Pregnancy, a window of opportunity to quit smoking! : the development, implementation and evaluation of a minimal intervention strategy for pregnant women and their partners

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Pregnancy, a window of opportunity to quit smoking!

The development, implementation and evaluation of a minimal intervention strategy for pregnant women and their partners

Pregnancy, a window of opportunity to quit smoking!
The development, implementation and evaluation of a minimal intervention strategy
for pregnant women and their partners

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Martijntje J. Bakker

Promotores:

Prof. dr. H. de Vries

Prof. P. Dolan-Mullen (University of Texas, USA)

Prof. dr. G.J. Kok

Thesis Committee:

Prof. dr. N.K. de Vries (voorzitter)

Prof. dr. R.P.T.M. Grol

Dr. A.N. Mudde

Prof. dr. C.P. van Schayck

Prof. R.A. Windsor (George Washington University, USA)

Bakker, Martijntje

Pregnancy, a window of opportunity to quit smoking! The development, implementation and evaluation of a minimal intervention strategy for pregnant women and their partners

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Chapter 1

Overview

Overview

Introduction

This dissertation describes the development, implementation and evaluation of a Dutch multi-media smoking cessation and relapse prevention program for pregnant women and their partners. The study was conducted between August 1994 and March 1998.

Not all smoking women automatically quit smoking when they learn they are pregnant although many negative health effects of smoking during pregnancy might occur. In the Netherlands it is expected that 35% of women will be smokers when they become pregnant. Approximately 70% of these women still smoke when they visit their midwife for their first prenatal consult, resulting in an average of 26% of Dutch smoking pregnant women (1).

Midwives, the usual providers of prenatal care in the Netherlands do not pay systematic attention to smoking. Most midwives ask during the first prenatal visit whether a woman smokes since this is one of the questions, which needs to be answered on the standardized intake form. However, if women indicate to be smokers most midwives will not provide smoking cessation counseling or guidance. Although midwives are motivated to provide smoking cessation counseling, they do not feel sufficiently capable to provide this information (Chapter 2).

Based on this information it was decided to develop a smoking cessation and relapse prevention intervention, which would help women to quit smoking during pregnancy and to prevent relapse after delivery. For the planning of the development of the intervention the ABC-planning model was used in order to structure the different steps, which are important to take into account (2-5). The planning model is described in the next paragraph. Subsequently an overview of the study in this thesis is given following the steps of the planning model.

The second chapter provides insight in determinants of midwives with regard to providing smoking cessation advice to their pregnant clients. This study was conducted before the development of the intervention to investigate whether midwives see themselves as the right intermediaries to provide smoking cessation advice to pregnant

women. It gave insight in determinants of giving smoking cessation advice and provided information for the development of guidelines for the intervention. For the purpose of this study 368 questionnaires were mailed to midwives of which 237 were returned (64.4%).

The third chapter describes the results of a process evaluation conducted among participating midwives. The aim of this study was to investigate satisfaction of midwives with the intervention and the feasibility of implementing the intervention in routine care. For the purpose of this study all 118 midwives who participated in the study received a questionnaire after the implementation period of the study was finished. In total, 58.4% of questionnaires were returned. To verify reports of midwives, questions about performance of midwives with regard to providing smoking cessation advice and satisfaction and appreciation of advice received were added to the effect evaluation questionnaires distributed among pregnant women.

To study the effectiveness of the intervention a pretest posttest randomized control design was used. Women were included in the study if they reported smoking (intake smokers) or to have stopped smoking in the previous six months (spontaneous quitters). Women who agreed to participate completed a written questionnaire at intake at the midwife's office and three telephone interviews six weeks post intervention (approximately 18 weeks gestation), six weeks postpartum and six months postpartum.

The fourth chapter describes the results of the intervention on quit efforts and point prevalence abstinence by pregnant women during pregnancy and early postpartum. For the purpose of this study data were used collected among 318 intake smokers six weeks post intervention and six weeks postpartum.

The fifth and final chapter provides information about the long-term effects of the study. Data of both intake smokers as well as spontaneous quitters (556 women in total) gathered six weeks and six months postpartum were used to study effects of the intervention on point prevalence abstinence six months postpartum and continued point prevalence abstinence (indicating abstinence six weeks and six months postpartum).

The ABC model

The ABC-planning model (2-5) considers planning to be a circular process. It builds on planning models like the PRECEDE-PROCEED framework of Green and colleagues (6-7) and a simplified version of the PRECEDE-PROCEED framework for developing educational activities described by Kok (8).

The ABC-planning model consists of three phases: the analysis, behavioral intervention and continuation phase. Each phase is divided into sub phases as described in figure 1.1.

Figure 1.1 The ABC-planning model (5)

The analysis phase

The analysis phase is divided into 5 sub phases: needs assessment, problem factors, target group, motives and access points. The first sub phase refers to the analysis of the problem. Green and Kreuter (7) refer to this phase as the analysis of the quality of life. Issues this phase deals with are for instance, how serious is the problem, how many people are affected by it and what are the consequences. The second sub phase, problem factors, is meant to investigate whether the problem is related to the behavior of an individual or to environmental factors. The outcome of this sub phase will indicate whether the intervention needs to be developed at the micro, meso or

macro level (or a combination). The micro level refers to an intervention developed for the individual, meso means that the intervention will target the environment of the individual, for instance an intervention at a worksite and macro refers to interventions developed to change issues at a broader level, for instance a national ban on smoking advertisements. The third sub phase, the analysis of the target group involves a detailed description of the group, which will be targeted by the intervention. Which characteristics of the target group, such as gender, age, educational level etc. need to be taken into account when developing the intervention. It is important in this sub phase to describe all target groups involved. Both the final target group for the intervention but also intermediaries if they are used to deliver the intervention. The fourth sub phase deals with the analysis of determinants. Many different socio-psychological models such as for instance the Attitude-Social influences-Efficacy model (abbreviated as the ASE-model) (9,10) can be used as a theoretical framework in studies aiming at the description of relevant determinants. The ASE-model was derived from the Theory of Reasoned Action (TRA) (11,12) and the Social Cognitive Theory (SCT) (13) and to some degree resembles the Theory of Planned Behavior (TPB) (14). However, it has evolved as a separate model with several differences, predominantly of a methodological nature. Similar to the TPB, the ASE-model suggests that behavior is determined by the intention to perform this behavior. This intention is determined by three important factors: attitude, social influence and self-efficacy (Figure 1.2) (10,15). The final sub phase describes the access points analysis. The aim of this final sub phase is to describe which access points can be used to reach the target group and what preferences the target group and intermediaries indicate.

Figure 1.2 The ASE-model (10)

The behavioral intervention phase

The behavioral intervention phase consists of 3 sub phases: goals and objectives of the intervention, development of the intervention and testing. The first sub phase describes the objectives of the intervention. There are several different objectives, which can be defined. Most commonly used objectives for the development of interventions targeted at behavior change are behavioral objectives, motivational objectives which refer to for instance awareness, attitude, social influence and self-efficacy and mastery objectives which refer to skills the target group needs to develop in order to change his or her behavior. Behavioral objectives, which were set for this project were for instance a long-term reduction of the percentage of smokers in the experimental group with 20% compared to 5% in the control group. A second behavioral objective was to reduce postpartum relapse with 20% compared to the control group among intake smokers.

The second sub phase involves the actual development of the intervention. In this sub phase important issues are target group characteristics, which might influence the effectiveness of the intervention, but also message and source characteristics. Message characteristics refer to the messages, which are important to bring across to motivate people to change their behavior. Source characteristics, as for instance reliability, attractiveness and competence are important to identify who will be most successful in convincing the target group to change. Additionally, in this sub phase the channel(s) which will be used to reach the target group will be identified. In this sub phase the persuasion communication matrix of McGuire (16) can be used as a tool for program development of the intervention, where principles of program development can be used such as program matrixing (5,16) and intervention mapping (17). It is important in this phase to pretest the different program components in order to check whether the target group and intermediaries understand the materials and 'like' them. The third sub phase deals with the actual testing of the effectiveness of the intervention in a preferable randomized control group design.

The continuation phase

In the final phase of the ABC-model three sub phases are described. In the first

sub phase it is important to collaborate with all partners, which might be involved in the implementation of the intervention when proven successful. It is important to start the collaboration with all stakeholders as soon as plans for development of an intervention exist. In this way it will be easier to take into account all relevant opinions of the different partners. The second sub phase involves the development of diffusion strategies. First, an analysis of determinants needs to be conducted to identify the perceived pros and cons of the intervention. Second, based on this determinant analysis strategies for diffusion can be developed. The final sub phase deals with structural measures, which might improve the diffusion of the intervention.

Although the three phases are described in this order, the ABC-planning model should be used as a circular process. As can be derived from the description of the final phase it is important to identify the relevant stakeholders before the intervention can be developed. Therefore, necessary interaction between the different phases will occur during the development process.

The next paragraphs will provide a description of the application of the ABC model to the problem of smoking during pregnancy and postpartum relapse. First, the information collected in national and international literature is described. If necessary, additional studies were conducted to solve lacks in information. These studies are described at the end of each phase.

A. The analysis phase

A1. Needs assessment: Smoking during pregnancy and relapse postpartum, a problem?

Health effects of prenatal and postpartum smoking

In 1957, the first study was published which found an average loss of birth weight of 200 grams in babies of smoking women compared to babies of non-smoking women (18). Since then many studies have been conducted to study the adverse effects of smoking prenatal and postpartum on the health of the fetus and young child.

- Fetal growth

In the developed world, smoking during pregnancy carries the highest attributable risk for low birth weight. Assuming a smoking prevalence of 20 to 40% in women of childbearing age, smoking can be attributed to 22 to 36% of cases of low birth weight (19). Even after controlling for confounding factors, babies of mothers who smoked during pregnancy weigh on average 170 to 200 grams less compared to babies of mothers who did not smoke. This is partly due to the increased risk of preterm birth but also to the risk for fetal growth retardation (19,20). Studies have indicated that there is a dose-response relationship between the number of cigarettes smoked by the mother and the birth weight of the baby (21,22). If women quit smoking during pregnancy the adverse effects on birth weight of the period they did smoke decreases.

- Spontaneous abortion

The commonly used definition of spontaneous abortion, usually called miscarriage, is a spontaneous fetal death in the first 20 weeks of gestation. A few methodologically sound studies have cited an association between maternal smoking and spontaneous abortion. But several have failed to include relevant confounders such as alcohol consumption or showed methodological weaknesses. Methodologically sound studies have reported an increased risk of 30 to 50% for spontaneous abortion among heavy smokers during pregnancy. The association was particularly strong among second trimester fetal deaths (23-25). There are also indications of an association between environmental tobacco smoke (ETS) and spontaneous abortion. However, more research needs to be conducted before conclusions with regard to this can be reached (25).

- Infant mortality

The term 'perinatal death' refers to both stillborn infants and infants who die shortly after birth. However, one of the main problems in comparing the results of studies, which investigate the relationship between maternal smoking and perinatal death is the variety of definitions that are used. DiFranza and Lew (26), conducted a meta-analysis to analyze the effect of smoking on perinatal death. In this way it was possible to combine undersized studies into a larger and more powerful study. For

cohort studies a pooled relative risk was found of 1.26 and for case control studies a pooled odds ratio of 1.23. Therefore, it can be concluded that maternal smoking does contribute to an increased risk for perinatal death (26).

- Sudden Infant Death Syndrome

Sudden Infant Death Syndrome (SIDS) is defined as an unexplained death in an infant, which is unexpected by history and in which postmortem examination fails to demonstrate an adequate cause of death. Studies have been conducted to investigate the role of maternal smoking during pregnancy in the incidence of SIDS as well as the role of environmental tobacco smoke (ETS). A meta-analysis (26) calculated a pooled odds ratio of 3.0 for maternal smoking during pregnancy. Two case-control studies, which controlled for relevant confounders (27,28) have studied the effect of ETS on SIDS. The study conducted by Klonoff-Cohen et al. (27) found increased risks for SIDS for postnatal maternal smoking (OR=2.3), paternal smoking (OR=3.5), total cigarette exposure per day with an odds ratio of 22.7 for more than 21 household cigarettes. The study by Blair et al. (28) confirms these results.

- Infant respiratory infections

Several studies were conducted to investigate the effect of passive smoke exposure on infant respiratory infections (29). Several studies have documented increased risk for respiratory infections, including pneumonia, bronchitis, tracheitis, laryngitis, and otitis media. Children of smokers who suffer from these infections are hospitalized three times more often than children of non-smokers (30).

A2. Problem factors: is smoking during pregnancy an individual or environmental factor

The adverse health effects for the fetus and newborn child described in the previous paragraph are almost all related to the smoking behavior of the woman. Therefore it can easily be concluded that this issue should be treated as an individual problem and the intervention should be developed at the micro level. However, is smoking during pregnancy a purely individual choice?

Smoking prevalence among pregnant women and relapse rates after delivery

A study published in 1991 reported that in the Netherlands about 35% of all pregnant women were estimated to be pre pregnancy smokers. At the time of their first prenatal consult 70% of them would still be smoking and 30% would report recent quitting, resulting in an average of 26% of Dutch women smoking while pregnant (1). An unpublished study conducted by TNO in the Netherlands in 1996 showed that 25% of women indicated to be smokers just before pregnancy and 21% during pregnancy. This percentage can be compared to the current percentage of pregnant smokers in the United States of approximately 20% (31).

Although women who quit during pregnancy usually abstain from smoking for six months or more, approximately 65% to 70% return to smoking within six months postpartum and half do so in the first six weeks (32-35) There are no Dutch data on relapse rates of women postpartum available.

Smoking, not just an individual's choice

Besides the fact that smoking is a decision an individual makes, it is also determined by the environment of the individual. With regard to smoking cessation of pregnant women it has been cited by several studies (33,36-38) that having a smoking partner seriously decreases the chance of becoming a non-smoker during pregnancy and remaining a non-smoker postpartum. Additionally, the results of a prospective study specifically designed to identify predictors of postpartum relapse indicated that women who reported that most or all of the family members they saw regularly were smokers were more likely to relapse than those who had fewer family members who smoked. Social pressure to maintain abstinence might reduce postpartum (33). Smoking during pregnancy seems to be less accepted by the environment than smoking postpartum.

Pregnant women cite health care providers as the most important source of information about health behavior in pregnancy (39). However, evidence shows that health care providers do not routinely offer smoking cessation and counseling to pregnant smokers (40). In the Netherlands, studies among both pregnant women (41) as well as midwives (42) indicated that pregnant women in general do not receive

smoking cessation advice from their midwife.

Referring to the ABC-model it can be concluded that it is important to develop interventions at the micro level (a smoking cessation and relapse prevention intervention for pregnant women) and meso level (social support and smoking cessation intervention for the smoking partner and training for midwives about how to provide effective smoking cessation advice). Development of interventions at the macro level might also be important. Examples of such interventions are for instance regulations on systematic provision of cessation education by midwives, practicing with smoking cessation counseling during formal training for midwives and mandatory monitoring of smoking behavior and counseling after the birth of the baby at the various contacts with the health care system (for instance visits to baby well-care centers).

A3. Target group: pregnant women, partners and midwives

In the past years extensive research has been conducted concerning demographic and social factors of smoking pregnant women. Literature shows that most women who continue to smoke have a smoking partner, are heavy smokers themselves, have been pregnant several times, are living with other smokers (43), have had little education, come from a lower social class, are single, younger (44), unemployed, earn less money and start with prenatal care later in pregnancy (45).

Target groups for the meso level are smoking partners of pregnant women and midwives. With regard to smoking partners of pregnant women no specific characteristics could be found in national or international literature. However, characteristics of all smokers are that they are usually younger, less educated and from a lower socio-economic background compared to non-smokers. With regard to midwives only characteristics are given of Dutch midwives since the prenatal care system in the Netherlands is very unique and therefore difficult to compare with other countries. The vast majority of Dutch midwives are women who work independently in private practices (solo, duo or group), organized into regional networks. No national data are available on smoking rates of midwives. Since little information was available about midwives it was decided to conduct a study among midwives to gather

information about for instance midwife and practice characteristics and smoking behavior (Chapter 2).

A4. Motives: determinants of smoking during pregnancy

Determinants of smoking in pregnant women

According to Gillies (44) smoking pregnant women indicate that they smoke because they are addicted and smoking helps them to control moods, relaxes, calms nerves, is pleasurable and relieves boredom. For some women smoking helps to cope with everyday situations. Dowsett (46) found that smokers are less convinced of the harmful effects of smoking for the unborn child. Another important finding from this study was that only few respondents reported to have received information from a health professional about smoking during pregnancy. Panjari (47) reports that smoking women are less convinced of the adverse effects of smoking for themselves and their baby. Smokers also indicated to experience more stress in their lives compared to non-smokers. Furthermore, smokers associated the following situations with the temptation to smoke: drinking alcohol, tea or coffee, pressure from work, children or other demands, needing time for self experiencing and strong physical cravings. Wakefield (48) found in her study that pregnant smokers sometimes feel guilty about their smoking behavior and think that other people feel badly about them because they smoke. They, however continue to smoke because smoking gives them important benefits, like relaxation and coping with depression. Continuing smokers are also less convinced or aware of the health consequences of smoking during pregnancy. Haug (49) reports that the most important predictor of reduced cigarette consumption is the encouragement of a daily smoking partner to quit smoking, even if this partner does not adjust his own smoking behavior.

In 1991 a cross sectional study was conducted to gain insight into determinants of smoking cessation of Dutch pregnant women (41). The study used a combination of the ASE-model (9) and the stages of change construct of the Transtheoretical model (50). The target group of the study were smoking pregnant women and women who had quit smoking during their pregnancy or in the last year before their pregnancy.

In total 144 pregnant women returned the questionnaire, 104 smokers and 40

spontaneous quitters. The main outcomes were that precontemplators (women who do not intend to quit) were not convinced of the advantages of quitting for themselves and their baby. They were also more convinced of the emotional disadvantages of quitting such as feelings of tension and unpleasantness. Contemplators (women who intend to quit) did not show any differences on the attitudinal beliefs compared to actors, maintainers and relapsers. However, they were less convinced of their ability to quit smoking (low self-efficacy). Actors (women who quit smoking, but no longer than six months ago) were convinced of the advantages of not smoking but had somewhat lower self-efficacy levels compared to maintainers (women who quit smoking more than six months ago but less than one year). Relapsers (women who quit smoking before or during pregnancy but had started again) were still convinced of the advantages of not smoking but reported the lowest self-efficacy scores.

To gain more specific information about relevant beliefs with regard to smoking cessation it was decided to conduct in depth interviews among pregnant smokers. The two key questions were, what are the behavioral determinants of women who continue to smoke during pregnancy, and in what way do midwives provide smoking cessation advice to their pregnant clients.

No specific information is available in both national and international literature about determinants of smoking of partners of pregnant women. It would have been very interesting to conduct such a determinant study among partners, but within the time available for the study, this was unfortunately impossible.

Determinants of providing smoking cessation advice to pregnant women

A physician's advice to quit is considered an important motivator for attempting to quit smoking by the general population of smokers (51,52). For pregnant women this does not differ (39). Unfortunately, only about half of current smokers report having ever been asked about their smoking status or urged to quit (53,54). For pregnant women only 4% to 19% report ever having received information about health behavior in pregnancy (55). Reasons why clinicians do not confront their clients consistently with their tobacco use may be attributed to time constraints, perceived lack of skills to be effective in this role, frustration due to low success rates, and the

belief that providing smoking cessation advice is not an important professional responsibility (56). Mullen & Holcomb (57) studied predictors of providing health promotion counseling for 10 areas of health promotion and disease prevention including smoking by three groups of health professionals, dental hygienists, dieticians and certified nurse-midwives. Results of their study indicate a relationship between self-efficacy and the provision of advice. This finding suggests the importance of skills training for health care providers, including the provision of actual or simulated counseling experience and modeling by others in the same professional group. Additionally, it would be useful to provide data regarding the impact of professionals' counseling on the behavior of their patients, through evaluation literature and patients' feedback. Zapka et al. (58) conducted a study to assess providers' performance of smoking cessation counseling steps at community health centers providing care to low-income pregnant and postpartum women. Results indicate that providers with greater smoking-related knowledge, who are older, and perceive smoking cessation as a priority were more likely to provide better counseling. However, beyond assessment of smoking behavior and advice, most providers did not provide real assistance to quit. Results of a Dutch study among general practitioners into reasons which might hamper the systematic implementation of smoking cessation advice in general practice included that GPs are used to work cure oriented (not provide preventive care), do not wish to be considered patronizing by their clients (my patient is responsible for his own lifestyle), lack of time and do not receive a separate reimbursement for providing preventive care (59).

To obtain more information about why midwives do not provide smoking cessation advice to their clients it was decided to conduct a study among midwives into psychosocial motives, which predict a positive role definition regarding providing smoking cessation advice (Chapter 2).

A5. Access points: how to reach pregnant smokers

International literature

Since the majority of pregnant women receive prenatal care from a health care provider (gynecologist, midwife) on a regular basis, the usual setting of smoking

cessation interventions is a hospital or community antenatal clinic where women receive advice from their health care provider and self-help materials. (31,60,61) Some smoking cessation interventions in addition make use of personal mailings to the woman's home address (34,62) or telephone calls to discuss cessation efforts and to provide support (63). A study which was specifically aimed at relapse prevention postpartum did not involve prenatal health care providers but mailed relevant materials to the woman and provided telephone counseling (64).

Dutch prenatal care

In the Netherlands, pregnancy care is provided by midwives, general practitioners (GPs) and gynecologists. Approximately 45% of the deliveries are supervised by midwives, who guide uncomplicated pregnancies. Approximately 10% are supervised by GPs when insufficient midwives are available or when women ask explicitly for guidance by their GP. The remaining 45% are supervised by a gynecologist when women are running increased risks during pregnancy for various reasons (65). Since gynecologists care for more risk-bearing pregnancies and they perceive themselves already overloaded with research and GPs only guide very little pregnancies a year, midwives seem to be the best intermediaries to provide smoking cessation advice.

