACT

Introduction

This study examined the effectiveness of low-intensity, practice-tailored training for general practitioners (GPs) aimed at personal and organizational barriers that arise when routinely asking patients' smoking status, advising to quit, and arranging follow-up.

Methods

A cluster-randomized controlled trial with 49 GPs and 3,401 patients (677 smokers). Two patient groups participated: 2,068 patients (433 smokers) at baseline and 1,333 patients (244 smokers) post-intervention. At follow-up, 225 smokers of both groups participated. The primary outcome was GP smoking cessation counseling (asking about smoking status, advising to quit, prescribing pharmacotherapy, and referring for behavioural support). Secondary outcomes were GPs' attitudes toward smoking cessation care, patients' intention to quit, and long-term quit rates. Outcomes were measured with GP self-report and patient report.

Results

Patients of trained GPs reported more often being asked about smoking behaviour compared to patients of untrained GPs (OR = 1.94, 95% CI = 1.45–2.60). According to GP self-report, the training increased the provision of quit-smoking advices (difference 0.56 advice per day; 95% CI = 0.13–0.98) and the ability and intention of providing smoking cessation care. We found no effect on GPs' arrangement of follow-up, smokers' intention to quit, and long-term quit rates.

Conclusions

After 1 hour of training, we found significant differences between trained and untrained GPs on the frequency in which they asked about smoking (patient reported) and advised smokers to quit (GP self-reported). The training did not increase prescriptions of pharmacotherapy, referrals to behavioural support, or quit rates. Future training methods should focus on the GPs' ability, tools, and skills to arrange follow-up to ensure intensive smoking cessation support.

INTRODUCTION

General practitioners (GPs) play a key role in the delivery of smoking cessation interventions to their patients. Even a GPs' minimal intervention of advising smokers to quit has the potential to significantly benefit smokers' motivation to quit and smoking abstinence.[1;2] Guidelines recommend that GPs put into practice a systematic approach of asking every patient about tobacco use, advising all smokers to quit, assessing smokers' willingness to make a quit attempt, assisting smokers with treatment and referrals, and arranging follow-up contacts.[3-10] In spite of the well-documented effectiveness of these guidelines[1;6;9], many GPs fail to routinely implement them.[11-13] This results in a substantial evidence-practice gap.

Several factors may affect the implementation of smoking cessation care (SCC) in general practice, related to the health professional and the organisation.[14-16] Personal barriers of GPs that impede the implementation of tobacco support are doubts and concerns regarding their ability to deliver SCC, and the effectiveness and the appropriateness of SCC.[17-20] Also, organisational barriers may hamper guideline implementation, as GPs often report role confusion, time and financial constraints.[20] For this reason, interventions aimed at enhancing the implementation of SCC guidelines should be multifaceted and tailored to the needs of the health professional and organisation.[2;18;21-25]

Training health professionals in improving SCC has been shown to benefit the implementation of counseling tasks, such as asking patients to set a quit date and providing self-help materials, as well as patient smoking abstinence.[26] However, these training programmes often fail to address organisational constraints that impede full implementation of smoking cessation guidelines.[26] Since smoking cessation counseling varies widely between general practices[27], strategies are needed that address the specific constraints GPs deal with in order to maximize the implementation of smoking cessation support and patients' smoking abstinence rates.

Therefore, we developed and examined the effectiveness of a new low-intensity, practice-tailored training method aimed at improving smoking cessation counseling activities of GPs. This method is tailored to the personal and organisational barriers that arise during the implementation of SCC in regular daily practice. In the present study we focus on the implementation of routinely asking patients' smoking status, advising smokers to quit, and arranging follow-up. This simplified approach (also called the A-A-A approach) has recently been introduced in healthcare settings where professionals face insurmountable barriers, such as a lack of time to provide assistance to smokers who want to quit.[28;29] Because preventive tasks, such as intensive lifestyle counseling, are more often delegated

to the practice nurse within Dutch general practice, this simplified approach is a promising solution to reduce the implementation gap of smoking cessation care in general practice.

We hypothesize that our training method will increase GPs' smoking cessation counseling activities, especially the rate at which smokers are identified, advised, and referred. Since we focus on the implementation of GPs' minimal cessation intervention, we expect a small but significant effect on smoker's intention to quit. If trained GPs succeed to increase the rate at which smokers are referred to intensive cessation support, we expect higher rates of long-term smoking abstinence reported by patients of trained GPs.

METHODS

Design

We performed a cluster-randomised controlled trial in general practice. In order to account for a lack of independence between the patients of the same GP, the GP was the unit of randomisation. GPs were matched according to gender, age and practice type and randomly assigned to one of two conditions using a simple randomisation procedure (coin tossing) by an independent researcher not involved in the recruitment of the GPs. Patients were unaware of the allocation during the entire study period. GPs remained unaware about the allocation until after the baseline measurements; thereafter, the GPs were informed about the allocation. GPs in both conditions were aware of the aim of the intervention during the entire study period. The study was approved by the Medical Ethical Board of the Leiden University Medical Centre (P10.125).

Intervention

We earlier conducted a systematic review on the effectiveness of training healthcare professionals in SCC.[26] The results of this meta-analysis show that a single, short training session is likely to be just as effective as multiple longer sessions. Therefore, we developed a single, one-hour training session in order to anticipate time constraints GPs often face. The GP training was delivered by a certified trainer of the Dutch Expert Centre on Tobacco Control (STIVORO) and was based on the 5-A behaviour change model from which we derived the 6 I-Model[4;5]; an Inventory was made of GPs' current knowledge and skills as well as organisational and personal barriers regarding SCC and the GP was Informed about the effectiveness of SCC in general practice. GPs' motivation to implement SCC was Identified and less motivated GPs were Inspired using Motivational Interviewing

techniques, such as exploring and resolving ambivalence.[30] GPs were Instructed on knowledge and skills related to the barriers they indicated. Several themes could be addressed, such as the content of the SCC guideline, behavioural and pharmacological SCC support, skills in motivating smokers to quit, and organisational aspects of SCC, such as task allocation, referral and registration. The training concluded with concrete, individual implementation goals which were summarized into an action plan. In addition, all GPs received a toolkit, which contained a SCC flowchart, a summary of pharmacological support, and leaflets for patients. Afterwards, the GP was given the opportunity to receive additional feedback support (Intervision). GPs in the control condition continued their usual SCC. Usual care can be defined as the SCC that is usually provided by the GP when not being trained, which is likely to vary between the GPs.[27]

Participants

General practitioners

We recruited GPs by letter and a follow-up telephone call. Eligibility criteria were the self-reported number of provided stop-smoking advices per week (maximum of five[31]), in order not to select 'best practice' GPs only. In addition, we selected only one GP per practice in order to prevent contamination. Among 228 GPs who returned the screening questionnaire, 64 agreed to participate. Six GPs were excluded because they provided on average more than 5 stop-smoking advices per week, and another 9 GPs already had a participating colleague in the same practice; this resulted in 49 GPs for randomisation. After randomisation, 4 GPs (3 intervention, 1 control) were partly excluded from further analyses because they did not complete their measurements, leaving 45 GPs for full analysis (22 intervention, 23 control).

Patients

During the study period (January-August 2011), adult patients visiting participating GPs in both conditions were asked to complete a questionnaire after consultation. The baseline group consisted of 2068 patients (1002 intervention, 1066 control) including 433 smokers (195 intervention (19.5%), 238 (22.3%) control) who completed the questionnaire during the three weeks prior to the GP training. The post-intervention group consisted of 1333 patients (630 intervention, 703 control), including 244 smokers (98 intervention (15.6%), 146 (20.8%) control) who completed the questionnaire during the three weeks after the GP training. All smoking patients of both the baseline and post-intervention group were sent a postal questionnaire 9 months after the intervention, which was completed by

225 smokers (112 intervention (response rate 38.2%), 113 control (response rate 29.4%)) (Figure 1).

Outcomes

The primary outcome was GP smoking cessation counseling. Secondary outcomes were GPs' attitudes, self-efficacy and intentions towards implementing SCC, and patients' intention to quit and long-term smoking abstinence.

GPs' smoking cessation counseling

We measured GPs' smoking cessation counseling by means of GP self-report and patient report. At baseline, GPs in both conditions completed a tracking list at the end of 2 working days per week, during 3 consecutive weeks. Questions were about smoking cessation activities during that day (asking, advising, prescribing pharmacological aids, and referring for behavioural support). In the intervention group, GP training in SCC took place within 2 weeks after this first tracking period. One week after the training a second tracking period started for GPs in both conditions. On those days that GPs completed the tracking lists, all adult patients who visited the participating GPs were asked to complete a questionnaire after consultation. These questionnaires included information on socio-demographics and GP performance with regard to SCC.

GPs' attitudes, self-efficacy and intention towards implementing SCC

Secondary endpoints were GPs' attitudes, perceived self-efficacy and intentions regarding routinely implementing SCC, measured with a pre- and post-questionnaire based on previous studies.[32-34]

Patients' smoking behaviour

Patients' intention to quit smoking was dichotomised (0=no intention to quit within 6 months, and 1=intention to quit within 6 months). Smoking patients were sent a postal questionnaire 9 months after the GP training in order to assess long-term smoking abstinence rates. Because patients visit their GP on average 4 times per year, we assumed that most smokers in the baseline group revisited their GP in this 9-month period and as a consequence were exposed to a trained GP (intervention) or non-trained GP (control).[35] Therefore, we included smokers from both the baseline and post-intervention group in the follow-up analyses. We examined self-reported 7-day point prevalence abstinence and continuous abstinence.[36] In total, 225 smokers completed the 9-month follow-up questionnaire (33.7%). Of these responders, 112 smokers consulted a GP in the intervention group (70 at baseline (35.9%) and 42 post-intervention (42.9%)), and

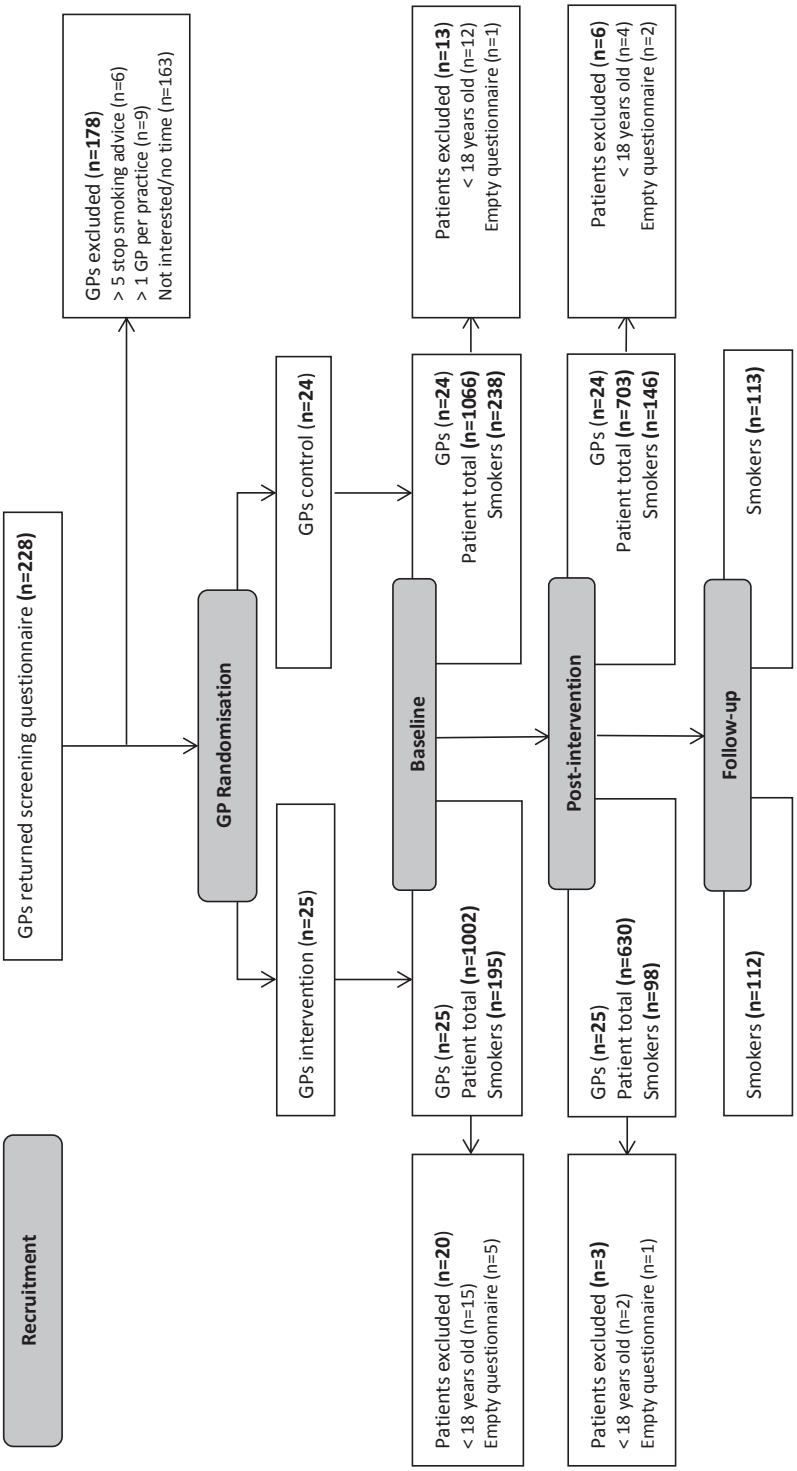

Figure 1. Flowchart of the intervention study

113 smokers consulted a GP in the control group (72 at baseline (30.3%) and 41 post-intervention (28.1%)).

Sample size

Assuming that 21% of the Dutch adult smokers currently receive a stop-smoking advice from their GP[12], to detect a doubled proportion of smoking patients receiving a stop-smoking advice from their GP, with a power of 80% (assuming an ICC of 0.013 and a design effect of 1.104[37] based on 25 clusters), 112 smoking patients per group were required.

Statistical analyses

We compared GP characteristics and practice characteristics between the intervention and control group using the χ2-test and independent samples t-test for dichotomous and continuous data, respectively. In addition, characteristics of patients in the intervention and control group were compared at baseline and post-intervention. The impact of the training on GP-reported outcomes was assessed using linear regression analyses, adjusting for values at baseline. Missing data were imputed according to the last-observation-carried-forward method, assuming that the outcome data did not change post-intervention.[38] The impact of the training on GP smoking cessation activities reported by patients was analysed using generalised estimating equations (GEE) in order to adjust for clustering. In addition, GEE was used to assess smoking abstinence rates of patients at follow-up. Smokers lost to follow-up were treated as not refraining from smoking at follow-up.[39]

RESULTS

GP cessation counseling

General practitioners

None of the GP and practice characteristics showed a significant difference between the intervention and control condition (Table 1). With regard to demographics, the sample was similar to the average Dutch GP population.[40] After adjustment for baseline values, we found a difference for the GP reported mean number of stop-smoking advices provided per day post-intervention (difference 0.56 advice per day; 95% CI=0.13-0.98) (Table 2). There was no significant difference in the mean number of times GPs asked smokers about smoking status, referred for behavioural support and prescribed pharmacological aids.

Table 1. Background characteristics of participating GPs and practices

GP characteristics	Intervention (n=25)	Control (n=24)
Gender, male	16 (64%)	12 (50%)
Cultural background, Dutch	24 (96%)	22 (92%)
Years of employment, > 10 years	19 (76%)	19 (79.2%)
Smoking status		
Smoker	0 (0%)	2 (8.3%)
Ex-smoker	8 (32%)	7 (29.2%)
Previous training in SCC	11 (44%)	8 (33.3%)
Age in years (M, SD)	49.9 (8.1)	51.3 (8)
Patients seen per week (M, SD)	115.8 (39.8)	109.5 (46.7)
Hours of work per week (M, SD)	38.3 (9.0)	38.1 (10.4)
Practice characteristics		
Type of practice		
Single-handed	12 (48%)	10 (41.7%)
Duo	6 (24%)	9 (37.5%)
Group	5 (20%)	2 (8.3%)
Health care centre	2 (8%)	3 (12.5%)
Number of practice nurses		
None	1 (4%)	3 (12.5%)
1 practice nurse	17 (68%)	16 (66.7%)
2 or more practice nurses	7 (28%)	5 (20.8%)
Previous training in SCC practice nurse	19 (76%)	14 (58.3%)

GP=general practitioner, SCC=smoking cessation care, M=mean, SD=standard deviation. Differences were examined using χ^2-tests for dichotomous variables and independent samples t-tests for continuous variables

Patients

Table 3 reports the characteristics of patients at baseline, post-intervention and at follow-up. At baseline, more patients in the control group reported a chronic airway disease compared to the intervention group (15.4% vs. 12.4%; p=0.03). Post-intervention, patients in the control group were younger, more often reported a non-Dutch cultural background and being a smoker (Table 3). After adjustment for clustering effects and patient background characteristics, a time-by-condition interaction was found for patients' report of being asked about smoking status (OR=1.94, 95% CI=1.43-2.60) (Table 2); patients in the intervention group who visited their GP post-intervention reported being asked about their smoking status more often than patients who visited their GP prior to the training. We found no effect on patient's report of being advised to quit

Table 2. Effect of GP training in SCC on smoking cessation activities by GPs (GP self-report and patient-report) and on patients' intention to quit smoking

	Baseline				Post-intervention					
GP self-report, SCC [a]	Intervention (n=22)	Control (n=23)	B (95% CI)	P	Intervention (n=22)	Control (n=23)	B (95% CI)	P		
Asked about smoking status	2.94 (1.80)	4.09 (5.19)	-1.15 (-3.51 – 1.21)	0.33	4.98 (0.62)	3.27 (0.60)	1.71 (-0.04 – 3.46)	0.06		
Advised to quit	1.09 (0.75)	1.43 (2.11)	-0.33 (-1.29 – 0.63)	0.50	1.61 (0.15)	1.05 (0.15)	0.56 (0.13 – 0.98)	0.01		
Provided pharmacotherapy	0.10 (0.12)	0.10 (0.18)	-0.002 (-0.09 – 0.09)	0.96	0.10 (0.03)	0.09 (0.03)	0.01 (-0.08 – 0.10)	0.87		
Arranged follow-up or referred	0.49 (1.04)	0.29 (0.38)	0.20 (-0.26 – 0.67)	0.38	0.56 (0.16)	0.26 (0.15)	0.30 (-0.14 – 0.74)	0.18		
Patient report, SCC [b]	Intervention (n=1002)	Control (n=1066)	OR (95% CI)	P	Intervention (n=630)	Control (n=703)	OR (95% CI)	P	Time X Group Interaction OR (95% CI)	P
Asked about smoking status [c]	32.7%	40.8%	0.79 (0.47-1.33)	0.37	41.5%	37.1%	1.60 (0.83-3.08)	0.16	1.94 (1.45-2.60)	<0.00
Smoker report, SCC	Intervention (n=195)	Control (n=238)	OR (95% CI)	P	Intervention (n=98)	Control (n=146)	OR (95% CI)	P	OR (95% CI)	P
Asked about smoking status [c]	45.2%	56.0%	0.74 (0.37-1.51)	0.41	53.1%	54.5%	1.27 (0.48-3.19)	0.68	1.79 (0.96-3.32)	0.07
Advised to quit [c]	40.2%	43.8%	0.79 (0.43-1.43)	0.43	43.3%	44.1%	1.37 (0.49-3.84)	0.56	1.70 (0.71-4.06)	0.24
Provided with pharmacotherapy [c]	17.4%	16.4%	1.38 (0.71-2.69)	0.34	13.3%	19.9%	0.76 (0.29-1.96)	0.57	0.54 (0.22-1.36)	0.54
Arranged for follow-up or referred [c]	12.3%	8.8%	1.43 (0.75-2.74)	0.28	16.0%	9.8%	2.38 (0.97-5.86)	0.06	1.40 (0.49-4.14)	0.52
Intention to quit smoking [d]	33.1%	33.3%	1.10 (0.70-1.70)	0.70	34.4%	37.7%	0.98 (0.55-1.73)	0.93	0.95 (0.46-1.98)	0.90
GP self-report, attitudes	Intervention (n=25)	Control (n=24)	B (95% CI)	P	Intervention (n=22)	Control (n=23)	B (95% CI)	P		
Attitude [e]	2.86 (0.39)	2.72 (0.54)	0.14 (-0.13 – 0.41)	0.30	2.84 (0.08)	2.65 (0.08)	0.19 (-0.05 – 0.43)	0.11		
Perceived self-efficacy [e]	2.56 (0.44)	2.39 (0.45)	0.18 (-0.08 – 0.43)	0.18	2.69 (0.07)	2.43 (0.07)	0.26 (0.05 – 0.46)	0.02		
Intention [f]	1.88 (1.09)	1.46 (0.78)	0.42 (-0.13 – 0.97)	0.13	2.32 (0.22)	1.00 (0.23)	1.32 (0.67 – 1.97)	0.00		

GP=general practitioner, SCC=smoking cessation care, B=unstandardised regression coefficient indicating difference, OR=odds ratio, CI=confidence interval

[a] Average number of smoking cessation activities per day measured on a continuous scale

[b] Generalised Estimating Equations adjusted for clustering and patient characteristics

[c] Control group = reference category

[d] No intention to quit within 6 months = reference category

[e] 5-point scale: 0=very negative attitude/low perceived self-efficacy; 4=very positive attitude/high perceived self-efficacy

[f] 4-point scale: 0=no intention within 6 months; 1=intention within 6 months; 2=intention within one month; 3=already full implementation

Table 3. Characteristics of participating patients at baseline, post-intervention and 9-month follow-up

	Baseline n=2068			**Post-intervention** n=1333			**9 month follow-up** n=225[a]		
	Intervention n=1002 (48.5%)	Control n=1066 (51.5%)	P	Intervention n=630 (47.3%)	Control n=703 (52.7%)	P	Intervention n=112 (49.8%)	Control n=113 (50.2%)	P
Age in years, M (SD)	52.9 (16.7)	52.2 (17.4)	ns	54.0 (16.2)	52.3 (17.3)	0.01	51.7 (14.9)	48.9 (14.3)	ns
Gender, Men	374 (37.3%)	425 (39.9%)	ns	282 (44.8%)	278 (39.5%)	ns	62 (55.9%)	45 (40.2%)	0.02
Cultural background, Dutch	918 (91.6%)	933 (87.5%)	ns	586 (93.0%)	626 (89.0%)	0.01	111 (99.1%)	106 (94.6%)	ns
Education level									
High	375 (37.4%)	401 (37.6%)	ns	250 (39.7%)	294 (41.8%)	ns	41 (36.6%)	34 (30.4%)	ns
Medium	356 (35.5%)	349 (32.7%)	ns	203 (32.2%)	215 (30.6%)	ns	37 (33.0%)	41 (36.6%)	ns
Low	224 (22.4%)	242 (22.7%)	ns	145 (23.0%)	162 (23.1%)	ns	33 (29.5%)	35 (31.2)	ns
Physical condition									
Chronic airways disease	124 (12.4%)	164 (15.4%)	0.03	73 (11.6%)	78 (11.1%)	ns	20 (17.9%)	22 (19.5%)	ns
Diabetes	73 (7.3%)	90 (8.4%)	ns	42 (6.7%)	60 (8.2%)	ns	11 (9.8%)	8 (7.1%)	ns
Cardiovascular disease	125 (12.5%)	108 (10.1%)	ns	78 (12.4%)	84 (12.0%)	ns	17 (15.2%)	8 (7.1%)	ns
Pregnant	5 (0.5%)	7 (0.7%)	ns	3 (0.5%)	6 (0.9%)	ns	1 (0.9%)	0 (0.0%)	ns
Smoker	195 (19.5%)	238 (22.3%)	ns	98 (15.6%)	146 (20.8%)	0.01			

ns=not significant, M=mean, SD=standard deviation
Differences were examined using $\chi 2$-tests for dichotomous variables and independent samples t-tests for continuous variables
[a] Smokers at baseline and post-intervention were included into the follow-up measurement

smoking, being prescribed pharmacotherapy, or being referred for behavioural support (Table 2).

GPs' attitudes, self-efficacy and intention

We found an effect of the training on GPs' perceived self-efficacy and intention towards implementing SCC (Table 2).

Patient's intention to quit and smoking abstinence

After adjustment for clustering effects and patient background characteristics, we found no effects of the GP training on smokers' intention to quit (Table 2). Nine months after the GP training, more patients in the intervention group (baseline and post-intervention) completed the follow-up questionnaire compared to patients in the control group (38.2% vs. 29.4%; p=0.02). We compared patients who completed the follow-up questionnaire with patients who did not complete the questionnaire. The patients did not differ on the background characteristics they filled out in the first questionnaire (age, gender, cultural background, and educational level). Also, responders and non-responders did not differ on the number of times they reported being asked about their smoking behaviour, were advised to quit, were prescribed pharmacotherapy or were referred for behavioural counseling during the GP visit, as indicated in the first questionnaire. After controlling for clustering effects and patient background characteristics, 26.8% of patients in the intervention group reported not having smoked during the past 7 days and 10.8% refrained from smoking since they completed the first questionnaire (Table 4). In the control group 25.0% and 7.1% of the patients reported 7-day point prevalence abstinence and continuous abstinence, respec-

Table 4. Effect of GP training in smoking cessation care on patient smoking behaviour at 9 month follow-up with different assumptions about smoking behaviour of non-responders

% non-smokers, not including non-responders	Intervention (n=112)	Control (n=113)	OR (95% CI) [a]	P
Point prevalence abstinence	26.8%	25.0%	1.07 (0.57-2.00)	0.89
Continuous abstinence	10.8%	7.1%	1.62 (0.60-4.34)	0.34
% non-smokers, assuming that all non-responders smoke	Intervention (n=293)	Control (n=384)	OR (95% CI) [a]	P
Point prevalence abstinence	10.2%	7.3%	1.33 (0.77-2.31)	0.30
Continuous abstinence	4.1%	2.1%	1.93 (0.77-4.89)	0.16

GP=general practitioner, OR=odds ratio, CI=confidence interval
Generalised Estimating Equations adjusted for clustering effects and patient characteristics
[a] Control group = reference category

tively. We did not find an effect on long-term patient smoking behaviour (Table 4). Also, when analysing responders of the baseline and post-intervention group separately, no effect of the GP training on long-term smoking abstinence was found (data not shown). We performed a sensitivity analysis using the conservative assumption that non-responders did not change their behaviour and still smoked at follow-up.[39] This analysis did not change the findings on long-term patients smoking abstinence rates (Table 4).

DISCUSSION

Major findings

This study evaluated the effectiveness of a low-intensity, practice-tailored training in smoking cessation care (SCC) for GPs, addressing both personal and organisational barriers that arise during the implementation of these counseling activities. After the training we found significant differences between trained and untrained GPs on the frequency they asked about smoking (according to the patients) and gave advice to quit (according to the GPs themselves).

