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General introduction

SMOKING THEN AND NOW

The earliest evidence of tobacco use by humans stretches back almost 12,000 years.[1] It is believed that the process of cultivation started in the South Americas around 6000 BC, after which cultivated tobacco slowly spread into Central America and the United States (US).[2] Tobacco was first introduced in Europe by Cristopher Columbus who encountered dried tobacco leaves in Cuba in 1492. [3] In the 300 years following its introduction in Europe, tobacco was mostly used as medicine to treat many different diseases.[3] The first opposition towards medicinal tobacco appeared in 1602, and by 1800 tobacco was removed from medical practice.[3] Despite the fall of tobacco as a botanical medicine, the tobacco industry continued to grow and towards the end of the 19th century the first cigarette-rolling machines were developed which helped tobacco companies expand their market and popularize the cigarette.[4]

A global lung cancer epidemic followed, and it was not until the 1940s and 1950s that cigarettes were identified as the most important cause of disease by the scientific community.[4] Though several health reports were released over the next decades which warned about the dangers of smoking, the public remained slow at recognising the harms of smoking, partly driven by successful efforts of the tobacco industry to undermine and twist scientific evidence.[5] By systematically creating scientific uncertainty about the causality between smoking and lung cancer and other diseases, the tobacco industry managed to undermine the need for regulatory interventions.[5] Claims of scientific uncertainty were also used by the tobacco industry to establish the notion that smoking and any risks associated with it are an individual's responsibility which the industry cannot be held accountable for.[5] Though ample scientific evidence now exists for smoking as an addiction rather than a free choice,[6] the notion that smoking is one's own responsibility still persists to this day, even among healthcare providers.[7]

Nowadays, smoking remains the single biggest preventable public health threat, with more than 1 billion people who smoke worldwide.[8] Each year, tobacco use kills more than 8 million people,[9] of which over 7 million deaths are the result of directly smoking tobacco,[8] and over 1 million deaths are the result of exposure to second-hand smoke or chewing tobacco.[9] Similarly in the Netherlands, smoking is still the leading cause of preventable disease and death. Of the total burden of disease in the Netherlands 9.4% can be attributed to smoking,[10] costing around €2.8 billion in healthcare each year[11] and resulting in an estimated four out of ten premature deaths.[12] The more people smoke, the greater their risk of dying prematurely from a smoking-related disease. [12]

GLOBAL AND NATIONAL TOBACCO CONTROL MEASURES

Fortunately, a lot of progress has been made over the years to reduce tobacco use. Back in 2000, 32.7% of the global population above 15 years old used tobacco.[13] This rate declined to 22.3% in 2020.[12] Much of this progress is due to the adoption of national tobacco control measures which aim to decrease tobacco use or exposure to tobacco smoke.[14,15] To date, 182 countries (covering more than 90% of the global population) have ratified the WHO Framework Convention on Tobacco Control (FCTC).[16] This legally binding treaty entered into force in 2005 and provides a framework for the implementation and enforcement of tobacco control policies. Specifically the six MPOWER measures are intended to assist countries in implementing effective tobacco control policies.[17] The acronym MPOWER stands for: (M) monitor tobacco use and prevention policies, (P) protect people from tobacco smoke, (O) offer help to quit tobacco smoking, (W) warn about the dangers of tobacco, (E) enforce bans on tobacco advertising, promotion and sponsorships, and (R) raise taxes on tobacco. The implementation level of the MPOWER measures strongly varies between countries. In 2021, 75% of ratifying countries had implemented at least one MPOWER measure at best-practice level, and only two countries had adopted all MPOWER measures at best-practice level.[16] Assuming that countries continue their current efforts in tobacco control, the global smoking prevalence is expected to decline further to 20.4% in 2025.[13]

Despite the ratification of the FCTC by the Netherlands in 2005, the Dutch government was rather slow at implementing effective tobacco control measures.[18] It was not until 2014 that tobacco control in the Netherlands started to gain more momentum after the formation of a comprehensive tobacco control coalition called the 'Dutch Alliance for a Smoke-free Society' (in Dutch: 'Alliantie Nederland Rookvrij').[18,19] With the launch of the 'Smoke-free Generation' movement, the coalition framed tobacco control in terms of protecting children from tobacco smoke and aimed to achieve a smoke-free generation by 2035 (meaning that children born from 2017 onwards are never exposed to smoking and never decide to start smoking themselves).[19] The ambitions of the Smoke-free Generation movement eventually became the starting point of the government's National Prevention Agreement (NPA) in 2018.[19] The NPA is an agreement between the Dutch government and more than 70 Dutch civil society organisations, and strives for a society in 2040 in which no adolescents and pregnant women smoke, and no more than 5% of all adults smoke (compared to 23% in 2018).[20] The NPA proposes a package of measures and actions designed to prevent young people from initiating smoking and to stimulate people to give up smoking (e.g., by raising taxes on tobacco, reducing the number of retail outlets, making healthcare smoke-free, and urging businesses and other organisations to become smoke-free).[20] In addition, several actions are proposed which focus on ensuring effective and accessible smoking cessation care. These actions not only encourage people to quit