Pregnant women visit their midwife on a regular basis during pregnancy until six weeks postpartum. At the beginning of pregnancy they see their midwife each month, but as the pregnancy progresses the time between visits decreases. At the first consultation the midwife checks by means of a standardized form any inheritable diseases or lifestyle behaviors, which might complicate the pregnancy. At subsequent visits the health of the mother and fetus are checked and any pregnancy related issues are discussed. If no complications occur during pregnancy, the midwife will deliver the baby. She will visit her client frequently in the first week after delivery. At six weeks postpartum the client visits her midwife for the last time.

Guidelines for development of the materials

- pregnant women

Studies, which investigate the effectiveness of smoking cessation materials for pregnant women make use of materials specifically directed to pregnancy. Besides being tailored to pregnancy it is also important to adapt materials to low literacy levels, different languages and various ethnic groups. Brief counseling of 5-10 minutes has shown to be effective and more intensive counseling does not seem to reliably improve the effectiveness of the intervention (66).

Several studies have indicated that smokers, both general smokers (9,67,68) and pregnant women (41) need specific information adapted to their stage of change. Precontemplators are usually not convinced of the advantages of quitting. Therefore, they will need information to change their attitude concerning smoking cessation. Contemplators and preparators, however are more convinced of the advantages of quitting but lack confidence of the ability to quit. Therefore, self-efficacy enhancing information is important for them to actually start a quit attempt. Based on these findings it is advised to stage match materials. In this way, materials will be relevant for all smokers and they can turn to the sections, which are relevant to them.

To gain additional information from Dutch pregnant women about how to reach them in depth interviews were conducted before the development of the intervention to ask them what kind of smoking cessation materials they would find interesting.

- Midwives

Since research among health care providers indicates that they do not provide smoking cessation information to their patients due to time constraints, lack of skills, frustration of low success rates, do not perceive providing smoking cessation advice as their responsibility (56) and lack of knowledge (58) it will be important to address these issues when developing materials for midwives about how to provide effective smoking cessation counseling.

No information was available about Dutch midwives concerning these issues. Therefore, it was decided to gather information regarding under what conditions midwives would be willing to provide smoking cessation advice to their clients by

means of a structured questionnaire and interviews with midwives who indicated they were willing to participate in a personal interview on their completed questionnaire.

A. Results of studies conducted for this dissertation

With the international and national literature available it was not possible to get a complete picture of all information necessary before the development of the information. Therefore, it was decided to conduct some additional studies to fill these gaps.

Pregnant women

With regard to women more information was needed about relevant beliefs with regard to smoking cessation and information about what kind of smoking cessation information they would be interested in. Therefore 23 in-depth interviews were conducted with pregnant women. Results of this study indicated that pregnant smokers had minimal knowledge of the consequences of smoking during pregnancy on the fetus. Furthermore, they indicated that it is very hard for them to quit smoking when their partner continues to smoke and they reported in general very low self-efficacy with regard to quitting. When asked which people they found most suitable to provide advice about smoking cessation during pregnancy most women indicated their midwife. However, they also reported that most midwives do not pay attention to smoking cessation. This indicates that it will be necessary to provide information about the consequences of smoking during pregnancy on the fetus to convince women of the harmful effects, to involve the partner to create positive social support, to provide skills to enhance self-efficacy of women with regard to quitting and to develop materials for midwives to make them aware of the role they can play in reducing smoking among their pregnant clients. Additionally, women indicated that they were overloaded with materials when they are pregnant. Therefore, it will be necessary to develop materials in a professional and colorful way to create attention. Furthermore, women said that they liked the materials to be designed as a magazine. In that way they would be able to read only information, which would be relevant and interesting to them. Therefore, information should be clustered in small segments with clear titles.

Midwives

With regard to midwives little was known about their smoking behavior, why they do not provide smoking cessation advice to their pregnant clients and under what conditions midwives would be willing to provide smoking cessation advice. Therefore it was decided to conduct a study by means of structured questionnaires among midwives and interviews with midwives who indicated to be willing to participate in a personal interview on their completed questionnaire.

Outcomes of the quantitative study among 237 midwives indicated that midwives who were more convinced of the advantages of giving smoking cessation advice, the positive perceived health benefits of quitting for mother and child and who perceived more support from their colleague midwives, general practitioners and gynecologists had a more positive role definition regarding providing advice. However, midwives were less positive about their ability to provide smoking cessation advice. These results indicate that it is important to stress health benefits for mother and child and the advantages of giving smoking cessation advice to convince midwives to provide this advice to their clients. Additionally it should be regarded good practice to provide smoking cessation advice to pregnant clients by health practitioners who are in contact with pregnant women to stimulate midwives to give smoking cessation advice. Skills training is needed to improve self-efficacy of midwives to give smoking cessation advice. With regard to smoking approximately 23% of Dutch midwives indicated to be smokers, which is considerably lower compared to the average smoking rate of the adult Dutch female population of 33.8%. However, the response rate of this study was only 64.4% and the relatively low percentage may be attributed to selectivity (Chapter 2).

Outcomes of both the quantitative study and the interviews indicated that although midwives are motivated to give smoking cessation advice, they need materials and training to enable them to perform this role successfully. One of the issues midwives raised was that giving smoking cessation advice may not take too long. The first consultation lasts on average 30 minutes, subsequent consultations only ten. Since midwives are not reimbursed for giving smoking cessation advice, the advice needs to be incorporated in these consultations. Another issue, which was raised by midwives is

that they experience that most of their pregnant smokers come from less advantaged backgrounds. Therefore materials should be adapted to characteristics of low SES women. Materials should be easily accessible and preferably not only written. Furthermore, midwives indicated that they also wanted materials for the smoking partner since they observe that it is especially hard for pregnant women to quit when their partner smokes. Finally, midwives indicated that it would be very hard for them to talk about the adverse effects of smoking during pregnancy on the fetus. They were afraid that talking about these health consequences will make the pregnant woman uncomfortable and the possibility of the woman changing to another practice might increase. Therefore, they wanted these consequences to be incorporated in the materials for the women so they would have the opportunity to decide to refer to the materials instead of talking about it themselves.

Partners

In both national and international literature we could not find any information about characteristics of partners of pregnant women who smoke or quit smoking, determinants of smoking of partners of pregnant women or information about how to reach these partners. Since having a smoking partner is one of the main predictors of relapse both during pregnancy as well as postpartum it will be very important to conduct studies to collect this information. However, within the time available to conduct the study, this was unfortunately impossible. Therefore, information about characteristics of general smokers and determinants of smoking were used as background information for the intervention for partners.

B. The development of the Minimal Intervention Strategy for pregnant women

B1. Goals and objectives

The outcomes of the analysis phase were used to design content and appearance of the materials for midwives, pregnant women and smoking partners. As a tool an application of McGuire's persuasion-communication matrix (16), the program

matrix was used (69). The program matrix has been used before to develop smoking prevention programs (69,70) and an aids prevention program (71). The program matrix states that the effectiveness of information depends on four education variables: characteristics of the target group, the message, the channel and the source. Furthermore, it is important that before changes in attitude, perceptions of social influences and self-efficacy expectations can occur, the target group needs to receive and understand the messages. It is important to realize that a channel, which might be useful to attract attention is not necessarily the ideal channel for for example attitude change. Therefore, it is usually necessary to use a range of channels to get the message across. Table 1.1 shows how the program matrix was applied to the development of the smoking cessation and relapse prevention intervention. (72)

Table 1.1: An application of the program matrix

PHASE	TARGET GROUP	MESSAGE	CHANNEL	SOURCE
Attention	- low/ moderate motivation to quit: other issues than smoking are important - more LSES	- worthwhile quitting for baby's health - it is possible to quit - both parents are responsible for the health of the baby	- personal communications - video - cover self-help guide	- pregnant women and partners - gynecologist - midwife
Comprehension	- low/ moderate educational level	- brief easy messages	- video	- pregnant women from same SES-group
Attitude	- not convinced of advantages of NS - not convinced of disadvantages of S for fetus and themselves - unaware of risks of passive smoking	- pros NS for baby - pros NS for mother - risks of passive smoking for young children	- personal communications - video messages - self-help guide for pregnant women	- pregnant women and partners - gynecologist - midwife
Social influences	- smoking behavior of partner - support of partner, midwife and social environment	- S-partner should quit - NS-partner can help pregnant smoker - social environment should help	- personal communications - self-help guide for pregnant women - partner booklet - video	- pregnant women - partners who have quit smoking and support their wife - midwife
Self-efficacy	- low levels of SE towards quitting - lower levels of SE to maintain quitting postpartum	- you can cope with barriers: (social/ personal) - discuss and show ways of coping - how to set goals	- video - self-help guide for pregnant women - personal communications	- pregnant women who have quit smoking - partners who have quit smoking - midwife
Behavior change	- need skills to refrain from smoking - need alternatives for smoking	- practice skills to cope with barriers	- self-help guide for pregnant women - personal communication	- pregnant women and partners - midwife
Behavior maintenance	- need skills to refrain pressure to start again - need skills to motivate partner to remain non-smoker - feedback	- continuation of cessation is important: passive smoking, health of young children and parents	- relapse prevention booklet - self-help guide for pregnant women - personal communications	- women and partners with young children - midwife - gynecologist

B2. The intervention

Favorable results have been found for interventions used by specifically trained health care professionals, but delivery in routine care has been less successful and represents an important aspect for future study (31,60,61). The aim of this study was therefore to develop a smoking cessation and relapse prevention intervention for pregnant women and their partners which could be easily implemented in regular Dutch prenatal care. Based on the results obtained in the analysis phase it was decided to develop materials for pregnant woman, partners of pregnant women and midwives.

The counseling strategy on which the intervention in this study was based has been tested before among a general population of smokers and among patients hospitalized for cardiac disease. Results of the intervention among a general population of smokers indicated a positive effect of the intervention both short term (one month after the intervention: 18.6% versus 3.8%) and long term (12 months after the intervention: 13.4% versus 7.3%). A significant predictor of abstinence besides receiving the intervention was being less addicted to nicotine. (59). Results of the intervention among patients hospitalized for cardiac disease indicated a positive effect of the intervention short term (3 months post intervention: 53.1% versus 36.8%). However, these results could not be replicated 12 months after the intervention (73,74).

Pretesting of materials

Pretesting of materials is essential in order to be able to change any problems, which might influence the effectiveness. There are many different pretest methods available such as readability testing, focus groups, in-depth interviews and written questionnaires (7,75).

For the pretesting of the materials of the pregnancy studies, two methods were used: focus groups to pretest the video and in-depth interviews to pretest the written materials. Materials were pretested among target group members, intermediaries and health education experts.

B3. Testing

Several systematic reviews, which have been conducted study the effectiveness of smoking cessation interventions for pregnant women (31,60,61). Outcomes of these reviews indicate that self-help minimal contact smoking cessation interventions have produced behavioral impact in public health maternity clinics and in obstetrical care in the US and non-US countries (31). Important aspects of these effective interventions are to tailor the intervention to pregnancy and to use multiple methods (counseling, written materials, follow-up) (60). Most of the trials, which are incorporated in these reviews made use of specifically trained health care personnel, only few trials were noted with interventions delivered by usual prenatal care practitioners (76,77).

Studies, which focused on prenatal smoking cessation but also included a post delivery component were unable to report effects postpartum (64,78). Only one study, which started the intervention in prenatal care, achieved a significant improvement in maintenance up till 12 months postpartum (79). This intervention also produced a significant reduction in the proportion of fathers who smoked.

In the Netherlands, no effectiveness studies were conducted before of programs aimed at smoking cessation during pregnancy and relapse prevention postpartum.

Based on this information it was decided to test the effectiveness of the intervention in routine Dutch prenatal care. The main research questions were:

1. Is the intervention effective in reducing smoking rates among pregnant intake smokers up till six months postpartum,
2. Is the intervention effective in reducing relapse rates postpartum among both intake smokers as well as spontaneous quitters,
3. Is the intervention effective in reducing smoking rates of partners of pregnant women,
4. Is the intervention easy to implement in routine Dutch prenatal care.

To answer the first three questions a pretest posttest randomized control design was used, where women were nested within midwife practice and practices within four provinces, the latter being the unit of randomization to the experimental and control condition. At intake at the midwife's office, both smokers as well as recent quitters

(quit smoking in the previous six months) were included in the study. Data among study participants were collected at four time points: a written questionnaire completed at intake at the midwife's office and three telephone interviews conducted six weeks after the intervention, six weeks postpartum and six months postpartum.

To answer the fourth question, all midwives of midwife practices who had participated in the effectiveness study received a questionnaire after the implementation period of the effectiveness study was finished. To illuminate the reports of midwives, data collected among study participants were used. Details of the study and participant characteristics are described in chapters 3,4 and 5.

B Results of studies conducted for this dissertation

For pregnant women a video, self-help guide and post delivery booklet were developed, for partners of pregnant women a partner booklet and for midwives a manual, intervention card and training. Details about the development of the materials and the health counseling protocol used by midwives are reported in chapter 3.

To pretest the video, focus groups were conducted with pregnant women and their partners (smokers as well as quitters), midwives and health education experts. First, the video was shown after which questions were asked regarding for instance the core message of the video, the models, credibility and completeness of the messages and sequence of the different issues. As a result, the sequence of some items was adapted according to suggestions made. One of the smokers who was selected to be interviewed in the video was removed from the final version since women as well as midwives and experts indicated that she was a 'bad' model. Her comments created a negative feeling among the viewers, which distracted them too much from the core message. One item was replaced since its message was unclear to the target group. The background music was changed and text was added to make some of the conclusions in the video more explicit.

To pretest the written materials, draft materials were sent to pregnant women and midwives. The partner booklet was sent to smoking partners. One week after receiving the materials they were contacted by phone. Based on the results of these interviews text was adapted (content, wording and sequence).

After materials were adapted based on the results of the pretest, the effectiveness of the materials was tested in a pretest posttest randomized control design. The results of this study among intake smokers with dropouts included as smokers (intention to treat procedure) indicated a positive effect of the intervention on smoking behavior of pregnant women up till six weeks postpartum. At six weeks postpartum 21.3% of women in the experimental group indicated 7-day abstinence compared to 12% of women in the control group. Consistent predictors of smoking cessation were belonging to the experimental group, smoking less cigarettes a day at the time of the first visit with the midwife and having a non-smoking partner. Additional predictors of smoking cessation six weeks postpartum were starting smoking at a later age and being higher educated.

However, at six months postpartum the positive effect of the study has disappeared. Data collected among intake smokers as well as spontaneous quitters (women who indicate to have quit smoking up till six months prior to the first consultation) showed no positive effect of the intervention on 7-day abstinence or continued abstinence (indicating 7-day abstinence six weeks and six months postpartum). In total, 24.6% of women in the experimental group reported continued abstinence versus 25.3% of women in the control group. Significant predictors of abstinence six months postpartum and continued abstinence were starting smoking at a later age and smoking less cigarettes a day at the time of the first consultation with the midwife. Having a non-smoking partner and being a spontaneous quitter at intake were additional predictors of 7-day abstinence. Having a non-smoking partner was almost significant ($p=0.07$).

With regard to the partner no effects of the intervention on smoking behavior of the partner were found at any time point.

Results of the process evaluation indicated that midwives in most cases distributed the video, self-help guide and post delivery booklet to their clients. Although midwives in the experimental group perceived discussing smoking cessation with their pregnant clients as more difficult, they more often provided the advice to quit, set a quit date with clients who were motivated to quit smoking and provided arrangements for aftercare. Midwives in the experimental group reported to find

implementation of the intervention in routine care feasible and a large majority plans to use the materials when they become available nationally.

Clients of midwives confirmed to great extent these results. Most women in the experimental group indicated to have received the video and self-help guide. However, only a small number (16.7%) reported having received the post-delivery booklet. Women in the experimental group reported more often that their midwife discussed with them their smoking behavior, gave the advice to quit, discussed barriers which might hamper a successful quit attempt, set a quit date, regularly discussed smoking during pregnancy, discussed consequences of passive smoking and discussed smoking behavior postpartum. They also indicated to appreciate the advice received more compared to control women.

A majority of midwives reported to have distributed the partner booklet, which was confirmed by reports of their clients. However, only about half of the women who gave the booklet to their partner indicated that their partner also actually read the booklet. There were no differences with regard to discussing smoking behavior with the partner between groups.

Satisfaction with the intervention and feasibility of implementation are described in chapter 3. Results of the effectiveness of the intervention on quit attempts and point prevalence abstinence up till six weeks postpartum are described in Chapter 4. Effects of the intervention on abstinence six months postpartum are described in Chapter 5.

C. Continuation

Collaboration

To improve the chances of structural national implementation of a successful intervention it is of great importance to collaborate with all actors who might be involved in the diffusion process. Therefore it was decided to create a steering group before the development of the intervention started. Since, in the Netherlands three professional groups of health care providers are involved in prenatal care we asked each group to send a representative to the steering group. Midwives are organized in

the Royal Dutch Organization of Midwives (Koninklijke Nederlandse Organisatie van Verloskundigen, KNOV) and General Practitioners (GPs) are organized in the Dutch GPs Association (Landelijke Huisartsen Vereniging, LHV). Gynecologists are not organized in a special group. Therefore, we asked a well-known gynecologist who is also a professor at the University of Utrecht to become a member. The Dutch Foundation on Smoking and Health (Stivoro) was also an important member of the steering group. Stivoro is an organization, which is sponsored by the Dutch Cancer Society, the Dutch Heart Foundation, the Astma Fund and the Ministry of Health to provide smoking cessation materials free of charge to all interested Dutch citizens. They also provide training to intermediaries who want to learn how to provide effective smoking cessation counseling. The arrangement was made with Stivoro that they would take care of national implementation after the intervention had proven to be successful.

During the project the steering committee was consulted on several occasions. Issues, which were discussed were for instance goals and objectives of the materials, the development of the materials and implementation strategies.

Diffusion Strategies

Diffusion is described by Rogers (80) as a process, which takes place in four phases. Parcel et al. (81) have also described which determinants are important to address in each phase. The target of the first phase, diffusion is to make people aware of the innovation. Important determinants in this phase are attention and knowledge. Second, people will have to decide whether they are going to adopt the innovation. It is important to create a favorable attitude towards the innovation and positive social influence. Third, people will actually start to implement the innovation. Therefore they will need positive self-efficacy and skills. Also they will need practical suggestions how to incorporate the innovation in their own practice. Finally, it is important that the innovation is incorporated in daily practice to improve the chance of continuation. People will need positive feedback to remain using the innovation.

Diffusion of a successful intervention is not a process, which takes place automatically. Therefore, effective diffusion strategies need to be developed in order to

increase the likelihood of a successful distribution. Important factors which might stimulate the diffusion process are the advantages of the new intervention compared to existing ones, the compatibility of the intervention in current practice, the complexity, the feasibility of the effects, the possibility to experiment and the flexibility to adapt the intervention to personal or other preferences. (80).

General conclusions and recommendations

Results

Before the development of the intervention a study was conducted into predictors of providing smoking cessation advice to pregnant women by Dutch midwives. Results of this study indicated that midwives who have a more positive role definition regarding giving smoking cessation advice were more convinced of the advantages of giving advice, the positive health benefits for mother and child and perceived more support from their colleagues with regard to giving smoking cessation advice. Self-efficacy with regard to providing smoking cessation advice was low among both midwives with a positive as well as midwives with a less positive role definition regarding providing smoking cessation advice. Based on these results it was concluded that effective materials and training were needed to facilitate and stimulate midwives in their role as effective smoking cessation counselors.

The results of the effect evaluation of the intervention indicated that smoking cessation occurred more often in the experimental group, among less heavy smokers and among women with a non-smoking partner. Effects on smoking cessation were sustained up till six weeks postpartum. No effects were found long term on smoking behavior. Additionally no effects were found on smoking behavior of the partner at either time-point.

The results of the process evaluation indicated that midwives appreciated content and appearance of the materials. Experimental midwives indicated to find discussing smoking behavior with their clients somewhat more difficult compared to their colleagues in the control condition. However, they more often did advise their clients to quit, set a quit date with clients motivated to quit smoking and provided

aftercare. These results were confirmed by reports of their clients. However, only few women reported to have received the post delivery booklet or to have discussed postpartum smoking behavior with their midwife. With regard to partner smoking, more experimental midwives reported asking the partner if he wanted to quit but there were no differences for advising the partner to quit and not to smoke around his pregnant wife. A vast majority of midwives reported to find implementation of the intervention feasible and plan to use the materials when they become available nationally.

Methodological conclusions (strengths and weaknesses)

Strengths of the effectiveness study reported in this dissertation included the implementation of the intervention in routine care, high response rates of study participants up till six months postpartum and the application of the intention to treat procedure (including dropouts as smokers) for the effect analysis. Most studies, which have been included in reviews of effectiveness of smoking cessation interventions for pregnant women (31,60,61) have been conducted with trained health educators/counselors under optimal conditions to achieve optimal results. Only two studies have been reported which relied on usual care providers to provide smoking cessation counseling (76,77). The study by Kendrick and colleagues (76) was unable to report an effect of the study on smoking cessation eight months gestation. The investigators speculated that implementation of the intervention may have been very low. Results of the study by Hjalmarsson and colleagues (77) indicated no effect of the intervention on smoking cessation rates in late pregnancy, but cessation rates were different by 8 weeks postpartum (15.8% versus 9.1%).

Midwives asked their clients at the first consultation whether they smoked or had quit smoking in the previous six months. Women who indicated yes to one of these questions were asked to participate in a study about smoking and health. In total, midwives indicated to have approached about 80% of women eligible for the study, 72% of these women agreed to participate resulting in a study group of 556 women. Response rates were 94.6% six weeks post intervention, 88.7% six weeks postpartum and 84.4% six months postpartum. Posttest data were collected by means of structured

telephone interviews. There were no differences in dropout rates between groups.