However, we did not find an effect on the arrangement of follow-up support, neither on provision of pharmacological therapy, nor on referrals for behavioural support. In addition, we found no effects on patients' intention to stop smoking after GP consultation and long-term cessation rates.

Study findings compared to previous research

Our training managed to increase the frequency at which patients reported being asked about smoking, and at which GPs reported the provision of stop-smoking advices. Compared to several other training programmes that did not find an increase in these counseling activities, this is a hopeful outcome.[41-43] However, we found relatively small rates of smokers for whom GPs had arranged referral and follow-up; other studies found rates of behavioural follow-up ranging from 25-59% and pharmacological prescriptions from 14-37%.[41-45]

With regard to the long-term effect of the GP training on patients' smoking behaviour, a recent meta-analysis of 14 studies found comparable long-term quit rates as a result of training health professionals in smoking cessation care.[26] However, the majority of the individual studies within this meta-analysis did not confirm statistical significance between quit rates in the intervention and control group, which is in line with our finding. Although our data suggest that trained GPs more often advised smokers to quit, they failed to increase referral rates and the intention to quit of smokers. This might explain the lack of long-term

results. A study of McRobbie et al. has shown the effectiveness of a brief training session addressing skills for referral of smokers on the number of GP referrals to evidence-based cessation support.[46] In addition, more and more studies show the increasing role and effectiveness of in-practice cessation support delivered by practice nurses.[47-51] Moreover, referring and connecting smokers to evidence-based quit lines is likely to increase smoking cessation.[29;52]

Strengths and limitations

Some limitations with regard to the study design should be considered when interpreting the results of our study. First, the exact response rate of patients who completed the questionnaire at baseline and post-intervention is unknown. Reasons for non-response might be attributed to GPs who did not hand over the patient questionnaires, or to patients who forgot or were unwilling to complete the questionnaire.

Second, participating GPs relatively often advised their patients to quit at baseline (40.2% and 43.8%, respectively, compared to only 21% found in another Dutch study.[12] An explorative analysis showed that the GPs' awareness of the aim of the intervention and completing tracking lists regarding smoking cessation counseling might make them more prone to ask about smoking, compared to GPs that did not complete tracking lists and were unaware of the study topic (data not shown). Despite this possible priming effect, we found an additional significant effect of the training on the number of times patients who were asked about their smoking status (patient-reported) and advised to quit (GP-reported).

A third limitation is the fact that smoking abstinence at follow-up was self-reported and lacked biochemical verification due to financial constraints. In addition, a large number of patients were lost to follow-up (66.4%), especially in the control group (69.9%). Attrition is common in lifestyle intervention trials, which may affect the study power, cause bias and threaten generalisability.[53]

Fourth, the different sources were slightly inconsistent. On the one hand, GPs reported an increase in the number of stop-smoking advices. On the other hand, patients only reported a significant increase in the number of times they were asked about their smoking status. This discrepancy is in line with other studies, reporting a lack of agreement between patient and provider surveys when measuring tobacco counseling actions.[54-57] This might be explained by patients' perception of a stop-smoking advice as being embedded in a general discussion about smoking behaviour and therefore have escaped their attention. This could have led to recall bias and may have contributed to the lack of effect on patients' motivation to quit and long-term smoking cessation. Finally, a minority of the participating GPs did not have direct access to smoking cessation programmes of

a (trained) practice nurses during the study period, which may have contributed to the lack of effect on GPs' referrals for behavioural cessation support.

Nevertheless, the major strengths are the pragmatic nature of this study (a low-intensity and pragmatic training method) in a specific setting (GP practice), tested in a cluster-randomised controlled trial preventing contamination between GPs, with outcome measures being assessed on both short-term GP and long-term patient level.

Conclusions

Our low-intensity, practice-tailored training for GPs in the implementation of asking patients' smoking status, advising smokers to quit, and arranging referral and follow-up does not lead to an increased patient access to more intensive smoking cessation support. Future training methods should also include practice nurses and focus on the GPs' role as gatekeeper for referring or connecting smokers to cessation support, such as quit lines and practice nurses. This approach is likely to ensure pharmacological and behavioural cessation support and increase patient abstinence rates.

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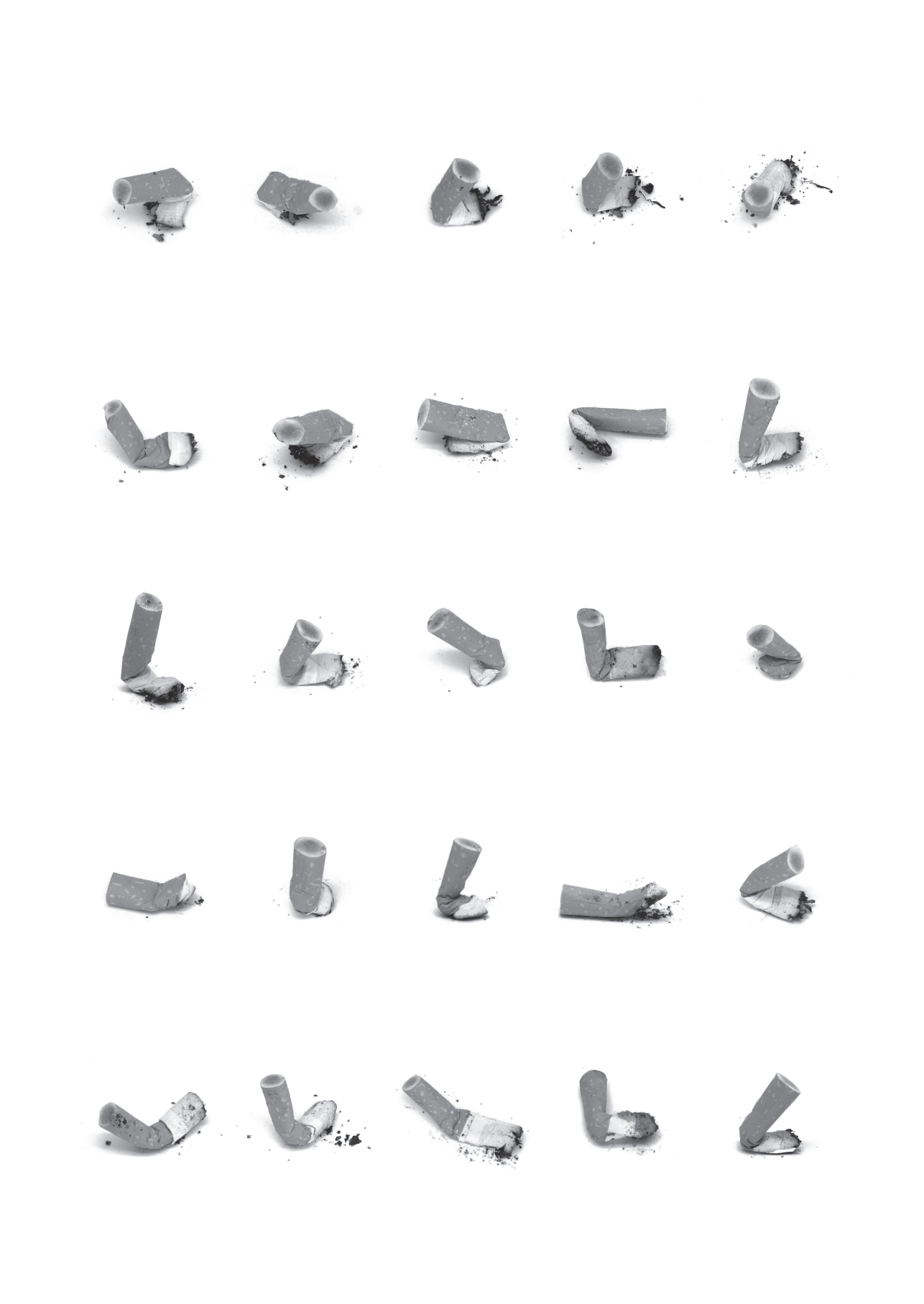

4

Use of action planning to increase provision of smoking cessation care by general practitioners: Role of plan specificity and enactment

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Submitted

ABSTRACT

Background

Strategies are needed to help general practitioners (GPs) to promote smoking cessation as recommended by guidelines. This study examines whether the quality of action planning among GPs improves their provision of smoking cessation care.

Methods

The effectiveness of a 1-hour training programme was examined in a cluster randomized controlled trial in which 49 GPs participated. GPs who followed the training (intervention group; n = 25) formulated action plans related to i) enquiring about smoking, ii) advising to quit smoking, and iii) arranging follow-up for smokers motivated to quit. GPs also formulated a coping plan for encountering smokers not motivated to quit. The quality of these plans (i.e. plan specificity) was rated and, 6 weeks after the training, GPs reported on the performance of these plans (i.e. plan enactment). Multilevel regression analyses were used to examine the effects of plan specificity and plan enactment on patient-reported smoking cessation activities of the GPs in the intervention group (n=1632 patients) compared with the GPs in the control group (n=1769 patients). In these analyses, the changes in time (baseline versus post-intervention) were examined and compared to the control group.

Results

Compared to the control group, GPs who formulated a highly specific action plan during the training asked their patients about smoking more often after the training compared to prior to the training (OR 2.11, 95% CI 1.51-2.95). GPs were most likely to have asked patients about smoking after the training compared to prior to the training when they had enacted a highly specific formulated action plan (OR 3.08, 95% CI 2.04-4.64). The effects of GP plan specificity and plan enactment on asking patient about smoking were most prominent among GPs who, at baseline, intended to provide smoking cessation care.

Conclusions

A highly specific action plan formulated by a GP on when, how and by whom patients will be asked about smoking had a positive effect on GPs' asking patients about smoking, especially when these professionals also reported to have enacted this plan. This effect was most prominent among GPs who intended to provide smoking cessation care prior to the intervention. Training in devising

personalised coping plans is recommended to further increase GPs' provision of advice to quit smoking and arranging follow-up support to quit smoking.

INTRODUCTION

Current guidelines recommend that general practitioners (GPs) routinely ask patients about smoking, advise them to quit, assess their motivation to quit, assist them with quitting, and arrange follow-up quit smoking support (the 5-A Model).[1;2] However, GPs report difficulties when translating these guidelines into practice[3-7] resulting in a substantial gap between evidence and practice. A study in Dutch general practice showed that 79% of all smokers and 40% of smokers who discussed smoking with their GP, did not receive stop-smoking advice.[8] The development of strategies that facilitate the implementation of guideline-recommended smoking cessation care may result in more patients being advised to quit and being provided with evidence-based quit-smoking support and, ultimately, giving up smoking.[9-11]

Strategies to facilitate the implementation of evidence-based clinical guidelines often focus on influencing the behaviour of the healthcare professionals.[12-15] Efforts to change the clinical behaviour of healthcare professionals often involve didactic modes of delivery aimed at educating these professionals.[13-15] However, this approach implies a lack of knowledge and assumes that additional knowledge will change the behaviour of healthcare providers, neither of which may necessarily be true. In fact, enhancing knowledge alone may not be the best, or even an adequate strategy, to influence the clinical behaviour of healthcare professionals.[16] Similarly, the motivation and/or the beliefs of GPs to routinely adopt evidence-based guidelines are not always a reliable predictor of the routine implementation of these guidelines.[17]

Psychological theories may provide a basis for identifying the predictors of GP behaviour and of behaviour change.[16] Clinical practice is a form of human behaviour that is sensitive to theory-based strategies that have proven effective in patient samples.[18-22] However, a systematic review showed that only a minority of the 235 interventions that previously aimed to facilitate guideline implementation by healthcare professionals actually used theory-based strategies.[12]

One of the well-established theory-based strategies (albeit in other populations) is the self-formation of 'conditional plans', such as action plans and coping plans.[23;24] Action plans in the form of if-then plans (i.e. 'implementation intentions'[25]) link a situational cue to behaviour in order to promote behaviour change and habit formation, e.g. *'if X occurs (if the patient visits me because of a cough more*

than 3 times a year), then I will do Y (I will advise the patient to quit smoking)'. Coping plans anticipate potential barriers to behaviour change which impede action plans from working. Such plans aim to bridge the gap between the individual's intention to perform the behaviour and the actual performance of that behaviour.[26;27]

The mechanisms that underlie the effectiveness of action and coping plans involve a heightened accuracy and speed of detecting the contextual cue for performing the intended behaviour.[28-31] Plans that are more specific are suggested to result in a greater improvement of the intended behaviour compared to incomplete or vague plans.[32;33] In addition, studies have shown that individuals who act according to their formulated action plans (i.e. plan enactment) are more likely to benefit from their plans, e.g. enacting an action plan to remove all tobacco products results in a higher likelihood to actually quit smoking.[34;35] The effects of plan specificity and enactment on behaviour are strongest among those individuals who are the most motivated to change the intended behaviour.[32-34;36]

It has been shown that planning predicts the clinical behaviour of GPs in various conditions.[37-39] Moreover, an intervention study showed that incorporating planning in postgraduate education increased the use of a practitioner-guided procedure among mental health professionals.[36] However, to our knowledge, no studies have examined whether planning improves the provision of evidence-based smoking cessation care by GPs.

The present study incorporates action planning within a training session for GPs, aimed at increasing their provision of smoking cessation tasks as recommended in clinical guidelines, including asking patients about smoking, advising them to quit, and arranging follow-up quit smoking support for smokers. Because GPs often indicate that patients' lack of motivation to quit may act as a barrier to the provision of guideline-recommended smoking cessation care[40-43], GPs also formulated a coping plan to address this potential barrier.

Based on the reported positive effects of action planning in patient samples[44-46], we hypothesized that GP action planning would improve their performance of these smoking cessation tasks. Secondly, we hypothesized that formulating a coping plan for smokers who are not motivated to quit provided GPs with a solution for this type of barrier, thereby increasing the provision of smoking cessation care for this group.[39;47-51] Since the present GP training includes multiple behaviour change strategies, we also examined the nature of action planning including plan specificity and plan enactment. In line with previous findings on plan specificity and self-reported plan enactment[32-36], we hypothesized that GPs who formulated a highly specific plan and reported a high level of plan enactment would be more likely to provide smoking cessation care post-training. Finally, we hypothesized that these effects would be most evident among GPs

with high intention to routinely implement smoking cessation care prior to the training.

METHODS

Design and intervention

The present paper reports the results of a two-group cluster randomized controlled trial in general practice. GPs were randomly assigned to either the intervention or control condition. The intervention entailed a 1-hour individual training session for GPs in the delivery of smoking cessation care. The training was based on behaviour change techniques related to methods that underlie the current Dutch guidelines for treating tobacco addiction (the 5-A Model [2;52]): 1) GPs' implementation barriers were identified, 2) GPs were provided with state-of-the-art evidence about the effectiveness of smoking cessation care, 3) GPs' motivation to routinely implement the guideline was identified and improved using motivational interviewing techniques, 4) GP instruction was provided and tailored to the identified implementation barriers, and 5) GPs were given the opportunity to receive additional feedback support. Action planning was the final component of the GP training programme. Previously, the effects of the multicomponent training on GPs' provision of smoking cessation care were tested and reported elsewhere.[53] Action planning was one of the components of the GP training and our initial RCT did not provide insight into the effects of this single behaviour change technique. Therefore, the present study focuses on a further examination of the effects and nature of action planning among the trained GPs.

Participants

During the study period (January-August 2011) 25 GPs received a 1-hour training programme that incorporated action planning. At baseline (pre-intervention) these 25 GPs saw 1002 patients, of whom 195 (19.5%) were smokers. Post-intervention, the same GPs saw a different group of 630 patients, of whom 98 (15.6%) were smokers. In the control condition, 24 GPs and 1769 patients (baseline: 1066, post-intervention: 703) were included, of whom 384 (21.7%) were smoking patients (baseline: 238 (22.3%), post-intervention: 146 (20.8%)).

Measurements

GP intention

Six weeks prior to the training programme, GPs rated their intention to implement guideline-recommended smoking cessation care on a 4-point scale ('*no intention to routinely implement smoking cessation treatment within six months*' (0), '*intention to routinely implement smoking cessation treatment within six months*' (1), '*intention to routinely implement smoking cessation care within one month*' (2), and '*already routinely implemented smoking cessation treatment*' (3). To facilitate testing of the hypotheses, we used a post-hoc categorisation in line with the principles from the Health Action Process Approach[54] to classify GPs into three groups depending on their response to the question about their intention: 1) 'GP pre-intenders' (answer category 0; 4 GPs, 393 patients), 'GP intenders' (answer category 1 and 2 combined; 14 GPs, 2211 patients), and 'GP actors' (answer category 3; 7 GPs, 797 patients).

Patient-reported provision of smoking cessation care

During the three weeks prior to and after the GP training programme, all patients completed a questionnaire immediately after their GP consultation in which they rated their GP's smoking cessation activities during that consultation. This questionnaire included the following items: '*Did your GP ask you about smoking during the consultation?*', '*Did your GP advise you to quit during the consultation*'? and '*Did your GP refer you to any kind of follow-up quit smoking support during the consultation*'? For each item, patients could answer '*Yes*' (1) or '*No*' (0).

Action planning

During the GP training programme, action planning was assessed based on the separate plans formulated by the GP for: a) identifying smokers, and b) advising smokers to quit. GPs wrote down *who* was going to perform the activity, *when* the activity was going to be performed, and *how* the activity was going to be registered in the patient's electronic health record. In addition, GPs formulated an action plan for c) arranging follow-up for smokers who are motivated to quit, and a coping plan for d) arranging follow-up for smokers who are not motivated to quit. In these plans, GPs formulated the *what*, *who* and *how* of each plan. This method is comparable to that used in similar studies with patient samples. [32]

Specificity of GP plans

The degree of specificity of each of the components of the GPs' plans (*who*, *when*, *what* and *how*) was assessed using a rating method based on previous studies. [32;33;35] The *who component* of the plans was rated as *not completed* (0) or *completed*

(1). The when, what, and how components of the plans were rated on a 4-point scale; components were rated as *not completed* (0) if GPs did not write down any plans, and components were rated as being *low specific* (1) when GPs described them in rather general terms, e.g. '*I will ask my patients about their smoking during the consultation*'. Components that were specified with moderate precision were rated as being *moderately specific* (2), e.g. '*I will ask my patients about their smoking, routinely once a year*'. A component was rated as being *highly specific* (3) when GPs specified their future action with a sufficient amount of precision e.g. '*I will ask my patients about their smoking when they present with smoking-related complaints during the consultation*'.

Analyses of the *when component* showed that GPs specified either a particular moment (e.g. during the consultation), or a particular type of patient (e.g. patients with smoking-related complaints), or both; therefore, we decided to rate both these types of specifications. As a result, the total specificity score for the first two action plans (asking about smoking and advising to quit) ranged from 0-10, and for the third action plan (dealing with smokers who were motivated to quit) and the coping plan (dealing with smokers who were not motivated to quit) scores ranged from 0-7 (Appendix 1).

Two researchers independently rated the specificity of all components of the GPs' plans. Kappa statistics were used to estimate the inter-rater agreement; this resulted in a high level of agreement between the two researchers for the total specificity scores of the GPs' plans: i.e. for asking about smoking 0.998 (95% CI 0.995-0.999), for advising to quit 0.940 (95% CI 0.864-0.973), for arranging follow-up for smokers who are motivated to quit 0.945 (95% CI 0.850-0.978), and for arranging follow-up for smokers not motivated to quit 0.962 (95% CI 0.907-0.984). These high kappa coefficients are probably due to the type of rating method used. Disagreements were discussed until consensus was achieved. For analyses, the GPs' total plan specificity scores were categorised into low (1) and high (2) scores, using the mean score as a cut-off.

Enactment of GP plans

After the GP training, we were interested in providing the GPs in the intervention group with their self-formulated if-then plans and ask them if they had the opportunity to enact them. Therefore, six weeks after the GP training programme, via a postal questionnaire, the GPs were asked to report the extent of plan enactment (response rate 76%; n=19). In this questionnaire, each GP was provided with the four plans that they had previously formulated. GPs were asked to rate the extent to which they had enacted each plan using a 5-point scale: '*plan not enacted, not intending to enact in the future*' (0), '*plan not enacted, intending to enact*

within one month'(1), '*plan not enacted, intending to enact within a week*' (2), '*plan partly enacted* (3),'*plan fully enacted* (4). For missing data, a negative scenario was applied which assumed that GPs who did not complete the questionnaire did not enact their plans (score 0). For the analyses, scores for plan enactment were categorised into low (1) and high (2) scores using the mean score as a cut-off.

Statistical analysis

Descriptive statistics were used for the characteristics of the GPs and for scores on specificity of the GP plan and on plan enactment. To test our hypotheses, we linked GP data with patient data and analysed these using two-level logistic regression analyses (generalised estimating equations), including data at the GP and patient level.

In our model, data at the GP level included scores on plan specificity and plan enactment as independent variables. To examine the main effects of these variables on GPs' provision of smoking cessation care (patient-reported), all patients were classified into three categories, i.e. patients who had a consultation with a GP who had formulated a highly specific plan/reported a high level of plan enactment (2), patients who had a consultation with a GP who had formulated a low specific plan/reported a low level of plan enactment (1), and patients who had a consultation with a GP within the control condition (0).

Data at the patient level included GPs' provision of smoking cessation care, as reported by patients, as dependent variables, including being asked about smoking, being advised to quit, and being provided with quit smoking follow-up. Patient-reported smoking cessation care was included as a dichotomous variable (1=yes, 0=no). The model was adjusted for differences between characteristics of the patients who visited the GPs in the intervention and control condition (gender, cultural background and smoking status).

Univariate analysis was used to examine the main effects of GP plan specificity and GP-reported plan enactment on their provision of smoking cessation care (as reported by patients). In addition, interaction analysis was used to examine whether or not the effects of GP plan specificity on the delivery of care, depended on the extent of GP plan enactment. Finally, subgroup analyses were performed to examine whether the effects of GP plan specificity and plan enactment on delivered smoking cessation care, differed between GPs with different baseline intentions to routinely implement smoking cessation care. In all models, we included Time (baseline (0)/post-intervention (1)) by Group (control group (0)/ low plan specificity or low plan enactment (1)/high plan specificity or high plan enactment (2)) interaction effects since we included different cohorts of patients at baseline and post-intervention.

RESULTS

Sample characteristics

Of the 49 participating GPs, 28 (57.1%) were men and 38 (77.6%) had worked more than 10 years as a GP; in addition, the majority worked on average 38 h/week, had a mean age of 50 years. Most of these GPs worked in collaboration with one (n=33; 67.3%) or two (n=12; 24.5%) practice nurses. None of the GP characteristics were significantly different between the intervention and control condition. A detailed overview of the background characteristics of participating GPs and patients is reported elsewhere.[53]

Specificity and enactment of GP plans

Descriptive data with regard to the specificity of GPs' plans are presented in Table 1. Most GPs completed all components of their action plans and coping plan. With regard to the 'when' component, most GPs described *a type of moment* for which they planned to ask about smoking or advise to quit, instead of a *type of patient* for who they planned to provide this care. Only a minority of the GPs described the *type of moment* or the *type of patient* highly specific, such as '*I'll ask my patient about smoking, when I make a risk profile of the patient*' (moment) or '*I'll ask all patients with a chronic illness about smoking*' (patient). Only a few GPs described highly specific what the planned to do when they would encounter a smoker who is motivated or unmotivated to quit, such as '*When I encounter a smoker who is motivated to quit, I will discuss the (dis)advantages of quitting, motivation to quit, and I will make a quit plan*' or '*When I encounter a smoker who is not motivated to quit, I'll ask the patient's permission to discuss their smoking behaviour again during the next consultation*'. Most GPs described highly specific *how* they planned to register the activities in the electronic patient record, for example using the '*International Classification of Primary Care*'. Most GPs who formulated an action plan for asking patients about smoking highly specific also reported a high level of plan enactment (n=6/9, 66.7%). Similar associations were found between GP plan specificity and plan enactment in the other action and coping plans. However, some GPs who described their plans low specific reported a high level of plan enactment, and vice versa.

Effect of GP plan specificity and enactment on provision of smoking cessation care

Table 2 and 3 show the effects of plan specificity and plan enactment, respectively, on GPs' provision of smoking cessation care, contrasting patients seen by GPs in the control group. With regard to GPs task of 'asking about smoking', all

Table 1. Specificity and enactment of GPs' plans to provide guideline-recommended smoking cessation care

		GP action plans		GP coping plan
	Ask about smoking	**Advise to quit**	**Arrange follow-up motivated to quit***	**Arrange follow-up unmotivated to quit***
Plan specificity (score)	(n=25, 100%)	(n=25, 100%)	(n=25, 100%)	(n=25, 100%)
Who, completed (1)	24 (96.0%)	24 (96.0%)	22 (88.0%)	21 (84.0%)
*When (moment) / What**				
Not completed (0)	6 (24.0%)	6 (24.0%)	2 (8.0%)	3 (12.0%)
Low specific (1)	13 (52.0%)	14 (56.0%)	6 (24.0%)	8 (32.0%)
Medium specific (2)	3 (12.0%)	4 (16.0%)	13 (52.0%)	5 (20.0%)
Highly specific (3)	3 (12.0%)	1 (4.0%)	4 (16.0%)	9 (36.0%)
Total score, M (SD)	1.12 (0.93)	1.00 (0.76)	1.76 (0.83)	1.80 (1.08)
When (type patient)				
Not completed (0)	20 (80.0%)	20 (80.0%)	n.a.	n.a.
Low specific (1)	0 (0.0%)	1 (4.0%)	n.a.	n.a.
Medium specific (2)	1 (4.0%)	3 (12.0%)	n.a.	n.a.
Highly specific (3)	4 (16.0%)	1 (4.0%)	n.a.	n.a.
Total score, M (SD)	0.56 (1.16)	0.40 (0.87)	n.a.	n.a.
How register				
Not completed (0)	2 (8.0%)	1 (4.0%)	4 (16.0%)	5 (20.0%)
Low specific (1)	4 (16.0%)	5 (20.0%)	7 (28.0%)	6 (24.0%)
Medium specific (2)	2 (8.0%)	6 (24.0%)	8 (32.0%)	10 (40.0%)
Highly specific (3)	17 (68.0%)	13 (52.0%)	6 (24.0%)	4 (16.0%)
Total score, M (SD)	2.36 (1.04)	2.24 (0.93)	1.64 (1.04)	1.52 (1.01)
Total specificity score, M (SD)[a]	5.00 (2.10)	4.60 (1.66)	4.28 (1.79)	4.12 (2.03)
Plan enactment (score)				
Plan not enacted, not intending to in the future (0)	10 (40.0%)	12 (48.0%)	11 (44.0%)	15 (60.0%)
Plan not enacted, intending to within one month (1)	2 (8.0%)	2 (8.0%)	0 (0.0%)	1 (4.0%)
Plan not enacted, intending to within a week (2)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (4.0%)
Plan partly enacted (3)	8 (32.0%)	6 (24%)	3 (12.0%)	3 (12.0%)
Plan fully enacted (4)	5 (20.0%)	5 (20.0%)	11 (44.0%)	5 (20.0%)
Total enactment score, M (SD)[b]	1.84 (1.70)	1.60 (1.73)	2.12 (1.94)	1.28 (1.72)

GPs = general practitioners, IIs = implementation intentions, M = mean, SD = standard deviation

[a] Total specificity scores for action plans 'asking about smoking' and 'advising to quit' could range from 0 to 10 and for the action and coping plans 'arranging follow-up for smokers motivated to quit' and 'arranging follow-up for smokers unmotivated to quit' could range from 0 to 7

[b] Total enactment scores could range from 0 to 4

patients (smokers and non-smoking) were included in the analyses but classified into patients seen by a GP 1) 'in the control condition', 2) 'who formulated a low specific action plan', and 3) 'who formulated a highly specific action plan'. With regard to GPs' tasks of 'advising to quit' and 'arranging follow-up', we present the results for the subsets of patients that reported being a smoker.