smoking, but also help to increase the likelihood of a successful quit attempt (e.g., by removing financial barriers to smoking cessation programmes, and equipping healthcare providers to discuss smoking and provide advice).[20] The idea is that implementation of all these measures and actions proposed by the NPA will eventually result in a smoke-free society in which non-smoking is the norm. The downside, however, is that people who continue to smoke may experience strong feelings of stigma as a result of the denormalisation of smoking. Thus, efforts are also needed to reduce feelings of stigma related to smoking, for example by using people-first language when referring to people who smoke (instead of using the term 'smoker' or 'tobacco user').

SMOKING CESSATION IN THE NETHERLANDS

Currently, the majority of the nearly 2.6 million adults in the Netherlands who smoke are motivated to quit smoking in the near or distant future.[21] Important motivators for Dutch adults to quit are concerns about their own health, concerns about their children's health, and receiving a quit advice from a doctor or other expert.[21] Each year, approximately 1 out of 3 Dutch adults who smoke undertake a serious attempt to quit smoking (i.e., refraining from smoking for at least 24 hours),[22] which is similar or even higher compared to some other European countries.[23] The goal of the NPA, however, is to ensure that at least 50% of all Dutch adults who smoke undertake a serious quit attempt yearly, and thus there is a need for interventions and measures which increase quit attempt rates.[20]

Quitting smoking provides health benefits at any age, but the sooner people quit the better.[12] People who quit smoking before the age of 35 achieve the same life expectancy as people who have never smoked.[12] Unfortunately, quitting smoking is a difficult process for most people. While it is often communicated that it takes people around six attempts to quit successfully, the latest research suggests that for some it may even take 30 or more attempts to eventually quit successfully.[24] The strong physical as well as psychological dependence on nicotine which many people who smoke experience, in combination with withdrawal symptoms once nicotine is discontinued, render it so highly challenging to remain abstinent from smoking.[25]

For people who experience difficulty quitting on their own, effective methods exist which significantly increase a person's chance of quitting smoking permanently, such as behavioural counselling, nicotine replacement therapy (NRT), medication, eHealth and mHealth interventions.[26-31] Compared to minimal support, such as a brief advice or self-help materials, behavioural counselling can increase the chances of quitting by 25% to 90%.[26-28] Compared to placebo, NRT and medication can increase chances of quitting by 80% to 190%.[29] Combining behavioural counselling with NRT or medication can further

increase the chances of success by about 10% to 20%.[32] While NRT and medication help to lessen the physical craving and withdrawal symptoms which occur in the first few weeks after quitting smoking,[29] behavioural counselling helps people to change their habits and deal with cues and challenges which can trigger relapse.[33] Smoking cues, which are often conditioned and thus personal (e.g., coffee breaks, social gatherings), can trigger relapse even years after someone has quit smoking,[25] indicating the importance of not only addressing the physical side of the addiction, but also addressing factors which contribute to the psychological addiction of smoking.

Behavioural counselling can either be provided individually (face-to-face or by telephone) or in a group format.[26-28] At the moment, more than 70% of Dutch people who smoke do not use any of the abovementioned methods when attempting to quit smoking, and only around 5% receives behavioural counselling.[21] This is far below the goal which the NPA set to achieve by 2020, namely that 20% of all people who smoke receive professional help during a quit attempt.[20] Therefore, it is not only important that more Dutch people attempt to quit smoking, but also that more people receive professional help during a quit attempt.

THE ROLE OF GENERAL PRACTICE

Healthcare providers can play an important role in identifying patients who smoke, stimulating patients who smoke to quit by providing a (brief) quit advice, and increasing the likelihood of success by offering evidence-based support. With a success rate of only 2 to 3% for unassisted quit attempts, a brief advice to quit smoking from a physician can already double long-term quit rates.[34] In particular professionals working in general practice are in a unique position to address smoking. In the Netherlands, 78% of the population contacts their general practice at least once per year.[35] Also, as of 2019, prevention (both indicated and care-related) is officially seen as a 'core task' of the Dutch general practitioner (GP).[36] Indicated prevention focuses on individuals with risk factors (such as smoking) or symptoms (such as smoking-related complaints) that precede a disease, while care-related prevention focuses on individuals with diseases.[36] With prevention as 'core task', GP practices are responsible for discussing health and lifestyle with patients and preventing (complications of) chronic diseases.[36]

However, with only 10 minutes per consultation on average,[37] Dutch GPs typically do not have enough time to provide the lifestyle counselling that is needed to prevent (complications of) chronic diseases themselves. This is where the practice nurse (PN) steps in. PNs specialised in somatic care are responsible for providing care to patients with chronic diseases, such as diabetes type 2, asthma, chronic obstructive pulmonary disease