Effects of the intervention on smoking cessation were analyzed in two ways. First, an intention-to-treat procedure was used including dropouts as smokers and second dropouts were excluded from the analysis. The first procedure has been recommended by various researchers as a protection against biased treatment effects due to patient selection (82-84). The intention-to-treat analysis should not be regarded as providing the ultimate answer, but as a check on the robustness against selection bias of the analysis without dropouts. Results of both analyses were almost similar.

Besides the reported strengths of the study, there were also some methodological weaknesses. Although the study used a pretest posttest randomized control design to test the effectiveness of the intervention, individuals were not randomized to one of both conditions, but women were nested within midwife practice and practices within four provinces, the latter being the unit of randomization to the experimental and control conditions. Such a nested design may lead to intra-class correlation, i.e. positive dependence between outcomes in the same practice, due to province and practice effect on the outcome. Ignoring such intra-class correlation will lead to underestimation of the standard error of the treatment effect, too narrow confidence intervals and possibly, Type 1 errors. (85,86). Therefore, final models were re-analyzed with random effect logistic regression treating women as nested within practices and practices as random effect with province as fixed effect. A small significant effect of midwife practice was found on 7-day abstinence six weeks post intervention, six weeks postpartum, six months postpartum and continued abstinence, but size and significance of treatment and covariate effects was not seriously changed.

Additionally, province should also have been included in multi-level analysis as random effect, since province was the unit of randomization. However, since only four provinces were randomized such a random effect approach is not relevant. Therefore, a fixed effect approach was used correcting for province, implying a restriction of the results to the four provinces of the study. Only under the assumption of no (random) differences between provinces with respect to the outcomes the standard errors and p-values were adequate for generalizing to other regions. Since the fixed effect of province was not predictive of any of the outcomes ($p > 0.20$) this assumption seems

acceptable and so results can probably be generalized to other provinces in the Netherlands.

In this study it was impossible to reach women before entry into care at the midwife's office and to conduct a proper pretest. Therefore, women had to complete the pretest questionnaire at the midwife's office, during the first consultation before the start of the intervention. In interviews with midwives during the implementation phase of the intervention to monitor progress some midwives indicated that they asked the woman to fill in the questionnaire after the first consultation or to fill it in at home. As a consequence, some of the variables such as attitudes and intention towards smoking cessation were not used as predictors for the outcome variables, since intervention effects for these variables were already expected.

To study level of nondisclosure (women reporting non smoking who are actually smokers), midwives were asked to collect urine among a random sample of 30% of their clients reporting non-smoking at intake and six weeks postpartum. Midwives were asked to label the samples so results could be linked to the data file and mail them to a laboratory. At the beginning the laboratory reported receiving many broken samples. Therefore, midwives received different packaging material. Also many samples were not labeled properly and samples, which could be identified were sometimes collected among women indicating to be smokers. This resulted in only 47 (14.8%) valid urine samples collected at intake and 7 six weeks postpartum. Results of the samples collected at intake indicated that overall 17% of self-reported non-smokers actually were smokers. There were no differences in level of nondisclosure between the experimental and control group. Results of the samples collected postpartum all confirmed the self-reported non-smoking status.

Implications for research

Since the intervention did not show an effect on smoking six months postpartum and smoking behavior of partners of pregnant women more research is needed to develop effective interventions.

Women

With regard to postpartum smoking behavior there have been a number of intervention studies, which have aimed to reduce relapse postpartum, but most studies have carried out the intervention during pregnancy and only reported smoking behavior postpartum (34,64,78). These studies have been unable to report an effect of the intervention on postpartum smoking behavior. The only study, which did achieve a significant improvement in maintenance 12 months postpartum is the PANDA project (79). Interventions, which were carried out only postpartum (36,38) have also been unable to show an effect on smoking behavior postpartum (at 12 months). Predictors of continued abstinence or postpartum relapse have been reported in several papers. Having a smoking partner is the most consistent predictor of postpartum relapse (33,36-38). Additional predictors are social support, decreases in self-efficacy (33) formula feeding (87) and concern about weight gain, duration of breast feeding and being a heavier smoker before pregnancy (38,88). These predictors must be taken into account when developing new postpartum relapse prevention interventions. Additionally, more research is needed into determinants of relapse postpartum among Dutch women. In this study both women should be included who quit smoking prior to becoming pregnant and women who quit smoking during pregnancy. Different access points need to be found to improve exposure to the postpartum non-smoking message.

Midwives

Since implementation of the postpartum component failed in this study more research is needed about the reasons for this failure. Before the development of the intervention predictors of providing smoking cessation advice were studied thoroughly among Dutch midwives, but not predictors of providing postpartum relapse prevention advice. Conducting such a study can provide important information for adapting the materials. Additionally, since women in the Netherlands are seen by their midwife for the last time six weeks postpartum, research is needed to explore which postpartum healthcare providers are willing to enforce the non-smoking message postpartum. However, since postpartum the focus of attention shifts from the woman

to the newborn child, postpartum healthcare providers should become aware of the important role they can play in relapse prevention. A non smoking mother benefits the health of the baby.

Partner

With regard to smoking behavior of the partner more research is needed among partners themselves. The analysis phase we conducted for pregnant women should be redone for partners of pregnant women. Is partner smoking an individual or environmental problem, what are characteristics of partners of pregnant women who continue to smoke, what are the important determinants of cessation, how can they support their pregnant wife to not smoke both during pregnancy as well as postpartum, but also what are the access points. Before the development of the intervention we expected most fathers to at least attend the first consult which would enable the midwife to discuss also his smoking behavior. However, we have no data to confirm that partners actually were present at this first consult. If partners, were not present women were asked to give the partner booklet to their partners, but reinforcement of the smoking cessation message by a healthcare provider might be essential to persuade partners to quit. If this cannot be done face to face, computerized tailoring might be an effective way to give partners an individualized smoking cessation advice. Favorable results of tailored smoking cessation messages have been found among a general population of smokers in the Netherlands (89,90).

Implications for practice

Since the program has proven its effectiveness on smoking cessation up till six weeks postpartum and process evaluation data have indicated the feasibility of implementing the program in routine care it is recommended to implement the intervention nationwide to at least reduce the number of smokers during pregnancy. The Dutch Organization on Smoking and Health (Stivoro) will take the leading role in the diffusion of the project and it is estimated that materials will become available to all people interested in the year 2001.

With regard to implementation of the intervention nationwide many

experiences can be derived from the diffusion of a smoking cessation protocol for GPs in the Netherlands (59). Based on their experiences it is advised to structure the diffusion of the program. In the first phase it is important to distribute the materials to all midwives in the Netherlands. The package should contain the protocol for midwives, intervention materials for their clients (video, self-help guide, partner booklet and post delivery booklet), a letter preferably signed by the Dutch Organization of Midwives and Stivoro to introduce the package and a form to order more copies. At the same time it is important to distribute articles about the effectiveness of the intervention in journals often read by midwives in the Netherlands. These articles should include the positive outcomes of the intervention and the results of the process evaluation, which show that it is possible to incorporate the intervention in daily practice. In the second phase it will be important to distribute the positive experiences of midwives who have worked with the intervention during the study period. Also, it will be essential to stress the importance of training to work with the intervention effectively. Training should be easily available at different times and places so all midwives who want to attend can do so. This information can for instance be distributed by newsletters to the regional networks of midwife practices. The third phase will incorporate the actual training of midwives to work with the intervention. Based on the results of the pilot study a training of three hours incorporating background information of the consequences of smoking pre- and postpartum, explanation of the different steps and skills training in applying the steps is sufficient for midwives to work effectively with the intervention materials. Since only few women indicated to have received the postpartum part of the intervention, the importance of stressing postpartum non smoking should receive more attention. Finally, it will be important to provide feedback on the diffusion of the intervention. If midwives learn of the increased number of colleagues who work with the intervention it can be a powerful tool to also persuade them to start working with the intervention. The materials of the intervention need to remain available. If diffusion is successful, it will be necessary to update the materials when new important findings with regard to for instance consequences of smoking during pregnancy are published or the design of the materials becomes out of date.

In this pilot study effectiveness of the intervention was only tested among midwives. However, in the Netherlands pregnancies are also guided by general practitioners and gynecologists. It will be important to study whether the intervention under the same conditions can be distributed among general practitioners and gynecologists or whether some adaptations need to be made. Since general practitioners and gynecologists were involved in the development of the intervention contact should be sought with them to discuss guidelines for implementation of the intervention in their practices.

Structural measures and policies have the possibility to influence the continuation of a successful intervention. With regard to the continuation of the MIS for pregnant women there are multiple options. Health education is not yet a structural part of the education of new midwives in the Netherlands. Since the health counseling protocol can be adapted to many different behaviors such as smoking, nutrition, alcohol and exercise which are all important for pregnant women it would make a good addition to incorporate it in the standard curriculum. Furthermore, midwives are not reimbursed for health education activities. Therefore they can only address limited time to issues related to health education. Acknowledging the importance of health education by incorporating it in standard prenatal care will be a good start. There is a current debate in the Netherlands about providing a standardized prenatal consult. Issues of importance during such a consultation would be inheritable diseases, which might influence the decision to become pregnant but also lifestyle behaviors which might influence the chance of becoming pregnant and the positive outcomes of a pregnancy. Since smoking is the main lifestyle behavior, which influences a positive pregnancy outcome, smoking cessation should be an essential part of a prenatal consult.

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Chapter 2

Predictors of perceiving smoking cessation counseling as a midwife's role: a survey of Dutch midwives¹

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Abstract

Objective. Smoking during pregnancy can have many serious consequences. As the usual providers of pregnancy care in the Netherlands, midwives could serve as effective counselors to pregnant women about cigarette smoking. The aim of the present study was to identify relevant factors that hamper or promote the provision of effective smoking cessation advice and counseling.

Design. Questionnaires were mailed to midwives; 237 (64.4%) were returned. Questions were asked about advantages and disadvantages of giving smoking cessation advice, perceived health benefits for mother and child, smoking behavior and normative beliefs of colleagues, self-efficacy and role definition of midwives with regard to giving smoking cessation advice.

Findings. Midwives who have a more positive role definition regarding giving smoking cessation advice are more convinced of the advantages of giving advice, the advantages of quitting for their clients and perceive more support from their colleagues with regard to giving advice.

Key conclusions and implications for practice. In general, midwives were motivated to provide their clients with smoking cessation advice. They were less comfortable with guiding women through the cessation process. Therefore, effective materials and training should be developed to facilitate and stimulate midwives in their role as effective counselors.

Introduction

Pregnant women are considered a special target group for smoking cessation because smoking cessation during pregnancy significantly reduces the risks of growth retardation, fetal death, Sudden Infant Death Syndrome, and other problems (1-5), women can be more readily motivated to quit smoking because of the harmful effects for their baby (6) and women are in regular contact with a health care professional. Health care professionals are a potential source of health information, and their attitudes and counseling practices can have an important impact on the health habits of their clients (7).

In the Netherlands, several sources and channels can be used to reach pregnant women, such as mass media approaches and more interpersonal approaches. Although mass media approaches may have a more agenda-setting function, interpersonal contacts may present a better strategy for realizing behavioral change. Consequently, those who provide pregnancy care can be potential sources of anti-smoking information. In the Netherlands, pregnancy care is provided through midwives, general practitioners and gynecologists. Uncomplicated pregnancies are usually guided by midwives who work independently in private practices, organized into regional networks (8).

Although midwives may be potential sources of smoking cessation education, a precondition is that they consider providing smoking cessation to be part of their job. In the Netherlands no information about this was available. Moreover, only a few international studies have addressed this issue. An English study by McGreal (9) revealed that midwives were anxious to encourage pregnant women to give up smoking, but arguably lacked certain skills in this area and thus felt ill equipped for the task. Although little has been written about attitudes regarding providing smoking cessation advice by midwives, more general studies about attitudes of health professionals have listed several reasons for failing to raise the issue of smoking. Lack of time, insufficient knowledge, personal attitudes and fear of endangering the relationship with the client have all been frequently cited (10).

Studies conducted among nurses indicate that nurses perceive health education to be an important part of their role but that there are various factors, which either

facilitate or constrain this role. Nurses feel for instance that it is essential that their health education role is valued by other health care professionals (11). With regard to providing smoking health risk education few actually provide this care due to perceived ineffectiveness of health risk education, belief that smoking is not a health risk, and lack of knowledge base to provide care (12).

Several behavioral science models suggest that behavior is determined by three types of cognitions or ideas that people hold about a particular behavior: attitudes, perceived social influences and self-efficacy expectations, although the description of these cognitions differ from model to model (13-17). The present study uses the Attitude- Social influences- Efficacy model, or ASE-model (18-20). Attitude is conceptualized as the result of weighing the perceived advantages and disadvantages of a behavior. Perceived social influence is conceptualized as the result of social norms (21), modeling (14) and social support encountered in favor of the behavior or pressure against the behavior (22). Self-efficacy, a concept derived from Bandura's Social Learning Theory (14,23), measures an individual's perceived capacity to perform a particular behavior. The ASE model has been used to explain various health behaviors, nutrition (24), exercise (25,26), alcohol consumption (27), child safety (28) and smoking (19,29-30).

To assess the degree to which midwives see themselves as appropriate intermediaries to give smoking cessation advice to pregnant women and their partners, a survey was conducted with a sample of members of the Dutch Organization of Midwives.

It was hypothesized that midwives who have a positive role definition of giving smoking cessation advice to their clients would be more convinced of the advantages of providing smoking cessation advice, including the perceived health benefits for pregnant women, experience more social support from their colleagues to provide smoking cessation advice, and have higher levels of self efficacy for this task than midwives with a less positive role definition.

Methods

Design

In January 1995, 368 questionnaires were mailed to all members of the Dutch Organization of Midwives in the Middle and Southern part of the Netherlands (provinces: Gelderland, Utrecht, Zeeland, Noord-Brabant and Limburg). Enclosed with the questionnaire was a cover letter explaining the purpose of the study and the co-operation of the Dutch Organization of Midwives and a post-paid pre-addressed envelope. Midwives who returned the questionnaire were offered the opportunity to win a gift certificate of 100 Dutch guilders.

Measures

- outcome expectations

Attitude toward providing smoking cessation advice was assessed with eight advantages ("When I provide smoking cessation advice to my clients ... there is less chance of young children becoming ill, they are better able to weigh the pros and cons of quitting, they will appreciate me more, I am a better midwife, I fulfill an important preventive task, I show interest in the health of my client, there is less chance that the woman will start smoking again postpartum") answered on a 7-point scale, with 6 indicating total agreement and 0 total disagreement ($\alpha=0.75$) and nine disadvantages ("When I provide smoking cessation advice to my clients this takes a lot of time, I am hindered by the presence of others, I notice that I am not trained to provide preventive tasks, I lack specific knowledge of the subject, I create evasive reactions, I intrude the privacy of my clients, I patronize my clients, I have to break my usual routine, it is difficult when there is no immediate reason") answered on a 7-point scale, with -6 indicating total agreement and 0 total disagreement ($\alpha=0.71$).

- perceived health benefits

Perceived health benefits of quitting for the pregnant client was assessed with eight advantages ("When my client quits smoking she will improve her health, she will improve her physical condition, she will improve the health of the fetus, she will reduce her risk of heart disease, cancer and lung problems, she shows a feeling of

responsibility for her pregnancy, she sets a positive example for other pregnant women”) answered on a 7-point scale, with 6 indicating total agreement and 0 total disagreement ($\alpha=0.80$) and three disadvantages (“When my client quits smoking she will gain more weight than usual, she will be less able to relax, she will eat less healthfully (eat more sweets)”) answered on a 7-point scale, with -6 indicating total agreement and 0 total disagreement ($\alpha=0.65$).

- *social norms*

Social norms about giving smoking cessation advice were assessed using three items representing different groups of important colleagues (“My colleague midwives/general practitioners/gynecologists think that providing smoking cessation advice is part of my job”) answered on a 5-point scale with -2 indicating total disagreement and 2 total agreement ($\alpha=0.72$). Additionally midwives were asked to indicate how many of their colleague midwives/ general practitioners/gynecologists smoke, using a 5-point scale, with 1 indicating none and 5 all.

- *self-efficacy*

Self efficacy for giving smoking cessation advice was assessed by 15 items (“Are you able to give smoking cessation advice when you are running out of time, you have little time per client, you feel rushed, you feel sick, you are not convinced of the negative consequences of smoking during pregnancy, your client is not interested, your client shows resistance, your client is accompanied by her partner, children, mother or acquaintance, your colleagues do not talk about smoking cessation, your client has little time available, you do not have sufficient background information, you are not specifically trained to provide smoking cessation information) answered on a 7-point scale, with -3 indicating total disagreement and 3 total agreement ($\alpha=0.72$).

- *role definition*

Role definition of midwives with regard to giving smoking cessation advice was assessed using two items (Do you think advising pregnant women to quit is part of your job?” and “Do you think helping pregnant women to quit is part of your job?”) answered on a 6-point scale, with 1 indicating total disagreement and 6 total agreement.

- *behavior*

Behavior was assessed by asking the midwife how much time she actually spent, per client, giving smoking cessation advice during the first consultation (in minutes).

- *background variables*

Three sets of variables were sociodemographic (sex (female, male) and age (in years), midwife and practice characteristics (years working as a midwife, type of practice (solo, duo, group or health center), having a practice assistant (yes/no), location of midwife practice (Utrecht, Gelderland, Zeeland, Noord-Brabant, Limburg) duration in minutes of a first consult and follow-up consultations) and smoking status (smoker, ex-smoker, never smoked) and about how many of your clients smoke at intake (in percentages).

Analysis

Chi-square for categorical variables and t-tests for continuous variables) were used for sociodemographic, midwife and practice characteristics and smoking items to check for any between group differences. Cronbach's α 's were computed to evaluate the internal consistency of the outcome expectations, perceived health benefits, social norms and self-efficacy items. Analysis of variance was performed to study differences between the two groups with regard to total scores on the scales (positive outcome expectations, negative outcome expectations, positive perceived health benefits, negative perceived health benefits, social support and self-efficacy) and also on individual items per scale.

Logistic regression was used to assess the predictive power of outcome expectations, perceived health benefits, social norms and self-efficacy for role definition with regard to giving smoking cessation advice. For the analysis, midwives were divided into two subgroups using a median split of their combined scores on the two role definition items. All analyses were performed using the SPSS-x statistical analysis program (31).

Results

Recruitment and participant characteristics

A total of 237 (64.4%) midwives returned their questionnaire. Respondents could be characterized as non-smokers, having worked as a midwife more than 10 years, and working in duo or group practices without a practice assistant. An average first consult lasts about 30 minutes and follow-up consultations last approximately 10 minutes each. Midwives estimate that about 30% of their clients still smoke at intake. They reported spending on average 3.5 minutes discussing smoking with their client during intake. There were no differences between groups on any of these items (table 2.1).

Outcome expectations

There are no differences between the two groups on the total score of disadvantages of providing smoking cessation advice. On individual items a difference was found only for believing that providing smoking cessation advice intrudes the privacy of clients (table 2.2). Midwives with a less positive role definition with regard to providing smoking cessation advice were more convinced that this intrudes on their clients' privacy (table 2.3).

With regard to advantages of providing smoking cessation advice, a difference was found between the two groups on the total score. Midwives with a more positive role definition were more convinced of the advantages (table 2.2).

In-depth analysis showed that midwives with a more positive role definition regarding providing smoking cessation advice were more convinced that providing smoking cessation advice reduces the risk of young children becoming ill, helps women to quit smoking, helps women to weigh the pros and cons, makes them a better midwife, helps them fulfill a preventive task, they show interest in their client's health and they help women to not start smoking again postpartum compared to midwives with a less positive role definition.

Table 2.1. Characteristics in percentages or mean (SD) of midwives by group (sociodemographic, midwife and practice and smoking items)

	Positive role definition (n=129)	missing	Negative role definition (n=104)	missing
Sex (female)	97.7%		98.0	2
Age (in years)	37.7 (9.65)		36.7 (8.51)	1
Smoker	20.9%		25.2	1
Ex-smoker	35.7		35.0	
Never smoker	43.3		39.8	
Number of years working as a midwife	12.4 (9.41)		11.1 (7.33)	1
Type of practice				
Solo	20.9		9.6	
Duo	28.7		32.7	
Group	49.6		57.7	
Health center	0.8			
Practice assistant (yes)	23.3		23.1	
Province				
Utrecht	16.7%		17.3	
Gelderland	28.6		32.7	
Zeeland	4.0		1.0	
Noord-Brabant	38.9		32.7	
Limburg	11.9		16.3	
Duration first consult (minutes)	30.5 (9.01)		28.9 (8.65)	1
Duration follow-up consultation (minutes)	11.1 (2.87)		10.6 (1.97)	1
Percentage of clients who smoke at intake	31.4%	2	31.2%	3
Time discussing smoking first consult (minutes)	3.76 (2.00)	6	3.38 (1.80)	1

Perceived health benefits

No differences were found between the two groups with regard to the total score of negative perceived health benefits of quitting for the pregnant woman (table 2.2). Additionally, no differences were found on individual items (table 2.3).

A difference was found between the two groups on the total score of positive perceived health benefits. Midwives with a more positive role definition were more convinced of the advantages of quitting for pregnant women (table 2). Additionally, women with a more positive role definition were more convinced that when pregnant women quit smoking they improve their health, they improve the health of the fetus, they decrease their risk of heart disease and lung problems and they set a positive example for other pregnant women (table 2.3).