After adjustment for clustering effects and patient characteristics, we found a significant time-by-group interaction effect of action planning on GPs' asking patient about smoking (Table 2); compared to the changes in GPs' asking about smoking in the control group, patients in the intervention group who visited their GP post-intervention reported being asked about their smoking status more often than patients who visited their GP prior to action planning. We only found a significant effect for highly specific action plans (OR 2.11, 95% CI 1.51-2.95).

Table 2. Effect of GP plan specificity on the provision of smoking cessation activities (patient-reported)[a]

	Baseline		Post-intervention		Time X Group OR (95% CI)
All patients (n=3401)	N Total	% asked	N Total	% asked	
Asked about smoking					
Highly specific GP plan	731	29.9%	437	41.0%	2.11 (1.51-2.95)**
Low specific GP plan	271	40.3%	193	42.8%	1.29 (0.82-2.03)
Control group	1066	40.8%	703	37.1%	1
All smokers (n=665)	N Total	% advised	N Total	% advised	
Advised to quit					
Highly specific GP plan	93	37.1%	49	53.3%	2.28 (0.81-6.40)
Low specific GP plan	102	43.3%	49	33.3%	0.62 (0.21-1.80)
Control group	229	43.8%	143	44.1%	1
Smokers motivated to quit (n=214)	N Total	% arranged	N Total	% arranged	
Arranged for follow-up					
Highly specific GP plan	39	15.4%	20	40.0%	[b]
Low specific GP plan	21	28.6%	11	18.2%	[b]
Control group	71	18.3%	52	9.6%	1
Smokers not motivated to quit (n=408)	N Total	% arranged	N Total	% arranged	
Arranged for follow-up					
Highly specific GP plan	39	20.5%	21	14.3%	[b]
Low specific GP plan	82	4.9%	38	7.9%	[b]
Control group	142	4.9%	86	10.5%	1

GPs=general practitioners, OR=odds ratio, CI=confidence interval

[a] Generalized estimating equations adjusted for clustering and patient characteristics

[b] Analyses not possible due to the sparseness of data

*<0.01 **<0.001

Similarly, we only found a positive time-by-group interaction effect of high plan enactment on GPs' asking about smoking (Table 3; OR 3.04, 95% CI 2.10-4.41). Further analyses showed that the effect of high plan enactment on GP asking about smoking differed according to the degree of specificity of the action plan ($p<0.001$). Compared to the changes in time in the control group, patients who visited a GP who formulated a highly specific action plan and reported a high level of plan enactment post-intervention were asked more often about their smoking behaviour compared to prior to the intervention (OR 3.08, 95% CI 2.04-4.64) (Table 4).

With regard to GPs' plans to routinely advise smokers to quit, and to arrange a follow-up for smokers who are motivated or not motivated to quit, no significant

Table 3. Effect of GP plan enactment on the provision of smoking cessation activities (patient-reported)[a]

	Baseline		Post-intervention		Time X Group OR (95% CI)
All patients (n=3401)	N Total	% asked	N Total	% asked	
Asked about smoking					
High GP plan enactment	459	34.6%	314	55.7%	3.04 (2.10-4.41)**
Low GP plan enactment	543	31.1%	316	27.3%	1.01 (0.68-1.49)
Control group[c]	1066	40.8%	703	37.1%	1
All smokers (n=665)	N Total	% advised	N Total	% advised	
Advised to quit					
High GP plan enactment	63	57.1%	33	66.7%	0.85 (0.27-2.65)
Low GP plan enactment	132	39.4%	65	46.2%	1.52 (0.58-3.99)
Control group[c]	229	43.8%	143	44.1%	1
Smokers motivated to quit (n=214)	N Total	% arranged	N Total	% arranged	
Arranged for follow-up					
High GP plan enactment	35	17.1%	16	18.1%	[b]
Low GP plan enactment	25	24.0%	15	26.7%	[b]
Control group[c]	71	18.3%	52	9.6%	1
Smokers not motivated to quit (n=408)	N Total	% arranged	N Total	% arranged	
Arranged for follow-up					
High GP plan enactment	35	17.1%	15	13.3%	[b]
Low GP plan enactment	86	7.0%	44	9.1%	[b]
Control group[c]	142	4.9%	86	10.5%	1

GPs=general practitioners, OR=odds ratio, CI=confidence interval
[a] Generalized estimating equations adjusted for clustering and patient characteristics
[b] Analyses not possible due to the sparseness of data
*<0.01 **<0.001

main or interaction effects of GP plan specificity and plan enactment were found on the delivery of smoking cessation care, as reported by the patients (Table 2 and 3).

Table 4. Interaction effect of GP plan enactment and GP plan specificity on the provision of smoking cessation activities (patient-reported)[a,b]

	Baseline		Post-intervention		Time X Group OR (95% CI)
Asked about smoking	N Total	% asked	N Total	% asked	
High PS * High PE	359	36.5%	221	57.5%	3.08 (2.04-4.64)**
Low PS * High PE	100	24.0%	93	43.0%	3.00 (1.54-5.86)*
High PS * Low PE	372	21.0%	216	20.8%	1.19 (0.74-1.92)
Low PS * Low PE	171	46.8%	100	37.0%	0.71 (0.40-1.26)
Control group	1066	40.8%	703	37.1%	1

GPs=general practitioners, OR=odds ratio, CI=confidence interval, PS=Plan specificity, PE=Plan enactment

[a] Includes all patients, both smokers and non-smokers (n=3401)

[b] Generalized estimating equations adjusted for clustering and patient characteristics

*<0.01 **<0.001

GP intention

Table 5 presents results of the analyses of three subgroups of patients, namely patients who consulted a GP who reported at baseline to be: 1) a 'pre-intender', 2) an 'intender', or 3) an 'actor' regarding the implementation of smoking cessation care. For each of these subgroups, we explored whether a more specific action plan and a higher plan enactment was associated with a significant increase in the percentage of patients reporting being asked about smoking. Consistent with our hypothesis, we found no positive main effects of GP plan specificity and GP plan enactment among those patients who visited GPs who, at baseline, had already fully implemented smoking cessation care (the 'actors'). Analyses showed a positive significant effect of high plan specificity and high plan enactment among those patients who consulted a 'pre-intender' GP (Table 5). Among patients who consulted an 'intender' GP, both high and low plan specificity, as well as high plan enactment had a positive effect on asking about smoking. In all three patient subgroups we found evidence for the combined effect of high plan specificity and high plan enactment on GP asking about smoking.

Table 5. Effect of specificity and enactment of GPs' plan on asking about smoking (patient-reported) among three subgroups of patients who consulted: 1) a pre-intender GP, 2) an intender GP, and 3) an actor GP[a,b]

	GP pre-intender (n=393)			GP intender (n=2211)			GP actor (n=797)		
Plan specificity	**Pre** N total (% asked)	**Post** N total (% asked)	**Time X Group** OR (95% CI)	**Pre** N total (% asked)	**Post** N total (% asked)	**Time X Group** OR (95% CI)	**Pre** N total (% asked)	**Post** N total (% asked)	**Time X Group** OR (95% CI)
High	86 (20.9%)	32 (68.8%)	8.26 (2.26-27.39)*	416 (31.0%)	274 (44.9%)	1.93 (1.49-2.50)**	229 (27.1%)	131 (20.6%)	0.82 (0.48-1.40)
Low	9 (33.3%)	0 (00.0%)	[c]	163 (33.1%)	144 (47.9%)	2.03 (1.38-2.99)**	99 (47.5%)	49 (16.3%)	0.19 (0.08-0.46)**
Control group	182 (15.4%)	84 (10.7%)	1	719 (40.1%)	495 (40.8%)	1	165 (40.6%)	124 (32.3%)	1
Plan enactment									
High	49 (28.6%)	21 (90.5%)	46.84 (6.8-324.9)**	256 (35.9%)	235 (57.0%)	2.80 (2.02-3.89)**	154 (64.3%)	58 (72.4%)	0.69 (0.36-1.32)
Low	46 (15.2%)	11 (27.3%)	1.49 (0.35-6.38)	323 (65.0%)	183 (61.2%)	1.10 (0.77-1.58)	174 (59.2%)	122 (80.3%)	0.43 (0.25-0.74)*
Control group	182 (10.0%)	84 (10.7%)	1	719 (51.3%)	495 (54.9%)	1	165 (55.5%)	124 (66.9%)	1
PS*PE									
High* High	40 (27.5%)	21 (90.5%)	66.45 (6.65-661.7)**	204 (38.2%)	166 (59.0%)	9.78 (3.90-24.53)**	115 (36.5%)	34 (29.4%)	37.82 (8.95-159.9)**
Low * High	9 (33.3%)	0 (0.00%)	[c]	52 (26.9%)	69 (52.2%)	4.78 (2.04-11.19)**	39 (17.9%)	24 (16.7%)	1.32 (0.31-5.58)
High* Low	46 (15.2%)	11 (27.3%)	1.94 (0.32-11.77)	212 (24.1%)	108 (23.2%)	1.09 (0.58-2.03)	114 (17.5%)	97 (17.5%)	2.04 (0.83-5.02)
Low * Low	0 (0.00%)	0 (0.00%)	[c]	111 (36.0%)	75 (44.0%)	1.60 (0.80-3.20)	60 (66.7%)	25 (16.0%)	0.14* (0.04-0.54)
Control group	182 (15.4%)	84 (10.7%)	1	719 (44.1%)	495 (41.1%)	1	165 (40.6%)	124 (32.3%)	1

GPs=general practitioners, PS=plan specificity, PE=plan enactment, OR=odds ratio, CI=confidence interval

[a] Includes all patients, both smokers and non-smokers (n=3401)

[b] Generalized estimating equations adjusted for clustering and patient characteristics

[c] Analyses not possible due to the sparseness of data

*<0.01 **<0.001

DISCUSSION

Main findings

This study examined the effects of action planning and coping planning within a training programme for GPs on their provision of guideline-recommended smoking cessation care. In line with our previously reported effects of the GP training[53], the 25 GPs in the intervention group more often asked patients about smoking after formulating an action plan during the training compared to prior to the training. In line with our hypothesis, GPs who formulated a highly specific action plan asked their patients more often about smoking than GPs with less specific plans. Moreover, high plan specificity had a positive effect on GPs' asking patients about smoking when they also highly enacted their plan. The effects of plan specificity and plan enactment were particularly present among GPs who initially intended to implement smoking cessation care but who had not yet routinely implemented such care. No effects of action planning, plan specificity and plan enactment were found on GPs' provision of quit smoking advice and arranging follow-up care for smokers who were motivated to quit. In addition, no effects were found of GP coping planning on arranging follow-up for smokers who were not motivated to quit.

Interpretation of the findings

Our finding that action planning incorporated in a training programme for GPs increased the extent to which these professionals asked their patients about smoking is in line with earlier results on the positive effects of incorporating self-formulated conditional plans in an educational class for healthcare professionals.[36] However, no evidence was found for GP action planning on GPs' provision of other tasks, such as advising to quit and arranging follow-up for smokers who were motivated to quit. This latter finding does not correspond with general evidence for action planning on intended behaviours in patient samples.[44-46] Nevertheless, the percentage of smokers that was advised to quit smoking by GPs who formulated a highly specific related action plan post-intervention was substantial larger compared to baseline (37.1% versus 53.3%). A comparable pattern was observed with regard to the percentage of smokers who were motivated to quit and for who a follow-up was arranged by the GP (15.4% versus 40.0%). These substantial positive changes in time were not observed within the control group (advised to quit at baseline: 43.8% versus 44.1% post-intervention; arranged follow-up for smokers motivated to quit at baseline: 18.3% versus 9.6% post-intervention).

The small sample sizes may have impeded statistical confirmation of these findings. Another explanation for this may be that GPs might have more difficulty to act upon other action plans compared to merely asking their patients about smoking. The percentage of smokers who report being advised to quit or for who follow-up support was arranged in our study is indeed overall lower than the percentage of patients who were asked about their smoking behaviour. Smokers tend to express more resistance and negative statements about quitting when being advised to quit compared to being asked about their smoking behaviour.[55;56] In addition, GPs indicate that they lack an overview of health promotion programmes in their own neighbourhood to which they can refer their patients.[40] Therefore, GPs may derive more benefit from training in coping plans on how to deal with these difficulties. A second explanation might relate to the quality of the action plans, which has shown considerable variability in patient samples.[17] In the present study, although we rated the specificity of GPs' action plans, a specific plan does not necessarily mean a 'good' plan. Indeed, for maximal impact of a plan, GPs require the opportunity to enact the plan as often as possible. Other aspects of planning, such as opportunity, could be explored in future studies. A final explanation may be related to the lack of a prior power analysis, which could have described the power required to detect the intended effects.

Although coping planning anticipates potential barriers to behaviour (i.e. encountering smokers who are not motivated to quit), no effect of GPs' coping plan was found on their provision of guideline-recommended smoking cessation care to these smokers. The current guideline for smoking cessation care offers GPs a solution for this type of barrier, i.e. asking the smoker's permission to discuss their smoking behaviour during a subsequent consultation.[1] Of our 25 GPs, only six (24%) formulated this guideline-recommended activity highly specific; this might indicate that not all GPs were familiar with this guideline-recommended solution, or that this solution may not be appropriate for all GPs. Additionally, GPs may face more specific obstacles, such as the resistance of smokers or lack of time to provide adequate smoking cessation care. Therefore, we recommend that future studies involve GPs in formulating their own obstacles and solutions to provide smoking cessation care. A volitional help sheet (providing a list of possible obstacles and behavioural responses) is often effective in translating individuals' intention into action and might also be a suitable tool for healthcare professionals.[48-51]

We also examined the effects of plan specificity and self-reported plan enactment on GPs' provision of smoking cessation care. In line with previous studies within patient samples, we found evidence for the positive effects of formulat-

ing a highly specific action plan on GPs' asking about smoking compared to a low specific action plan.[32;57] We also found evidence for GP-reported high plan enactment on the frequency with which GPs asked their patients about smoking. This latter finding is in line with de Vries et al.[34] and Ziegelmann et al.[35] who found that a self-reported plan enactment predicted smoking abstinence and an increase in physical activity, respectively. Moreover, our analyses showed that GPs were most likely to ask their patients about smoking when they enacted a highly specific formulated action plan. To our knowledge, this interaction effect has not yet been examined and provides additional insight into the mechanisms underlying action planning.

All the described effects were present among GPs who, at baseline, intended to implement smoking cessation care and were lacking among GPs who, at baseline, were already categorised as 'actors'. These findings are in line with theories suggesting that action planning is a post-intentional strategy which aims to bridge the gap between the individual's intention to perform the behaviour and the actual performance of that behaviour.[25;58] At baseline, GPs who indicated that they had already fully implemented smoking cessation care in their practice may already have a clear idea of when, where and how they will ask their patients about smoking. Indeed, highly conscientious individuals might benefit less from self-formulated conditional plans as they may already use such approaches.[17] As reported elsewhere, the GP training programme focused on increasing the GP's intention to implement smoking cessation care, and succeeded therein.[53] This might explain why 'pre-intender' GPs also benefitted from action planning; however, the small size of this subgroup resulted in ORs with a wide confidence interval, indicating a low level of precision of this finding.

Study strengths and weaknesses

A strength of the present study is that it explored whether a training programme with action planning (a strategy proven effective in patient samples) increases the provision of guideline-recommended smoking cessation activities among GPs. In addition, we examined the specificity of the plans GPs made and the extent to which they enacted these plans; these aspects are often neglected within planning interventions.[17] There is increasing interest in the effects of planning interventions on the clinical behaviour of healthcare professionals.[59] The present study provides further insight into the feasibility of applying this strategy in a GP sample and generates new hypotheses that can be examined in future research.

Some limitations should also be mentioned. First, we assessed the effects of the GP training incorporating action planning on patient-reported smoking cessation activities of GPs. Patients may have perceived the GP's quit smoking advice

or referral for follow-up support as being embedded in a general conversation about smoking behaviour; in that case, the smoking cessation activities of the GP might have escaped their attention. Such recall bias may have led to a lack of effect of action planning on the delivery of these smoking cessation activities. Secondly, the precise response rate of patients who completed the questionnaire (at baseline and post-intervention) is unknown. Reasons for non-response might be attributed to GPs who failed to hand out the patient questionnaires, or to patients who forgot or were unwilling to complete the questionnaire. Thirdly, the relatively small sample of GPs and smoking patients might have reduced the chance of detecting a true effect of action planning, plan specificity and/or plan enactment on GPs' provision of quit smoking advice and referrals. Also, we measured GPs' intention and plan enactment with single item measures. Further research is needed to examine the validity of these measures. Finally, during the study period, some of the GPs did not have direct access to the smoking cessation programmes of (trained) practice nurses, which may have contributed to the lack of effect on GPs' referrals.

Conclusions

Action planning within a training programme for GPs improves the frequency with which the GPs ask patients about their smoking. Action planning was particularly beneficial among those GPs who had a pre-existing intention to implement smoking cessation care. Importantly, a highly specific action plan that was well enacted was most likely to result in patients being asked about smoking by their GP. Since action planning did not improve the provision of other GP tasks regarding smoking cessation care, future studies should further examine the effects of coping plans on the provision of these GP tasks. These plans might help GPs to anticipate possible barriers that impede them from acting on their intentions. In addition, we recommend that our findings be replicated in randomised controlled studies with a larger GP sample and a long-term follow-up.[60]

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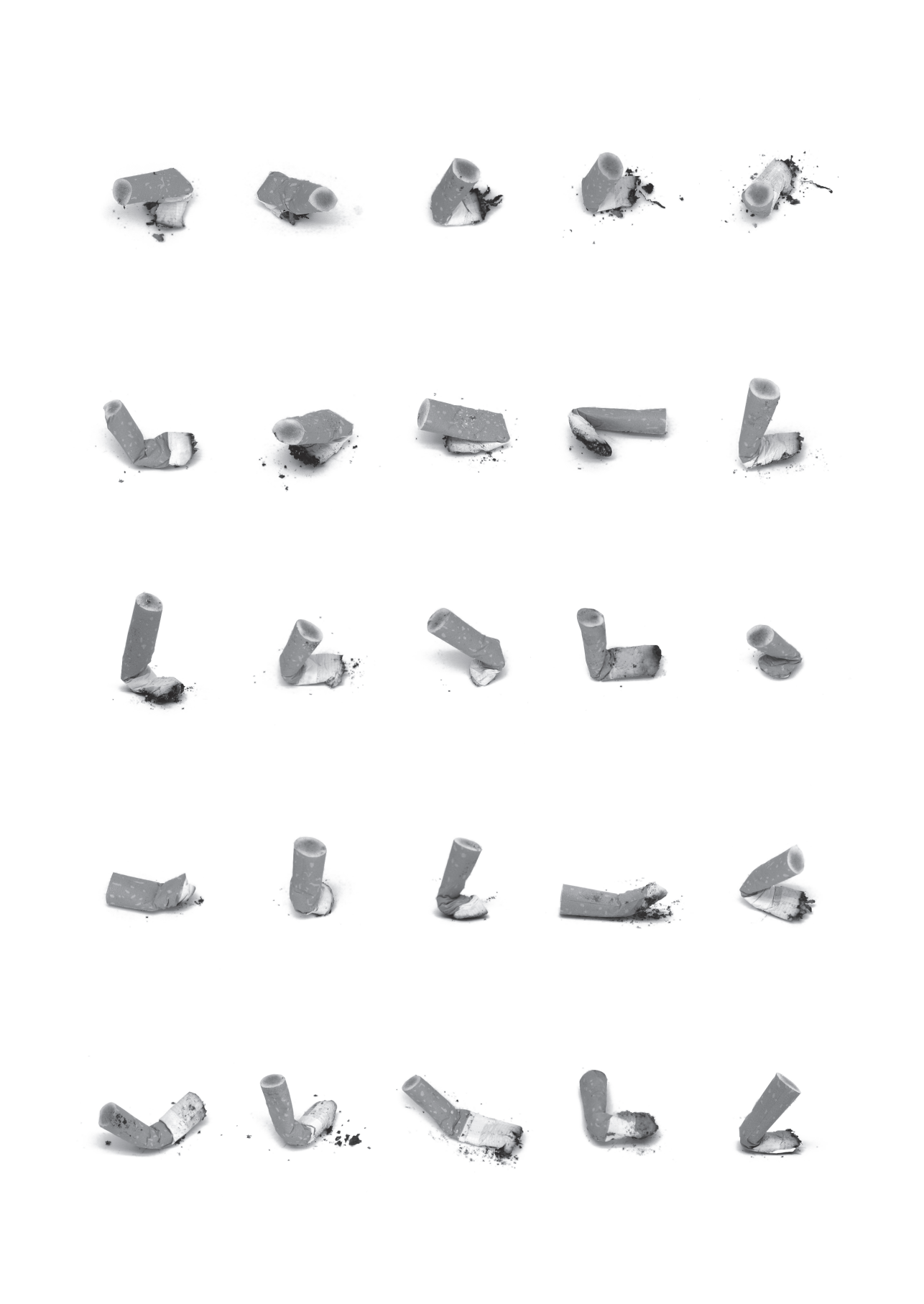
Appendix 1. Rating of the specificity of GPs' plans with regard to smoking cessation activities

GP plans	Who	When - Moment	When - Patient	How to register	Specificity score
Ask about smoking	0 / 1	0 / 1 / 2 / 3	0 / 1 / 2 / 3	0 / 1 / 2 / 3	(0-10)
Advise to quit	0 / 1	0 / 1 / 2 / 3	0 / 1 / 2 / 3	0 / 1 / 2 / 3	(0-10)

	What	Who	How to register	
Arrange follow-up for smokers motivated to quit	0 / 1 / 2 / 3	0 / 1	0 / 1 / 2 / 3	(0-7)
Arrange follow-up for smokers not motivated to quit	0 / 1 / 2 / 3	0 / 1	0 / 1 / 2 / 3	(0-7)



5

Sequence-analysis of video-recorded practitioner-patient communication about smoking in general practice: Do smokers express negative statements about quitting?

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Patient Education and Counseling *[ahead of print]*

ABSTRACT

Objective

To provide insight into the professional-patient interaction during unsolicited dialogues about smoking; to examine the extent to which smokers express negative statements about quitting and the extent to which these statements influence general practitioners' (GPs') and practice nurses' (PNs') (dis)continuation of guideline-recommended smoking cessation care.

Methods

Fifty-two video-consultations were observed (GP-consultations: 2007-2008; PN-consultations: 2010-2011). Dialogues were transcribed verbatim and professionals' and patients' speech units were coded and analysed using sequential analyses (n=1424 speech units).

Results

GPs focused on asking about smoking (GPs: 42.4% versus PNs: 26.2%, p=0.011) and advising to quit (GPs: 15.3% versus PNs: 3.5%, p<0.001) whereas PNs focused on assisting with quitting (GPs: 25.4% versus PNs: 55.2%, p<0.001). Overall, patients expressed more negative statements about quitting than positive statements (negative: 25.3% versus positive: 11.9%, p<0.001), especially when PNs assessed their willingness to quit (OR 3.61, 95% CI 1.44-9.01) or assisted with quitting (OR 2.23, 95% CI 1.43-3.48).

Practice implications

An alternative approach to smoking cessation care is proposed in which GPs' tasks are limited to asking, advising, and arranging follow-up, such as referrals to the PN. This approach seems the least likely to evoke negative statements of patients about quitting during dialogues with GPs and is compatible to tasks and skills of PNs who could subsequently assist smokers with quitting.

INTRODUCTION

Evidence-based guidelines for smoking cessation care recommend general practitioners (GPs) and practice nurses (PNs) to routinely *ask* patients about smoking, *advise* smokers to quit, *assess* their motivation to quit, *assist* them with quitting, and *arrange* follow-up support.[1;2] A full implementation of these '5 A's' significantly improves smoking abstinence rates[3-5] and is cost-effective.[6]

Nevertheless, GPs and PNs (see Appendix 1 for description of PNs' role in Dutch general practice) report various barriers to the implementation of these guidelines during routine consultation.[7-12] Although patients state they are willing to discuss their smoking behaviour during a practitioner-initiated dialogue[13], GPs and PNs report that smokers regularly express negative statements regarding quitting during unsolicited dialogues about smoking, such as a lack of motivation or discipline to quit.[7-12] These negative statements about quitting impede a structural implementation of guideline-recommend smoking cessation care.[7-12] GPs report a limited range of skills for dealing with these negative statements[8] and as a consequence, tend to avoid these negative statements in order to preserve a good doctor-patient relationship.[14;15] This is one of the reported reasons for the evidence-practice gap regarding the provision of guideline-recommended smoking cessation care in Dutch general practice. Results show that, for example, 79% of all smokers and 40% of smokers who discuss smoking with their GP do not receive a quit-smoking advice.[16] Therefore, we aim to provide more insight into the interaction between primary care professionals and smokers during unsolicited dialogues about smoking. These insights may result in recommendations for primary care professionals in how to deal with smokers' negative statements regarding quitting and help them to fully implement guideline-recommended smoking cessation care.

Until now, only a few studies have examined the interaction between primary care professionals and smokers. These studies focused on the way patients react when GPs link their health issues to their smoking[17] or when they are counselled to quit smoking based on their readiness to quit.[18] To our knowledge, no studies have examined the responses of smokers when professionals apply a guideline for smoking cessation care. Moreover, the impact of these responses on professionals' continuation of guideline adherence is unknown. More insight into this interaction may contribute to strategies that can benefit the implementation of smoking cessation counseling in general practice.

Therefore, we assess the extent to which: i) professionals use the 5 A's for smoking cessation care, ii) smoking patients express negative or positive statements about quitting when professionals use these 5 A's, and iii) professionals continue or discontinue their use of the 5 A's after patients express a positive or negative

statement about quitting. Based on literature, we hypothesize that an unsolicited conversation about smoking will elicit patients' negative statements about quitting. Furthermore, we hypothesize that patients' negative statements about quitting will hamper the continuation of guideline adherence, while patients' positive statements about quitting will facilitate it. Since knowledge and skills regarding lifestyle counseling are highlighted in the 'competence profile' of PNs[19], we hypothesize that patients' negative statements about quitting are less likely to hamper guideline adherence in dialogues with PNs compared to dialogues with GPs.