Table 2.2 Means of and significant differences in outcome expectations, perceived health benefits, social norms and self-efficacy by group (n=233)

Sum scores	Positive role definition (129)	Negative role definition (104)	
Negative outcome expectations	-15.3 (7.31)	-15.6 (7.22)	ns
Positive outcome expectations	34.4 (5.50)	31.2 (6.13)	F(1,231)=17.3; p<0.001
Negative perceived health benefits	-10.5 (3.17)	-9.88 (3.14)	ns
Positive perceived health benefits	41.6 (4.28)	39.4 (4.69)	F(1,231)=14.2; p<0.001
Social norms	3.32 (2.00)	2.64 (1.94)	F(1,228)=6.80; p<0.05
Self-efficacy	9.51 (12.2)	7.17 (11.5)	ns

Social support

Midwives with a more positive role definition were more convinced that their colleagues are more positive about them providing this task (table 2.2). On individual items a difference was found for believing that general practitioners and gynecologists consider providing smoking cessation advice to be part of the midwife's job. (table 2.3).

Self-efficacy

There were no differences between the two groups with regard to total score on self-efficacy items (table 2.2). On individual items only a difference was found for being able to provide smoking cessation advice when you are running out of time or you have little time per client. Midwives with a more positive role definition are more convinced that they are able to provide smoking cessation advice in the situations described on this scale.

Table 2.3 Means (SD) and significant differences in outcome expectations, perceived health benefits, social norms and self efficacy scores by group

Outcome expectations	Positive (n=129)	Negative (n=104)	
Cons Takes a lot of time	-2.50 (1.75)	-2.20 (1.57)	
Hindered by presence of others	-1.22 (1.44)	-1.31 (1.50)	
Not educated for preventive tasks	-1.26 (1.44)	-1.19 (1.25)	
No specific knowledge	-1.22 (1.31)	-1.34 (1.32)	
Evasive reactions	-2.42 (1.58)	-2.54 (1.42)	
Intrusion of privacy	-1.73 (1.34)	-2.09 (1.38)	F(1,231)=4.00;p<0.05
Patronizing	-1.88 (1.40)	-2.10 (1.33)	
Breaks usual routine	-1.67 (1.67)	-1.34 (1.44)	
Difficult without immediate cause	-1.40 (1.50)	-1.54 (1.49)	
Pros Less risk of young children becoming ill	4.46 (1.34)	3.89 (1.51)	F(1,231)=9.09;p<0.01
Helping women to quit smoking	4.60 (0.98)	4.14 (1.33)	F(1,231)=8.97;p<0.01
Weighing up pros and cons	4.94 (0.91)	4.49 (1.32)	F(1,231)=9.33;p<0.01
Being more appreciated	2.88 (1.14)	2.86 (1.07)	
Being a better midwife	4.71 (1.29)	4.27 (1.35)	F(1,231)6.54;p<0.05
Fulfilling a preventive task	5.05 (0.91)	4.57 (1.09)	F(1,231)=13.4;p<0.001
Showing interest in clients health	4.71 (1.17)	4.34 (1.14)	F(1,231)=5.88;p<0.05
Relapse prevention	3.03 (1.45)	2.63 (1.56)	F(1,231)=4.04;p<0.05
Perceived health benefits			
Cons Gaining more weight than usual	-4.19 (1.24)	-3.89 (1.42)	
Less able to relax	-3.12 (1.47)	-3.08 (1.40)	
Less healthy eating habits	-3.22 (1.29)	-2.91 (1.34)	
Pros improving health	5.05 (0.77)	4.76 (0.93)	F(1,231)=6.97;p<0.01
Improving physical condition	5.18 (0.68)	5.03 (0.65)	
Better health of fetus	5.60 (0.54)	5.31 (0.76)	F(1,231)=12.1;p<0.01
Decreased risk heart disease	5.36 (0.66)	5.06 (0.71)	F(1,231)=11.6;p<0.01
Decreased risk cancer	5.15 (0.86)	4.92 (0.91)	
Decreased risk lung problems	5.35 (0.68)	5.05 (0.81)	F(1,231)=9.54;p<0.01
Being responsible	5.13 (1.01)	4.99 (1.03)	
Setting an example	4.78 (1.18)	4.28 (1.52)	F(1,231)=8.15;p<0.01
Social norms and smoking behavior			
Smoking behavior of midwives	1.61 (0.84)	1.63 (0.98)	
Smoking behavior of GPs	2.00 (0.72)	1.95 (0.73)	
Smoking behavior of gynecologists	2.04 (0.93)	1.96 (0.94)	
nb of colleague midwives	1.47 (0.73)	1.31 (0.77)	
nb of colleague GPs	0.83 (0.88)	0.55 (0.79)	F(1,228)=6.37;p<0.05
nb of colleague gynecologists	1.02 (0.87)	0.78 (0.87)	F(1,229)=4.29;p<0.05
Self-efficacy			
Overrun office hours	0.83 (1.35)	0.37 (1.51)	F(1,231)=6.12;p<0.05
Insufficient time per client	0.43 (1.46)	0.005 (1.37)	F(1,231)=4.25;p<0.05
Feeling rushed	-0.22 (1.35)	-0.24 (1.36)	
Feeling sick	-0.006 (1.45)	0 (1.39)	
Not convinced of disadvantages	-0.33 (1.72)	-0.57 (1.60)	
Client shows no interest	0.26 (1.52)	0.006 (1.39)	
Client shows resistance	0.31 (1.35)	0.006 (1.41)	
Partner present	1.61 (1.13)	1.56 (0.91)	
Children present	1.40 (1.22)	1.21 (1.17)	
Mother present	1.38 (1.19)	1.28 (1.20)	
Acquaintance present	1.36 (1.18)	1.25 (1.16)	
Colleagues do not provide information	1.57 (1.18)	1.58 (0.87)	
Client has insufficient time	0.41 (1.34)	0.22 (1.37)	
Not enough background information	-0.22 (1.35)	-0.29 (1.17)	
Not educated	0.80 (1.33)	0.64 (1.04)	

Correlations among scales

Significant correlations between factors are presented in table 2.4. Logistic regression indicated that midwives who were more convinced of the advantages of giving smoking cessation advice ($B=0.07$, $SE=0.03$, $OR=1.07$, $p<0.05$) and midwives who were more convinced of the advantages of quitting for pregnant women ($B=0.08$, $SE=0.03$, $OR=1.08$, $p<0.05$) were more likely to have a positive role definition with regard to providing smoking cessation advice.

Table 2.4 Pearson correlations between outcome expectations, perceived health benefits, social norms, self-efficacy, role definition and behavior (n=228)

	Positive outcome expectations	Negative outcome expectations	Positive perceived health benefits	Negative perceived health benefits	Social norms	Self-efficacy	Role definition
Negative perceived health benefits	0.41**		-0.16*				
Social norms	0.28*	0.15*		0.14*			
Self-efficacy		0.26**			0.23**		
Role definition	0.35**		0.31**		0.24**	0.17*	
Behavior	0.13*					0.18**	0.19**

* significant correlation $p<0.05$

** significant

Conclusions

The present study investigated a set of psychosocial motives that were thought to determine whether a midwife has a positive or negative role definition with regard to giving smoking cessation advice to their clients. The framework used in the study was the ASE-model, which states that behavior is determined by attitude, social influences and self-efficacy.

There were no differences between midwives who expressed a more positive role definition and those who were less positive with regard to any of the background characteristics. Respondents with a more positive role definition were more convinced of the advantages of providing smoking cessation advice, the advantages of quitting smoking for their clients and perceived more support from their colleagues to provide smoking cessation advice. Examples of important items, which accounted for the difference between the two groups were that midwives with a more positive role definition regarding providing smoking cessation advice were more convinced that by providing advice they would perform their job as midwives better and would help more women to quit smoking and prevent relapse postpartum. An important finding of this study is that both groups had very low scores on the individual self-efficacy items.

The data from our self-administered questionnaire of smoking behavior indicated a relatively small percentage of smoking midwives in this survey; between 20.9% and 25.2%. This means that the smoking rate among midwives is lower compared to the general population of Dutch adult females (33.8%). Research of smoking habits among nurses and general practitioners has shown that these health professionals tend to smoke more than the general population. However, a study conducted in the United Kingdom (32) found that only 9.5% of midwives smoked, indicating that the relatively low smoking rates in our study group might be correct or attributed to response bias (fewer smoking midwives responded to the questionnaire).

The results of the present study suggest that to foster a more positive attitude of midwives towards providing smoking cessation education to pregnant women who smoke, they need to receive information about the advantages such as helping more women quit smoking, women can be enabled to weigh up the pros and cons of non-smoking, and more women can be helped to avoid relapse after delivery. Furthermore,

it may be helpful for midwives to receive information about the positive health benefits of smoking cessation during pregnancy for mother and child. Additionally, publicizing the midwives, general practitioners and gynecologists who view smoking cessation as normal and good practice may increase positive role definition. Finally, training including enactment, persuasion, and role modeling to increase self-efficacy, even under adverse conditions, would seem to be helpful.

Moreover, some structural problems may also cause perceptions of low self-efficacy, such as time constraints and lack of knowledge. The latter issue implies that changes at the organizational level may be needed in order to facilitate smoking cessation advice by midwives. An example of such changes can be training midwives systematically to provide effective stage-matched smoking cessation advice so information can be given in a short period of time. Another option would be the development of materials to provide midwives with enough background information to make them feel comfortable in talking about the subject. Also, materials should be developed for smoking clients, so midwives can refer to these materials when women need more information.

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Chapter 3

Use and appreciation of midwives of a Dutch smoking cessation and relapse prevention protocol for pregnant women¹

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Abstract

Objective. To assess whether Dutch midwives trained to use a smoking cessation counseling protocol appreciated it and could implement it in routine care.

Methods. Pretest-posttest controlled design, with 118 midwives from 42 practices from 4 provinces; provinces were randomized. Data were collected from 69 midwives (58.5%) after implementation.

Results. Although experimental group midwives indicated discussion of smoking, motivation to quit, and barriers as more difficult than control group midwives, they more often advised quitting, set a quit date, and provided aftercare. Clients reported midwives did not often discuss smoking postpartum or give post delivery booklets. More experimental midwives reported asking the partner if he wanted to quit, but there were no differences between study groups on advising the partner to quit and not smoke around his wife.

Conclusions. This effective, easy-to-implement program is recommended for broad dissemination. Further investigation is needed to improve the partner and postpartum component.

Introduction

Health care professionals are a potential source of health information, and their attitudes and counseling practices can have an important impact on the health habits of their clients (1). For pregnant women, health care professionals can play a major part in adapting health behavior, because during pregnancy regular contacts enable the professional to discuss adapting behavior on a regular basis and to provide aftercare. Since 1957, when Simpson found an average loss of birth weight of 200 g in babies of smoking women compared to babies of non-smoking women (2), it has become increasingly clear that smoking cessation is one of the most important factors which can reduce negative pregnancy outcomes (3). It is therefore essential to develop programs which enable women to quit smoking effectively early in pregnancy.

Several recent systematic reviews of studies evaluating the effectiveness of smoking cessation interventions for pregnant women (4-6) indicate that self-help plus minimal contact smoking cessation interventions have produced behavioral impact in public health maternity clinics and in obstetrical care in the U.S. and other industrialized countries (4). Important aspects of these effective interventions are to tailor the intervention to pregnancy and to use multiple methods (counseling, written materials, follow-up) (5). Most of the trials, which are incorporated in these reviews made use of specifically trained health care professionals; only two trials were noted with interventions delivered by usual prenatal care practitioners (7-8). Delivery in routine care has been less successful and represents an important aspect for future study (7-8).

The aim of the study described here was to study the feasibility of implementing a tailored smoking cessation and relapse prevention program for pregnant women and their partners in regular midwife prenatal care in the Netherlands. In the Netherlands uncomplicated pregnancies are usually guided by midwives who work independently in private practices, organized into regional networks.

The content of the midwife advice and materials was designed using a counseling approach, previously tested in the Netherlands for other groups of smokers (9-11) and known as the minimal intervention strategy (MIS). MIS combines elements of the Attitude-Social influences-Efficacy model (12-14) and the stages of change

construct of the Transtheoretical model (15), and it helps intermediaries to select the information relevant to their clients. The main goal of the MIS is to promote a structured way of working, not to spend more time discussing smoking cessation but to use time available in regular care more efficiently. MIS for pregnant smokers consists of 7 steps, which are presented in figure 3.1. These steps are similar to the steps developed by Glynn and Manley (16) for the U.S. National Cancer Institute and adopted by the Clinical Guideline Panel (17) and updated in the new guideline (18) by making an implicit step explicit by the insertion of “assess” before “arrange”.

We expected that midwives in the experimental condition would find it easier to discuss smoking behavior, the consequences of smoking, advise women to quit, discuss barriers, set a quit date with motivated clients and provide aftercare, and would also perform these behaviors more often.

Methods

Design

The study used a pretest posttest randomized control design, where women were nested within midwife practice and practices within four provinces, the latter being the unit of randomization to the experimental and comparison condition (Figure 3.2). At intake at the midwife's office, both smokers as well as recent quitters (quit smoking in the previous six months) were included in the study. Details of the study and participant characteristics have been described elsewhere (19).

All midwives in participating practices received a questionnaire after the implementation period of the effectiveness study was finished in March, 1998. Enclosed with the questionnaire was a letter thanking them for their participation in the study, a small gift and a post-paid pre-addressed envelope. Reminders, another questionnaire and reply envelope, were mailed to non-responders one month later. At the end of that month non-responders were also contacted by telephone. To illuminate the reports of midwives, data collected among study participants were used.

Intervention

Midwives in the experimental condition received a brief manual and intervention card on the MIS. The manual describes seven steps, based on the health counseling model described by Gerards (20) which incorporates several different psychological concepts, including the stage of change, goal setting and relapse prevention. The health counseling model has been applied previously to smoking cessation by Mudde and colleagues (9) for the general population of smokers in the Netherlands.

Step 1 consisted of identifying smoking behavior by the woman and her partner (Figure 3.1). The number of cigarettes smoked per day and the motivation to quit were also assessed to classify her stage of change, adapted from the Transtheoretical model (21). Women who indicated that they wanted to quit smoking in the next 30 days were identified as in preparation, women who indicated that they want to quit smoking during this pregnancy but not within the next 30 days were identified as contemplators

and women who indicated that they did not want to quit smoking were identified as precontemplators. In step 2, the midwife tried to enhance the motivation to quit for precontemplators and contemplators by giving information about mainly short term advantages of not smoking. Step 3, for those in the preparation stage, the midwife discussed barriers that might hamper a successful quit attempt and midwives were to help mobilize social support by asking whether someone in the woman's environment would help her during the quitting process. Also for women in preparation a quit date was set and noted by the midwife (step 4). Step 5 was to give additional self-help materials to women in all stages. Step 6 was to ask what kind of aftercare she preferred (telephone contacts, during the next consultation, on initiative of the woman herself). And, step 7 at about eight months gestation, the midwife handed out a booklet about smoking after delivery to all who had been smokers, regardless of quitting status. Information about the consequences of passive smoking for young children was discussed, and for quitters, a commitment to stay a non-smoker was invited. An intervention card was designed for midwives to be able to write down progress and commitments of their clients.

We offered all midwives in the experimental condition 3 hours of training about how to talk about smoking and smoking cessation with their clients during the first consultation based on the MIS. During pregnancy the midwife was advised to talk about smoking with her client on a regular basis. At least two contacts were encouraged during the first consultation (three months pregnant) to enhance quitting behavior and at eight months pregnant to talk about relapse prevention.

For clients of midwives in the experimental condition a video, self-help guide and post delivery booklet were developed. The video was especially directed to precontemplators, women who were not giving any thought to stopping smoking and who probably would not put any effort in reading materials about smoking cessation. The self-help guide is stage-matched and based on a self-help smoking cessation guide used by general practitioners in the Netherlands (9-10). The guide was adapted for pregnant women, by changing the definitions of stage (defining precontemplators as those not serious about quitting in the next 30 days), adding pregnancy specific information and changing the illustrations. To make women aware of the danger of

relapse after delivery, a booklet was written about the positive effects of not smoking after delivery and the consequences of environmental tobacco smoke for young children.

Figure 3.1 Smoking cessation and relapse prevention protocol for pregnant women and their partners

Because pregnant women who want to quit smoking indicate that it is very difficult for them to quit when their partner smokes, a special booklet was made for this partner. The partner booklet did not follow the MIS, because there was no counseling element in place; it was directed to precontemplators. It stressed the importance of the commitment of the expectant father to the pregnancy, and it explained that quitting together with his partner would make a substantial difference for the health of their baby and for the parents themselves.

Midwives in the comparison condition were asked to provide smoking cessation counseling as they used to do and hand out a folder about smoking cessation during pregnancy developed by the Dutch Foundation on Smoking and Health.

Measures

- midwives

outcomes. Six questions were asked to assess performance of smoking cessation counseling steps with pregnant clients. Did you discuss your clients' smoking behavior, did you discuss consequences of smoking during pregnancy, did you advise your client to quit smoking, did you discuss barriers which might hamper a quit attempt, did you set a quit date with your client and did you discuss what type of aftercare your client would prefer (1-5 scale with 1 = never and 5 = always). Additionally, midwives were asked to indicate how difficult it was to apply each individual step (1-5 scale with 1 = very difficult and 5 = very easy).

With regard to partner smoking, midwives were asked whether they assessed partner smoking behavior, advised the partner to quit and advised the partner not to smoke around his pregnant wife (1-5 scale with 1 = never and 5 = always).

background variables. We measured one sociodemographic characteristic, age in years; professional and practice characteristics, including years working as a midwife and type of practice (solo, duo, group or health center), having a practice assistant (yes/no), duration in minutes of a first consult and follow-up consultations) and location of midwife practice (East/ West); personal smoking behavior, are you a smoker (never, not anymore, yes) and smoking in the professional environment (no, minority, half, majority, all).

implementation variables. Midwives indicated whether they participated in the training (yes/no) and what they thought of the duration (1-5 scale with 1 = too long and 5 = too short) and the content (good/bad). They also reported the amount of time spent discussing smoking cessation at the first consult and during pregnancy (before the start of the study and during the study period). With regard to the video, self-help guide, post delivery booklet and partner booklet, midwives indicated whether they distributed them to their clients (1-5 scale, with 1 = never and 5 = always) and watched or read them (yes/no). Those who watched the video rated its readability, understandability, interest, attractiveness and length (1-5 scale, with 1 = the lowest score and 5 = the highest. The same aspects of the manual, the self-help guide, post-delivery booklet and partner booklet were rated, using the same rating scale. Lastly,

they were asked to give a global rating for the intervention (1-10 scale, with 10 = highest).

- *clients*

implementation variables. Participants indicated whether or not their midwife discussed smoking at intake, advised to quit, discussed barriers for a quit attempt, set a quit date, regularly discussed smoking during pregnancy, discussed consequences of passive smoking postpartum and discussed smoking behavior postpartum. Additionally, they were asked to indicate their opinion of receiving smoking cessation advice from their midwife (1-7 scale, with 1=very bad and 7=very good) and to give an overall rating of the smoking cessation advice received at the first consult and during pregnancy (1-10 scale, with 10=highest). With regard to the video, self-help guide, post delivery booklet and partner booklet, women indicated whether or not they received them.

Analysis

Chi-square (for categorical variables) and t-tests (for continuous variables) were used to test for any differences between the study conditions in descriptive variables. Non-response was analyzed using logistic regression analysis, with response as the dependent variable and study condition (0=control, 1=experimental) and location of midwife practice (0=East, 1=West) as independent variables.

To determine whether midwives in the experimental condition were more effective in applying the MIS steps, we used linear regression, with applying the MIS steps and difficulty of applying the steps as outcomes and the following covariates as independent variables: study condition and location of midwife practice. Linear regression analysis was conducted with participant data to explore differences on advice received from the midwife regarding smoking cessation pre- and postpartum as outcomes. Independent variables included study condition (0=control, 1=experimental), intake smoking status (0=smoker, 1= recent quitter) and location of practice (0= East, 1=West). Additionally, linear regression with outcomes indicating satisfaction with advice received and the same independent variables also were conducted. To keep results comparable with data gathered from midwives, client data

were aggregated to the midwife level.

Traditional linear regression analysis is based on the assumption that the outcomes of the study are statistically independent. However, ours is a nested design with midwives nested within practices (on average approximately, two midwives per practice), which may lead to intra-class correlation, i.e. positive dependence between outcomes in the same practice, due to province and practice effect on the outcome. Ignoring such intra-class correlation would lead to underestimation of the standard error of the treatment effect, overly narrow confidence intervals, and possibly Type I errors (22-23). Therefore, we also aggregated data to the practice level and conducted the same linear regression analyses with practices as unit of analysis.

Results

Recruitment and drop-out

- midwives

In total, 118 midwives representing 42 practices were assigned to participate in the study, 57 in the experimental condition and 61 in the control condition, and approximately 65% and 52% of the two groups respectively, returned the follow-up questionnaire (Figure 3.2). Reasons for not returning the questionnaire were retirement (4.1%), on holiday (2%), no longer working in the practice (10.2%), and not interested or no time (83.7%). Non-response was not related to study condition ($p>0.20$) nor location of midwife practice ($p>0.10$).

- clients

A total of 556 women were included in the study, 253 in the experimental condition (clients of 44 midwives out of 20 practices) and 303 in the control condition (clients of 51 midwives out of 20 practices) (Figure 3.2). By the second posttest approximately 88% remained eligible for the study.

Characteristics - midwives

Midwives participating in the study can be characterized as having a mean age of about 37 years and having worked as a midwife for a mean of 12 years (Table 3.1). Most were members of a group practice and did not have a practice assistant. The reported mean length of the first consultation was about 30 minutes, with follow-up consultations of about 10 minutes. About 8% of midwives indicated to be smokers themselves and most reported that none of their colleagues smoked.

Study groups differed on number of minutes used for a first consultation and location of midwife practice (Table 3.1). Midwives in the experimental group used less time for a first consultation and practices were more often located in the Eastern part of the Netherlands.