METHODS

Study setting, participants and design

We conducted a cross-sectional study in which we observed video-recordings of random real-life routine consultations in general practice. Such video-taped consultations are regularly used to observe lifestyle counseling[20-25], provide a complete record of what actually happens during consultations, and can be viewed repeatedly.[26] Videos were collected (nationwide) and archived by the Netherlands Institute for Health Services Research (NIVEL). Consultations with GPs and PNs were recorded during 2007-2008 and during 2010-2011, respectively. A detailed overview of the data collection is reported elsewhere.[27;28]

All video-recordings in which smoking was discussed were selected for the present study (n=211). We excluded video-recordings of consultations with non-smokers (n=63), ex-smokers (n=70), consultations in which the patient specifically requested smoking cessation assistance (n=13) and in which patients addressed smoking on their own initiative (n=13). This resulted in a set of 52 videos of 33 primary care professionals (17 GPs and 16 PNs). All PNs were trained in motivational interviewing during the study.[28] This was not the case for GPs and it is unclear whether the participating GPs were trained in motivational interviewing prior to the study. All GPs, PNs and patients were unaware of the fact that the recordings and analyses would focus on smoking cessation care. This study was conducted according to Dutch privacy legislation in which approval of the medical ethics committee was not required.[29]

Procedure and measurements

After the patients gave their informed consent consultations were recorded. Two researchers observed the video-recordings. Subsequently, the dialogues between professionals and patients about smoking were transcribed verbatim (MV and EP). A coding scheme was developed for every speech unit of patients and profes-

sionals. A speech unit is defined as '*the smallest distinguishable speech segment to which a classification may be assigned*'.[30] The length of a speech unit can vary from a single word to a lengthy sentence.

Professionals' speech units

We coded speech units of professionals which were related to the core components of the guideline for smoking cessation care ('5 A's'). These included: 1) *Ask* (about the patient's smoking status, the number of cigarettes, or smoking history), 2) *Advise* (to quit smoking or to smoke less), 3) *Assess* (the smoker's motivation to quit), 4) *Assist* (with quitting, which include discussing advantages of (quitting) smoking, risks of smoking, barriers to quitting, support options, pharmacological support, or a quit plan), and 5) *Arrange* (follow-up quit-smoking support, including referring the smoker to behavioural quit support, arrange a telephone follow-up, or ask permission to discuss smoking next time). Appendix 2 provides an overview of the coding scheme illustrated by examples of speech units of primary care professionals and patients.

Patients' speech units

We coded both negative and positive statement about smoking cessation expressed by patients. A negative statement included: 1) barriers to quit, 2) disadvantages of quitting, 3) advantages of smoking, and 4) reasons to relapse. Patients' positive statement included: 1) motivators to quit, 2) advantages of quitting, 3) disadvantages of smoking, and 4) reasons to smoke less or continue abstinence (see Appendix 2 for coding scheme).

Other speech units

The speech units of professionals which we did not code as related to the 5A's and speech units of patient which we did not code as a negative or positive statement about quitting, were coded as follows: 1) other (non-)smoke-related questions/answers, e.g. "I smoke 10 cigarettes per day", 2) other (non-)smoke-related information, e.g. "These complaints might results from your smoking", 3) other (non-)smoke-related confirmations, e.g. "Yes, I agree", 3) other (non-) smoke-related speech units, e.g. "Thank you". In contrast to '5A-related' speech units, 'other smoke-related' speech units of professionals included general statements about smoking and its risks and were unrelated to quitting or the patient's motivation to quit (see Appendix 2 for coding scheme).

Inter-rater agreement

Two researchers (MV and MC) independently coded five randomly selected dialogues (in total 153 speech units) which resulted in a moderate inter-rater agreement (kappa 0.66). During this pretest of our coding scheme, we encountered two coding difficulties. Firstly, some disagreements occurred regarding differentiating between speech units of professionals related to '*Assisting* a quit attempt' and to 'providing smoke-related information'. These disagreements were resolved via a third person (NC) and we decided to code a speech unit as '*Assisting* a quit attempt' solely when it was related to the patients' motivation to quit, such as an exploration of barriers and motivators to quit, e.g. "*Can you tell me a bit more about the reasons why you want to quit?*". When professionals only made general statements about smoking unrelated to quitting or the patient's motivation to quit, we coded the speech unit as 'other, smoke-related: the provision of smoke-related information', e.g. "*Your smoking has an impact on your vocal cords*".

Secondly, the pretest of our coding scheme showed that the number of coding categories for patients' negative and positive statements about smoking cessation was too limited (it originally included only the coding categories 'barriers to quit' and 'motivators to quit'). After consulting a third person (NC), we therefore decided to extend these coding categories, including '(dis)advantages of quitting', '(dis)advantages of smoking', 'reasons to relapse', and 'reasons to smoke less or continue abstinence'.

The remaining transcripts were coded by one researcher (MV) (see Appendix 2 for coding scheme).

Statistical analyses

Firstly, we calculated the total number of speech units of both professionals and patients and the number of speech units per dialogue. Differences between GP- and PN-dialogues were analyzed with a chi-square test.

Secondly, we performed a number of sequential analyses which can be defined as '*a set of techniques used to identify temporal patterns embedded within sequences of coded behaviours or stimulus events*'.[31-33] The main aim of sequential analysis is to determine if a particular sequence of behaviours or events occurs to a greater or lesser extent than can be expected by chance alone.[31;32] This type of analysis can be regarded as a suitable method for exploring interaction patterns between healthcare professionals and patients.[31]

We prepared our data for these analyses by forming a chain of codes representing the speech units of professionals and patients (a total of 1424 speech units). Then, we examined the three speech units (three lags) following each 5A-related speech unit for negative and positive statements of smokers about

quitting. The existing literature gives only few indications for the optimal number of lags.[30;31] Yet, because we focused on the immediate responses of patients on the provision of smoking cessation care, we limited our analyses to three lags. Lag 0 represented the 5A-related speech unit of a professional during the dialogue, lag 1 represented the speech unit of the patient immediately following the professional's 5A-related speech unit at lag 0, lag 2 represented the second speech unit of the patient following the professional's 5A-related speech unit at lag 0, and lag 3 represented the third speech unit of the patient following the professional's 5A-related speech unit at lag 0.

Next, we calculated transitional probabilities, i.e. the likelihood that a patient expressed one or more negative and positive statements regarding quitting within the three lags following a 5 A-related speech unit of the professional (see Appendix 3). The transitional probabilities were uncorrected for the potential effects of clustering effects of speech units within dialogues. Therefore, we used generalized estimating equations to take into account the multilevel structure of the data. This resulted in corrected odds ratio's (ORs), i.e. the likelihood that a negative or positive statement of the smoker about quitting was preceded by a 5A-related speech unit of the professional compared to any other preceding category of speech units of professionals.

The same method was used to compute the likelihood that a negative or positive statement about quitting of the patient was followed within 3 lags by one or more 5 A-related, other-smoke-related or non-smoke-related speech units of the professional.

RESULTS

Sample characteristics

Table 1 shows the characteristics of the duration of the consultations and dialogues about smoking, and characteristics of the patients, GPs and PNs who enrolled in the study. In total, we coded 1424 speech units (mean 27.4 speech units per smoking dialogue, range 4-118) of which 727 were of professionals (51.1%, mean 14.0 speech units per smoking dialogue, range 2-55) and 697 of patients (48.9%, mean 13.4 speech units per smoking dialogue, range 1-63).

Speech units

Professionals' smoking cessation care

Overall, half of the speech units of professionals were related to the 5 A's for smoking cessation care (Table 2). Chi-square tests showed that PNs expressed

Table 1. Characteristics of video-recorded consultations between patients, GPs and PNs

		Dialogues with	
Consultation characteristics	**Total (n=52)**	**GPs (n=20)**	**PNs (n=32)**
Total duration (min), M (SD)	22:41 (12:05)	12:29 (4:21)	29:04 (10:56)
Duration of smoking dialogue (min), M (SD)	2:57 (2:53)	1:28 (1:04)	3:53 (3:17)
		Dialogues with	
Patient characteristics	**Total (n=52)**	**GPs (n=20)**	**PNs (n=32)**
Age in years, M (SD)	53.5 (14.8)	46.1 (15.7)	57.7 (12.6)
Gender, female	23 (44.2%)	9 (45.0%)	14 (43.8%)
Educational level			
Low	11 (21.2%)	3 (15.0%)	8 (25.0%)
Middle	29 (55.8%)	8 (40.0%)	21 (65.6%)
High	3 (5.8%)	2 (10.0%)	1 (3.1%)
Reason for consultation			
Respiratory	16 (30.8%)	8 (40.0%)	8 (25.0%)
Cardiovascular	14 (26.9%)	6 (30.0%)	8 (25.0%)
Diabetes mellitus	9 (17.3%)	0 (0.0%)	9 (28.1%)
Multiple smoke-related	10 (19.2%)	3 (15.0%)	7 (21.9%)
Other smoke-related	1 (1.9%)	1 (5.0%)	0 (0.0%)
Non-smoke-related	2 (3.8%)	2 (10.0%)	0 (0.0%)
Professional characteristics	**Total (n=33)**	**GPs (n=17)**	**PNs (n=16)**
Age in years, M (SD)	46.4 (7.1)	49.9 (6.1)	42.4 (6.2)
Gender, female	22 (66.7%)	6 (35.3%)	16 (100.0%)

GP=general practitioner, PN=practice nurse, M=mean, SD=standard deviation

significantly more speech units related to these 5 A's than GPs (GPs: 37.8% versus PNs: 55.2%; p <.001). Within this category, GPs significantly more often *asked* about smoking and *advised* to quit compared to PNs. PNs significantly more often *assisted* with quitting compared to GPs.

The remaining speech units of professionals were coded as 'other smoke-related' speech units (31.4%) and 'other non-smoke-related' speech units (17.2%). Although no significant differences were found in these coding categories between GPs and PNS overall, we found a significant difference in one of the subcategories of 'other smoke-related' speech units: GPs significantly more often provided general smoke-related information compared to PNs (GPs: 37.0% versus PNs: 12.6%, p<0.001, data not shown).

Patients' statements about smoking cessation

Overall, patients expressed significantly more often negative than positive statements about quitting during an unsolicited dialogue about smoking (negative: 25.3% versus positive: 11.9%; p<.001). We found no significant differences between the number of negative statements during dialogues with PNs compared to dialogues with GPs (Table 2).

A relative high number of patient's speech units were coded as 'other smoke-related' (49.2%). This category comprised numerous simple answers to and confirmations of the provision of smoke-related questions and information of the professional, e.g. "*Yes, I smoke*" or "*Yes, I agree*").

Sequential analysis

Table 3 shows the transitional probabilities that smokers expressed negative or positive statements about quitting following the 5 A's speech units of professionals. Overall, patients were more likely to express a negative than a positive statement, irrespective of the preceding 5A. The probability that smokers expressed a negative statement about quitting was lowest when professionals *asked* about smoking (11%) or *arranged* a follow-up (15%), and highest when professionals *assessed* the smoker's motivation to quit (55%) or provided *assistance* with quitting (38%).

When adjusting for clustering effects, patients were overall significantly more likely to express a negative statement about quitting when professionals preceded with a speech unit related to *assessing* the patient's motivation to quit (OR 3.61, 95% CI 1.44-9.01) or *assisted* with quitting (OR 2.23, 95% CI 1.43-3.48), compared to any other preceding speech unit of professionals. When professionals preceded with a speech unit related to providing *assistance* with quitting, patients were also significantly more likely to express a positive statement about quitting (OR 2.76, 95% CI 1.56-4.89), compared to any other preceding speech unit of professionals. Table 4 shows the results of comparable analyses, separated for GP and PN dialogues. We found the above-mentioned effects only in PN dialogues. Due to data sparseness, it was not possible to compute all corrected odds ratio's in GP and PN dialogues (Table 4).

Figure 1 illustrates the transitional probabilities that GPs and PNs expressed a 5A-related, other smoke-related, or non-smoke-related speech unit following patients' negative and positive statements about quitting. Although we observed that GPs were less likely to continue with using the 5 A's following patients' negative statements compared to preceding positive statements (negative: 19% versus positive: 47%), analyses could not confirm this statistically (OR 0.68, 95% CI 0.17-2.75).

Table 2. Total number of coded speech units of patients and professionals and the difference between GPs and PNs

	Total coded speech units (n=1424)				GPs' coded speech units (n=287)				PNs' coded speech units (n=1137)				
Professionals	**Number/ Total**	**Mean**	**Range**	**%**	**Number/ Total**	**Mean**	**Range**	**%**	**Number/ Total**	**Mean**	**Range**	**%**	***p*** [a]
Total	727/1424	14.0	2 - 55	51.1%	156/287	14.4	2 - 15	54.4%	571/1137	35.5	2 - 55	50.2%	0.210
Other SR	228/727	4.4	0 - 22	31.4%	54/156	2.7	0 - 9	34.6%	174/571	5.4	0 - 22	30.5%	0.323
Other NSR	125/727	2.4	0 - 16	17.2%	43/156	2.2	0 - 7	27.6%	82/571	2.6	0 - 16	14.4%	<0.001
5A's	374/727	7.2	1 - 33	51.4%	59/156	3.0	1 - 9	37.8%	315/571	9.8	1 - 33	55.2%	<0.001
Ask	107/374	2.1	0 - 6	28.6%	25/59	1.3	0 - 3	42.4%	82/315	2.6	1 - 6	26.0%	0.011
Advise	20/374	0.4	0 - 6	5.4%	9/59	0.5	0 - 3	15.3%	11/315	0.3	0 - 6	3.5%	<0.001
Assess	43/374	0.8	0 - 4	11.5%	8/59	0.4	0 - 2	13.6%	35/315	1.1	0 - 4	11.1%	0.588
Assist	189/374	3.6	0 - 22	50.5%	15/59	0.8	0 - 7	25.4%	174/315	5.4	0 - 22	55.2%	<0.001
Arrange	15/374	0.3	0 - 4	4.0%	2/59	0.1	0 - 1	0.03%	13/315	0.4	0 - 4	4.1%	0.791
Patients	**Number/ Total**	**Mean**	**Range**	**%**	**Number/ Total**	**Mean**	**Range**	**%**	**Number/ Total**	**Mean**	**Range**	**%**	***p***
Total	697/1424	13.4	1 - 63	48.9%	131/287	6.6	1 - 16	45.6%	566/1137	17.7	1-63	49.8%	0.210
Other SR	343/697	6.6	1 - 32	49.2%	63/131	3.2	1 - 7	48.1%	280/566	8.8	1-32	49.5%	0.776
Other NSR	95/697	1.8	0 - 15	13.6%	29/131	1.5	0 - 5	22.1%	66/566	2.1	0-15	11.7%	0.002
Negative statements	176/697	3.4	0 - 13	25.3%	25/131	1.3	0 - 7	19.1%	151/566	4.7	0-13	26.7%	0.071
Positive statements	83/697	1.6	0 - 8	11.9%	14/131	0.7	0 - 4	10.7%	69/566	2.2	0-8	12.2%	0.632

GPs=general practitioner, PNs=practice nurse, SR=smoke-related, NSR=non-smoke-related

[a] Differences in the proportion of coded speech units between GP and PN dialogues were calculated with χ^2 tests

Table 3. Transitional probabilities of patients' speech units following speech units of primary care professionals (GPs and PNs combined) related to the five A's for smoking cessation care [a,b]

	Patients' speech units (lag 1-3)							
	Negative statement about quitting		**Positive statement about quitting**		**Other smoke-related speech unit**		**Non-smoke-related speech unit**	
Professionals' 5-A speech unit (lag 0)	Probability	OR (95% CI)	Probability	OR (95% CI)	Probability	OR (95% CI)	Probability	OR (95% CI)
All 5 A's	0.31 (149/476)	1.88 (1.30-2.72)**	0.09 (41/476)	1.78 (1.07-2.97)*	0.53 (250/476)	3.01 (2.00-4.54)**	0.08 (36/476)	0.42 (0.29-0.59)**
Ask	0.11 (16/142)	1.06 (0.61-1.84)	0.01 (2/142)	0.66 (0.26-1.64)	0.83 (118/142)	11.30 (3.68-34.65)**	0.04 (6/142)	0.24 (1.13-1.45)**
Advise	0.27 (3/11)	0.86 (0.19-3.94)	0.10 (1/11)	-	0.36 (4/11)	1.17 (0.34-3.98)	0.27 (3/11)	0.68 (0.24-2.27)
Assess	0.55 (35/63)	3.61 (1.44-9.01)*	0.13 (8/63)	2.87 (0.89-9.27)	0.27 (17/63)	1.98 (0.58-6.57)	0.05 (3/63)	0.43 (0.13-1.39)
Assist	0.38 (93/247)	2.23 (1.43-3.48)**	0.12 (30/247)	2.76 (1.56-4.89)**	0.41 (102/247)	1.64 (1.00-2.68)*	0.09 (22/247)	0.70 (0.45-1.07)
Arrange	0.15 (2/13)	-[c]	0.00 (0/13)	-	0.69 (9/13)	1.08 (0.26-4.44)	0.15 (2/13)	0.78 (0.20-3.06)
Other SR	0.30 (89/293)	2.44 (1.62-3.66)**	0.12 (35/293)	3.46 (2.01-5.93)**	0.48 (140/293)	1.55 (1.02-2.37)*	0.11 (32/293)	0.81 (0.56-1.17)

[a] Transitional probabilities represent the probabilities of speech chains that begin with the event indicated as '*professionals' 5-A speech unit*' and end with the specific coded patients' speech unit within the following three speech lags (the ratio of the specific patients' speech unit and the total number of coded speech units of patients in brackets),

[b] Generalised estimating equations (GEE) corrected for the hierarchical structure of the data

[c] Analyses not possible due to data sparseness

*p<0.05, **p<0.001

Table 4. Transitional probabilities of patients' speech units following speech units of GPs and PNs separately related to the five A's for smoking cessation care [a,b]

	Patients' speech units (lag 1-3)							
	Negative statement about quitting		**Positive statement about quitting**		**Other smoke-related speech unit**		**Other non-smoke-related speech unit**	
GPs' 5-A speech units (lag 0)	Probability	OR (95% CI)	Probability	OR (95% CI)	Probability	OR (95% CI)	Probability	OR (95% CI)
All 5A's	0.23 (17/75)	1.71 (0.71-4.12)	0.12 (9/75)	0.79 (0.18-3.54)	0.56 (42/75)	7.01 (2.50-19.67)**	0.09 (7/75)	0.24 (0.11-0.54)**
Ask	0.08 (3/38)	1.65 (0.58-4.75)	0.03 (1/38)	0.84 (0.13-5.32)	0.79 (30/38)	8.79 (1.97-39.34)*	0.11 (4/38)*	0.29 (0.11-0.78)*
Advise	0.50 (3/6)	2.32 (0.20-26.66)	0.17 (1/6)	-	0.33 (2/6)	-	0.00 (0/6)	-
Assess	0.63 (5/8)	- [c]	0.25 (2/8)	-	0.00 (0/8)	1.88 (0.08-42.27)	0.13 (1/8)	0.48 (0.02-9.59)
Assist	0.27 (6/22)	1.59 (0.33-7.06)	0.23 (5/22)	-	0.41 (9/22)	3.36 (0.61-18.45)	0.10 (2/22)	0.29 (0.06-1.42)
Arrange	0.00 (0/1)	-	0.00 (0/1)	-	10.00 (1/1)	-	0.00 (0/1)	-
Other SR	0.19 (12/59)	1.96 (0.87-4.44)	0.07 (4/59)	2.81 (0.84-9.37)	0.55 (34/59)	1.81 (0.88-3.73)	0.19 (9/59)	0.71 (0.36-1.38)
PNs' 5-A speech units (lag 0)	Probability	OR (95% CI)	Probability	OR (95% CI)	Probability	OR (95% CI)	Probability	OR (95% CI)
All 5 A's	0.33 (132/401)	1.91 (1.28-2.85)*	0.08 (32/401)	2.02 (1.16-3.54)*	0.52 (208/401)	2.59 (1.57-4.26)**	0.07 (29/401)	0.46 (0.30-0.69)**
Ask	0.13 (13/104)	1.01 (0.54-1.89)	0.01 (1/104)	0.65 (0.23-1.81)	0.85 (88/104)	17.06 (8.29-35.11)**	0.02 (2/104)	1.15 (0.05-0.43)**
Advise	0.00 (0/5)	0.51 (0.06-4.00)	0.00 (0/5)	-	0.40 (2/5)	0.69 (0.18-2.60)	0.60 (3/5)	1.13 (0.31-4.14)
Assess	0.55 (30/55)	4.37 (1.69-11.30)*	0.11 (6/55)	2.24 (0.60-8.36)	0.31 (17/55)	2.24 (0.46-10.87)	0.04 (2/55)	0.36 (0.08-1.67)
Assist	0.39 (87/225)	2.20 (1.3803.51)**	0.11 (25/225)	3.17 (0.74-5.76)**	0.41 (93/225)	1.50 (0.85-2.66)	0.09 (20/225)	0.77 (0.47-1.26)
Arrange	0.17 (2/12)	-	0.00 (0/12)	-	0.67 (8/12)	0.99 (0.19-5.14)	0.17 (2/12)	0.81 (0.17-3.95)
Other SR	0.33 (77/234)	2.75 (1.75-4.32)**	0.13 (31/234)	3.93 (2.17-7.15)**	0.45 (106/234)	1.57 (0.89-2.76)	0.09 (20/234)	0.82 (0.51-1.32)

GPs = general practitioners, PNs = practice nurses

[a] Transitional probabilities represent the probabilities of speech chains that begin with the event indicated as 'professionals' 5-A speech unit' and end with the specific coded patients' speech unit within the following three speech lags (the ratio of the specific patients' speech unit and the total number of coded speech units of patients in brackets)

[b] Generalised estimating equations (GEE) corrected for the hierarchical structure of the data

[c] Analyses not possible due to data sparseness

*p<0.05, **p<0.001

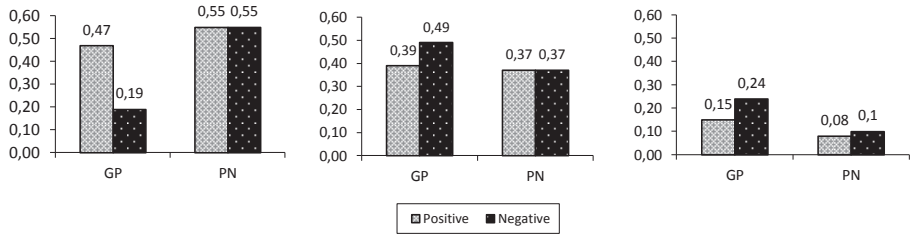

Figure 1. Transitional probabilities of GPs' and PNs' 5 A-related speech units (I), other smoke-related speech units (II), and non-smoke-related speech units (III) following patients' positive and negative statements about quitting smoking

DISCUSSION

Main findings

The present study aimed to provide insight into the professional-patient interaction during unsolicited dialogues about smoking. Firstly, we assessed the extent to which primary care professionals use the 5A's for smoking cessation care during unsolicited dialogues about smoking. We found that GPs mainly focused on *asking* their patients about smoking and PNs on *assisting* patients with a quit attempt. Overall, little attention was paid to *advising* smokers to quit, to *assessing* their motivation to quit, and to *arranging* follow-up. Secondly, we examined the extent to which smokers expressed positive and negative statements about quitting during these dialogues. Overall, we found that patients more frequently expressed negative statements compared to positive statements about quitting. These negative statements mainly consisted of quit-smoking barriers and were most likely expressed when PNs *assessed* the patients' willingness to quit or when PNs *assisted* patients with a quit attempt. Finally, we explored the degree to which primary care professionals (dis)continued the 5 A's following patients' positive or negative statements about quitting. Although we observed that GPs were less likely to continue using the 5 A's following patients' negative statements about quitting, analyses could not statistically confirm this finding.

Interpretation of the findings

In line with previous studies and assumptions underlying current guidelines, we found that GPs and PNs focus on different smoking cessation counseling activities.[1;20;21;34;35] GPs tend to focus on identifying smokers and informing about risks, whereas stop-smoking support is more often provided by PNs. Although these differences might be explained by the different time-periods in which the consultations were recorded (GPs: 2007-2008, PNs: 2010-2011), it is more likely

that these differences can be explained by other factors, such as differences in patient population, characteristics of the professionals (e.g. training, skills, practice protocols), and consultation characteristics (e.g. time available).

Both GPs and PNs lacked focus on *arranging* a follow-up for quit-smoking support. This is in line with recent findings showing that GPs in the Netherlands experience a lack of overview of smoking cessation programs in their neighborhood.[12] In addition, smokers may lack motivation to quit, which seems a logical reason for not arranging follow-up care. However, even if smokers are not motivated to quit, guidelines recommend primary care professionals to ask the patient's permission to discuss their smoking behaviour in a next consultation. Therefore, when GPs and PNs in our study would have followed these current guidelines, the rate of arranging follow-up should have been much higher than observed.

Although not statistically confirmed, we observed that GPs were less likely to proceed with a 5A-related speech unit following a negative statement of patients about quitting. We did not observe this in PN-patient dialogues. A possible explanation for this is that all PNs in the present study were trained in motivational interviewing, and that GPs might lack such skills or have insufficient time to apply them.[36;37] This might also explain why patients were more likely to respond both negatively *and* positively towards quitting during dialogues with PNs: exploring and resolving patients' ambivalence towards behaviour change is an essential part of motivational interviewing.[38] Another explanation might be that GPs and PNs encounter different types of patients. For example, patients who visit the GP might be more likely to perceive their complaints as not directly related to their smoking behaviour, resulting in less motivation to quit or discuss smoking. On the other hand, PNs provide care for patients with diabetes mellitus, asthma, or COPD, including routinely providing information, advice and counseling on lifestyle. These patients might be more inclined to relate their health complaints to their smoking behaviour, which results in a higher motivation to quit or discuss smoking.

Study strengths and limitations

Video-based observations provide an objective method to capture all modalities of the interaction between professionals and patients.[26] In addition, sequence analysis exceeds a simple description of frequencies of spoken communication and provides further insight into practitioner-patient interactional processes. To our knowledge, this is the first study using sequence analysis to provide insight into the way smoking cessation care evokes positive and negative responses of

patients thereby providing further insight into practitioner-patient interactional processes.