Figure 3.2 Design, sampling procedure, sizes of samples and participation rates (%)

Table 3.1 Sociodemographic, midwife and practice and smoking characteristics in percentages or mean (SD) by study group

	Exp (n=37)	missing	Con (n=32)	missing
Age (M,SD)	38.4 (9.39)		36.7 (8.16)	
Years working as a midwife (M,SD)	12.5 (8.70)		11.7 (8.03)	
Type of practice		2		
Solo	5.7%		3.1	
Duo	20.0		6.3	
Group practice	74.3		87.5	
Health center			3.1	
Practice assistant (yes)	37.8%		18.8	
Minutes first consultation (M,SD)	29.8 (7.74)	1	34.1 (8.48)	
(F(1)=4.95; p<.05)				
Minutes follow-up consultations (M,SD)	11.2 (2.44)		10.3 (1.33)	
Minutes discussing smoking cessation first consultation (M,SD)	3.4 (5.01)	4	4.8 (8.26)	4
Minutes discussing smoking cessation during pregnancy (M,SD)	8.2 (9.08)	11	6.9 (4.07)	11
Smoker (yes)	10.8%		6.3	
Do colleagues smoke				
No	81.1		90.6	
Minority	16.2		9.4	
All	2.7			
Location midwife practice (West) ($\chi^2(1)=5.28$; p<.05)	35.1%		63.3%	2

Satisfaction with training and content of materials

- midwives in the experimental group

At least one midwife was trained in using the MIS in every participating practice, 71% of all midwives in the experimental condition. Of midwives who returned the questionnaire 44.6% participated in the training. Participants of the training found the length sufficient, with an average of 2.86 (1-5 scale, SD=0.36) and 74.3% appreciated the content.

In total 86% of the midwives watched the video, 97% read the self-help guide, and 89%, the post delivery booklet. Participant ratings of the length of the video, and written materials were lower than ratings of other attributes (Table 3.2). In general midwives rated the materials as credible, understandable, interesting and attractive (Table 3.2). The self-help guide, however, was perceived as too long. The overall rating for the intervention was 7 (SD=0.85) on a scale from 1 to 10.

In total, 83.8% of midwives in the experimental group indicated that they found

the health counseling protocol and accompanying materials implementable in routine care, 78.4% of experimental midwives also plan to use the materials when they become available nationally.

Table 3.2 Evaluation of manual, video, self-help guide and post delivery booklet (M,SD)

	Manual	Video	Self-help guide	Post delivery booklet	Partner booklet
Credible*	4.31 (0.58)	4.15 (0.76)	4.29 (0.52)	4.12 (0.74)	4.18 (0.68)
Understandable	4.20 (0.63)	4.21 (0.65)	4.26 (0.56)	4.09 (0.68)	4.18 (0.63)
Interesting	3.91 (0.56)	3.79 (0.82)	3.97 (0.82)	3.85 (0.62)	3.85 (0.62)
Attractive	3.50 (0.71)	3.68 (0.79)	3.88 (0.73)	3.84 (0.68)	3.88 (0.61)
Length	2.56 (0.70)	2.91 (0.82)	2.32 (0.68)	2.66 (0.55)	2.50 (0.57)

* Scale of 1-5, 1=lowest rating

Performance of smoking cessation counseling steps

- midwives

Midwives in the experimental group indicated they had distributed the video (M=4.43, SD=0.92), self-help guide (M=4.43, SD=0.92) and post-delivery booklet (M=3.49, SD=1.36). During the implementation period, the experimental group reported discussing smoking cessation with their clients at the first consultation a mean of 6.5 minutes (SD=3.01) and in the control condition during 4.2 (SD=2.78) minutes (F(1)=9.57;p<.01). During the entire pregnancy smoking cessation was discussed a mean of 14.2 (SD=8.71) and 7.5 (SD=5.25) minutes, respectively (F(1)=8.62;p<.01).

Study groups differed on providing the advice to quit, setting a quit date and discussing aftercare (Table 3.3). The experimental group more often reported giving the advice to quit, setting a quit date with women who indicated they were motivated to quit and discussing aftercare. With data aggregated to the practice level, similar results were found. The difference between the two groups with regard to providing the advice to quit was no longer statistically significant, however.

Table 3.3 Midwives performance of health counseling steps by study group (M, SD) and results of linear regression analysis (B, SE and p-value of study condition adjusted for location of practice (East/West))

	Exp (n=37)	missing	Con (n=32)	missing	B	SE	p-value
Did you discuss with your client:¹							
Smoking behavior	4.91 (0.37)	2	5.00		-0.07	0.07	0.37
Consequences of smoking during pregnancy	4.31 (0.99)	2	4.50 (0.95)		-0.21	0.26	0.42
The advice to quit smoking	4.60 (0.77)	2	4.19 (1.03)		0.50	0.24	p<0.05
Barriers	3.49 (1.12)	2	2.91 (1.15)		0.54	0.30	0.07
Quit date	3.63 (1.19)	2	1.63 (1.10)		1.69	0.28	p<0.001
Aftercare	3.97 (0.89)	2	2.84 (0.99)		1.10	0.25	p<0.001
Data aggregated to practice level							
	Exp (n=18)	missing	Con (n=14)	missing	B	SE	p-value
Did you discuss with your client:¹							
Smoking behavior	4.93 (0.24)		5.00		-0.06	0.07	0.40
Consequences of smoking during pregnancy	4.39 (0.84)		4.58 (0.68)		-0.14	0.29	0.62
The advice to quit smoking	4.64 (0.62)		4.33 (0.70)		0.36	0.25	0.15
Barriers	3.56 (1.01)		3.15 (0.86)		0.44	0.36	0.23
Quit date	3.69 (1.02)		1.90 (1.07)		1.57	0.37	p<0.001
Aftercare	4.13 (0.80)		3.02 (0.79)		1.13	0.31	p<0.01

¹ Scale of 1-5 (1=never, 5=always)

Midwives in the comparison condition reported greater ease in discussing smoking, motivation to quit and barriers to a successful quit attempt (Table 3.4). Similar results were found for data aggregated to the practice level.

- study participants

In total 84% of experimental group women reported having received the video, 80%, the self-help guide and 17%, the post delivery booklet. More women in the experimental condition reported that their midwife discussed with them their smoking behavior, gave the advice to quit, discussed barriers which might hamper a successful quit attempt, set a quit date, regularly discussed smoking during pregnancy, discussed consequences of passive smoking and discussed smoking behavior postpartum (Table 3.5). Identical results were found with data aggregated to the practice level.

Table 3.4 Difficulty of applying the steps of the health counseling model by study group (M,SD) and results of linear regression analysis (B, SE and p-value of study condition adjusted for location of practice (East/West))

	Exp (n=37)	missing	Con (n=32)	missing	B	SE	p-value
Do you find it difficult or easy to discuss:¹							
Smoking behavior	3.74 (0.61)	1	4.63 (0.55)		-0.90	0.16	p<0.001
Consequences of smoking during pregnancy	4.03 (0.62)	2	4.06 (0.77)	1	-0.15	0.17	0.40
motivation to quit	3.06 (0.89)	3	4.03 (0.78)		-0.94	0.22	p<0.001
Barriers	2.71 (0.79)	2	3.42 (0.81)	1	-0.62	0.22	p<0.01
Quit date	3.00 (0.94)	2	2.58 (0.85)	1	0.31	0.23	0.19
Aftercare	3.57 (0.81)	2	3.84 (0.81)		-0.20	0.21	0.37
Data aggregated to practice level							
	Exp (n=18)	missing	Con (n=14)	missing	B	SE	p-value
Do you find it difficult or easy to discuss:¹							
Smoking behavior	3.65 (0.61)		4.65 (0.41)		-1.00	0.20	p<0.001
Consequences of smoking during pregnancy	4.12 (0.48)		4.05 (0.55)		0.09	0.20	0.66
motivation to quit	2.92 (0.81)		4.04 (0.70)		-0.95	0.27	p<0.01
Barriers	2.75 (0.68)		3.50 (0.82)	1	-0.67	0.29	p<0.05
Quit date	2.88 (0.85)		2.60 (0.74)		0.14	0.29	0.64
Aftercare	3.67 (0.67)		3.75 (0.68)		-0.06	0.26	0.83

¹Scale of 1-5 (1=very difficult, 5=very easy)

Experimental group clients give higher mean ratings on a scale of 1-7, with 7 the highest rating, of advice about smoking cessation from their midwife (M=6.5, SD=0.29) than control group clients (M=6.1, SD=0.61) (B=0.33, SE=0.09, p<0.001). On a scale from 1-10, with 10 the highest, the overall rating for the advice received from the midwife at intake was 7.3 (SD=0.69) and 6.8 (SD=1.00) for experimental and control group women (B=0.12, SE=0.06, p<0.05). For the advice received from the midwife during pregnancy the ratings were 6.7 (SD=0.90) and 5.8 (SD=1.86), respectively (B=0.008, SE=0.03, p<0.05). Similar results were found with data aggregated to the practice level.

Table 3.5 Midwives performance of health counseling steps according to study participants by study group (M,SD) and results of linear regression analysis (B, SE and p-value of study condition adjusted for location of practice (East/West)

	Exp (n=44)	missing	Con (n=51)	missing	B	SE	p-value
Did your midwife discuss:¹							
Smoking at intake	0.91 (0.18)		0.72 (0.29)		0.17	0.05	p<0.01
Advice to quit	0.85 (0.25)	1	0.64 (0.36)	6	0.22	0.07	p<0.01
Discuss barriers	0.38 (0.29)		0.11 (0.18)		0.25	0.05	p<0.001
Set a quit date	0.33 (0.34)	1	0.03 (0.16)	6	0.22	0.06	p<0.001
Regularly discuss smoking during pregnancy	0.55 (0.29)		0.21 (0.27)		0.35	0.06	p<0.001
Discuss consequences of passive smoking postpartum	0.51 (0.32)		0.26 (0.26)		0.29	0.06	p<0.001
Discuss smoking behavior postpartum	0.21 (0.25)		0.04 (0.08)		0.17	0.04	p<0.001
Data aggregated to practice level							
	Exp (n=20)	missing	Con (n=20)	missing	B	SE	p-value
Did your midwife discuss:¹							
Smoking at intake	0.94 (0.08)		0.74 (0.16)		0.19	0.04	p<0.001
Advice to quit	0.87 (0.14)		0.61 (0.24)		0.26	0.07	p<0.01
Discuss barriers	0.39 (0.23)		0.11 (0.10)		0.28	0.06	p<0.001
Set a quit date	0.33 (0.29)		0.02 (0.05)		0.25	0.07	p<0.01
Regularly discuss smoking during pregnancy	0.57 (0.21)		0.20 (0.15)		0.37	0.06	p<0.001
Discuss consequences of passive smoking postpartum	0.52 (0.29)		0.30 (0.13)		0.26	0.08	p<0.01
Discuss smoking behavior postpartum	0.17 (0.14)		0.05 (0.07)		0.11	0.04	p<0.01

¹Scale of 0-1 (0=no, 1=yes) at the patient level, continuous from 0-1 at the midwife or practice level.

Partner smoking

- midwives

Midwives indicated on a scale from 1 to 5 to have distributed the partner booklet (M=4, SD=1.16). In total, 89.2% of midwives indicated having read the booklet. They rated the partner booklet as credible, understandable, interesting, attractive, and sufficient in length (Table 3.2).

There was no difference between experimental and control midwives with regard to asking the partner if he wanted to quit (M=3.82 (1.49) vs. M=3.08 (1.35), B=0.78, SE=0.40, p=0.06) advising the partner to quit (M=4.03 (1.33) vs. M=3.58

(1.42), $B=0.42$, $SE=0.38$, $p=0.28$) and advising the partner not to smoke in the presence of his pregnant wife ($M=3.45$ (1.35) vs. $M=3.85$ (1.32), $B=-0.28$, $SE=0.39$, $p=0.46$). Similar results were found with data aggregated to the practice level.

- study participants

In total 86.1% of women in the experimental group reported having given the partner booklet to their smoking partner.

Discussion

The vast majority of midwives in the experimental group who returned the follow-up questionnaire in the study of the effectiveness of a multi media smoking cessation and relapse prevention program for pregnant women and their partners in routine Dutch prenatal care indicated that the program is easy to implement within their practice and that they plan to use the program when it becomes available nationally. They reported distributing the different materials (video, self-help guide and post delivery booklet) to a large majority of their clients and those midwives who also watched and read the materials themselves appreciated content and appearance.

After a three-hour training session and supported by a manual and intervention card describing the 7 steps, midwives were able to implement the steps of the counseling strategy effectively. Though they indicated that applying some of the steps was more difficult compared to their colleagues in the control group, midwives in the experimental group more often advised their clients to quit smoking, set a quit date with women who are motivated to quit smoking and discussed and provided arrangements for aftercare.

Similar data collected among the participants of the study largely confirmed the reports of midwives. Most women indicated they received the video and self-help guide. Adjusted for location of midwife practice and intake smoking status, women in the experimental group reported more often receiving the advice to quit and counseling about quitting compared to women in the control group. Although midwives in the experimental group indicated that they found applying some of the steps more difficult, women were more positive about the advice received from their midwife, both during intake as well as during the entire pregnancy.

With regard to receiving advice about non-smoking postpartum, however, data collected among midwives and women were contradictory. Responding midwives indicated they distributed the post delivery booklet to the majority of their clients, whereas only 17% of clients indicated they received it. Additionally, although women in the experimental group indicated they received more advice regarding their smoking behavior postpartum compared to control group clients, the percentage who said they received advice was very low.

With regard to smoking behavior of the partner, most midwives distributed the partner booklet to their clients, which was confirmed by reports of their clients. However, there were no differences between the two groups with regard to discussing smoking behavior of the partner.

From the above it can be concluded that the implementation of the smoking cessation component of the program for pregnant women during pregnancy was successful. However, implementation of the relapse prevention component postpartum and partner smoking cessation was not successful. This is also confirmed by the results of the study which are reported in detail elsewhere. Until six weeks postpartum, abstinence rates are significantly larger among women in the experimental group (21.3% and 12.0% in the experimental and control group, respectively) (24). However, this effect is not sustained. Results collected six months postpartum show no differences between groups with regard to abstinence (19). At no single time point, partner smoking rates differ between the two groups.

How can this be explained? Perhaps, prenatal care providers are not the right intermediaries for interventions aimed at continued smoking cessation postpartum. This seems to be confirmed by the fact that although several studies, which focused on prenatal smoking cessation but also included a post delivery relapse component were unable to report effects postpartum (25-26). Even though these interventions were not implemented in routine care, but made use of specially trained personnel.

Furthermore, it might be that interventions aimed at smoking cessation during pregnancy do not make use of the right arguments to sustain non-smoking postpartum. By trying to convince pregnant women to quit smoking, most emphasis is put on the harmful effects of smoking for the fetus. This is also one of the recommendations of the AHCPR regarding smoking cessation interventions for pregnant women (17). However, by laying the emphasis on the consequences for the fetus, women might draw the conclusion that cessation will only be temporary. As soon as the baby is born these consequences disappear and the woman is free to start again. The decision to quit might therefore not be a decision to refrain from smoking for life but only while pregnant. This seems to be confirmed by Stotts et al. (27-28), who reported that during pregnancy the baby is an 'external' motivation for quitting, there is no 'internal'

intention to change.

Since this study has shown that it is feasible to implement the program in routine midwifery care in the Netherlands and has shown to be effective in increasing cessation both during pregnancy as well as early postpartum, we recommend further investigation of the possibilities and requirements of implementation. Besides implementation of the intervention in midwife practices, it will be important to study preconditions for implementation of the intervention in general practitioners and gynecologist practices, since they are also providers of prenatal care.

As for the partner and the post delivery component of the intervention, further work on an appealing and efficacious intervention is required. It may be that other access points to communicate with partners about smoking cessation during pregnancy and the positive role they can play in helping their wife to stop should be found. As for the post delivery component it might be most effective to study possibilities to continue the non-smoking message postpartum at for instance well baby visits, although this will be very difficult to implement in routine care. So far, the few studies (25,29-30) which have aimed specifically at non-smoking postpartum have not been able to reduce relapse rates.

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Chapter 4

Smoking cessation by participants in a Dutch multi-media smoking cessation program for pregnant women and their partners¹

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Abstract

Objectives. This study assessed the effects of brief counseling by midwives and self-help materials on smoking cessation during pregnancy and early postpartum. Additionally, the effects of a partner booklet on smoking cessation were analyzed.

Methods. The study used a pretest posttest randomized control group design with 318 daily smokers (72.1% response) nested within midwife practice and practices nested within 4 provinces (province=unit of assignment). Posttest data were collected 6 weeks after intake and 6 weeks postpartum.

Results. In total 95.6% of women received the video and 91.2%, the self-help guide. Of experimental women 18.7% reported not smoking in the past 7 days 6 weeks after the intervention versus 7.4% of the controls. Postpartum, these percentages were 21.3% and 12.0%, respectively. Predictors were receiving the intervention (OR=3.63, 95% CI=1.50-8.83 six weeks post intervention; OR=2.40; 95% CI=1.03-5.58 six weeks postpartum), being a lighter smoker (OR=0.84; 95% CI=0.76-0.93 and OR=0.87; 95% CI=0.79-0.95) and having a non-smoking partner (OR=0.42; 95% CI=0.19-0.92 and OR=0.21; 95% CI=0.10-0.47). Only 48.4% of smoking partners read the booklet. Partner smoking was not different between study groups at either time point.

Conclusions. The intervention is effective in reducing smoking by women early in pregnancy and early postpartum. The booklet for partners was not successful. Women indicated that they appreciated the intervention.

Introduction

Smoking cessation during pregnancy significantly reduces the risks of growth retardation, fetal death, Sudden Infant Death Syndrome, and other problems (1-5). Continued abstinence postpartum also reduces children's exposure to environmental tobacco smoke and its associated health risks (6,7). Moreover, sustained abstinence postpartum reduces women's lifetime risk for smoking related-diseases (8). Therefore, it is essential to develop programs which enable women to quit smoking effectively early in pregnancy and reduce the high relapse rates which occur in the first few months after delivery (9-11).

Systematic reviews of prenatal smoking cessation trials have noted few trials with interventions delivered by usual prenatal care practitioners (12-14). Favorable results have been found for interventions used by specifically trained health care professionals, but delivery in routine care has been less successful and represents an important aspect for future study. An additional finding of these reviews and research priority is that partner smoking is a chief predictor of postpartum relapse (12,13).

The aim of the study was to develop, implement and evaluate a tailored smoking cessation and relapse prevention program for pregnant women and their partners which could be easily implemented in regular midwife prenatal care in the Netherlands. In the Netherlands uncomplicated pregnancies are usually guided by midwives who work independently in private practices, organized into regional networks. Therefore midwives were chosen as intermediaries for delivering the program.

The content of the midwife advice and materials for women was designed using a counseling approach, previously tested in the Netherlands for other groups of smokers (15-17) and known as the minimal intervention strategy (MIS). MIS combines elements of the Attitude-Social influences-Efficacy model (18-20) and the stages of change construct of the Transtheoretical Model, (21) and it helps intermediaries select the information relevant to their clients.

Methods

Design

The study used a pretest posttest randomized control design, where women were nested within midwife practice and practices within four provinces, the latter being the unit of randomization to the experimental and control conditions.

Recruitment and assignment method

At the end of 1995, we sent letters and an information brochure to the 62 chairs of regional networks of midwife practices (members of the Dutch Organization of Midwives) to inform them about the project and to ask them to inquire among their members whether they were willing to participate in the study. After one week the chairs were also contacted by telephone. Fifteen chairs (24.2%) agreed to ask their members to participate. Reasons for refusal included no extra time available, already participating in another study, the midwife was a smoker and the midwife was pregnant. The 15 regional networks represented 60 practices (157 midwives), which were all willing to participate. The first 42 practices (118 midwives) were selected, because our power calculation indicated that by 7 clients per midwife approximately 100 midwives were needed for the study. Selected practices were located in 4 provinces, which were representative of the Netherlands with regard to geographic distribution (east-west) and level of urbanization. Provinces were matched by location and level of urbanization, and one province in each of the resulting pairs was assigned to experimental or control group condition by throwing a die.

Identification of pregnant smokers

Women were eligible for the study if they had not been pregnant more than twice, were able to speak and understand spoken and written Dutch and indicated to smoke at least one cigarette a day. Women were included in the study from February 1995 to December 1995. Participating midwives asked their clients at the first consultation whether they smoked. Clients reporting smoking were given a letter asking whether they wanted to participate in a study about smoking and health. The letter also

explained the study requirements, including the possibility of having urine tested for cotinine, an indicator of cigarette use. If the woman consented, she filled out the baseline questionnaire and was then included in the study. Although midwives were asked to have nonconsenters fill out a form with reasons for refusal, only 12 were returned. Therefore, we asked the midwives to estimate the percentage of women who refused.

Intervention

We offered all midwives in the experimental condition 3 hours of training about how to talk about smoking and smoking cessation with their clients during the first consultation. The training was based on the MIS (15-17), a guideline developed for health counselors to help them give short, effective, stage-matched information about smoking cessation. For the application of the MIS protocol for pregnant women, special materials were developed for three groups: midwives, pregnant women who smoke or quit smoking recently and smoking partners.

For women in the experimental condition a video, self-help guide and post-delivery booklet were developed. The video was especially directed to precontemplators, women who were not giving any thought to stopping smoking and who probably would not put any effort in reading materials about smoking cessation. The self-help guide is stage-matched and based on a self-help smoking cessation guide used by general practitioners in the Netherlands (15-16). The guide was adapted for pregnant women, by changing the definitions of stage (defining precontemplators as those not serious about quitting in the next 30 days), adding pregnancy specific information and changing the illustrations. To make women aware of the danger of relapse after delivery, a booklet was written about the positive effects of not smoking after delivery and the consequences of environmental tobacco smoke for young children.