However, several limitations of our study have to be acknowledged. First, to guarantee the anonymity of the patients, the camera was positioned so that patients were only visible from behind or were not visible at all. Therefore, we were unable to observe non-verbal behaviour, which may also play a role when assessing patients' responses towards smoking cessation. Yet, a recent study showed that communication ratings using only audio or video data are highly correlated.[39] Second, due to the small samples it was not always possible to take into account that the possible cluster effects within the data . Third, using video-based observations may limit the external validity of the findings, unless the sample is representative for the overall population.[26] Although we were unable to compare our sample of PNs with the average Dutch population of PNs, the GPs in our study were representative for the average Dutch population of GPs with regard to gender and practice type.[36] Moreover, none of the GPs and PNs were aware that the observations would focus on dialogues about smoking.

Practice implications

Our study findings support alternative approaches to smoking cessation care in healthcare settings where a successful implementation of the 5 A's is lacking. These alternative approaches include the 'Ask-Advise-Arrange' (A-A-R) or 'Ask-Advise-Connect' (A-A-C) approaches.[40;41] These approaches instruct healthcare professionals to routinely *ask* patient about smoking, *advise* smokers to quit, and to *refer* (A-A-R) or proactively *connect* (A-A-C) smokers to a quit line or face-to-face quit-smoking support. As shown by Vidrine et al., significantly more smokers enrolled in quit-smoking treatment following the A-A-C approach (11.4%) compared to the A-A-R approach (0.6%) which is also likely to result in more smokers who successfully quit.[41]

Since we found that smokers are least likely to express negative statements about quitting when being *asked* about smoking, *advised* to quit and *arranged* with follow-up support, we recommend GPs to focus on implementing these alternative approaches. This might reduce the amount of impeding implementation barriers, such as the amount of time involved in discussing barriers to quitting. These approaches are also compatible with the lifestyle counseling tasks and skills of PNs. PNs could play an important role in motivating smokers to quit and provide behavioural counseling.

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Appendix 1. Role of practice nurses (PNs) in general practice in the Netherlands

The standard general practice in the Netherlands comprises about 2,350 patients and an average consultation lasts about 10 minutes[42]; this results in considerable time pressure and workload for general practitioners (GPs). Therefore, in 1999 practice nurses (PN) were introduced in Dutch general practice to reduce the workload of GPs and to improve the quality of care for chronically ill patients.[43] Nowadays, PNs are involved in multiple primary prevention activities (e.g. hypertension care) and secondary prevention activities (e.g. routine care for elderly patients and/or patients with diabetes mellitus, asthma, or COPD). PNs work under the supervision of GPs, manage their consultations independently, and base their clinical practice on guidelines developed by the Dutch College of General Practitioners (NHG) and on healthcare standards which specifically focus on the treatment of chronically ill patients. The collaboration between GPs and PNs provides a good basis for identifying smokers, for motivating them to quit, and to deliver effective quit-smoking support.

Appendix 2. Coding scheme for speech units

Theme	Category	Subcategory	Example
Professionals			
5 A's	• Ask	Smoking status	"Do you smoke?"
		Number of cigarettes	"How many cigarettes do you smoke?"
		Smoking history	"At what age did you start smoking?"
	• Advise	To quit	"The best prevention for not only your airways but also your coronary problems, is to quit smoking"
		To smoke less	["The best thing to do is quit smoking"] "but at least cut down on your smoking"
	• Assess	Motivation to quit	"Do you still not feel like quitting?"
	• Assist	Discuss previous quit attempt	"You quit smoking for almost a year, did you think of cigarettes every day in that period?"
		Discuss quit plan	"First, I want you to go home and think about it, 'do I *want* to quit smoking, am I *able* to quit smoking'?"
		Offer/discuss pharmacotherapy	"Nowadays, we have medication that decreases the craving for cigarettes"
		Discuss advantages of smoking	"Well, you get some kind of peace from it.. especially during hard times, then you desire your cigarettes.."
		Discuss risks of smoking	"..when you continue your smoking, it's far more likely that you will move from stage 2 to 3, and maybe to stage 4"
		Discuss advantages of quitting	"When you say 'I considered quitting', what would be the reasons for this? What would be the positive side of this?"
		Discuss barriers to quitting	"Maybe it is more like a habit, is that right?"
		Discuss support options	"We talked about it before, I also provide consultations for smoking cessation, so if you think you would like to quit smoking, then we could do that together…"
	• Arrange	Ask permission to discuss smoking next time	"Do you mind if we discuss your smoking again next time?"
		Plan (telephone) follow-up	"Yes, we'll discuss that next time, do you come back then?"

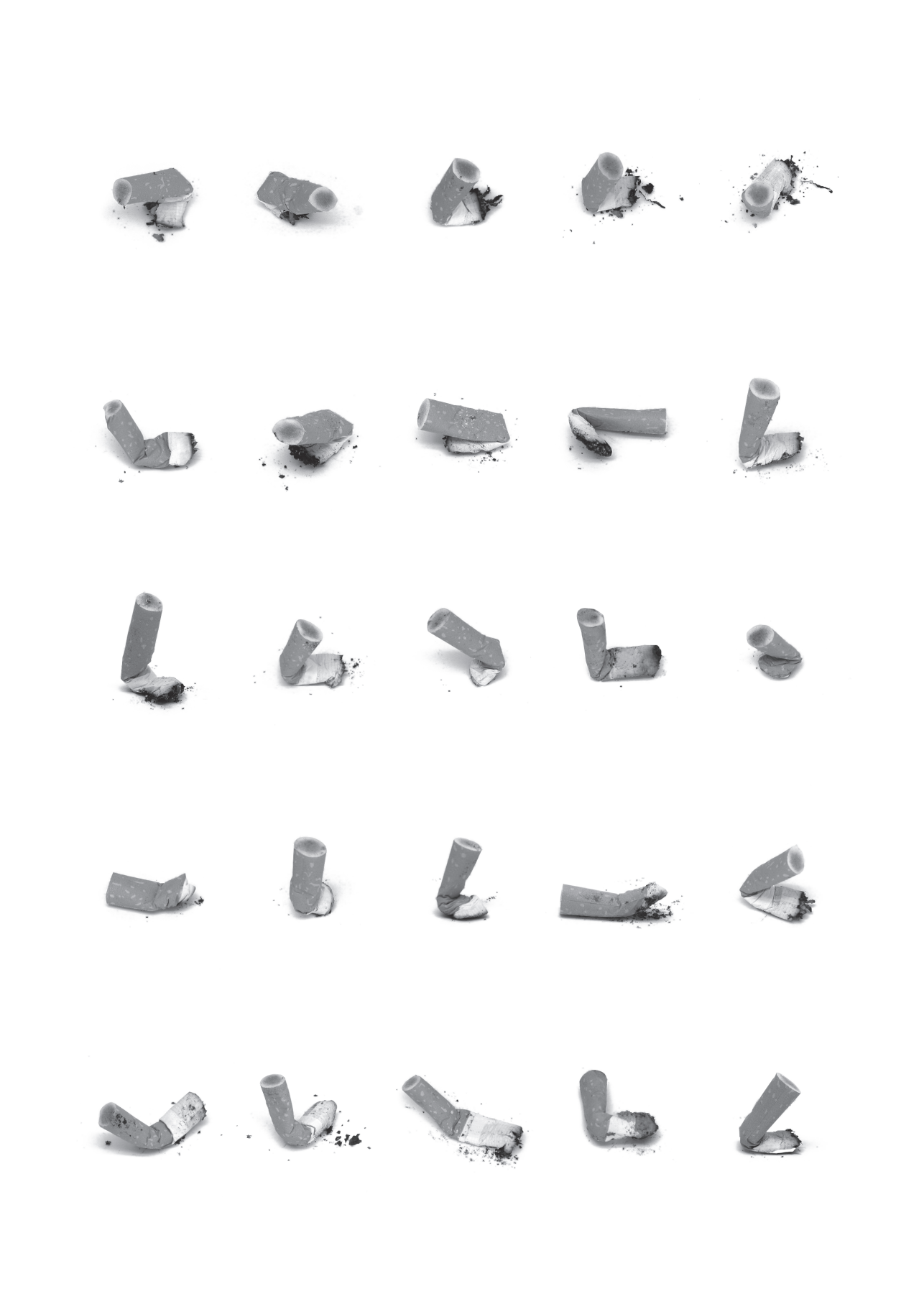
Theme	Category	Subcategory	Example
Patients			
Negative statement about smoking cessation	• Barriers to quit • Reasons for relapse • Advantages smoking • Disadvantages quitting	Habit	"Meanwhile, it has become a habit after all those years"
		Lack of motivation/ discipline	"I quit smoking for a year, but I started again.. I think it depends on your overall lifestyle, maybe a little unhealthy.. I would like to improve that…but that will require some discipline of course…"
		Denial of consequences	"Maybe when you're smoking a package each day, then I should think 'yes, maybe you should cut down a little on your smoking…"
		Social environment	"Someday I have to quit, but my wife is a smoker as well.."
		Stress	"..but on the other hand, it helps to reduce my stress"
		(Fear of) weight gain	"Yes, I would like to quit smoking, but I'm worried about my weight, to gain weight again…"
		Previous quit attempt failed	" I already tried it 7 or 8 times…"
		Not the right time	"When I quit I'm not very pleasant, and we bought a new house, the transfer will be on the 4th"
		Addiction	"That's the addiction to nicotine of course, it's the same as with alcohol"
		Smoking is tasteful/ enjoyable	"It's stupid, but I really like it, especially in the weekends after breakfast…"
		Satisfied smoker	"I'm okay with being a smoker"
		Lack of distraction/ daytime activities	"I sit at home for 3 weeks… and then you'll start smoking again"
		Lack of self-confidence	"I want to quit, but I really don't know how"
		Related to pharmacotherapy (e.g. costs)	"I once did a treatment, I had to continue smoking for 10 days and after the pill it would be all over… but it did not work…"
		No complaints of smoking	["What would be reasons for quitting smoking?"] "Well, I feel fine actually"
		Long-time smoker	["Do you think about quitting or not?"] "Well, what do you want? I'm 70.. I only have a few years left so…"
		Smoking cessation is not profitable	"When I don't smoke I still have those complaints"
		Stigma	"Nowadays, if you have a sore knee they will ask you if you're smoking… as if you sprain your ankle because of smoking.. well, that makes me furious"

Theme	Category	Subcategory	Example
		Smoking is the only thing left	"I'll never give up smoking, it's the only thing I still have"
		Withdrawal symptoms	"In the morning I have to smoke a cigarette again, to feel fine again…"
		Psychological complaints	"I quit smoking, but now I go to a psychologist again for depression and I started smoking again.."
		Smoker identity	"I don't see myself refraining from smoking actually…'
Positive statements about smoking cessation	• Motivators to quit	Health concerns	"The main reason I would say is 'it's not good for your health', that would be the reason to quit"
		Social environment	"I will read that [leaflet], then we can look at it together at home, maybe he'll also say 'when you quit, I will quit'
		Health of children	"My daughter is pregnant, so nobody smokes anymore. I think I should quit, yes.."
		Fear for disease/illness	"But I'm actually not really afraid of getting lung cancer, but more of getting something here …[larynx]"
		Quit-smoking advice of health professional	"Yes, you're absolutely right… but, yes well… then I shall do that"
		Smoke-free legislation	"Once I was in prison for 18 months… that was hard, 24 hours inside and not allowed to smoke…I then quitted smoking"
		Costs	"I've already thought about it for a while because, well cigarettes are expensive"
		Smoke smell/taste	"…and they [cigarettes] don't taste very special anymore"
		Sufficient distraction/ daytime activities	"When I'm busy, then it's easy. For example, tomorrow my grandchild will visit me, then it's going perfect"
		Sufficient motivation/ discipline	"I definitely want to quit smoking"
		Positive consequences of quitting	"I often have good results if I refrain from smoking for a while, I feel mentally better than"

Theme	Category	Subcategory	Example
Professionals and patients			
Other speech units	• Other, smoke-related	Question	"So, coffee and smoking are two risk factors?" [patient]
		Answer	"I smoke one packet a day" [patient]
		Provision information	"People who smoke… this has its effect on the vocal cords" [professional]
		Confirmation	["You are a smoker, that's not good"] "No, that's right" [patient]
		Other	[I don't think you are a good example for your kids this way] "Well, I shall talk about it with my wife" [patient]
	• Other, non-smoke-related	Question	"Do you have a fever?" [professional]
		Answer	"This side is much more painful" [patient; during physical examination]
		Provision information	"With regard to your cholesterol, according to this table, you are still within the normal risk boundaries" [professional]
		Confirmation	[I can give you something to inhale] "Yes" [patient]
		Other	"Thank you, see you next time" [patient]

Appendix 3. Simplified example of transitional probabilities

		Lag 1-3			Total
		A	**B**	**C**	
Lag 0	**A**	0.00 (0/7)	0.43 (3/7)	0.57 (4/7)	1.00 (7/7)
	B	0.40 (2/5)	0.00 (0/5)	0.60 (3/5)	1.00 (5/5)
	C	0.63 (5/8)	0.25 (2/8)	0.12 (1/8)	1.00 (8/8)



6

An increase in primary care prescriptions of stop-smoking medication as a result of health insurance coverage in the Netherlands: Population based study

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ABSTRACT

Aims

To examine the impact of two national tobacco control interventions in the past decade on (dispensed) prescriptions of stop-smoking medication.

Design

Ecological study with interrupted time-series analyses of quarterly data points of three nationwide representative databases.

Setting

The Netherlands 2001-2012, with the introduction of the guideline for smoking cessation care in general practice (GP) in 2007 and full insurance coverage for smoking cessation treatment in 2011.

Participants

GPs, pharmacists and persons in the general population aged 15 years and older.

Measurements

Time-series plots were visually inspected and segmented regression analyses were performed to estimate the change in level and slope of (dispensed) prescriptions of stop-smoking medication and smoking prevalence in the years preceding and after the tobacco control interventions.

Findings

No measurable effects of the GP guideline on (dispensed) prescriptions were observed. Shortly after the start of health insurance coverage, an estimated increase in primary care prescriptions of 6.3 per 1.000 smokers (95% CI 2.9-9.8; p=0.001) and 17.3 dispensed items per 1.000 smokers (95% CI 12.5-22.0; p<0.000) was accompanied by a sudden drop in smoking prevalence of 2.9% (95% CI 4.6-1.1; p=0.002) in the first quarter of 2011. Immediately after the coverage abolition, smoking prevalence increased by 1.2% (95% CI 0.5-2.8; p=0.156) and dispensed prescription rates decreased with 21.6 per 1.000 smokers (95% CI 26.0-17.2; p<0.000).

Conclusions

Full health insurance coverage for smoking cessation treatment in the Netherlands was accompanied by a significant increase in the number of (dispensed) prescriptions of stop-smoking medication and a decrease in smoking prevalence.

INTRODUCTION

In the past decade, cigarette consumption has declined in various high and middle-income countries.[1] However, about 25% of the Dutch adult population still smokes.[2] As a result, in the Netherlands, the attributive risk of smoking-related mortality is estimated at 21% which is relatively high compared to 16% in Europe and 12% worldwide.[3;4] Consequently, 13% of the Dutch disease burden and an annual 2 billion euros in healthcare costs are attributed to the use of tobacco.[5;6]

Therefore, in the last decade multiple national tobacco control interventions were implemented.[7;8] The Dutch government initiated several policies aimed at reducing exposure to environmental tobacco smoke and discouraging tobacco use. Bans on tobacco advertisement (November 2002) and the sale of tobacco to minors (January 2003) were implemented, and legislation was introduced for smoke-free workplaces (January 2004) and public places (April 2006 and July 2008). In addition, national guidelines for smoking cessation support in health care were developed and implemented. Moreover, in the year 2011, full health insurance coverage for evidence-based pharmacotherapy in combination with behavioural counseling was implemented.

These tobacco control interventions are likely to reduce smoking initiation, increase the number of quit attempts and/or use of effective treatments and therefore reduce smoking prevalence.[9-16] For example, in the Netherlands, smoking prevalence decreased from 30.1% in 2001 to 25.9% in 2012.[2] However, the impact of national tobacco control interventions on primary care prescriptions of stop-smoking medication is not yet clear.

GPs are more likely to deliver successful smoking cessation treatment when they use a systematic approach and when structural barriers (e.g. lack of financial reimbursement) are alleviated.[17;18] Therefore, we examined the impact of two national tobacco control interventions on prescriptions of stop-smoking medication in general practice that were likely to have directly prompted GPs to support smokers to quit. These two interventions are the guideline for smoking cessation care introduced in general practice and the full health insurance coverage period of stop-smoking treatment.

METHODS

Design

To explore the hypotheses, we used an ecological study design in which the unit of analysis was the population rather than the individual. The main advantage of this type of study is the presence of available data which enabled a relatively fast and inexpensive study. However, the results cannot be extrapolated to the individual level and no confounder data were available. Moreover, inferences regarding causality need to be made with caution, taking into account other explanations for changes in outcomes. Nevertheless, this type of study is useful to generate new hypotheses based on the results.

National tobacco control interventions

We assessed the impact of potentially high-impact national tobacco control interventions on prescriptions of stop-smoking medication in general practice, i.e. i) the introduction of the GP guideline for smoking cessation care, ii) full health insurance coverage of evidence-based pharmaceuticals and behavioural treatment for smoking cessation.

Implementation of the first Dutch guideline 'Treatment of Tobacco Dependence' started in 2004, accompanied by campaigns in which physicians and other healthcare providers were informed about the guideline and were provided with additional insight into the addictive character of smoking.[19] This implementation period resulted in the first version of a guideline for treatment of tobacco use in general practice, developed by the Dutch College of General Practitioners in June 2007.[20] This guideline recommends actively enquiring about a patient's motivation for stopping smoking. When a patient smokes more than 10 cigarettes/day and is motivated to quit, the first choice recommendation is to prescribe nicotine replacement therapy (NRT) in combination with behavioural treatment. If specifically requested by the patient, or in case of relapse after NRT, the antidepressant smoking cessation agents bupropion and nortriptyline are recommended. In December 2006 varenicline was introduced in the Netherlands and (after an evaluation period) was incorporated into the GP guideline in March 2011.[21]

In January 2011, the Dutch government introduced full health insurance coverage for evidence-based smoking cessation programs using pharmacotherapy in combination with behavioural counseling. Due to governmental changes, a shift of focus of the Ministry of Health on people's autonomy regarding lifestyle choices and overall cutting in budget led to the cancellation of full health insurance coverage after only one year. As a result, only behavioural support and not

pharmacological support for smoking cessation was reimbursed during the year 2012.

We analysed the effects of both policies within the same regression model which allowed us to quantify the effects of one policy taking into account the effect of the other policy.

Data extraction

For a full overview of the number of primary care prescriptions of stop-smoking pharmaceuticals in the past decade we used two nationwide representative databases of i) prescribed medication in general practice and ii) prescriptions dispensed in outpatient pharmacies. The term 'prescription' refers to an order of the GP for the pharmacist to dispense and the patient to take the medication. The act of dispensing is defined as providing a patient with their labelled medication. In the Netherlands all stop-smoking medications are prescription drugs, with the exception of NRT which is also available over-the-counter.

At quarterly intervals, we extracted data on prescriptions and dispensed items of stop-smoking medication in general practices and pharmacies. Data on nortriptyline were excluded because this pharmaceutical is also used for various other indications. Finally, to explore the impact of the tobacco control interventions on smoking prevalence a third database was used (see C. below).

The privacy regulation of the study was registered at the Dutch Data Protection Authority. According to current Dutch legislation, neither informed consent nor approval is required from a medical ethics committee for observational studies using anonymized data records.[22]

A. The number of quarterly prescribed stop-smoking medication in general practice was derived from the Netherlands Information Network of Primary Care (LINH) in the period 2001-2011. Data were retrieved from electronic medical patient records, kept in a representative sample of 84 general practices with approximately 350,000 listed patients. The characteristics of the study population (GPs and patients) are comparable with the general Dutch population in terms of age and gender.[23] We selected prescriptions of NRT, varenicline and bupropion in the period 2001-2011 and calculated prescription rates per 1,000 smokers. These rates were calculated by dividing the absolute number of primary care prescriptions by the number of smokers, multiplied by 1,000. The number of smokers was based on the total population[24] and smoking prevalence.[25] In this database it was not possible to differentiate between prescriptions of bupropion as an anti-depressant or for smoking cessation.

B. For prescriptions of stop-smoking medication dispensed in outpatient pharmacies, we used quarterly data of the Dutch Foundation for Pharmaceutical Statistics (SFK) in the period 2001-2012. The SFK gathers data from a representative panel of 95% of Dutch community pharmacies. Data were extrapolated to nationwide figures. We selected dispensations of NRT, varenicline and bupropion in the period 2001-2012 and calculated dispensed rates per 1,000 smokers.

C. We used quarterly data from the Dutch Continuous Survey of Smoking Habits (DCSSH) from 2001-2012 for smoking prevalence. The DCSSH assesses smoking behaviour of the Dutch adult population (15 years and older). The DCSSH has been part of the CASI omnibus (Computer-Assisted Self-Interviewing) of TNS NIPO from 2001-2008. From 2009 onwards, the DCSSH has been performing an ad-hoc internet survey in which a representative sample of about 350 subjects is selected from a database of 200,000 respondents every week. Up to 2008, the data of the DCSSH were weighted on the basis of respondents' gender, age and education level, the province in which they lived, and their family and community size. Since January 2009, the data are also weighed on the basis of respondents' social economic status. Smoking prevalence was assessed by asking participants 'Do you (ever) smoke?'

Statistical methods

We drew and visually inspected time-series plots to detect marked changes in the number of (dispensed) prescriptions, and smoking prevalence in the past decade. Interrupted time-series analyses (SPSS 20.0) were used to evaluate the impact of the national tobacco control interventions on (dispensed) prescriptions of stop-smoking medications and smoking prevalence.[26] The advantages of these analyses are the fact that they allowed us to assess whether the interventions changed the outcomes immediately as well as over a period of time, taken into account pre-existing trends in the data.[26-28] Prior studies have shown that segmented regression analysis is a suitable method for analysing interrupted time-series data in order to assess the impact of extraneous events on smoking-related outcomes.[26;29-32] We examined the following linear regression equation:

$$Y_t = B_0 + B_1{}^* \, time_t + B_2{}^* \, intervention1_t + B_3{}^* \, time\ after\ intervention1_t + B_4{}^* \, intervention2_t + B_5{}^* \, intervention3_t + e_t$$

Time (in quarters) was included as a continuous predictor. *Intervention* indicated the introduction of the GP guideline, and the introduction and abolition of health

insurance coverage of stop-smoking treatment; pre-intervention time points were coded 0 and post-intervention time points were coded 1. *Time after intervention* was coded 0 up to the last time point before the intervention, and was sequentially coded from 1 thereafter.

In the model, Y_t represents the outcome variable at time t (the number of (dispensed) prescriptions per 1,000 smokers or smoking prevalence). B_0 estimates the baseline level/intercept of the outcome at time point zero; B_1 estimates the quarterly change in outcome prior to the interventions; B_2 (introduction GP-guideline), B_4 (introduction insurance coverage), and B_5 (abolition insurance coverage) estimates the change in level immediately after the interventions; and B_3 estimates the change in slope after the introduction of the GP-guideline compared with the slope before the intervention. We assessed both full and parsimonious models in which we incorporated all parameters regardless of their significance and only significant covariates, respectively.

We did not assess the impact of the GP guideline introduction on the number of (dispensed) prescriptions of varenicline because this pharmaceutical was introduced in the Netherlands around the same time as the GP guideline (December 2006). Furthermore, we only assessed the immediate effect of the introduction and abolition of the insurance coverage in (dispensed) prescriptions and smoking prevalence, since we lacked sufficient time-points to estimate a change in trend.

Since time is a predictor in segmented regression analyses, it is likely that consecutive observations are correlated, which is called autocorrelation. Since regression analysis assumes independency between observations and autocorrelation can overestimate or underestimate significance, we examined autocorrelation by visually inspecting residual plots. Autocorrelation was judged to be present if there were statistically significant spikes in the correlogram. In addition, the Durbin-Watson statistic was used to test serial autocorrelation; based on the number of observations and regressors in the model we determined an upper and lower bound and tested the null hypothesis of zero autocorrelation in the data.[33] We found first-order autocorrelation in the time-series of the total prescription rate, prescription rate of NVM, and of the number of (dispensed) prescription of bupropion and varenicline. These time-series were differenced by subtracting the value of an earlier observation from the value of a later observation in order to control for autocorrelation.[26;28] The regression models were re-checked after time-series were differenced in order to confirm that autocorrelation was accounted for.

RESULTS

Figure 1 shows the time-series plots of primary care prescriptions of stop-smoking medication and dispensed items in pharmacies in the past decade. It highlights the introduction of the smoking cessation guideline in general practice and the period of the full health insurance coverage of smoking cessation treatment. Both time-series were relatively low in the period 2001-2006, but show a small increase after 2007. Next, both time series increased steeply in 2011, especially in the first and last quarter. Thereafter, dispensed prescriptions in pharmacies show a decrease in 2012. Overall, the number of stop-smoking medication prescribed in general practices is lower than dispensed in pharmacies. This can probably be explained by other clinical specialists also prescribing these pharmaceuticals. Further explanations are that GPs sometimes prescribe multiple doses of stop-smoking medications at the same time, and pharmacists sometimes dispense the labelled medication at multiple moments to be able to check for possible side-effects.[34]

Figure 2 shows the number of primary care prescriptions and dispensed items of NRT, varenicline, and bupropion. Visual inspection points out that between 2001-2008, the number of primary care prescriptions of NRT increased in the first quarter of every year, which can be defined as seasonality in the time-series. In this period, the prescription rates of NRT show little change, with a single small increase in 2008. Both time-series of NRT show a steep increase in 2011, especially in the first and last quarter.

After the introduction of varenicline in December 2006, visual inspection of figure 2 shows that both prescriptions and dispensed items of this pharmaceutical rapidly increased, particularly in the first and last quarter of 2011. Next, dispensed items of varenicline show a steep decrease in 2012.

With regard to bupropion, we observed a discrepancy between primary care prescriptions and dispensed items from 2007 (Figure 2). At that time, bupropion was registered in the Netherlands as an anti-depressant in addition to stop-smoking medication.[35] The observed discrepancy can be explained by the fact that the primary care prescriptions in this study represent the total number of prescriptions for both depression and quit smoking and the dispensed items represent only stop-smoking medication. Both prescriptions and dispensed items of bupropion show a single slight increase in 2004. Subsequently, primary care prescriptions of bupropion increase in 2011 and the number of dispensed items show a slight decrease in 2012.

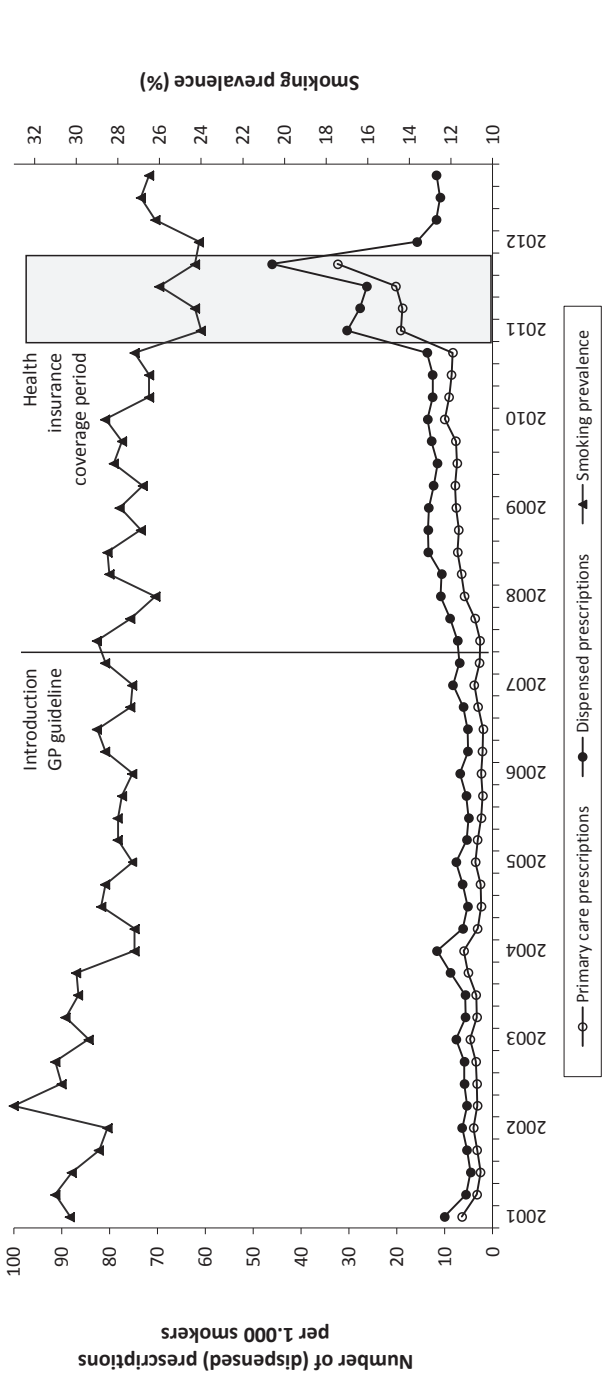

Figure 1. Smoking prevalence and the number of primary care prescriptions and dispensed prescriptions of stop-smoking medication per 1.000 smokers in the period 2001-2012

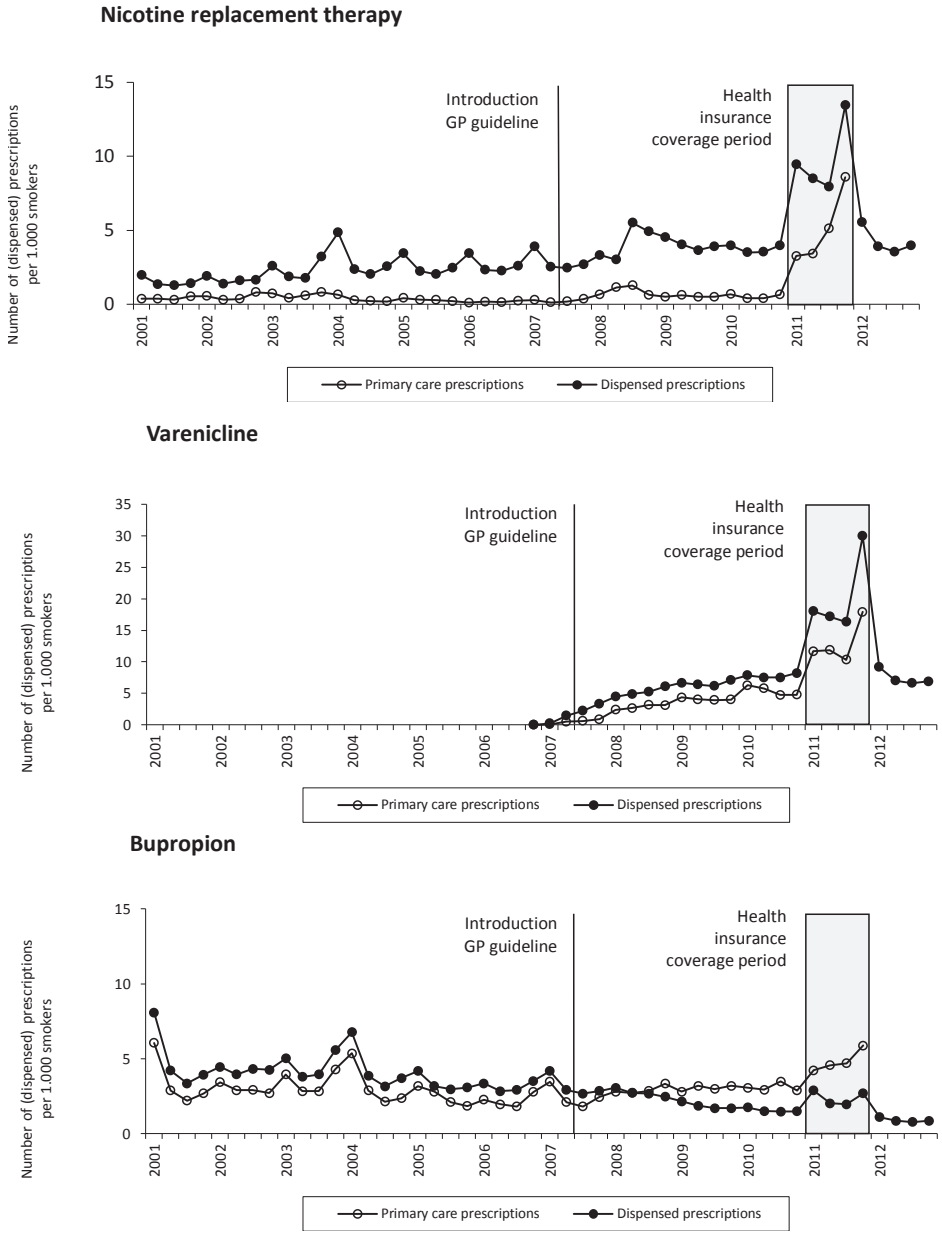

Figure 2. The number of primary care prescriptions and dispensed prescriptions of nicotine replacement therapy, varenicline, and bupropion per 1.000 smokers in the period 2001-2012

GP guideline

When accounting for the effect of the introduction of the health insurance coverage, there was no statistically significant immediate (B_2) and long-term (B_3) effect of the introduction of the GP guideline on the number of primary care prescriptions and dispensed items (Table 1).

Health insurance coverage

According to the segmented regression analysis, the total number of stop-smoking medication prescribed in general practices and dispensed in pharmacies showed a significant increase in 2011, the year in which smoking cessation treatment was reimbursed (Table 1). In the first quarter of 2011, prescriptions and dispensed items increased by 6.3 per 1.000 smokers (95% CI: 2.0-9.8; p = 0.001) and 17.3 per 1.000 smokers (95% CI:12.5-22.0; p= <0.000), respectively (Table 2). This change also occurred in the number of primary care prescriptions and dispensed items of NRT and varenicline (Table 1). Subsequently, a significant decrease in the number of dispensed items of stop-smoking medication was established of 21.6 items per 1.000 smokers (95% CI: -25.9 - -17.2; p <0.000) in the first quarter of 2012, immediately after the abolition of the coverage. This effect also occurred in the number of dispensed items of varenicline and NRT.

Smoking prevalence

Visual inspection of figure 1 shows a steady overall decline in smoking prevalence in the period 2001-2012, with a more prominent decrease in 2004, 2007 and 2011. Thereafter, smoking prevalence shows a marked increase in 2012. Segmented regression analyses confirmed a significant decrease in the first quarter of 2011, immediately after the introduction of the health insurance coverage (Table 1).

DISCUSSION

In the past decade, the number of primary care prescriptions of stop-smoking medication in general practices and dispensed items in pharmacies increased. We found a significant change in (dispensed) prescriptions following full health insurance coverage of stop-smoking support in the year 2011. Moreover, our data suggest a positive impact of this tobacco control policy on smoking prevalence. We did not find measurable effects of the introduction of a guideline for smoking cessation care in general practice on prescription rates.

Table 1. Results of segmented regression analyses of the number of primary care prescriptions, dispensed prescriptions and smoking prevalence

	Pre GP guideline and insurance coverage period			Post introduction GP guideline for smoking cessation care						Post introduction of insurance coverage			Post abolition of insurance coverage		
Prescriptions	B_1	95% CI	*p*	B_2	95% CI	*p*	B_3	(95% CI)	*p*	B_4	95% CI	*p*	B_5	95% CI	*p*
Total[a]	0.02	-0.09 – 1.14	0.676	0.84	-2.04 – 3.71	0.560	-0.10	-0.40 – 0.20	0.499	6.31	2.86 – 9.76	0.001	-	-	-
Bupropion	0.02	-0.03 – 0.07	0.374	0.12	-1.13 – 1.37	0.845	-0.05	-0.18 – 0.08	0.475	0.91	-0.59 – 2.41	0.227	-	-	-
NRT	-0.00	-0.03 – 0.02	0.832	0.11	-0.52 – 0.73	0.735	-0.00	-0.07 – 0.07	0.986	1.97	1.23 – 2.72	<0.000	-	-	-
Varenicline	0.01	-0.03 – 0.05	0.644	-	-	-	-	-	-	2.97	1.30 – 4.64	0.001	-	-	-
Dispensed items															
Total[a]	-0.01	-0.16 – 0.15	0.924	2.68	-1.23 – 6.59	0.173	0.39	-0.02 – 0.79	0.060	17.26	12.53 – 21.98	<0.000	-21.56	-25.93 – -17.19	<0.000
Bupropion	0.03	-0.03 – 0.08	0.292	-0.31	-1.64 – 1.03	0.645	-0.02	-1.28 – 1.92	0.688	0.32	-1.28 – 1.92	0.688	-0.79	-2.27 – 0.69	0.288
NRT	0.06	0.01 – 0.11	0.026	0.20	-1.15 – 1.55	0.768	0.01	-0.13 – 0.15	0.929	5.45	3.82 – 7.08	<0.000	-5.86	-7.37 – -4.35	<0.000
Varenicline	0.02	-0.07 – 0.12	0.618	-	-	-	-	-	-	4.72	0.65 – 8.79	0.024	-11.30	-16.05 – -6.55	<0.000
Smoking prevalence	-0.14	-0.20 – 0.09	<0.000	-0.15	-1.60 – 1.30	0.835	0.17	0.02 – 0.32	0.028	-2.86	-4.61 – -1.11	0.002	1.16	-0.46 – 2.79	0.156

Parameters in the full segmented regression model are reported (parsimonious model showed comparable effects). B_1: quarterly change in the number of (dispensed) prescriptions per 1.000 smoker and smoking prevalence (%) prior to the introduction of the GP guideline and the health insurance period for smoking cessation treatment; B_2: change in the quarterly level of (dispensed) prescriptions per 1.000 smokers and smoking prevalence (%) immediately after the introduction of the GP guideline; B_3: change in trend in quarterly number of (dispensed) prescriptions per 1.000 smoker and smoking prevalence (%) after the introduction of the GP guideline; B_4: change in the quarterly level of (dispensed) prescriptions per 1.000 smoker and smoking prevalence (%) immediately after the introduction of the health insurance coverage for smoking cessation treatment; B_5: change in quarterly level of (dispensed) prescriptions per 1.000 smoker and smoking prevalence (%) immediately after the abolition of the health insurance coverage for smoking cessation treatment

NRT: nicotine replacement therapy; CI: confidence interval

[a] Total number of (dispensed) prescriptions consist of bupropion, NRT, and varenicline

Current results compared to previous research

These results complement other Dutch reports indicating an upward trend in the use of pharmacological aids for smoking cessation in recent years.[36] Nevertheless, relatively few stop-smoking prescriptions are actively suggested by GPs and guidelines for cessation support are often implemented suboptimal in general practice.[16;37;38] Moreover, these guidelines also comprise behavioural cessation support, which we did not addressed in our study, which may explain why we did not found effects of the introduction of the GP guideline introduction on prescription rates.

Regarding our findings related to the effect of full health insurance coverage on prescription rates and smoking prevalence, latest research also shows a strong association between this policy and a more than ten-fold increase in telephone counseling for smoking cessation.[39] Moreover, a recent review of 11 randomized controlled trials of four countries found a positive effect of full health insurance coverage on the use of smoking cessation treatment.[18]

Strengths and weaknesses

A strength of our study is that three large nationwide representative databases were used with regard to prescriptions in general practice, dispensed items in pharmacies and smoking prevalence. With regard to the SFK database, in 2011 an unknown and possibly substantial part of Dutch health insurance companies covered dispensed prescriptions of stop-smoking medications only of specific (online) pharmacies; therefore, the precise number of dispensed items was unknown in this year. This implies that these data might underestimate the actual situation and that the impact of health insurance coverage might be even larger. Another strength of the study is the fact that in the Dutch healthcare system, almost all non-institutionalized Dutch citizens are registered with a general practice, which resulted in data with strong external validity.

Regarding the analyses, we assessed the impact of tobacco control interventions with quarterly data points, which enables us to detect subtle temporary effects in the period prior to or immediately after the interventions. Additionally, we included the most recent available data in order to analyse changes in trends following the abolition of the health insurance coverage.

However, some limitations of the study have to be mentioned. First, it was not possible to differentiate between bupropion prescriptions for treating depression and those used as a quit-smoking aid in general practice. Furthermore, we did not include data regarding NRT distributed over-the-counter. Because the estimated mean costs of NRT are 2.57 Euro per day[40], this may have been an incentive for patients to get a prescription of the GP during the period smoking cessation aids were reimbursed. For this reason, it is possible that the reported

large increase in the number of (dispensed) prescriptions of NRT in the period 2011-2012 is partially caused by the fact that over-the-counter distribution of these aids are not included into the analyses in the pre-intervention period.

With regard to the segmented regression analyses, when assessing the impact of an intervention on time series, the impact of extraneous events on the observed changes in the series must be taken into account.[29] In the past decade, multiple tobacco control policies have been implemented in the Netherlands which might have had an (indirect) effect on the number of prescriptions; for example, tax increases, and smoke-free legislation in the workplace (2004) and other public areas (2008). However, in 2011 no other tobacco control measures were introduced in the Netherlands. Although caution is required in assuming causal relations, it seems likely that the increase in (dispensed) prescriptions and decrease in smoking prevalence in 2011 can be attributed to the introduction of the health insurance coverage. This assumption is supported by the fact that we visually detected a marked increase in smoking prevalence and statistically confirmed a decrease in dispensed items immediately after the abolition of the coverage.

Conclusion and practical implications

The results of this study suggest that health insurance coverage for smoking cessation treatment prompt GPs to prescribe evidence-based pharmaceuticals for smoking cessation and have positive effects on smoking prevalence. Therefore, these results are a relevant addition to the existing evidence demonstrating the importance of tobacco control policies in the effective tackling of the tobacco epidemic.[10-15;29;41;42]

We argue that policy makers and the tobacco-control community consider this evidence in developing future tobacco control policy. Given the limitations of our study, we recommend replication of population based studies to further evaluate the effectiveness of tobacco control interventions.

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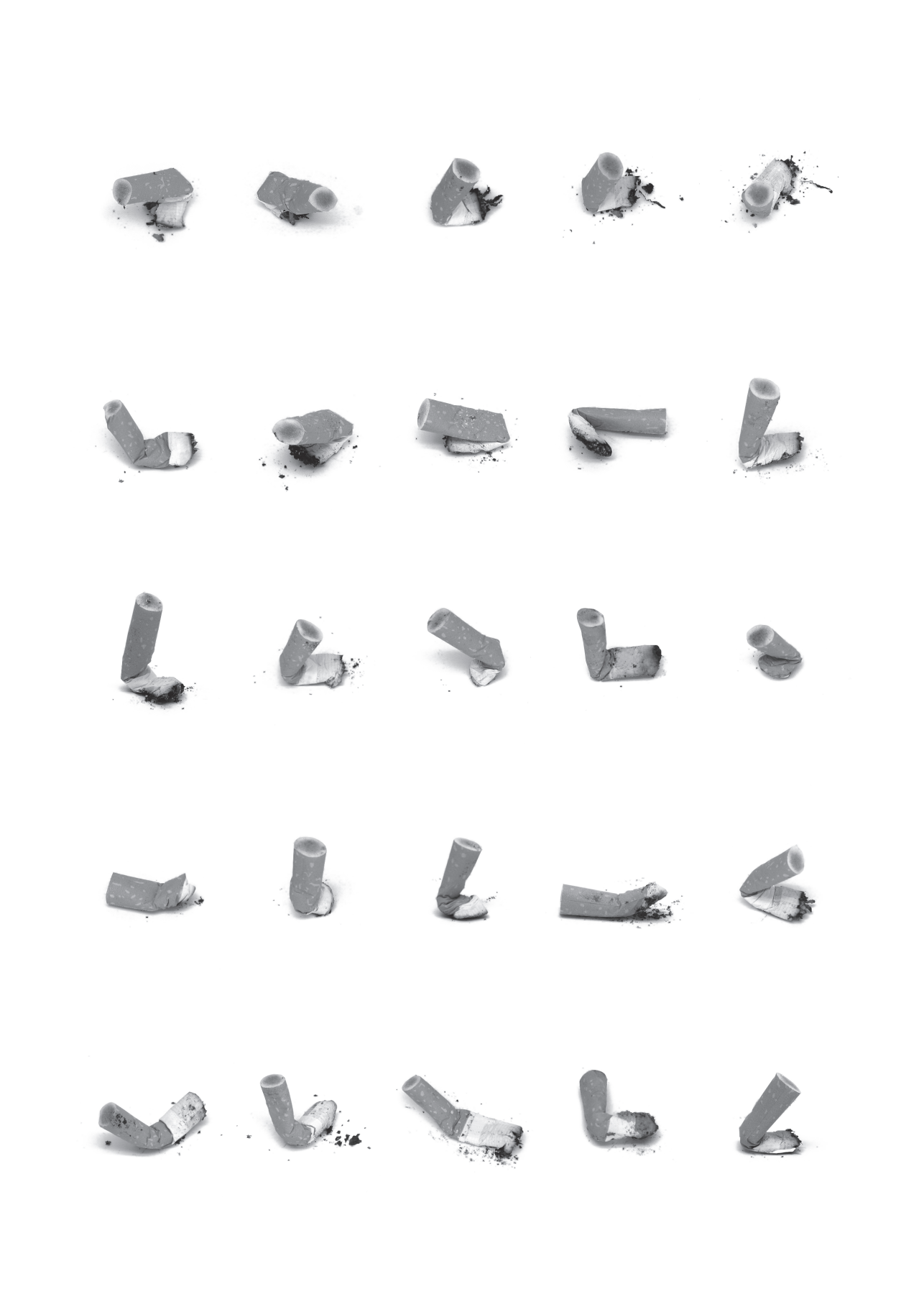


7

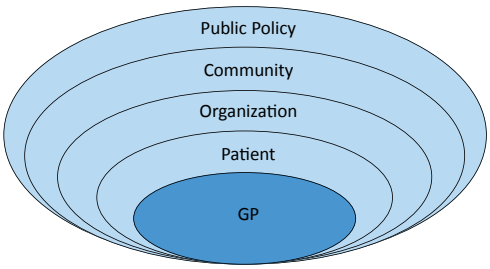
General discussion

This general discussion provides further explanations for the observed findings of the presented studies, discusses the practical implications of the study results, and provides recommendations for future research. Furthermore, the empirical studies in this dissertation will be put into the context of the socio-ecological model that was introduced in the first chapter.

IMPROVING GPS' IMPLEMENTATION OF SMOKING CESSATION CARE

Successful implementation of innovations within healthcare, including a guideline for smoking cessation care in general practice, is a complex and often long-lasting process.[1] The factors that influence this implementation process operate on several levels, including the general practitioner (GP), patient, organization, community, and public policy level. These levels are summarized in a five-level socio-ecological model depicted in the introductory chapter of this dissertation. This model constitutes the conceptual framework that guided this dissertation; all empirical studies addressed factors related to one or more of these levels.

GP level



Chapter three of this dissertation presented the effectiveness of a pragmatic, practice-tailored training programme for GPs that aimed to influence the determining GP-related factors of implementation. The trained GPs increased the number of times they asked their patients about smoking and advised smokers to quit compared to the untrained GPs. In addition, they reported a higher perceived self-efficacy and intention towards routinely implementing smoking cessation care. However, in additional analyses we could not confirm that an increased self-efficacy or an increased intention to implement smoking cessation care was related to improved delivery of such care. There may be several explanations for this lack of a relation between GPs' self-efficacy, intention and behaviour. The first possible explanations entail methodological considerations. The relatively small GP sample may have resulted in low statistical power and an inadequate way of operationalizing the self-efficacy and intention constructs may have violated the construct validity within the study. Other possible explanations entail theoretical considerations. It can be argued

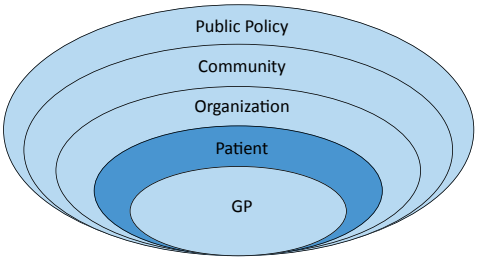
that cognitive determinants of behaviour may be too parsimonious to predict complex human volitional behaviour, such as GPs' advices to quit, prescriptions for quit-smoking medication, and referrals to follow-up quit smoking support.[2] As a result, GPs' provision of such guideline-recommended smoking cessation care may be influenced by other behavioural attributes than cognitive determinants alone, such as perceived self-efficacy and intention.

GP action planning

Because the gap between an individual's intention and actual behaviour can be closed by formulating action plans[3-5], *chapter four* of this dissertation presented the effects of this strategy among GPs. Based on these results, no conclusions can yet be drawn on the effectiveness of action planning on GPs' advices to quit and follow-up arrangements. This might be due to the previously mentioned small GP and smoker sample sizes. In addition, coping planning might result in more positive effects on GPs' provision of quit-smoking advices and arrangements of follow-up support. This type of planning is known to anticipate behavioural barriers that impede action plans from working.[6]

Patient level

Chapter five reports a study in which a quantitative approach to video-recorded communication was used to examine the interaction between primary care professionals and patients during unsolicited dialogues about smoking. Overall, this study showed that the probability that smokers expressed a negative statement about quitting was lowest when primary care professionals asked about smoking (11%), advised to quit (27%), or arranged a follow-up (15%), compared to assessing the smoker's motivation to quit (55%), or providing assistance with quitting (38%). GPs seemed less likely to continue their use of these 5 A's following smokers' negative statements about quitting (19%) compared to smokers' positive statements about quitting (47%), which might relate to GPs' fear of harming the doctor-patient relationship when discussing smoking unsolicited.[7] Nevertheless, we could not confirm this last finding statistically. This could be explained by several methodological issues. Within multilevel modelling it is desirable to include a sufficient sample size on each level to obtain sufficient power for the statistical test to



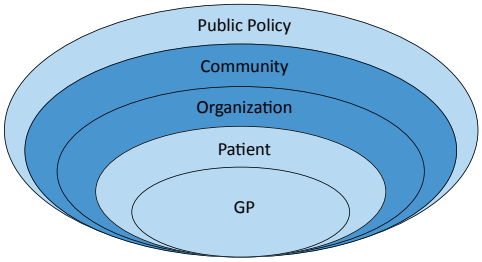
confirm effects when these are present.[8] Our two-level model (GP and speech unit level) included 17 GP consultations on the highest level. Literature suggests, however, a minimum sample size of and a sample size of 100 as sufficient at the highest level of such models.[9;10] Including a small sample size might have led to biased estimates of the effects.[8] Nevertheless, some suggest that the appropriate sample size depends on the area of research; a sample size on the highest level of 30 is, for instance, appropriate in educational research, whereas a sample size of 5 at the highest level is appropriate in family and longitudinal research.[9] Until now, multilevel techniques to examine physician-patient communication are rarely used in general practice[11], which makes an estimation of the appropriate GP sample size difficult.

GP-patient communication

Studies have shown that emphasizing a link between the patient's (possible future) health status and his/her current smoking behaviour, as recommended by the current GP-guideline[12], may evoke resistance in a patient.[13] Achieving mutual agreement on the importance of smoking cessation might reduce this resistance.[13] Following the basic principles of motivational interviewing, GPs may use this resistance, or 'sustain talk', to evoke 'change-talk' in which the patient is encouraged to verbalize arguments to quit smoking. As shown by a meta-analysis of 14 studies, such motivational interviewing techniques significantly increase smoking abstinence rates when compared to a brief quit-smoking advice.[14] In addition, this approach might result in a more balanced relationship between the GP and patient.[15] As a result, patients will feel engaged in the decision-making process, which is known to result in more positive patient outcomes.[16;17]

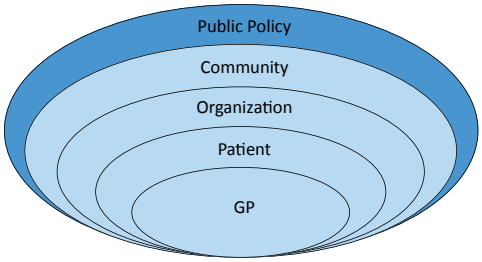
Nevertheless, GPs and practice nurses (PNs) apply motivational interviewing techniques only to a minor extent.[18] In addition, it has been suggested that training during and after medical school may not be sufficient for adequately applying these techniques in practice.[19] Although it is still unknown which training components and frequencies are most profitable for healthcare professionals to improve motivational interviewing techniques[20;21], previous studies have suggested that the provision of systematic (video-)feedback might be effective.[18;22] Therefore, it is recommended to examine the effects of (long-term) (video-) feedback on GPs' usage of motivational interviewing techniques in dealing with negative statements of smokers about quitting and reaching mutual agreement on the importance of a smoking cessation advice.

Organization and community level



Chapter two of this dissertation recommended more focus on organizational factors within training programmes for health professionals in smoking cessation care. It may facilitate implementation of such care when the conditions in which these professionals work are addressed. This was recently confirmed by a study by Geense et al., which reports on the organizational and community barriers primary care professionals perceive as impeding for a full implementation of lifestyle interventions.[23] The GP training programme presented in *chapter three* of this dissertation attempted to target such organizational factors, including referral opportunities to quit-smoking programmes in the community, and possibilities to register the smoking status of patients in their electronic medical file. Nevertheless, our trained GPs did not refer smokers to follow-up care more often. Since we do not know whether the trained GPs improved the organization of smoking cessation care in their practice, we are unable to draw further conclusions regarding the effectiveness of including organizational barriers of implementation in training programmes for GPs based on these findings. Future process evaluations of such training programmes might improve our knowledge about effective strategies tackling organizational and community implementation barriers.