Since pregnant women who want to quit smoking indicate that it is very difficult for them to quit when they have a smoking partner, a special booklet was made for all smoking partners of women in the experimental group. The partner booklet did not follow the MIS because there was no counseling element in place but was directed to

precontemplators. It was written to stress the importance of the commitment of the expectant father to the pregnancy and to explain that quitting together with his partner would make a substantial difference for the health of their baby and for themselves.

For midwives to be able to work with the MIS, a brief manual and intervention card were developed. The manual describes the seven steps midwives need to follow to provide effective counseling. These steps are based on the health-counseling model described by Gerards (22), which incorporates several different psychological concepts, including the stages of change, goal setting and relapse prevention. The health-counseling model has been applied to smoking cessation before by Mudde (15) for the general population of smokers in the Netherlands.

The first step of the MIS consisted of identifying smoking behavior from both woman and partner. The number of cigarettes smoked per day and the motivation to quit were also assessed to group women by stage of change. Women who indicated that they want to quit smoking within the next 30 days were identified as in preparation, women who indicated that they want to quit smoking during this pregnancy but not within the next 30 days were identified as contemplators; and women who indicated that they did not want to quit smoking were identified as precontemplators. Second, when a woman indicated she did not intend to quit within the next 30 days (precontemplators and contemplators) the midwife tried to enhance the motivation to quit by giving information about mainly short term advantages of not smoking. Third, when women indicated that they wanted to quit smoking within the next 30 days (preparation stage) the midwife discussed barriers that might hamper a successful quit attempt. During the preparation stage mobilizing social support was also discussed by asking the woman whether someone in her environment would help her during the quitting process. Fourth, if a woman actually wanted to stop smoking a quit date was set and noted by the midwife. Fifth, additional self-help materials were given. Sixth, the midwife also discussed with the woman what kind of aftercare she preferred (telephone contacts, during the next consultation, on initiative of the woman herself). Seventh, at about eight months pregnant the midwife handed out a booklet about smoking after delivery. Information about the consequences of passive smoking for young children was discussed and for quitters a commitment to stay a non-smoker was invited. An

intervention card was designed for midwives to be able to write down progress and commitments of their clients.

During pregnancy the midwife was advised to talk about smoking with her client on a regular basis. At least two contacts were scheduled: during the first consultation (three months pregnant) to enhance quitting behavior and at eight months pregnant to talk about relapse prevention.

Midwives in the control condition were asked to provide smoking cessation counseling as they used to do and hand out a folder about smoking cessation during pregnancy developed by the Dutch Foundation on Smoking and Health.

Measures

Data presented here are from 3 measurement occasions: a written questionnaire completed at intake at the midwife's office and two telephone interviews conducted six weeks after the intervention and six weeks postpartum. Since the pretest questionnaire was completed at the midwife's office, it had to be very brief. Therefore, some additional demographic and smoking history questions were asked in the first posttest measurement. Questions related to satisfaction with content and appearance of materials were also asked in the first posttest measurement. Questionnaire development was based on earlier work on smoking cessation in general (23-24) and pregnant women (20).

- Outcomes

Three outcomes were assessed at both follow-ups based on self-reports. First, women were asked whether they had one or more quit attempts of at least 24-hours since the last measurement contact. Second, to assess point prevalence abstinence they were asked whether they had smoked a cigarette (even if it was just one puff) in the past 7 days. Third, women were asked to indicate whether their partner smoked and how many cigarettes per day. To increase the reliability of self-reports a bogus pipeline procedure was used (25).

- biochemical validation

Midwives were asked to collect urine during the first consultation and 6 weeks after pregnancy for cotinine analyses among a randomly selected sub sample of women

reporting not smoking. Urine-cotinine was measured by gas chromatography/ mass spectrometry. The cut off point was set at 25 mg/l (26).

- predictor and control variables

Three sets of variables were sociodemographic characteristics (age in years, highest educational level, having a steady partner, and having a paid job), pregnancy (parity and number of weeks gestation at entry into care), and smoking items (number of cigarettes per day before pregnancy and at entry into care, number of minutes to first cigarette, age when they became a regular smoker, and whether they anticipated help from their partner for quitting, "a lot", "average", "a little", "none"). Glasses of alcohol per week was measured at all time points.

- implementation variables

Women indicated whether they received the video (yes/ no) and watched it (yes/ no). With regard to the self-help guide they were asked whether they received it (yes/ no), read it (yes/ no) and if yes, to what extent (on a scale from 0 to 4 with 0 indicating nothing and 4 everything). Those who watched the video rated credibility, understandability, interest, attractiveness and length on a scale from 1 to 7 with 1 indicating the lowest score and 7 the highest. The same rating applies for those who read the self-help guide. Both the video and guide were given an overall rating on a scale from 1 to 10 with 10 as the highest mark.

Analysis

Chi-square (for categorical variables) and t-tests (for continuous variables) were used for sociodemographic, pregnancy and smoking characteristics to check for any baseline differences between the study conditions.

Numbers of participants who dropped out and reasons for dropout were described by study group, but in all outcome analyses dropouts (except for women who miscarried or could not participate due to language difficulties) are treated as smokers. Attrition was analyzed as additional outcome with logistic regression analysis according to the same procedure as used for the outcome analysis. For the attrition analysis of posttest 1 dropout at posttest 1 was the outcome. For the attrition analysis of posttest 2 dropout at posttest 1 and/ or 2 was the outcome.

To determine whether the intervention had an effect, we used logistic regression analysis, with quit attempt and 7-day abstinence as dependent variables, and study condition (experimental versus control group) and the following covariates as independent variables: age, educational level, number of weeks pregnant at intake, parity, the age at onset of smoking, number of cigarettes smoked on average a day at intake, having a smoking partner, number of glasses of alcohol on average per day and location of midwife practice. Interactions between study condition and baseline characteristics were entered first as one block. Interaction terms were then removed one by one, using a backward elimination procedure. If a significant interaction term remained, the logistic regression was done within strata defined by the covariate interacting with condition. Covariates were removed from the model unless they satisfied at least one of the following criteria: interacting with the treatment condition, differing between the 2 study groups and/ or being a significant predictor of the dependent variable. All analyses were performed using the SPSS 8 for Windows statistical program (27). All tests were 2-tailed and $\alpha=0.10$ was used to keep main effects in the model, but $\alpha=0.05$ for conclusions. To test the effect of the intervention on smoking behavior of the partner, we used the same procedure with smoking behavior of the partner as dependent variable and study condition, educational level of the partner, number of weeks pregnant at intake, parity, smoking behavior of the partner at intake, number of cigarettes smoked on average a day at intake by the pregnant woman and location of midwife practice as independent variables.

Traditional logistic regression analysis is based on the assumption that the outcomes of all study participants are statistically independent. However, ours is a nested design, which may lead to intra-class correlation, i.e. positive dependence between outcomes in the same practice, due to province and practice effect on the outcome. Ignoring such intra-class correlation will lead to underestimation of the standard error of the treatment effect, too narrow confidence intervals and possibly, Type I errors (28-29). Therefore, we re-ran our models with random effect logistic regression (using EGRET version 1.02.10) (30) treating women as nested within practices and practices as random effect, and type of province (East/ West) as fixed effect.

Results

Recruitment

Participating midwives in both conditions estimated that they approached 80% of women eligible for the study and 72% agreed to participate. Reasons for refusal were described as women did not want to quit, feared the confrontation with their smoking behavior, intrusion of privacy, feelings of guilt and shame and the burden of participating in a research study (e.g. filling out questionnaires).

A total of 318 intake smokers were included in the study, 141 in the experimental condition and 177 in the control condition. By the time of the second posttest 85.1% and 88.7% of the two groups respectively, remained eligible for the study (Figure 4.1). Neither study condition nor any of the baseline characteristics was predictive of dropout at posttest 1 ($p>.20$) or posttest 2 ($p>.08$).

Figure 4.1 Reasons for dropout by study group and point of measurement

Participant characteristics

Study groups differed at baseline on educational level, number of weeks gestation at intake, the number of cigarettes women smoked on average per day when they visited their midwife for the first time and the location of the midwife practice (Table 4.1). Women in the experimental group were more highly educated, began pregnancy care earlier, were heavier smokers and their midwife practice was more often located in the Eastern part of the Netherlands.

Table 4.1 Baseline characteristics in percentages or mean (SD) by study group (sociodemographic, pregnancy, smoking history and smoking networks)

	Exp (n=141)	missing	Con (n=177)	missing
Age (M, SD)	28.6 (4.32)	9	28.4 (4.39)	5
Level of education (χ^2 (2)=7.97; $p<.05$)		5		13
Low	47.1%		61.6	
Medium	38.2		23.8	
High	14.7		14.6	
Steady partner (yes)	99.3%	2	97.2	1
Paid job woman (yes)	68.4%	5	65.2	13
Number of prior pregnancies		5		13
0	55.1%		51.8	
1	29.4		30.5	
2+	15.4		17.7	
Number of weeks pregnant at intake (M, SD)	12.4 (1.91)	1	13.5 (3.60)	3
(F(1,312)=10; $p<.01$)				
Number of cigarettes a day before pregnancy (M, SD)	17.4 (8.46)	1	18.4 (8.51)	0
Number of cigarettes a day at first visit with midwife (M, SD) (F(1,316)=4.69; $p<.05$)	9.1 (6.83)	0	7.7 (5.01)	0
Age began smoking (M, SD)	14.9 (2.28)	5	15.4 (2.51)	13
Minutes to first cigarette		5		13
<5	8.8%		6.7	
6-30	18.4		22.0	
31-60	19.9		13.4	
>60	52.2		56.1	
Glasses of alcohol per week (M, SD)	0.38 (1.29)	5	0.28 (1.11)	13
Partner smoking (yes)	71.2%	10	72.5	18
Anticipated help in effort to quit from partner		0		3
a lot	29.8%		27.0	
average	31.2		30.5	
little	13.5		15.5	
none	21.3		21.8	
Province (West) (χ^2 (1)=72.8; $p<.001$)	28.4%	0	76.3	0

Implementation

At least one midwife was trained in using the MIS in every participating practice, resulting in 71% of all midwives in the experimental condition.

In total 95.6% of treatment group women reported having received the video and 91.2%, the self-help guide. Of those who received the video 67.5% watched and of those who received the guide 82.4% read at least part of it, with an average of 2.82 on a scale from 0 to 4 (SD=1.40). In general women rated the materials as credible, understandable, interesting, and attractive and gave them a good overall rating (Table 4.2). The self-help guide, however, was perceived as too long.

Table 4.2 Evaluation of video, self-help guide and relapse booklet by experimental intake smoking group

	Video (n=92)	Self-help guide (n=112)
	Mean (SD)	Mean (SD)
credible*	5.76 (1.30)	5.91 (1.03)
understandable*	6.30 (0.87)	6.32 (0.54)
interesting*	5.08 (1.66)	5.78 (1.10)
attractive*	4.40 (1.81)	5.35 (1.41)
length*	5.20 (1.59)	3.19 (1.65)
overall**	6.66 (1.36)	7.39 (0.96)

* Scale of 1-7, 1=lowest rating

** Scale of 1-10, 1=lowest rating

Differences in quit attempts and point-prevalence abstinence

Six weeks post intervention, 36.7% of the experimental group, reported a quit attempt versus 24.0% of controls ($\chi^2(1)=5.99$; $p<.05$). Seven day abstinence was reported by 18.7% of experimental group members versus 7.4% of controls ($\chi^2(1)=9.06$; $p<.01$). Percentages without including dropouts as smokers were 37.5% versus 25.6% for quit attempts ($\chi^2(1)=4.91$; $p<.05$) and 19.1% versus 7.9% for 7-day abstinence ($\chi^2(1)=8.23$; $p<.01$), respectively. Logistic regression indicated that women in the experimental group were more likely to attempt to quit and to be quitters (Table 4.3). Further, women with a smoking partner and heavier smokers were less likely to be abstinent. The same conclusions were drawn with logistic regression excluding dropouts. In multilevel analyses, no significant effect of practice with respect to quit attempt was shown. However, there was a significant effect of practice on 7-day

abstinence (p near 0.05), but this did not seriously change size or significance of treatment or covariate effects.

Table 4.3 Odds ratios and confidence intervals of predictors of quitting and remaining a non smoker 6 weeks after the start of the intervention (dropouts included as smokers) (n=272)

Quit attempt after first consult	B	SE	OR	95% CI for the odds ratio	p-value
Study condition ¹	0.66	0.32	1.94	1.04-3.63	<0.05
Number of cigarettes at first visit	-0.05	0.03	0.95	0.90-1.00	0.05
Educational level					0.20
Low vs high	-0.35	0.40	0.71	0.32-1.56	0.39
Medium vs high	0.20	0.42	1.22	0.54-2.77	0.63
Number of weeks pregnant	-0.01	0.05	0.99	0.90-1.09	0.91
Age onset of smoking	0.11	0.06	1.11	1.00-1.24	0.06
Province	0.23	0.31	1.26	0.69-2.31	0.46
Constant	-2.29	1.24			0.07
Quitters six weeks after first consult	B	SE	OR	95% CI for the odds ratio	p-value
Study condition	1.29	0.45	3.63	1.50-8.83	<0.01
Number of cigarettes at first visit	-0.17	0.05	0.84	0.76-0.93	<0.01
Educational level					0.75
Low vs high	0.03	0.59	1.03	0.33-3.24	0.96
Medium vs high	0.33	0.58	1.39	0.44-4.37	0.57
Number of weeks pregnant	-0.08	0.09	0.92	0.78-1.09	0.35
Smoking partner	-0.88	0.40	0.42	0.19-0.92	<0.05
Province	-0.49	0.44	1.64	0.69-3.89	0.27
Constant	-0.25	1.36			0.86

¹ Coding of variables: study condition (experimental=1; control=0); number of cigarettes at first visit (continuous); educational level (0/1 dummy indicators with high as reference category); number of weeks pregnant at intake (continuous); age onset of smoking (continuous, in years); smoking partner (no=0; yes=1); province (East=0, West=1)

Six weeks postpartum 38.2% of women in the experimental condition attempted to quit versus 23.4% of controls ($\chi^2(1)=8.00$; $p<.01$). Seven day abstinence was reported by 21.3% of experimental women and 12.0% of controls ($\chi^2(1)=4.93$; $p<.05$). Excluding dropouts, percentages were 43% versus 25.5% ($\chi^2(1)=9.58$; $p<.01$) and 24.2% versus 13.2% ($\chi^2(1)=5.58$; $p<.05$), respectively. Logistic regression indicated that women in the experimental group, lighter smokers, women with higher education and women without a smoking partner were more likely to attempt to quit and to be 7-day abstinent (Table 4.4). Further, women who began pregnancy care early were more likely to attempt to quit and women who started smoking at a later age were more likely to be 7-day abstinent. Logistic regression excluding dropouts revealed almost identical

results. Women in the experimental group were more likely to attempt to quit (OR=3.02, $p<0.01$; 95% CI=1.47-6.18) and to be 7-day abstinent (OR=2.58, $p<0.05$; 95% CI=1.07-6.20). With regard to attempting to quit an additional predictor was found. Women who started smoking at a later age were more likely to quit (OR=1.14, $p=0.05$; 95% CI=1.01-1.30). Multilevel analyses showed no significant random effect of practice on quit attempt but did show a significant random effect of practice on 7-day abstinence. However, size and significance of treatment or covariate effects were not seriously changed.

Table 4.4 Odds ratios and confidence intervals of predictors of quitting and remaining a non smoker 6 weeks postpartum (dropouts included as smokers) (n=269)

Quit attempt during pregnancy	B	SE	OR	95% CI for the odds ratio	p-value
Study condition ¹	0.92	0.34	2.51	1.28-4.91	<0.01
Number of cigarettes at first visit	-0.11	0.03	0.89	0.84-0.95	<0.001
Educational level					<0.05
Low vs high	-1.11	0.44	0.33	0.14-0.77	<0.05
Medium vs high	-0.43	0.45	0.65	0.27-1.56	0.33
Number of weeks pregnant	-0.16	0.07	0.85	0.75-0.97	<0.05
Age onset of smoking	0.12	0.06	1.12	0.99-1.27	0.06
Smoking partner	-0.73	0.32	0.48	0.26-0.90	<0.05
Province	0.18	0.34	1.19	0.62-2.30	0.60
Constant	1.03	1.47			0.49
Quitters six weeks postpartum	B	SE	OR	95% CI for the odds ratio	p-value
Study condition	0.88	0.43	2.40	1.03-5.58	<0.05
Number of cigarettes at first visit	-0.14	0.05	0.87	0.79-0.95	<0.01
Educational level					<0.01
Low vs high	-1.77	0.58	0.17	0.05-0.53	<0.01
Medium vs high	-0.51	0.53	0.60	0.21-1.70	0.34
Number of weeks pregnant	-0.08	0.08	0.93	0.79-1.09	0.34
Age onset of smoking	0.16	0.08	1.18	1.00-1.39	<0.05
Age	-0.09	0.05	0.92	0.83-1.01	0.09
Smoking partner	-1.56	0.41	0.21	0.10-0.47	<0.001
Province	-0.46	0.42	0.63	0.28-0.47	0.28
Constant	2.04	2.19			0.35

¹ Coding of variables: study condition (exp=1; con=0); number of cigarettes at first visit (continuous); educational level (0/1 dummy indicators with high as reference category); number of weeks pregnant at intake (continuous); age onset of smoking (continuous, in years); age (continuous, in years); smoking partner (no=0; yes=1); province (East=0, West=1)

Tables 4.3 and 4.4 are the final regression models (after dropping non-significant interactions and covariates eligible for deletion according to the modeling

procedure outlined in the method section), no interactions were found.

Biochemical validation

At intake 47 (14.8%) urine samples were collected from a random sample of women. Results indicated that overall 17% of self-reported non-smokers actually were smokers (17.6% and 16.7% for the experimental and control condition, respectively). Six weeks postpartum only 7 urine samples were collected. These samples all confirmed the self-reported non-smoking status.

Partner smoking

In total 76.2% of women in the experimental group reported having given the partner booklet to their smoking partner. Of those who received the booklet 48.4% read it. At intake 71.2% of experimental group partners and 72.5% of controls were described by the women as smoking. Six weeks post intervention these percentages were 70.1% for experimental group partners and 69.6% for controls. Six weeks postpartum a further decrease was reported, 68.1% and 65.8% respectively. None of these differences was statistically significant. None of the included covariates predicted partner smoking 6 weeks post intervention, excepting pretest partner smoking (OR=42.3, $p<0.0001$). Study condition had no effect on partner smoking during pregnancy or early postpartum.

Discussion

Findings from this study indicate that a smoking cessation intervention consisting of brief counseling by a midwife, a video and self-help guide was effective in assisting pregnant women to quit smoking. Implementation of the intervention in routine Dutch prenatal midwifery care was successful. A large majority of daily intake smokers reported receiving the materials. Materials were watched and read by most women, and they reported liking both the content and appearance. The program raised quit rates 6 weeks after the intervention and early postpartum. Consistent predictors of smoking behavior were the number of cigarettes smoked on average at intake, the age at onset of smoking and having a smoking partner. Comparison of the logistic regression output with re-analyses of the final models using random effect logistic regression showed a small effect of midwife practice on 7-day abstinence 6 weeks post intervention and six weeks postpartum and no significant effect on quit attempt at both time points. However, this small effect did not substantially change the effect of study condition on abstinence.

The partner component of the intervention, consisting of a partner booklet was not successful. Approximately 75% of the women reported having given the booklet to their smoking partner, but they indicated that only about half of the partners also read it. Partner smoking rates were not different between study groups at either time point. Furthermore, logistic regression indicated no effect of study condition on partner smoking behavior.

Previous studies (31-32) that also relied on usual health care providers to provide counseling did have comparable assessment periods. Kendrick and colleagues (31) conducted 3 statewide trials with public maternity clinics and Women, Infants, and Children's Supplemental Feeding Programs ("WIC") clinics, and their cotinine-validated results at the 8th month of pregnancy showed no effect of the intervention. These investigators speculated that implementation of the intervention may have been very low. Hjalmarsen's trial with Swedish obstetricians (32) did not really involve counseling, but consisted primarily of distribution of a self-help manual. This intervention achieved a non-significant increase in verified cessation in late pregnancy (12.6% of the experimental group versus 8.6% of controls), but by 8 weeks

postpartum, these percentages had increased to 15.8% and 9.1%, respectively.

There were some methodological weaknesses to this study. One of the problems of conducting research in routine care is that, as a researcher, one should not disrupt standard practice. Therefore, women had to complete the pretest at the midwife's office, during the first consultation before the start of the intervention. However, in practice many women completed the questionnaire after the first consultation was finished. As a consequence, some of the variables such as attitudes and intention towards becoming a non-smoker were not used as predictors for the outcome variables, since intervention effects for these variables were already expected.

Furthermore, although we tried to conduct cotinine analyses on 30% of women claiming to be non-smokers at intake and six weeks postpartum we only received a fraction of this number. Results of the cotinine analyses at intake indicated that in total 17% of self-reported non-smokers actually were smokers. Percentages did not differ between study groups. Six weeks postpartum all samples confirmed the self-reported non-smoking status. The level of nondisclosure at intake was similar to at least one other study at a comparable time in a U.S. health maintenance organization (33). The major difficulty with nondisclosure has occurred in several U.S. trials at the late pregnancy measurement, when the overall level was above 25% and when there were also large differences between study groups (31-34). Postpartum self-report would seem to remove at least some of the social demand of pregnancy, but there is little literature regarding this period.

To be able to generalize the present results to other regions in the Netherlands, region should have been included into the analysis as a random effect, as was midwife practice. The small number of regions renders such an approach impossible, however. The present correction for region (East/ West dummy) is a fixed effect approach, implying a restriction of the results to the present 4 regions. Only under the assumption of no (random) differences between regions with respect to the outcomes are the present standard errors and p-values adequate for generalizing to other regions. The fact that the fixed effect of East versus West was not predictive of any outcome ($p > 0.20$) gives tentative support for this assumption.

Since the intervention can be implemented in routine prenatal midwifery care in

the Netherlands and has shown to be effective in increasing cessation both during pregnancy as well as early postpartum, we recommend further investigation of the possibilities and requirements of implementation. Besides implementation of the intervention in midwife practices, it will be important to study preconditions for implementation of the intervention in general practitioners and gynecologist practices, since they are too providers of prenatal care in the Netherlands.

As for the partner component of the intervention, further work on an appealing and efficacious intervention is required. It may be that other access points to communicate with partners about smoking cessation during pregnancy and the positive role they can play in helping their wife to stop smoking should be found.

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Chapter 5

Effects six months postpartum of a Dutch multi-media smoking cessation and relapse prevention program for pregnant women and their partners

Abstract

Background. This study assessed the effects of brief counseling by midwives and self-help materials on 7-day abstinence six months postpartum and continued abstinence. Additionally, the effects of a partner booklet on smoking cessation were analyzed.

Methods. The study used a pretest posttest randomized control group design with 556 daily smokers and spontaneous quitters (72% response) nested within midwife practice and practices nested within 4 provinces (province=unit of assignment). Posttest data were collected six weeks and six months postpartum.

Results. In total 83.8% of women reported receiving the video, 79.8%, the guide and 16.7% the post delivery booklet. Of experimental women 27.4% reported not smoking in the past 7-days versus 30.6% of the controls. For continued abstinence percentages were 24.6% and 25.3%. Consistent predictors of abstinence were being a lighter smoker and starting smoking at a later age. Additionally, women with a smoking partner and intake smokers were less likely to be 7-day abstinent. Women who began pregnancy care later were less likely to be continued abstinent. Only 46.3% of smoking partners read the booklet. Partner smoking was not different between study groups.

Conclusions. The short-term effects on smoking cessation during pregnancy and early postpartum were not sustained. The booklet for partners was also not successful. Since only few women received the post delivery booklet, different methods and access points should be tested.

Introduction

Smoking cessation during pregnancy significantly reduces the risks of growth retardation, fetal death, Sudden Infant Death Syndrome, and other problems (1-5). Continued abstinence postpartum also reduces children's exposure to environmental tobacco smoke and its associated health risks (6,7). Moreover, sustained abstinence postpartum reduces women's lifetime risk for smoking related-diseases (8).

In the Netherlands, about 35% of all pregnant women are estimated to be pre pregnancy smokers. At the time of their first prenatal consult 70% of them will report smoking and 30% will report recent quitting, resulting in a smoking prevalence among pregnant women of 24.5% (9). US studies report 25% of women who become pregnant to be smokers at the time they learn they are pregnant (10). Approximately 23% to 40% of these women spontaneously quit after learning they are pregnant (11,12). Although women who quit during pregnancy usually abstain from smoking for five months or more, approximately 65% to 70% return to smoking within six months after delivery and half do so in the first six weeks (12-15). Considering the harmful consequences of smoking pre- and postpartum and the substantial number of women who remain smokers during pregnancy or relapse after delivery, it is essential to develop programs which enable women to quit smoking effectively early in pregnancy and will reduce the high relapse rates which occur in the first few months after delivery (12,14,16).

Favorable results have been found for interventions used by specifically trained health care professionals on prenatal smoking cessation, but delivery in routine care has been less successful and represents an important aspect for future study (17-19). Furthermore, although some studies have incorporated a post delivery relapse prevention component, only one study, which started the intervention in prenatal care, achieved a significant improvement in maintenance up till 12 months postpartum (20). This intervention also produced a significant reduction in the proportion of fathers who smoked, suggesting that this was a helpful strategy to reduce mothers' return to smoking.

The aim of the study described in this article was to develop, implement and evaluate a tailored smoking cessation and relapse prevention program for pregnant

women and their partners which could be easily implemented in regular midwife prenatal care in the Netherlands. In the Netherlands uncomplicated pregnancies are usually guided by midwives who work independently in private practices, organized into regional networks. Therefore midwives were chosen as intermediaries for delivering the program.

The content of the midwife advice and materials for women was designed using a counseling approach, previously tested in the Netherlands for other groups of smokers (21-23) and known as the minimal intervention strategy (MIS). MIS combines elements of the Attitude-Social influences-Efficacy model (24-26) and the stages of change concept of the Transtheoretical Model (27), and it helps intermediaries to select the information relevant to their clients.

Short-term effects of the intervention which have been described elsewhere have indicated a positive effect on smoking cessation up till 6 weeks postpartum. In total 21.3% of experimental women indicated to be 7-day abstinent compared to 12% of control women (28). This paper reports the effects of the intervention on 7-day abstinence six months postpartum and continued point prevalence abstinence (reporting 7-day abstinence at six weeks and six months postpartum) among intake smokers and spontaneous quitters and the main predictors of non-smoking. Additionally, the effects of the intervention on partner smoking behavior are presented. Satisfaction with content and appearance of the materials is also reported here.

Methods

Design

The study used a pretest posttest randomized control design, where women were nested within midwife practice and practices within four provinces, the latter being the unit of randomization to the experimental and control condition.

Number of practices and assignment method

In total 42 midwife practices (118 midwives) were selected to participate in the study. Selected practices were located in 4 provinces, which were representative of the Netherlands with regard to geographic distribution (east-west) and level of urbanization. Provinces were matched by location and level of urbanization, and one province in each of the resulting pairs was assigned to experimental or control group condition by throwing a die. Details about the identification of practices are reported elsewhere (28).

Identification of pregnant intake smokers and spontaneous quitters

Women were eligible for the study if they had not been pregnant more than two times, were able to speak and understand Dutch and indicated to smoke at least one cigarette a day (intake smokers) or to have quit smoking in the previous six months (spontaneous quitters). Women were included in the study from February 1995 to December 1995. Participating midwives asked their clients at the first consultation whether they smoked or had quit smoking. Clients reporting smoking or to have stopped smoking were given a letter asking whether they wanted to participate in a study about smoking and health. The letter also explained the study requirements, including the possibility of having urine tested for cotinine, an indicator of cigarette use. If the woman consented, she filled out the baseline questionnaire at the midwife's office and was then included in the study. Although midwives were asked to have women who refused to participate fill out a form with reasons for refusal, only 12 were returned. Therefore, we also asked the midwives to estimate the percentage of women who refused.

Intervention

During the first consultation, the midwives in the experimental condition were trained to talk about smoking and smoking cessation with their clients based on the MIS (21-23). For the application of the MIS, special materials were developed.

For pregnant women who smoked or quit smoking recently, a video, self-help guide and post delivery booklet were developed. Furthermore, since pregnant women who want to quit smoking indicate that it is very difficult for them to quit when they have a smoking partner, a special booklet was made for this partner.

For midwives to be able to work with the MIS, a brief manual and intervention card were developed. The manual describes the seven steps midwives need to follow to provide effective counseling. A schematic overview of the steps is provided in figure 5.1. Details about the materials and steps of the MIS are described elsewhere (28).

During pregnancy the midwife was advised to talk about smoking with her client on a regular basis. At least two contacts were scheduled: during the first consultation (three months pregnant) to enhance quitting behavior and at eight months pregnant to talk about postpartum relapse prevention.

Midwives in the control condition were asked to provide smoking cessation counseling as they used to do and hand out a folder about smoking cessation during pregnancy developed by the Dutch Foundation on Smoking and Health.

Figure 5.1 Smoking cessation and relapse prevention protocol for pregnant women and their partners

Measures

Data presented here are from 4 measurement occasions: a written questionnaire completed at intake at the midwife's office and three telephone interviews conducted six weeks after the start of the intervention, six weeks postpartum and six months postpartum. Since the pretest questionnaire was completed at the midwife's office, it had to be very brief. Therefore, some additional demographic and smoking history questions were asked in the first posttest measurement. Questions related to satisfaction with content and appearance of materials were asked in the first posttest measurement with regard to the video and self-help guide and in the second posttest measurement with regard to the post delivery booklet. Questionnaire development was based on earlier work on smoking cessation in general (29,30) and pregnant women (26).

- outcomes

Three outcomes were assessed based on self-reports. To increase the validity of self-reports a bogus pipeline procedure was used (31). First, to assess point prevalence abstinence women were asked whether they had smoked a cigarette (even if it was just one puff) in the past 7 days. Second, to assess continued point prevalence abstinence a new variable was computed by combining the answers on the point prevalence abstinence question six weeks and six months postpartum. Third, women were asked to indicate whether their partner smoked and how many cigarettes per day.

- biochemical validation

Midwives were asked to collect urine during the first consultation and 6 weeks after pregnancy for cotinine analyses among a randomly selected sub sample of women reporting not smoking. Urine-cotinine was measured by gas chromatography/ mass spectrometry. The cut off point was set at 25 mg/l (32).

- predictor and control variables

Three sets of variables were sociodemographic characteristics (age in years, highest educational level, having a steady partner, and having a paid job), pre and post pregnancy (parity, number of weeks gestation at entry into care and still breastfeeding the baby 6 months postpartum), and smoking items (intake smoking status, "daily smoker", "spontaneous quitter", number of cigarettes per day before pregnancy and at

entry into care, number of minutes to first cigarette, age when they became a regular smoker, and whether they anticipated help from their partner for quitting, “a lot”, “average”, “a little”, “none”). Glasses of alcohol per week was measured at all time points.

- implementation variables

Women indicated whether they received the video (yes/ no) and watched it (yes/ no). With regard to the self-help guide they were asked whether they received it (yes/ no), read it (yes/ no) and if yes, to what extent (on a scale from 0 to 4 with 0 indicating nothing and 4 everything). For the post delivery booklet, women indicated whether they received it (yes/ no) and read it (yes/ no). Those who watched the video rated credibility, understandability, interest, attractiveness and length on a scale from 1 to 7 with 1 indicating the lowest score and 7 the highest. The same rating applies for those who read the self-help guide and post delivery booklet. The video, guide and post delivery booklet were given an overall rating on a scale from 1 to 10 with 10 as the highest mark.

Analysis

Chi-square (for categorical variables) and t-tests (for continuous variables) were used for sociodemographic, pregnancy and smoking characteristics to check for any baseline differences between the study conditions.

Numbers of participants who dropped out and reasons for dropout were described by study group, but in all outcome analyses dropouts (except for women who miscarried or lost the baby) are treated as smokers. Attrition was analyzed as additional outcome according to the same procedure as used for the outcome analysis. For the attrition analysis of posttest 1 dropout at posttest 1 was the outcome. For the attrition analysis of posttest 2 dropout at posttest 1 and/ or 2 was the outcome and for dropout at posttest 3 dropout at posttest 1 and/or 2 and/or 3.

To determine whether the intervention had an effect, logistic regression analyses were carried out with 7-day abstinence and continued point prevalence abstinence as dependent variables, and study condition (experimental versus control group) and the following covariates as independent variables: age, educational level, number of weeks

pregnant at intake, parity, the age at onset of smoking, number of cigarettes smoked a day before intake and at intake, intake smoking status, having a smoking partner, number of glasses of alcohol on average a day, still breastfeeding the baby at six months postpartum and location of midwife practice as independent variables.

Interactions between study condition and baseline characteristics were entered first as one block. Interaction terms were then removed one by one, using a backward elimination procedure. If a significant interaction term remained, the logistic regression was done within strata defined by the covariate interacting with condition. Furthermore, covariates were removed from the model unless they satisfied at least one of the following criteria: interacting with the treatment condition, showing a difference between the two treatment conditions and/ or being a significant predictor of the dependent variable. All analyses were performed using the SPSS 8 for Windows statistical program (33). An $\alpha=0.05$ was used for all 2-tailed tests of main effects ($\alpha=0.01$ for interactions). To test the effect of the intervention on smoking behavior of the partner, we used the same procedure with smoking behavior of the partner as dependent variable and study condition, educational level of the partner, number of weeks pregnant at intake, parity, smoking behavior of the partner at intake, number of cigarettes smoked on average a day at intake by the pregnant woman and location of midwife practice as independent variables.

To check which factors determined whether a woman in the experimental group received the post delivery booklet, we conducted a logistic regression analysis only on women in the experimental group with receiving the post delivery booklet as outcome and baseline characteristics and abstinence six weeks post-intervention as predictors. Additionally, we also tested whether receiving the post delivery booklet influenced the outcomes of the study. However, distribution of the post delivery booklet might itself be influenced by the woman's smoking behavior at, or before, the time of distribution. This might induce a spurious correlation between receiving the booklet and smoking postpartum. Therefore, the effect of receiving the booklet on abstinence postpartum was tested with the same regression procedure as for the intervention effect on abstinence, but with as additional predictors: receiving the booklet, abstinence six

weeks post-intervention, and the interaction between study condition and abstinence six weeks post-intervention.

Traditional logistic regression analysis is based on the assumption that the outcomes of all study participants are statistically independent. However, ours is a nested design, which may lead to intra-class correlation, i.e. positive dependence between outcomes in the same practice, due to province and practice effect on the outcome. Ignoring such intra-class correlation will lead to underestimation of the standard error of the treatment effect, too narrow confidence intervals and possibly, Type I errors (34-35). Therefore, we re-ran our models with random effect logistic regression (using EGRET version 1.02.10) (36) treating women as nested within practices and practices as random effect, and type of province (East/ West) as fixed effect.

Results

Recruitment

Participating midwives in both conditions estimated that they approached 80% of women eligible for the study and 72% agreed to participate. Reasons for refusal were described, as women did not want to quit, feared the confrontation with their smoking behavior, intrusion of privacy, feelings of guilt and shame and the side-effects of participating in a research study (e.g. filling out questionnaires).

A total of 556 women were included in the study, 253 in the experimental condition and 303 in the control condition. By the third posttest 83.4% and 85.1% of the two groups respectively, remained eligible for the study (Figure 5.2). Study condition was not predictive of dropout at posttest 1, posttest 2 or posttest 3. However, heavier smokers (OR=1.05; 95% CI=1.01-1.09) were more likely to dropout at posttest 2 and heavier smokers (OR=1.04; 95% CI=1.01-1.08) and younger women (OR=0.93; 95% CI= 0.88-0.99) were more likely to dropout at posttest 3.

Participant characteristics

Study groups differed at baseline on having a steady partner, number of weeks

pregnant at intake, the number of cigarettes women smoked on average per day when they visited their midwife for the first time (only intake smokers) and location of midwife practice (Table 5.1). Women in the experimental group were more likely to have a steady partner, to begin pregnancy care early, intake smokers were heavier smokers and the midwife practice was more often located in the Eastern part of the Netherlands.

Figure 5.2. Reasons for dropout by study group and point of measurement

Implementation

At least one midwife was trained in using the MIS in every participating practice, resulting in 71% of all midwives in the experimental condition.

In total 83.8% of experimental group women reported having received the video, 79.8%, the self-help guide and 16.7%, the post delivery booklet. Of those who

received the video 70.8% watched it, of those who received the guide 87.1% read at least part of it, with an average of 2.76 on a scale from 0 to 4 (SD=1.48) and of those who received the post delivery booklet 75.7% read it. In general women rated the materials as credible, understandable, interesting, and attractive and gave them a good overall rating (Table 5.2). The self-help guide, however, was perceived as too long.

Table 5.1 Baseline characteristics in percentages or mean (SD) by study group (sociodemographic, pregnancy, smoking history and smoking networks)

	Exp (n=253)	missing	Con (n=303)	missing
Age (M, SD)	28.5 (4.21)	12	28.6 (4.24)	9
Level of education		11		19
Low	42.1%		51.1	
Medium	40.1		31.0	
High	17.8		18.0	
Steady partner (yes) ($\chi^2(1)=4.17$; $p<.05$)	99.6%	11	97.3	3
Paid job woman (yes)	71.5%	11	73.2	19
Number of prior pregnancies		11		19
0	55.7%		56.8	
1	27.7		24.4	
2+	12.3		12.5	
Number of weeks pregnant at intake (M, SD)	12.5 (2.31)	2	13.4 (3.43)	5
($F(1,547)=11.1$; $p<.01$)				
Number of cigarettes a day before pregnancy (M, SD)	16.0 (8.41)	5	16.2 (8.63)	2
Daily smoker at first visit with the midwife (yes)	65.2%		58.4%	
Number of cigarettes a day at first visit with midwife (M, SD) (only intake smokers)	9.13 (6.83)		7.69 (5.01)	
($F(1,316)=4.69$; $p<.05$)				
Age began smoking (M, SD)	15.3 (2.45)	11	15.6 (2.60)	19
Minutes to first cigarette				
<5	7.9%	11	5.7	20
6-30	19.0		18.7	
31-60	17.4		14.5	
>60	55.4		59.4	
Glasses of alcohol per week (M, SD)	0.31 (1.10)	11	0.25 (0.91)	19
Partner smoking (yes)	69.0%	24	64.4	28
Anticipated help in effort to quit from partner				
a lot	32.7%	2	32.0	3
average	32.3		28.3	
little	13.1		14.3	
none	18.3		18.0	
Breast feeding, 6 months postpartum	15.2%	42	14.0	45
Province (West) ($\chi^2(1)=145.4$; $p<.001$)	25.7%		76.9	

Table 5.2 Evaluation of video, self-help guide and post delivery booklet by experimental intake smokers and spontaneous quitters (Mean, SD)

	Video (N=150)	Self-help guide (N=176)	Post delivery booklet (N=28)
credible*	5.78 (1.18)	5.95 (0.93)	6.14 (1.04)
understandable*	6.35 (0.78)	6.23 (0.78)	6.21 (0.50)
interesting*	5.13 (1.68)	5.80 (1.07)	4.89 (1.52)
attractive*	4.66 (1.66)	5.41 (1.34)	4.89 (1.64)
length*	5.03 (1.57)	3.14 (1.53)	4.04 (1.84)
overall**	6.73 (1.27)	7.44 (0.91)	7.08 (0.63)

* Scale of 1-7, 1=lowest rating

** Scale of 1-10, 1=lowest rating

Outcomes

In total, 34.8% of experimental women indicated to have quit smoking before the first visit with the midwife versus 41.6% of controls (spontaneous quitters), 18.7% of experimental women indicated to have quit during pregnancy after this initial visit versus 7.4% ($\chi^2(2)=9.06$; $p<.01$) (intake smokers). Seven-day abstinence at six weeks postpartum was reported by 33.9% of experimental group members versus 34.7% of controls (ns) (spontaneous quitters and intake smokers combined).

Six months postpartum, 27.4% of women in the experimental condition reported 7-day abstinence versus 30.6% of controls (ns). Percentages without including dropouts as smokers were 31.5% and 34%, respectively (ns). Logistic regression indicated that women who indicated to be daily smokers at intake at the midwife's office, were heavier smokers at intake, started smoking at a younger age and had a smoking partner were more likely to be smokers. The same conclusions were drawn with logistic regression excluding dropouts. Multilevel analysis showed a marginally significant random effect of practice, but this did not seriously change size or significance of treatment or covariate effects (Table 5.3).

Continued point prevalence abstinence was reported by 24.6% of experimental women versus 25.3% of controls (n.s). Percentages without including dropouts as smokers were 27.7% versus 27.9%. Logistic regression indicated that women who indicated to be heavier smokers at intake, started pregnancy care later, had a smoking

partner and started smoking at a younger age were less likely to be 7-day abstinent at both 6 weeks and 6 months postpartum. Logistic regression without including dropouts showed similar results. Similarly, a random effect of practice was found, but size or significance of treatment or covariate effects was not seriously changed.

The interaction between study condition and intake smoking status was not significant for both outcomes (p near 0.09). Additional analyses of the final models presented in table 5.3 among intake smokers only also did not show a significant effect of study condition on both outcomes ($B=0.38$, $SE=0.41$, $p=0.35$ for the effect of study condition on point prevalence abstinence 6 months postpartum, and $B=0.59$, $SE=0.45$, $p=0.19$ for continued point prevalence abstinence).

Table 5.3 Odds ratios and confidence intervals of point prevalence abstinence 6 months postpartum and continued point prevalence abstinence (dropouts included) (n=450)

Point prevalence abstinence	B	SE	OR	95% CI for the odds ratio	p-value
Study condition ¹	0.11	0.28	1.11	0.65-1.91	0.70
Number of weeks pregnant	-0.05	0.05	0.95	0.87-1.04	0.25
Age onset of smoking	0.11	0.05	1.12	1.02-1.22	<0.05
Smoking partner	-0.61	0.24	0.55	0.34-0.88	<0.05
Province	0.16	0.27	1.17	0.69-1.99	0.57
Breast feeding at 6 months	0.54	0.33	1.72	0.91-3.26	0.09
Intake smoking status	0.79	0.35	2.20	1.11-4.37	<0.05
Number of cigarettes at first visit	-0.16	0.05	0.85	0.78-0.94	<0.01
Constant	-1.53	0.99			0.12
Continued point prevalence abstinence	B	SE	OR	95% CI for the odds ratio	p-value
Study condition	0.15	0.28	1.17	0.67-2.03	0.58
Number of weeks pregnant	-0.10	0.05	0.90	0.82-0.99	<0.05
Age onset of smoking	0.12	0.05	1.13	1.02-1.24	<0.05
Smoking partner	-0.45	0.25	0.64	0.39-1.03	0.07
Province	-0.13	0.28	0.88	0.51-1.52	0.65
Intake smoking status	0.62	0.38	1.87	0.89-3.90	0.10
Number of cigarettes at first visit	-0.20	0.06	0.82	0.73-0.92	<0.001
Constant	-0.96	1.03			0.35

¹ Coding of variables: study condition (experimental=1; control=0); number of weeks pregnant at intake (continuous); age onset of smoking (continuous, in years); smoking partner (no=0; yes=1); province (East=0, West=1); still breast feeding 6 months postpartum (no=0; yes=1); intake smoking status (smoker=0; spontaneous quitter=1); number of cigarettes at first visit (continuous)

Abstinence 6 weeks post intervention was not predictive of receiving the post delivery booklet ($B=0.54$, $SE=0.63$, $p=0.39$), neither was any of the baseline variables.