Public policy level



Chapter six reported the results of a population-based study in which we examined the effects of the introduction of full health insurance coverage of quit-smoking support in the Netherlands (2011) on GP prescriptions of stop-smoking medication and on smoking prevalence. As shown in this chapter, this public policy was accompanied by an increase in GP prescriptions of stop-smoking medication. Unfortunately, this registration-based study was unable to examine the influence of this policy on the provision of other smoking cessation activities by GPs, such as advices to quit or referrals for quit-smoking

support. Another population-based study in the Netherlands, however, showed that the number of smokers who called the national smoking-cessation quit line increased more than tenfold; from 848 smokers that enrolled in telephone treatment in 2010 to 9091 smokers in 2011, the year the coverage was introduced.[24] We also found a significant decrease in smoking prevalence in 2011, which is in line with recent published findings of a longitudinal four-wave web-based survey among a national representative sample of adult smokers.[25] This study found that the self-reported number of quit attempts increased in this year as well as the number of smokers who gave up their smoking successfully. However, this study did not find a significant increase in the self-reported use of stop-smoking medication as a result of the health insurance coverage.[25] As argued by the authors, this is probably due to a time-lag in reporting.[25]

CONCLUSIONS

It can be concluded that the implementation of smoking cessation care in general practice can be improved by targeting factors on multiple levels. Nevertheless, challenges remain for the future. In particular, there is considerable room for improvement regarding GPs' referrals for follow-up quit-smoking support. In addition, GPs seem to discontinue their use of guideline-recommended smoking cessation care when smokers express negative statements about quitting, which may indicate the importance of improving (the use of) motivational interviewing techniques. These conclusions lead to the following implications.

PRACTICAL IMPLICATIONS

This section discusses the practical implications of the study findings for current Dutch GP training programmes, GP guidelines, and tobacco control policies that have the potential to facilitate a successful implementation of smoking cessation care in future general practice.

GP training programmes

In the Netherlands, various GP training programmes for improving smoking cessation care are currently available. To our knowledge, no evidence exists on the effectiveness of these training programmes, which makes it difficult to compare them with the GP training programme discussed in *chapter three* of this dissertation. In addition, large heterogeneity exists with regard to the mode of delivery,

duration, and content of these training programmes. In contrast to our individual, one-hour GP training programme, these programmes most often have a longer duration, ranging from 1.5 hours to four days, and are delivered to a group of professionals. Whereas our GP training programme focused on tailored guidance regarding individual implementation barriers, including organizational and community factors, only a minority of other training programmes thoroughly incorporate such implementation aspects.

As elaborated upon in *chapter two*, organizational factors should be considered within GP training programmes in order to facilitate a full implementation of guideline-recommended smoking cessation care. Although the training programme discussed in *chapter three* incorporated such organizational factors, it is not clear whether the organization with regard to smoking cessation care in general practice improved. Nevertheless, a majority of the GPs addressed organizational barriers during our training, underpinning its importance. Therefore, we recommend current Dutch training programmes to focus more on the implementation aspects of smoking cessation care in general practice, including organizational factors, such as a clear task distribution and a supportive work environment. In addition, providing a follow-up meeting for GPs and monitoring their progress after the training may ensure that smoking cessation care is successfully implemented in the long term.

To ensure a routine approach to lifestyle counseling in future general practice, it is recommendable to put more emphasis on this during medical school and GP residency. Currently, GP residents are trained in basic motivational interviewing techniques. We recommend to incorporate ongoing (video-)feedback and monitoring of these GP skills within consultations in which smoking is unsolicited discussed (this approach may also be applied to other aspects of lifestyle counseling). Including this feedback in their portfolios can encourage GP residents to reflect on their progress concerning these skills and develop personal learning goals.[26]

In addition, forming action plans on who, when, where, and how to implement such techniques and other smoking cessation activities, such as advising to quit and referring for follow-up, might link situational cues in consultations and other aspects of daily practice to these activities. This strategy may especially alleviate implementation barriers operating on an organizational level since it specifies a clearer task allocation within the practice. Coping planning might further stimulate GPs to anticipate obstacles to implementation that might impede action plans from working. Taking into consideration the importance of achieving mutual agreement with the patient regarding the importance of smoking cessation, combined with increasing time restrictions within consulta-

tions, (future) GPs should be prepared thoroughly in order to provide adequate smoking cessation care.

GP guideline

As discussed in the *chapter one* of this dissertation, current guidelines for smoking cessation care in general practice are based on the 5A-Model, which entails *Asking* about smoking, *Advising* to quit, *Assessing* motivation to quit, *Assisting* with quitting, and *Arranging* follow-up.[12;27-29] Although these guidelines seem to focus on a full implementation of the 5A-Model by the GP, some recommendations are provided with regard to specifically delegating quit-smoking assistance to trained PNs. In line with these recommendations, *chapter five* showed a clear division of tasks between GPs and PNs with regard to the provision of smoking cessation care; when using the 5 A's, GPs focussed on *Asking* about smoking and *Advising* to quit, while PNs focussed on *Assisting* with quitting. Nevertheless, both GPs and PNs lacked sufficient focus on *Advising* smokers to quit, *Assessing* their motivation to quit, and *Arranging* referrals or follow-up appointments.

Recently, the (dis)advantages of the 5A-Model were summarized.[30] On the one hand, this model is a rather straightforward approach for busy healthcare settings. Additionally, the 5A-Model matches existing practices and patients' expectations well. On the other hand, the 5A-Model is tied to only one professional, in particular to physicians. Yet, smoking cessation interventions have shown the added value of involvement of multiple members of a practice team.[31] Moreover, various factors impede GPs' implementation of the full 5A-Model, some of which can be considered as insurmountable, such as a lack of sufficient consultation time. Therefore, it may be argued that alternative approaches to the treatment of tobacco addiction should be developed which do not solely rely on the GP, but rather involve multiple members of the practice team.

Alternatives to the 5A-Model

A smoking cessation initiative on cardiology wards recommends a simplified *Ask-Advise-Refer* (A-A-R) approach.[32] When applying this approach in general practice, busy GPs solely address the patients' smoking behaviour and refer them to effective smoking cessation treatments provided by PNs. Yet, as shown in a previous study[19] and confirmed in *chapter five* of this dissertation, GPs do not frequently refer patients for quit-smoking support. Moreover, the vast majority of smokers who are passively referred to quit lines fail to call for quit-smoking assistance.[33;34]

Therefore, Vidrine et al. developed an approach to smoking cessation care in general practice known as the *Ask-Advise-Connect* (A-A-C) approach.[35] Contrary

to the A-A-R approach in which patients are passively *referred* to follow-up support, the A-A-C approach proactively *connects* patients' with follow-up support. Connections were made by clicking on an automated link in the patient's electronic medical file that sent the smoker's name and phone number to a quit line. Within 48 hours, the patient was then proactively called and quit-smoking support was scheduled. A group-randomized controlled study showed a significant larger proportion of identified smokers that enrolled in quit-smoking treatment within the A-A-C approach compared to the A-A-R approach (A-A-C: 100% versus A-A-R: 68.7%).[35] Although evidence of the A-A-C on smoking abstinence rates is still lacking, previous studies have suggested that such proactive approaches to smoking cessation are just as or even more effective than reactive strategies, such as the A-A-R approach.[36] In addition, it might be argued that GPs are more inclined to proactively *connect* smokers with follow-up support, because they perceive this approach as more effective when compared to a passive A-A-R approach.

Tobacco control policy

Based on previous studies, we hypothesized that the implementation of smoking cessation treatment in general practice could be facilitated by full health insurance coverage of quit-smoking programmes.[23;37] Following the findings presented in *chapter six*, it is highly recommended to continue the current full health insurance coverage for quit-smoking programmes. This public policy is likely to further stimulate GPs to provide smoking cessation care (e.g. prescriptions and referrals for behavioural counseling), thereby decreasing smoking prevalence.

IMPLICATIONS FOR FUTURE RESEARCH

The empirical studies within this dissertation generate a number of hypotheses for future research. In this section, we will address these theoretical considerations and measurement instruments, methodological and statistical considerations, and further research ideas for facilitating the implementation of smoking cessation care in general practice.

Theoretical considerations and measurement instruments

In *chapter three* we used a screening questionnaire to examine the implementation barriers GPs experience. This questionnaire was based on the Theory of Planned Behaviour[38] and examined GPs' attitudes, social norms, self-efficacy, and intention to routinely implement smoking cessation care. There may be,

however, other ways to explore underlying theoretical concepts of professional behaviour. Huijg et al. recently developed a theory-based screening questionnaire to examine factors that influence implementation processes within healthcare, in particular healthcare professionals' clinical behaviours.[39;40] This questionnaire is based on the Theoretical Domain Framework, which was developed by a consensus group of behavioural and implementation research experts and integrates multiple behaviour change theories.[41] This framework has been used to identify factors that influence the implementation of smoking cessation care in dental healthcare.[42] This study showed that the constructs "memory, attention and decision processes" and "professionals' role and identity" were significantly associated with dentists' adherence to smoking cessation guidelines. Identifying such determining constructs among GPs may further improve our understanding of the implementation of guideline-recommended smoking cessation care within general practice. As a result, this knowledge can inform future behaviour change techniques that aim to improve GPs' provision of smoking cessation care.

Methodological and statistical considerations

Experimental studies with larger GP samples are recommended to further examine the effects of incorporating organizational factors, as well as action planning and coping planning in GP training programmes on their provision of smoking cessation care. An example of such a study is a recently published protocol of a cluster randomized controlled trial of Presseau et al., who will examine the effects of action planning on GPs' provision of guideline-recommended care for patients with diabetes.[43] In addition, future quantitative studies on the communication between professionals and patients, using sequence analysis and multilevel modelling, are recommended to ensure sufficient power on both levels of the model. Moreover, adding a third level in the model which incorporates characteristics of the healthcare professional may result in more reliable outcomes. Finally, a replication of our population-based study on the effects of full health insurance coverage of stop-smoking programmes (*chapter six*) is recommended in order to examine the long-term effects on GP prescription rates and smoking prevalence. In addition, future studies are needed on the effects of this public policy on GPs' provision of other guideline-recommended smoking cessation care, such as quit-smoking advices, quit-smoking assistance, and referrals for quit-smoking support. Such studies may contribute to our knowledge of the facilitating role of public policies on the implementation of smoking cessation care in general practice.

Implementation

We recommend an alternative approach to smoking cessation care in general practice, i.e. an A-A-C approach. Future (qualitative) studies should explore the overall willingness of patients and GPs towards this approach. It is anticipated that several patient groups are reluctant to such a proactive approach.[44] Identification of these patients allows primary care professionals to tune in to their reluctance by using motivational interviewing techniques. Additionally, we recommend studies that assess the feasibility and effectiveness of this A-A-C approach in Dutch general practice.

WHAT THIS DISSERTATION ADDS

The empirical studies in this dissertation provide insight in a variety of methodological approaches that can be used to describe and facilitate the implementation of smoking cessation care in general practice. This resulted in study findings which show that training GPs has the potential to facilitate the implementation of smoking cessation care, in particular the degree to which smokers are identified and advised to quit. In addition, full health insurance coverage of stop-smoking programmes increased GP prescription behaviour. Yet challenges remain to incorporate smoking cessation care as a routine procedure in general practice, with a special focus on arranging follow-up support by GPs. This dissertation provided several new ideas for future research in order to overcome these challenges. Multifaceted strategies, based on a socio-ecological approach to guideline implementation and including behavioural change theories, have the potential to facilitate a successful implementation of smoking cessation care in general practice. In the end, the delivery of lifestyle counseling, with a focus on smoking cessation care, should become an ingrained habit for GPs.

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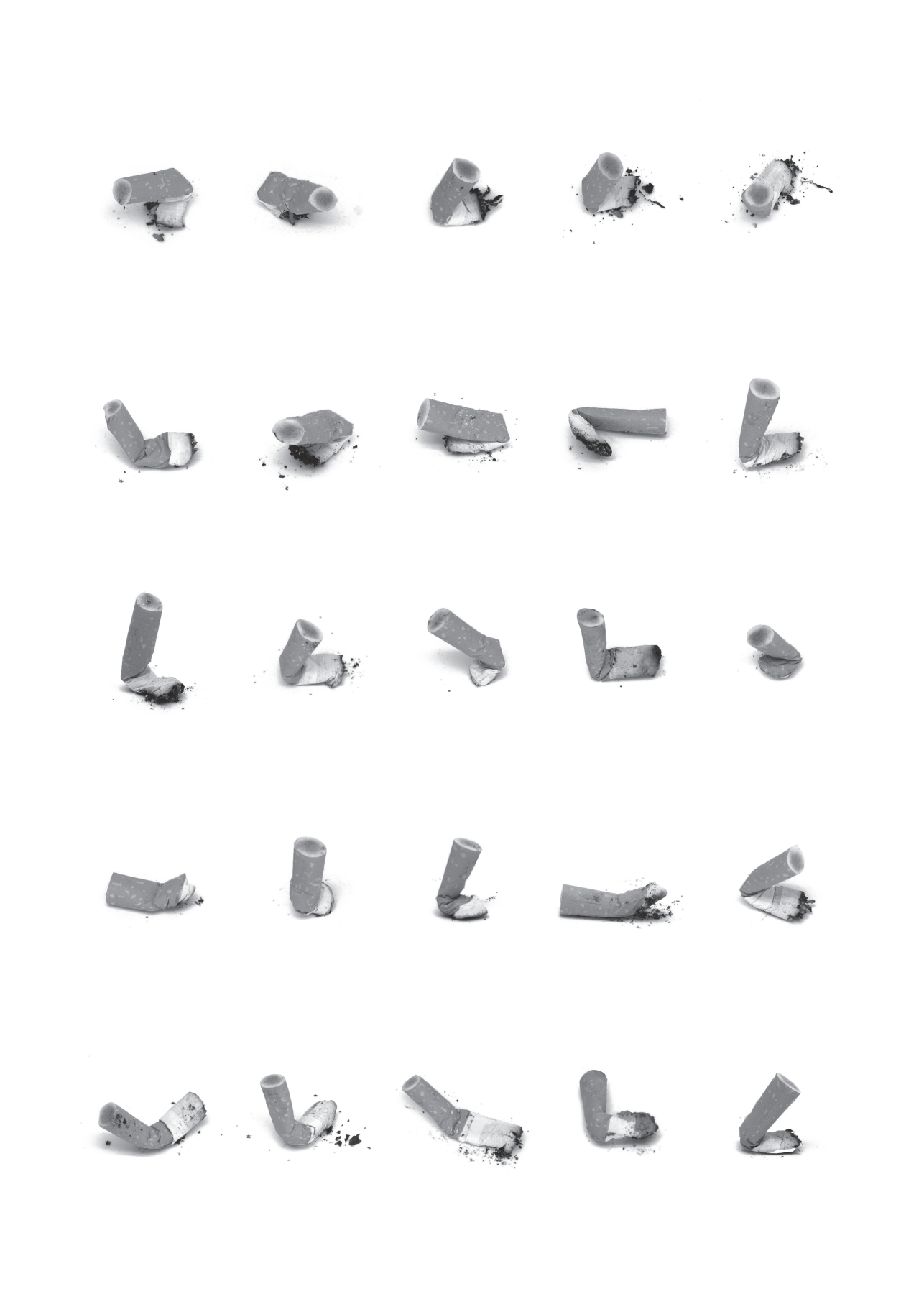

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Summary

The WHO acclaimed the tobacco epidemic as one of the biggest public health threats the world has ever faced. Therefore, tobacco control has been identified as the most urgent and immediate priority intervention to reduce the prevalence of non-communicable disease. **Chapter one** elaborates on the current state-of-the-art evidence with regard to pharmacological and behavioural quit-smoking support and stresses the importance of a routine approach to smoking cessation care in general practice. Nevertheless, a substantial gap exists between the evidence-based knowledge on the treatment of tobacco dependence and real-world practices of primary care professionals. Therefore, the aim of this dissertation was to examine the implementation of smoking cessation care in general practice. A five-level socio-ecological model is introduced as the conceptual framework that guided this dissertation; all empirical studies in this dissertation adressed one or more factors related to the general practitioner (GP), patient, organization, community, or public policy level which determine the implementation of smoking cessation care in general practice.

The aim of **chapter two** was to examine the overall effectiveness of training health professionals in the delivery of smoking cessation interventions to their patients. In addition, this chapter aimed to examine which training characteristics are most likely to be effective, such as the content, delivery method and intensity. In a systematic review, 17 randomized controlled trials were included in which the intervention was training of health care professionals in providing smoking cessation care, and in which outcomes for patient smoking behaviour at least six months after the intervention were reported. These studies were found during a systematic search procedure using the Cochrane Tobacco Addiction Group's Specialised Register, electronic databases and the bibliographies of identified studies. Two independent reviewers extracted information relating to the characteristics of each included study for interventions, participants, outcomes and methods. Raw data of studies was requested from the study authors where needed. Studies were combined in a meta-analysis where possible and reported in narrative synthesis in text and table. A meta-analysis of 14 studies for point prevalence of smoking produced a statistically and clinically significant effect in favour of the intervention. A meta-analysis of eight studies that reported continuous abstinence was also statistically significant in favour of the intervention. In addition, healthcare professionals who had received training were more likely to perform tasks of smoking cessation than untrained controls, including asking patients to set a quit date, make follow-up appointments, counseling of smokers, providing self-help material, and prescribing a quit date. No evidence of an effect was observed for the provision of nicotine gum/replacement therapy.

With regard to the training characteristics, we found that health professionals who were trained using only a single session and in a group setting were just as likely if not more likely to have patients quit smoking as those being trained with multiple delivery sessions and one-on-one training (i.e., face to face with the trainer). Similarly, the duration of training for the health professional of between 40 minutes to two hours was just as effective, and in some cases more so, than a duration of greater than two hours. To conclude, this study found evidence for training health professionals to provide smoking cessation interventions on the point prevalence of smoking, continuous abstinence and professional performance. The one exception was the provision of nicotine gum or replacement therapy, which did not differ between groups.

We developed a one-hour, practice-tailored training for GPs which aimed to alleviate GP-related and organizational barriers that arise when routinely asking patients' smoking status, advising to quit, and arranging follow-up. **Chapter three** reports the effectiveness of this GP training programme which we examined in a cluster-randomized controlled trial including with 49 GPs and 3,401 patients (677 smokers). Two patient groups participated: 2,068 patients (433 smokers) at baseline and 1,333 patients (244 smokers) post-intervention. At follow-up, 225 smokers of both groups participated. The primary outcome was GPs' smoking cessation counseling (asking about smoking status, advising to quit, prescribing pharmacotherapy, and referring for behavioural support). Secondary outcomes were GPs' attitudes toward smoking cessation care, patients' intention to quit, and long-term quit rates. Outcomes were measured with GP self-report and patient report. Multilevel regression analyses showed that patients of trained GPs more often reported being asked about smoking behaviour compared to patients of untrained GPs. According to GP self-report, the training also increased the provision of quit-smoking advices and improved GPs' perceived self-efficacy and intention to routinely implement smoking cessation care. No effects of the training were found on GPs' arrangement of follow-up quit-smoking support, smokers' intention to quit, and long-term quit rates.

One of the training components consisted of action planning among the GPs. **Chapter four** reports the results of a study that examined if this strategy increased the provision of smoking cessation care among the GPs, with a special focus on the quality of the action plans. During the training programme, the GPs formulated action plans related to i) enquiring about smoking, ii) advising to quit smoking, and iii) arranging follow-up for smokers motivated to quit. The GPs also formulated a coping plan for encountering smokers not motivated to

quit. The quality of these plans (i.e. plan specificity) was rated and, 6 weeks after the training, GPs reported on the performance of these plans (i.e. plan enactment). Multilevel regression analysis was used to examine the effects of plan specificity and plan enactment on patient-reported smoking cessation activities of the GPs before the training compared with these activities after the training. These analyses showed that GPs who formulated an action plan of high specificity more often asked their patient about smoking, especially when these professionals also enacted this plan. This effect was most prominent among GPs who intended to provide smoking cessation care prior to the intervention. No effects of (the quality of) action planning were found on GPs' advices to quit and arrangements for follow-up quit-smoking support. Based on these study findings, recommendations are made in additional training in devising coping plans to further increase GPs' provision of advice to quit smoking and arranging follow-up support to quit smoking.

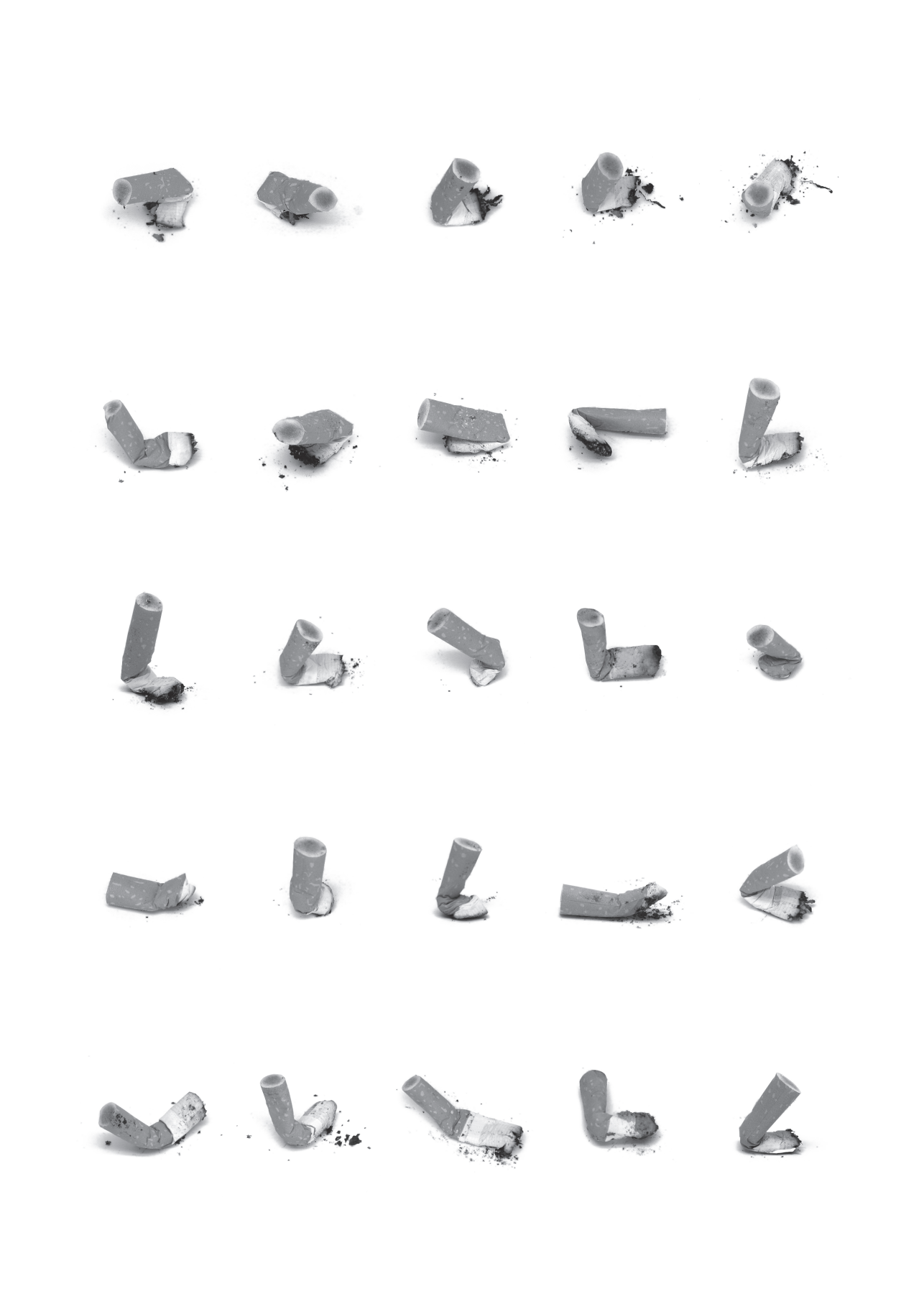
In order to provide more insight in the interaction between primary care professionals and patients during consultations in which smoking is unsolicited discussed, **chapter five** presents the results of sequential analyses of communication obtained from video-recorded consultations. In this study, 52 video-recordings of consultations in primary care were collected, in which 17 GPs and 16 practice nurses (PNs) initiated a conversation about smoking. Dialogues about smoking were transcribed verbatim. Professionals' speech units were coded according to the core aspects of the GP guideline. Patients' speech units were coded as either positive or negative statements about smoking cessation. All other speech units of professionals and patients were coded as other smoke- or non-smoke-related. Descriptive and sequential analyses (two-level multilevel modeling) were used to determine if particular sequences of speech units occurred to a greater or lesser extent than could be expected by chance alone. These analyses showed that, compared to PNs, GPs focused more on asking about smoking and advising to quit. PNs focused more on assisting patients with quitting. In addition, the analyses showed that smokers responded more often negatively than positively towards quitting, especially when PNs assessed their willingness to quit or assisted them with a quit attempt. Moreover, we found that GPs seemed more likely to discontinue their use of guideline-recommended smoking cessation care following patients' negative statements about quitting. However, this finding could not be statistically confirmed. Based on these findings, this chapter concludes with the recommendation to limit GPs' tasks for smoking cessation care to identifying smokers, advising them to quit and arranging follow-up support. This

approach seems the least likely to evoke negative responses of patients and is complimentary to lifestyle counseling tasks and skills of PNs.

Next to factors on a GP, patient, organization, and community level, we know from previous literature that the implementation of smoking cessation care may also be influenced by factors operating on a public policy level. Therefore, **chapter six** discusses the results of a population-based study on the effects of two national tobacco control interventions (the introduction of the GP guideline for smoking cessation care in 2007 and the introduction of full health insurance coverage for stop-smoking medication in 2011) on the number of (dispensed) prescriptions of stop-smoking medication in general practice. This ecological study analysed quarterly data points of three nation-wide representative databases using interrupted time-series analyses. These analyses showed no effects of the introduction of the GP guideline on (dispensed) prescriptions. Shortly after the introduction of the health insurance coverage, an estimated significant increase in primary care prescriptions of 6.3 per 1,000 smokers and 17.3 dispensed items per 1,000 was accompanied by a sudden drop in smoking prevalence of 2.9% in the first quarter of 2011. Immediately after the coverage abolition, smoking prevalence significantly increased by 1.2% and dispensed prescription rates decreased with 21.6 per 1,000 smokers. This chapter concludes with recommendations for policy makers and the tobacco control community to consider these findings in developing future tobacco control policy.