Receiving the post delivery booklet was also not predictive of abstinence 6 months postpartum ($B=0.37$, $SE=0.69$, $p=0.60$) or continued abstinence ($B=0.60$, $SE=0.74$, $p=0.42$).

Biochemical validation

At intake 47 (14.8%) urine samples were collected among a random sample of women. Results indicated that overall 17% of self-reported non-smokers actually were smokers (17.6% and 16.7% for the experimental and control condition, respectively). Six weeks postpartum only 7 urine samples were collected. These samples all confirmed the self-reported non-smoking status.

Smoking behavior of partners

In total 86.1% of women in the experimental group reported having given the partner booklet to their smoking partner. Of those who received the booklet 46.3% read it. At intake 69% of partners reported smoking in the experimental group versus 64.4% of controls. Six months postpartum these percentages were 62% and 59%, respectively. None of these differences were statistically significant. Logistic regression indicated that partners who smoked themselves at intake and who had a wife who was a heavier smoker at intake were more likely to be smokers six months postpartum (table 5.4).

Table 5.4 Odds ratios and confidence intervals of predictors of the partner being a smoker six months postpartum (dropouts included) (n=468)

Partner smokes six months postpartum	B	SE	OR	95% CI for the odds ratio	p-value
Study condition ¹	-0.08	0.32	0.93	0.50-1.73	0.81
Number of cigarettes the woman smokes at first visit	0.08	0.03	1.08	1.03-1.14	<0.01
Province	-0.10	0.32	0.90	0.49-1.68	0.75
Number of weeks pregnant at intake	0.01	0.05	1.01	0.92-1.12	0.79
Smoking status partner at intake	3.51	0.28	33.49	19.4-57.9	<0.0001
Constant	-2.03	0.75			<0.01

¹ Coding of variables: study condition (experimental=1; control=0); number of cigarettes the woman smokes at first visit (continuous); province (East=0, West =1); number of weeks pregnant at intake (continuous); partner smokes at intake (no=0; yes=1)

Discussion

While short-term effects were found (28) of the smoking cessation and relapse prevention program for pregnant women on smoking behavior, the findings of this study failed to show long-term effects for 7-day abstinence and continued abstinence. Most women received the video and self-help guide and the vast majority also watched and read them and indicated to appreciate content and appearance. However, very few women received the post delivery booklet, which was aimed at sustaining non-smoking postpartum. Hence, an explanation of the disappearance of the effect long-term is the implementation failure of the postpartum intervention (37).

Multi-level analysis did indicate a random effect of practice on both outcomes, but size and significance of treatment and covariate effects were not seriously changed. No effect of the intervention on smoking behavior was indicated in logistic regression analyses. Consistent predictors of 7-day abstinence six months postpartum and continued abstinence were starting smoking at a later age and being a lighter smoker at intake. Seven-day abstinence was further predicted by having a smoking partner and being an intake quitter. An additional predictor of continued abstinence was starting pregnancy care early.

The partner component of the intervention, consisting of a partner booklet was not successful either. Approximately 86.1% of the women reported having given the booklet to their partner, but less than half actually read it. Partner smoking rates did not differ six months postpartum. Logistic regression indicated no effect of the intervention on partner smoking behavior. Partners who smoked at intake and partners with a pregnant wife who was a heavy smoker at intake were more likely to remain smokers postpartum.

Several studies, which have focused on prenatal smoking cessation, have also reported relapse rates postpartum for intake smokers (38,39) or intake smokers and spontaneous quitters (14,20). McBride (38) compared the results on relapse data of three interventions: a self-help booklet only, prepartum relapse prevention and prepartum and postpartum relapse prevention. The intervention was delivered by mail and telephone without involving prenatal health care providers. The pre/post intervention delayed but did not prevent postpartum relapse to smoking. Secker-

Walker (39) evaluated the effect of individualized smoking cessation advice provided by trained smoking cessation counselors. No significant differences on relapse rates were reported on data gathered 8 to 54 months postpartum. Mullen (14) reported the effects of a serialized smoking cessation program, the first part of which was given at the intake visit and the remainder were mailed weekly thereafter. The non smoking maintenance rate was not related to the intervention. The only study, which did achieve a significant improvement in maintenance 12 months postpartum, was the PANDA project (20).

There were some methodological weaknesses to this study. One of the problems of conducting research in routine care is that, as a researcher, one should not intervene with standard practice. Therefore, women had to complete the pretest at the midwife's office, during the first consultation before the start of the intervention. As a consequence, some of the variables such as attitudes and intention towards becoming a non-smoker were not used as predictors for the outcome variables, since intervention effects for these variables were already expected.

Furthermore, although we tried to conduct cotinine analyses on 30% of women claiming to be non-smokers at intake and six weeks postpartum we only received a fraction of this number. Results of the cotinine analyses at intake indicated that in total 17% of self-reported non-smokers actually were smokers. Percentages did not differ between study groups. Six weeks postpartum all samples confirmed the self-reported non-smoking status.

An explanation for the absence of effects of the intervention on long-term cessation and relapse prevention for women might be that midwives perhaps did not pay specific attention to relapse prevention postpartum. An indicator is that only a very small percentage of women reported receiving the post delivery booklet. This may indicate that midwives need more training to convince them of the importance of paying specific attention to postpartum relapse before delivery. It might be that midwives do not consider themselves to be the right intermediaries for information about postpartum relapse since they see their client for the last time six weeks postpartum. Therefore it will be essential to collaborate with pediatricians and baby well care centers to remain consistent in the non smoking message postpartum.

Having a partner who smokes negatively influences the chance of women to remain non smokers. Although the intervention contained a special partner component no effects were found on smoking behavior of the partner. A possible explanation could be that partners do not necessarily join their wives on their prenatal visits. This makes it impossible for the midwives to interact with them directly on the importance of their smoking behavior for mother and child. Therefore other access points to communicate with partners about smoking cessation during pregnancy and the positive role they can play in helping their wife to stop should be found.

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Summary

Smoking during pregnancy is detrimental to the health of an unborn child. Research has shown that smoking during pregnancy can lead to for instance low birthweight, fetal growth retardation, spontaneous abortion, perinatal death and sudden infant death syndrome. Passive smoking by babies and young children can also have adverse effects on their health. However, many women do not quit smoking when they become pregnant and when they quit the chance of relapse is high after delivery. So far, in the Netherlands no research was conducted into the effectiveness of smoking cessation programs during pregnancy. Therefore, it was decided to conduct research into the development, implementation and evaluation of a smoking cessation and relapse prevention program for pregnant women.

For the development of the program the ABC planning model was used. This model describes step by step the three different phases which can be followed when developing, implementing and evaluating an effective intervention. In the first phase an analysis is made of the problem, the second phase describes the development of the intervention and the third phase deals with continuation of the program.

In chapter 1 the application of the model on smoking and pregnancy is described. In the analysis phase a description is given of the detrimental effects of smoking both during pregnancy as well as passive smoking postpartum on the health of the (un)born child. Although smoking can be regarded as a more or less conscious choice woman make during pregnancy it is also important to take the environment of the woman into consideration. Research has shown that women with a smoking partner are more likely to remain smokers during pregnancy and to relapse after delivery. Furthermore, although women indicate to consider health care providers as the most important source of information regarding smoking, very few women actually receive information from their health care provider about smoking. A description is provided of the most important determinants of smoking and smoking cessation during pregnancy as well as the most important determinants of providing smoking cessation advice to pregnant women by midwives. In the Netherlands midwives are the usual providers of prenatal care. In the final step of the analysis phase the different

access points are described which can be used for a smoking cessation and relapse prevention program.

Based on the results of the analysis phase it was decided to develop materials for the pregnant women, the smoking partner and the midwife. The intervention phase describes the goals and objectives of the different program components, the development of the intervention, the way the different components were pretested before the start of the study into the effectiveness of the program and the effect and process evaluation.

In the third and final phase it is described that it is necessary to collaborate with all actors who can play a part in the implementation of a program from the start of the project to increase the chance of successful implementation. Furthermore, factors are described which can play an important role in the successful diffusion of an effective intervention.

In the final section of the first chapter general conclusions are drawn and recommendations are made for research and practice.

In Chapter 2 the determinant study is described which was conducted among midwives before the development of the intervention. In total 368 questionnaires were sent to midwives of which 237 were returned. In the questionnaire questions were asked about the advantages and disadvantages of providing smoking cessation advice, the advantages and disadvantages of smoking cessation for the health of both mother and child, social support and self-efficacy of midwives with regard to providing smoking cessation advice. Results of this study indicated that midwives with a positive role definition regarding providing smoking cessation advice were more convinced of the advantages of providing smoking cessation advice, the health benefits of smoking cessation for mother and child and perceived more support from their colleagues with regard to giving advice. Self-efficacy with regard to providing smoking cessation advice was low among both midwives with a positive role definition as well as midwives with a less positive role definition. Based on these results it was concluded that it is important to develop materials and training to facilitate and stimulate midwives to provide smoking cessation advice to their clients.

In chapter 3 the results of the process evaluation are described. After the implementation phase of the study was finished all 118 midwives who participated in the study received a questionnaire. In total 69 midwives returned the questionnaire. In the questionnaire questions were asked regarding the application of the different steps of the health counseling model, the difficulty of applying the different steps, the distribution of the program materials and the possibility of implementation of the intervention in routine care. Although midwives in the experimental group indicated to find discussing smoking behavior, motivation to quit and barriers which might hamper a successful quit attempt more difficult compared to their colleagues in the control group, experimental midwives more often indicated to provide the advice to quit, set a quit date with women motivated to quit smoking and made arrangements for aftercare. Midwives in the experimental group indicated to have distributed the different program materials to a large majority of their clients. There were no differences between midwives in the experimental and control group with regard to advising the partner to quit and to not smoke around his pregnant wife. Results of midwives were largely confirmed with data gathered among study participants. However, with regard to discussing smoking behavior postpartum results were contradictory. Only very few women indicated to have received the postdelivery booklet from their midwife or to have discussed postpartum smoking behavior with their midwife. It was concluded that it is feasible to implement the program in routine care but that more research is needed into the implementation of the partner smoking and postdelivery relapse prevention component.

In chapter 4 an overview is given of the short-term results of the intervention study. In total 318 smoking pregnant women were included in the study. Six weeks after the start of the intervention 18.7% of women in the experimental group indicated to have not smoked a cigarette in the past seven days compared to 7.4% of women in the control group. Six weeks postpartum these percentages increased to 21.3% and 12%, respectively. Receiving the intervention, being a less heavy smoker and having a non-smoking partner were predictors of non-smoking. At both time-points no effects were observed of the intervention on smoking behavior of the partner. Based on these results it was concluded that the intervention is effective in reducing the number of

pregnant women who smoke, this effect is sustained up till at least six weeks postpartum. The partner intervention is not effective.

In the final chapter of this dissertation the long-term effects of the intervention are described. For the analysis of the long term effects data were used of 318 pregnant women who indicated to be smokers at intake and 238 so called spontaneous quitters (women who indicated to have quit smoking in the previous six months before intake). Since the interaction effect between intake smoking status and study condition was not significant it was decided to study the effects on both groups together. Six months postpartum 27.4% of women in the experimental group indicated to have not smoked a cigarette in the previous seven days compared to 30.6% of women in the control group. The difference between the two groups was not significant. Less heavy smokers and women who started smoking at a later age were more likely to be non-smokers. Women with a smoking partner and who were smokers themselves at intake were more likely to be smokers. There was no effect of the intervention on partner smoking behavior. Since the intervention did not result in long term effects on smoking behavior it was concluded that more research is needed into determinants of postpartum relapse among women, the determinants of providing relapse prevention advice to pregnant women by midwives and new access points for the delivery of postpartum relapse prevention advice.

Samenvatting

Roken tijdens de zwangerschap is schadelijk voor de gezondheid van het ongeboren kind. Onderzoek heeft aangetoond dat roken tijdens de zwangerschap onder andere kan leiden tot een lager geboortegewicht, groeiachterstand, het vaker voorkomen van spontane abortus, een verhoging van perinatale sterfte en wiegendoed. Ook passief roken door baby's en jonge kinderen kan nadelige effecten hebben op de gezondheid. Veel vrouwen stoppen echter niet met roken als zij zwanger worden en als zij stoppen is de kans groot dat zij weer beginnen met roken na de bevalling. In Nederland was tot nu toe geen onderzoek uitgevoerd naar de effectiviteit van stoppen met roken programma's tijdens de zwangerschap. Derhalve werd besloten een onderzoek op te zetten naar de ontwikkeling, implementatie en evaluatie van een stoppen met roken en relaps preventie programma voor zwangere vrouwen.

Voor de ontwikkeling van het programma werd gebruikt gemaakt van het ABC planningsmodel. Dit model beschrijft stapsgewijs de drie verschillende fases die doorlopen kunnen worden bij de ontwikkeling, implementatie en evaluatie van een effectieve interventie. In de eerste fase wordt een analyse gemaakt van het probleem, de tweede fase beschrijft de ontwikkeling van de interventie en de derde fase richt zich op continuering van het programma.

In hoofdstuk 1 wordt de toepassing van het ABC planningsmodel op zwangerschap en roken beschreven. In de analyse fase wordt beschreven dat roken tijdens de zwangerschap en passief roken na de bevalling schadelijk is voor de gezondheid van het (on)geboren kind. Behalve dat roken tijdens de zwangerschap een al dan niet bewuste keuze is die door vrouwen wordt gemaakt is het tevens belangrijk rekening te houden met de omgeving van vrouwen. Uit onderzoek blijkt dat vrouwen met een rokende partner meer kans hebben om zelf te blijven roken tijdens de zwangerschap, maar ook om weer te beginnen met roken na de bevalling. Verder blijkt dat hoewel vrouwen aangeven medici als belangrijkste bron te beschouwen voor het ontvangen van informatie over roken, slechts weinig vrouwen ook daadwerkelijk deze informatie ontvangen. Een beschrijving wordt gegeven van de belangrijkste determinanten van roken en stoppen met roken

tijdens de zwangerschap maar ook van het geven van stoppen met roken voorlichting aan zwangere vrouwen door verloskundigen. Verloskundigen zijn in Nederland de gebruikelijke hulpverleners bij ongecompliceerde zwangerschappen. Tot slot van de analyse fase wordt beschreven welke kanalen het meest geschikt zijn voor een stoppen met roken en relaps preventie programma.

Op basis van de gegevens verzameld in de analyse fase werd besloten tot de ontwikkeling van materialen voor zowel de zwangere vrouw, de rokende partner van de zwangere en de verloskundige. De interventie fase beschrijft de doelstellingen van de diverse programma onderdelen, de ontwikkeling van de interventie, de wijze waarop de diverse onderdelen zijn getest voor aanvang van de effectiviteitsstudie en de effect en proces evaluatie.

De derde fase beschrijft dat voor succesvolle implementatie van een interventie het belangrijk is om vanaf het begin van het project samen te werken met de verschillende beroepsgroepen en organisaties die een rol kunnen spelen bij de implementatie van een programma. Verder worden factoren beschreven die een rol kunnen spelen bij de succesvolle verspreiding van een interventie.

In het laatste onderdeel van het eerste hoofdstuk worden algemene conclusie getrokken en aanbevelingen gedaan voor onderzoek en praktijk.

In hoofdstuk 2 wordt de determinanten studie beschreven die is uitgevoerd onder verloskundigen voor aanvang van de ontwikkeling van de interventie. In totaal werden aan 368 verloskundigen vragenlijsten verstuurd waarvan er 237 ingevuld werden geretourneerd. In de vragenlijst werden vragen gesteld over voor- en nadelen van het geven van stoppen met roken voorlichting, voor- en nadelen voor de gezondheid van stoppen met roken tijdens de zwangerschap voor moeder en kind, sociale steun en eigen effectiviteit van verloskundigen ten aanzien van het geven van stoppen met roken voorlichting. Resultaten van deze studie wezen uit dat verloskundigen met een meer positieve taakopvatting ten opzichte van het geven van stoppen met roken voorlichting aan hun cliënten meer overtuigd waren van de voordelen van het geven van stoppen met roken voorlichting, de voordelen voor de gezondheid van stoppen met roken voor

moeder en kind en meer steun verwachten van hun collegae ten aanzien van het geven van stoppen met roken voorlichting. De eigen effectiviteit met betrekking tot het geven van stoppen met roken voorlichting was laag onder zowel verloskundigen met een positieve als verloskundigen met een minder positieve taakopvatting. Op basis van de resultaten van deze studie werd geconcludeerd dat het belangrijk is om materialen en training te ontwikkelen voor verloskundigen om hen te helpen en te stimuleren om stoppen met roken voorlichting te geven.

In hoofdstuk 3 worden de resultaten van de procesevaluatie beschreven. Na afloop van de implementatie van de interventie ontvingen alle 118 verloskundigen een vragenlijst, 69 verloskundigen vulden de vragenlijst in. In de vragenlijst werden vragen gesteld over de wijze waarop stoppen met roken voorlichting was gegeven, de moeilijkheid van het geven van stoppen met roken voorlichting, het verstrekken van de diverse materialen en de mogelijkheid van implementatie van de interventie in de dagelijkse praktijk. Hoewel verloskundigen in de experimentele groep aangaven dat zij het moeilijker vonden om het rookgedrag van hun cliënten te bespreken, de motivatie om te stoppen met roken en eventuele hindernissen die een succesvolle stoppoging zouden kunnen belemmeren bleek dat experimentele verloskundigen vaker het advies gaven om te stoppen, een stopdatum afspraken met cliënten die gemotiveerd waren om te stoppen met roken en afspraken maakten over nazorg. Experimentele verloskundigen gaven tevens aan de diverse materialen verspreidt te hebben onder een ruime meerderheid van hun cliënten. Er werden geen verschillen gevonden tussen verloskundigen in de experimentele en controle groep voor wat betreft het geven van een stopadvies aan de rokende partner of het geven van het advies niet te roken in aanwezigheid van de zwangere vrouw. Deze resultaten werden grotendeels bevestigd met data verzameld onder cliënten. Echter, wat betreft het relaps preventie gedeelte van de interventie spraken de gegevens verzameld onder verloskundigen en cliënten elkaar tegen. Slechts weinig cliënten gaven aan het relaps preventie boekje te hebben ontvangen of postnataal rookgedrag te hebben besproken met hun verloskundige. Op basis van deze resultaten werd geconcludeerd dat het mogelijk is

de stoppen met roken interventie te implementeren, maar dat meer onderzoek nodig is naar de implementatie van het partner gedeelte en het relaps preventie gedeelte.

In hoofdstuk 4 worden de korte termijn resultaten van de interventie beschreven. In totaal werden 318 rokende zwangeren geïncludeerd in de studie. Zes weken na aanvang van de interventie gaf 18.7% van de vrouwen in de experimentele groep aan niet te hebben gerookt in de afgelopen zeven dagen in vergelijking tot 7.4% van de vrouwen in de controle groep. Zes weken na de bevalling was dit percentage gestegen tot respectievelijk 21.3% en 12%. Het ontvangen van de interventie, een minder zware roker zijn en het hebben van een niet rokende partner waren voorspellers van stoppen met roken. Op beide meetmomenten kon geen effect worden geconstateerd van de interventie op het rookgedrag van de partner. Op basis van deze resultaten werd geconcludeerd dat de interventie effectief is in het reduceren van het aantal rokende zwangeren tijdens de zwangerschap en dat dit effect aantoonbaar blijft tot in ieder geval zes weken na de bevalling. De partner interventie was niet effectief.

In het laatste hoofdstuk worden de lange termijn resultaten van de interventie beschreven. Voor de analyse van de lange termijn resultaten werden de gegevens gebruikt van de 318 rokende zwangeren die werden geïncludeerd in de studie en 238 zogenaamde spontane stoppers (vrouwen die aangaven recent te zijn gestopt met roken). Omdat de interactie tussen rookstatus bij aanvang van de studie en het behoren tot de experimentele en controle groep niet significant was werden de resultaten van beide groepen samengevoegd. Zes maanden na de bevalling gaf 27.4% van de vrouwen in de experimentele groep en 30.6% van de vrouwen in de controle groep aan niet te hebben gerookt in de afgelopen zeven dagen. Dit verschil was niet significant. Minder zware rokers en vrouwen die op latere leeftijd waren begonnen met roken gaven vaker aan niet te roken. Vrouwen met een rokende partner en vrouwen die zelf nog rookten bij aanvang van de studie gaven vaker aan wel te roken. Er was geen effect van de interventie op rookgedrag van de partner. Omdat geen lange termijn effect van de interventie op rookgedrag kon worden aangetoond werd geconcludeerd dat meer onderzoek noodzakelijk is naar de determinanten van terugval onder zwangeren, de determinanten

van het geven van relaps preventie door verloskundigen en mogelijke andere kanalen voor het verspreiden van voorlichting over het belang van niet roken na de bevalling.

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Martijntje Bakker

Den Haag, 2001

Curriculum Vitae

Martijntje Bakker was born on October 9, 1969 in Sneek. In 1988 she received her VWO diploma at the Nienoord College in Leek. In that same year she started studying Health Sciences at the University of Limburg (now called Maastricht University). In 1993 she graduated, specializing in Health Education. After graduation she started to work as a research assistant at the Department of Health Education of Maastricht University.

From 1994 to 1998 she was employed as a researcher at the Department of Health Education. In this period she conducted the study described in this thesis. In March 1998 she started to work as the European Project Manager for the European Smoking prevention Framework Approach (ESFA) project. The goals of the ESFA project were to develop, implement and evaluate smoking prevention materials for adolescents in six European countries simultaneously.

From September 1999 until July 2001 she has worked at the Department of Public Health of the Erasmus University Rotterdam as an editor of a book entitled Reducing inequalities in health: a European perspective. The goal of this book was to provide insight in effective interventions and policies to reduce socioeconomic inequalities in health in Europe.

Since July 2001 she is employed as a policy worker with the Public Health Fund, the Hague.