The general discussion in **chapter seven** provides further explanations for the observed findings of the presented studies, discusses the practical implications of the study results, and provides recommendations for future research. Theory-based screening questionnaires are recommended to further explore factors that influence the implementation process of smoking cessation care, in particular GPs' clinical behaviours. This knowledge can inform future behaviour change techniques that aim to improve GPs' provision of smoking cessation care. In addition, experimental studies with larger GP samples are recommended to further examine the effects of incorporating organizational factors, action planning and coping planning in GP training programmes on their provision of smoking cessation care and on patient smoking behaviour. Furthermore, a replication of our population-based study on the effects of full health insurance coverage of stop-smoking programmes is recommended in order to examine the long-term effects on GP prescription rates and smoking prevalence. Finally, we discuss an alternative approach to smoking cessation care in general practice, i.e. an ask-advise-connect (A-A-C) approach. Future (qualitative) studies should explore the

overall willingness of patients and GPs towards this approach. Additionally, we recommend studies that assess the feasibility and effectiveness of this A-A-C approach in Dutch general practice.



Nederlandse samenvatting

De Wereldgezondheidsorganisatie heeft de tabaksepidemie uitgeroepen tot een van de grootste bedreigingen voor de publieke gezondheid die de wereld ooit heeft gekend. Om die reden wordt het ontmoedigen van tabaksgebruik gezien als de meest urgente interventie om de prevalentie van niet-overdraagbare ziekten terug te dringen. In **hoofdstuk één** van dit proefschrift wordt wetenschappelijk onderzoek besproken dat de positieve effecten van farmacologische en gedragsmatige stoppen-met-rokenbegeleiding heeft aangetoond. Onderzoek laat tevens zien dat zorgprofessionals in de huisartspraktijk een belangrijke rol kunnen spelen bij tabaksontmoediging door deze vormen van begeleiding routinematig aan patiënten aan te bieden. De literatuur laat echter ook zien dat er een kloof bestaat tussen enerzijds de wetenschappelijk aangetoonde positieve effecten van stoppen-met-rokenbegeleiding en anderzijds de implementatie hiervan in de dagelijkse praktijkvoering van huisartsen; rokers worden niet structureel door hun huisarts geadviseerd en begeleid bij het stoppen met roken. Om die reden is het doel van dit proefschrift de implementatie van stoppen-met-rokenbegeleiding in de huisartspraktijk te onderzoeken. De implementatie van onderzoeksbevindingen in de praktijk wordt door tal van factoren beïnvloed. Deze factoren worden in een sociaalecologisch model in vijf niveaus ingedeeld: het niveau van de zorgprofessional, de patiënt, de organisatie, de community, en het beleid. Op elk niveau zijn er factoren die de implementatie van stoppen-met-rokenbegeleiding in de huisartspraktijk kunnen belemmeren of verbeteren. Dit sociaalecologisch model vormt het raamwerk van dit proefschrift; alle empirische studies in het proefschrift behandelen een of meerdere factoren gerelateerd aan een of meerdere niveaus van dit model.

Hoofdstuk twee, drie en vier van dit proefschrift richten zich op het niveau van de huisarts en de huisartspraktijk. In **hoofdstuk twee** wordt nagegaan wat het effect is van een training aan zorgprofessionals in het begeleiden van hun patiënten bij het stoppen met roken. Ook wordt nagegaan welke eigenschappen van dergelijke trainingen het meest effectief zijn, zoals de inhoud van de training, de wijze van trainen en de intensiteit van de training. In totaal werden 17 studies samengevoegd waarin het effect van een training aan zorgprofessionals in het begeleiden van patiënten bij het stoppen met roken werd vergeleken met een controlegroep waarin zorgprofessionals niet getraind werden. Alle studies bekeken het effect van de training van zorgprofessionals op het rookgedrag van patiënten minimaal zes maanden na de training. Alle studies zijn gevonden door middel van een systematische zoekprocedure waarbij gebruik werd gemaakt van een gespecialiseerd register van de *Cochrane Tobacco Addiction Group*, elektronische databases en bibliografieën van de geïdentificeerde studies. Twee onderzoekers

extraheerden onafhankelijk van elkaar informatie over de studies met betrekking tot de eigenschappen van de participanten, uitkomstmaten en onderzoeksmethoden. Waar mogelijk werden de bevindingen van de studies samengevoegd in een meta-analyse. Deze analyses toonden een statistisch en klinisch significant effect aan van de training van zorgprofessionals op het rookgedrag van patiënten. Bovendien bleek dat getrainde zorgprofessionals vaker stoppen-met-rokenactiviteiten ontplooiden dan ongetrainde professionals, zoals samen met de patiënt een stopdatum bespreken en het maken van een vervolgafspraak. Geen effect werd gevonden op het voorschrijven van nicotinevervangende middelen. Wat betreft de eigenschappen van de training vonden we dat patiënten van zorgprofessionals die een training gevolgd hadden bestaande uit een enkele sessie en in groepsverband even vaak gestopt waren met roken als patiënten van professionals die een training gevolgd hadden van meerdere één-op-één sessies (face-to-face met de trainer). Ook vonden we dat een training van tussen de 40 minuten en twee uur even effectief was, en in sommige studies zelfs effectiever, als een training die langer dan twee uur duurde. Op basis van deze bevindingen kan geconcludeerd worden dat het trainen van zorgprofessionals in het begeleiden van hun patiënten bij het stoppen met roken positieve effecten heeft op de prevalentie van roken en op de prestaties van de zorgprofessionals. De enige uitzondering hierop was het voorschrijven van nicotinevervangende middelen. Dit verschilde niet tussen getrainde en ongetrainde gezondheidsprofessionals.

Vervolgens ontwikkelden we voor huisartsen een één-uur-durende, op de praktijk afgestemde training in het begeleiden van patiënten bij het stoppen met roken. Deze training had tot doel het verminderen van barrières die huisartsen ervaren bij het structureel vragen naar de rookstatus van patiënten, het adviseren van rokers om te stoppen, en het doorverwijzen van rokers naar stopondersteuning. In **hoofdstuk drie** van dit proefschrift wordt de effectiviteit van deze training besproken. In een cluster gerandomiseerde, gecontroleerde trial werden 49 huisartsen en 3.401 patiënten (677 rokers) geïncludeerd. Twee patiëntengroepen namen deel: 2.068 patiënten (433 rokers) voor de interventie en 1.333 patiënten (244 rokers) na de interventie. Aan de vervolgmeting (na 9 maanden) namen nog 225 rokers van beide groepen deel. De primaire uitkomstmaat vormde de mate waarin de huisarts tijdens het consult aandacht besteedde aan het rookgedrag van de patiënt (vragen naar de rookstatus, adviseren om te stoppen met roken, het voorschrijven van farmacotherapie en doorverwijzen naar stopondersteuning). Secondaire uitkomstmaten waren de attitude, gepercipieerde eigeneffectiviteit en intentie van de huisarts om patiënten routinematig stoppen-met-rokenbegeleiding aan te bieden, de intentie van de patiënt om te stoppen met

roken en het rookgedrag van de patiënt op de lange termijn. Deze uitkomstmaten werden gemeten door middel van zelfrapportage van de huisartsen en patiënten en vervolgens geanalyseerd met behulp van multilevel regressie-analyses. Deze analyses toonden aan dat patiënten van getrainde huisartsen vaker gevraagd werden naar hun rookgedrag dan patiënten van ongetrainde huisartsen. Volgens de zelfrapportage van huisartsen werden rokende patiënten van getrainde huisartsen ook vaker geadviseerd om te stoppen dan patiënten van ongetrainde huisartsen. Ook verbeterde de training de eigeneffectiviteit en intentie van de huisartsen. We vonden geen effect van de training op het voorschrijven van farmacotherapie, doorverwijzen naar stopondersteuning, intentie van de patiënt om te stoppen met roken en het rookgedrag van de patiënt op de lange termijn.

Een van de onderdelen van de hierboven beschreven training aan huisartsen was het maken van actieplannen. Voor deze actieplannen beschreven de huisartsen de wijze waarop zij van plan waren enkele zorgtaken op het gebied van stoppen-met-rokenbegeleiding in de toekomst te gaan implementeren. Deze actieplannen waren gerelateerd aan de volgende taken: 1) het vragen naar de rookstatus, 2) het adviseren om te stoppen met roken, en 3) het regelen van stopondersteuning voor rokers die gemotiveerd zijn om te stoppen. De huisartsen formuleerden ook een copingplan waarin zij weergaven wat ze zouden doen als zij rokers spraken die ongemotiveerd bleken te zijn om te stoppen met roken. De huisartsen beschreven wie deze verschillende taken zou gaan uitvoeren, wanneer deze plannen zouden worden uitgevoerd en hoe deze taken in het huisartsinformatiesysteem geregistreerd zouden gaan worden. Eerdere studies lieten zien dat wanneer het gaat om gezondheidsgedrag (zoals stoppen met roken, meer bewegen, deelname aan kankerscreening) het formuleren van dergelijke plannen een positief effect had op het uitvoeren van het gewenste (gezondheids)gedrag. In **hoofdstuk vier** van dit proefschrift wordt nagegaan of deze gedragsveranderingsstrategie ook een positief effect had op het aanbieden van stoppen-met-rokenbegeleiding door de huisartsen. Hierbij lag de nadruk op de kwaliteit van de plannen die de huisartsen maakten. De kwaliteit van deze plannen, met andere woorden de specificiteit van de plannen, werd bepaald door de onderzoekers. Daarnaast rapporteerden de huisartsen zes weken na de training in hoeverre zij de plannen hadden uitgevoerd zoals beschreven. Multilevel regressie-analyses werden gebruikt om het effect van de specificiteit en de uitvoering van de plannen op de daadwerkelijke stoppen-met-rokenactiviteiten van de huisartsen voor en na de training te bepalen. Deze analyses toonden aan dat patiënten vaker gevraagd werden naar hun rookgedrag indien huisartsen hiertoe een hoog-specifiek plan maakten, vooral wanneer huisartsen daarnaast

tevens aangaven dit plan te hebben uitgevoerd. Dit effect was het sterkst onder huisartsen die voorafgaand aan de training al een hoge intentie hadden om routinematig stoppen-met-rokenbegeleiding te bieden. We vonden geen significant effect van de (kwaliteit van de) actieplannen op het aantal rokende patiënten dat geadviseerd werd om te stoppen, of waarvoor stopondersteuning was geregeld door de huisarts. Voor toekomstige trainingen wordt om die reden aanbevolen om voor de implementatie van deze activiteiten op maat gesneden copingplannen als onderdeel van een training toe te voegen. Deze plannen kunnen mogelijk leiden tot meer positieve effecten op de stopadvisering en doorverwijzing van rokers naar stopondersteuning door huisartsen.

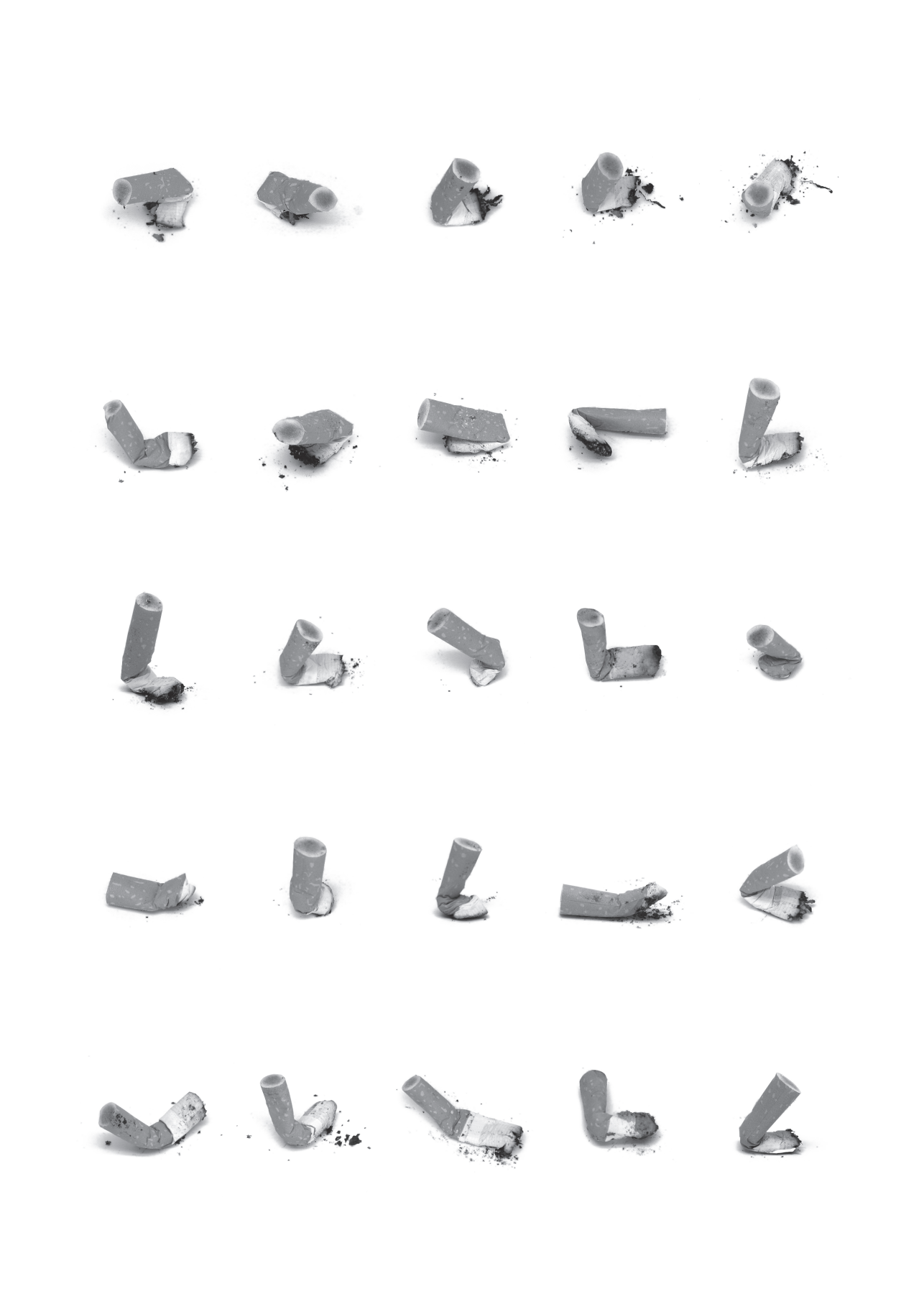
Hoofdstuk vijf verschaft meer inzicht in de interactie tussen professionals in de huisartsenpraktijk en hun patiënten tijdens consulten waarin het rookgedrag van de patiënt besproken wordt. Oftewel, in hoeverre beïnvloeden factoren op het niveau van de patiënt de implementatie van stoppen-met-rokenbegeleiding in de huisartsenpraktijk? Hiertoe werden 52 video-opnames van consulten in de huisartspraktijk geobserveerd (van 17 huisartsen en 16 praktijkondersteuners (POH's)). In alle consulten initieerden de professionals het gesprek over het rookgedrag van de patiënt. De dialogen tussen professionals en patiënten werden letterlijk uitgeschreven. Gesprekseenheden van professionals werden vervolgens gecodeerd op basis van de kernaspecten van de NHG-Standaard Stoppen met roken (5 A's; *Ask*, *Advise*, *Assess*, *Assist* en *Arrange*). Gesprekseenheden van de patiënten werden gecodeerd als positieve of negatieve uitlatingen over stoppen met roken. Alle andere gesprekseenheden van professionals en patiënten werden gecodeerd als 'anders (niet-)rookgerelateerd'. Met behulp van beschrijvende en sequentieanalyses werd nagegaan of bepaalde volgorden van gesprekseenheden vaker of minder vaak voorkwamen dan verwacht zou kunnen worden op basis van toeval. Deze analyses toonden aan dat huisartsen vaker naar de rookstatus van hun patiënten vroegen en rokers adviseerden om te stoppen dan POH's. POH's assisteerden daarentegen de rokers vaker bij het stoppen. Daarnaast toonden de analyses aan dat rokende patiënten zich tijdens de consulten vaker negatief dan positief uitlaten over stoppen met roken, met name wanneer POH's vroegen naar de motivatie om te stoppen of hen assisteerden bij het stoppen. Na een negatieve uitlating over het stoppen met roken van de patiënt leken huisartsen minder vaak het gebruik van de richtlijn voort te zetten dan na een positieve uitlating van de patiënt. Deze bevinding kon echter niet statistisch bevestigd worden. Op basis van de bevindingen wordt aanbevolen om de taken van de huisartsen te beperken tot het vaststellen van de rookstatus van de patiënt, het adviseren van de roker om te stoppen en het regelen van stopondersteuning. Deze aanpak lijkt

het minst te leiden tot negatieve uitlatingen van de patiënt over het stoppen met roken en sluit goed aan bij de taken en vaardigheden van POH's ten aanzien van leefstijlbegeleiding.

De voorgaande onderzoeken zijn met name gericht op kenmerken van de patiënt, huisarts en huisartsenpraktijk die de implementatie van stoppen-met-rokenbegeleiding in de huisartspraktijk kunnen beïnvloeden. Maatregelen op beleidsniveau kunnen hierin echter tevens een rol spelen. In **hoofdstuk zes** wordt daarom een populatieonderzoek beschreven naar de effecten van twee nationale maatregelen om tabaksgebruik te ontmoedigen op het aantal voorschriften van stoppen-met-rokenmiddelen vanuit de huisartspraktijk alsook de prevalentie van roken. Het betreft de invoering van de NHG-Standaard Stoppen met roken in 2007 en de invoering van de vergoeding van het stoppen-met-rokenprogramma in 2011. Deze laatste beleidsmaatregel betrof een vergoeding voor een combinatie van farmacologische en gedragsmatige begeleiding van rokers bij het stoppen met roken vanuit de basiszorgverzekering, waar de roker een keer per kalenderjaar gebruik van kan maken. Deze vergoeding werd een jaar later, in januari 2012, afgeschaft en in 2013 weer ingevoerd. In dit ecologisch onderzoek werden data (kwartaalcijfers) van drie nationaal representatieve databases geanalyseerd door middel van tijdreeksanalyses. Deze analyses toonden geen effect aan van de invoering van de NHG-Standaard Stoppen met roken op het aantal voorschriften en uitgiften van stoppen-met-rokenmiddelen door respectievelijk de huisarts en apotheker. Kort na de invoering van de vergoeding van het stoppen-met-rokenprogramma in 2011 steeg echter het aantal voorschriften en uitgiften van stoppen-met-rokenmiddelen significant met respectievelijk 6,3 en 17,3 per 1.000 rokers. Deze stijging in het aantal voorschriften en uitgiften van hulpmiddelen in het eerste kwartaal van 2011 ging gepaard met een significante daling van 2,9% van de prevalentie van roken. Onmiddellijk nadat de vergoeding van het stoppen-met-rokenprogramma werd afgeschaft (eerste kwartaal 2012) steeg de prevalentie van roken weer met 1,2% en daalde het aantal uitgiften van stoppen-met-rokenmiddelen door apothekers met 21,6 per 1.000 rokers. Dit hoofdstuk sluit dan ook af met aanbevelingen voor beleidsmakers om deze bevindingen in overweging te nemen bij de ontwikkeling van toekomstig beleid op het gebied van de ontmoediging van tabaksgebruik.

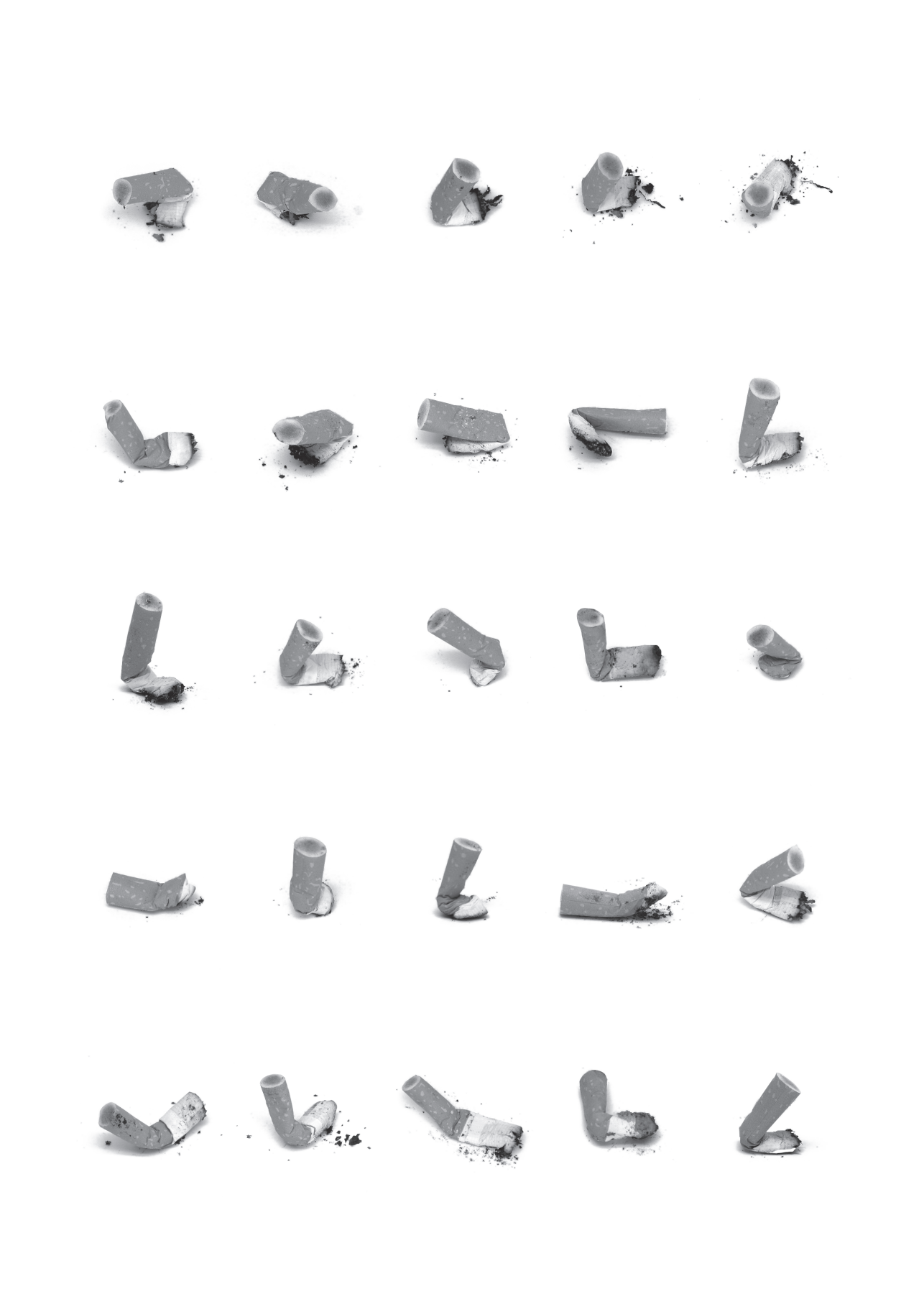
De algemene discussie in **hoofdstuk zeven** bespreekt de onderzoeksbevindingen beschreven in dit proefschrift. Daarnaast biedt dit hoofdstuk inzicht in hetgeen de onderzoeksbevindingen voor de praktijk en toekomstig onderzoek betekenen. Om verder inzicht te verschaffen in de factoren die de implementatie

van stoppen-met-rokenbegeleiding in de huisartspraktijk beïnvloeden worden theoriegestuurde determinantenvragenlijsten aanbevolen. Op basis van deze kennis kunnen in de toekomst strategieën verder ontwikkeld worden die het klinisch handelen van huisartsen volgens de richtlijn verder verbeteren. Daarnaast worden experimentele studies met grotere steekproeven aanbevolen om na te gaan wat de effecten zijn van trainingsprogramma's voor huisartsen waarin organisatorische factoren alsook actie- en coping planning geïncorporeerd worden. Tevens wordt in dit hoofdstuk aanbevolen om het populatieonderzoek naar de effecten van de vergoeding van stoppen-met-rokenprogramma's te herhalen. Op die manier kunnen ook de langetermijneffecten van deze beleidsmaatregel op het voorschrijven van stoppen-met-rokenmiddelen en op de prevalentie van roken onderzocht worden. Ten slotte wordt een alternatieve aanpak voor stoppen-met-rokenbegeleiding in de huisartspraktijk besproken, de zogenaamde *Ask-Advise-Connect* (A-A-C) aanpak. In vergelijking met het huidige 5A-Model worden de taken van de huisarts binnen de A-A-C aanpak beperkt tot het routinematig identificeren en adviseren van rokers. Daarnaast worden rokers op proactieve wijze doorverwezen voor stopondersteuning. Amerikaans onderzoek laat zien dat door middel van deze proactieve aanpak significant meer rokers uiteindelijk gebruikmaken van professionele stopondersteuning. Toekomstig (kwalitatief) onderzoek zou kunnen nagaan hoe patiënten en huisartsen in Nederland tegen deze aanpak aankijken. Tevens worden studies aanbevolen die de haalbaarheid en het effect van de A-A-C aanpak in de Nederlandse huisartspraktijk onderzoeken.



Curriculum Vitae

Marjolein Verbiest is geboren op 18 april 1986 te Bergen op Zoom. Haar basis- en voorbereidend wetenschappelijk onderwijs genoot zij op de openbare basisschool Oost en de Roncalli Scholengemeenschap te Bergen op Zoom. Tussen 2005 en 2008 volgde zij de opleiding tot Bachelor of Science in *Social Psychology* aan de Universiteit Utrecht. Vervolgens volgde zij tussen 2009 en 2010 de masteropleiding *Health Psychology* aan de Universiteit van Leiden alwaar zij haar Basisaantekening Psychodiagnostiek behaalde. Gedurende haar opleiding tot Gezondheidspsycholoog ontwikkelde zij haar interesse in gedragsverandering, op het snijvlak van de somatische gezondheidszorg en psychologie. In 2010 startte zij dan ook in de hoedanigheid van Gezondheidspsycholoog/-onderzoeker aan een tweejarig onderzoeksproject op de afdeling Public Health en Eerstelijnsgeneeskunde van het Leids Universitair Medisch Centrum. Zij ontwikkelde en onderzocht de effectiviteit van een training voor huisartsen in het leveren van stoppen-met-rokenbegeleiding. Een succesvol verloop van dit onderzoek, vervolgprojecten op dit onderzoeksgebied en intensieve scholing in het wetenschappelijk onderzoek mondde in 2014 uit in een proefschrift. Tevens werkt zij sinds 2014 als postdoctoraal onderzoeker aan een onderzoek op het gebied van de ontmoediging van tabaksgebruik onder jongeren in de huisartspraktijk. Gedurende haar jaren als onderzoeker is zij betrokken geweest bij het universitair onderwijs aan de faculteit Sociale Wetenschappen en Geneeskunde van de Universiteit Leiden. Tevens nam zij actief deel aan diverse nationale en internationale symposia en congressen op het gebied van de Gezondheids- en Medische Psychologie.



Dankwoord

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