(COPD), and cardiovascular disease, and are also trained to provide lifestyle counselling, including smoking cessation counseling.[38] Currently around 80% of all Dutch general practices employs at least one PN who works under supervision of a GP.[38] Though less common, smoking cessation counselling in general practice can also be provided by a trained doctor's assistant (DA), a PN specialised in mental health care, a pulmonary nurse or nurse specialist.[39] Similar systems in which nurses work alongside GPs are also found in a few other countries (e.g., the United Kingdom (UK), Sweden); mainly high-income countries with an ageing population and increasing prevalence of chronic illnesses.[40]

CHALLENGES DURING THE COVID-19 PANDEMIC

Since 2020, general practices have been faced with the challenges of the coronavirus disease 2019 (COVID-19) pandemic. Especially during the first wave of the COVID-19 pandemic, it was not clear which care GPs could and could not provide in their own practice.[41] Barriers such as limited practice space, a shortage of protective equipment and limited referral possibilities made it difficult to provide regular care.[41] Care for chronically ill patients, such as asthma and COPD patients, was postponed and also spirometry tests (i.e., pulmonary function tests) could not be performed,[42] which normally are an opportunity for practitioners to address smoking. Various studies across the globe also demonstrated an adverse impact of the COVID-19 pandemic on the wellbeing of GPs, with GPs experiencing stress, exhaustion, anxiety, and depression.[43.]

In spite of these difficulties, smoking cessation has never been more important, as people who smoke have an increased risk of severe or critical COVID-19.[44,45] In the Netherlands, 14.1% of people who smoke reported smoking less during the pandemic, possibly due to the threat of contracting COVID-19 and becoming severely ill.[46] Quitting smoking has, however, also been challenging for many people during the COVID-19 pandemic. In fact, 18.9% of Dutch people who smoke reported smoking more due to the pandemic, influenced by elevated levels of stress.[46] Such findings emphasize the indispensable role of general practices in addressing smoking and offering cessation support, especially during the COVID-19 pandemic.

SMOKING CESSATION GUIDELINE IMPLEMENTATION

For addressing and treating tobacco use, GPs and PNs in the Netherlands are expected to follow the clinical smoking cessation guideline (in Dutch: NHG-Behandelrichtlijn Stoppen met roken) developed by the Dutch College of General Practitioners (NHG).[39,47] Like most national guidelines for smoking cessation in primary care, the Dutch guideline

follows the 5A approach.[33,48] This approach consists of: 1) **asking** patients about smoking, preferably all patients seen in consultation; 2) **advising** all patients who smoke to quit; 3) **assessing** the motivation to quit among patients who smoke; 4) providing **assistance** to those motivated to quit; and 5) **arranging** follow-up for those who accept support.[47] For patients motivated to quit, intensive behavioural counselling is recommended consisting of at least four ten-minute consultations over a period of several months, typically provided by the PN.[39,47] Patients can also be referred to an external counsellor, for example if more specialised addiction care is required or if the patient wants to receive group counselling.[39] The guideline recommends prescribing pharmacotherapy (i.e., NRT or medication) to patients who smoke more than 10 cigarettes per day.[47] Professionals are advised to address smoking yearly among patients unwilling to quit, and to increase the motivation of patients who are still unsure about quitting before providing assistance.[47]

Though the 5A approach is an effective and relatively brief intervention to treat tobacco use,[47] Dutch GPs and PNs insufficiently adhere to the clinical guideline for smoking cessation care.[39,49-52] Very few GPs ask all patients about smoking,[39,49] or advise all patients who smoke to quit on a yearly basis.[39] Light smokers are less likely to receive a quit advice than moderate or heavy smokers,[50] and people with a low educational level more often receive a quite advice compared to people with a medium or high educational level.[51] Moreover, though the guideline recommends offering patients motivated to quit intensive behavioural counselling optionally combined with NRT or medication, Dutch GPs more often discuss NRT or medication with patients who smoke compared to behavioural counselling.[51] Many PNs also experience difficulty with adhering to the guideline, especially with regard to increasing the motivation of patients who smoke and assisting in quitting smoking, which are typically the responsibility of the PN.[52]

Adherence to the smoking cessation guideline in general practice is influenced by various factors at different levels. At the provider level, role identity (i.e., the perception that smoking cessation care is part of a professional's role), self-efficacy expectations, training, guideline familiarity, perceived sensitivity of the subject, and perceived motivation to quit among patients have been found to influence the provision of smoking cessation care by Dutch GPs and PNs.[49,53-55] Also, previous research found that most Dutch GPs hold patients who smoke themselves responsible for their smoking and are concerned that addressing smoking will harm the patient-provider relationship, further preventing GPs from adhering to the smoking cessation guideline.[7]

Moreover, factors at the organizational and environmental level play an important role in the provision of smoking cessation care. The literature shows that barriers include time constraints, insufficient reimbursement, a lack of (an overview of) smoking cessation programs in the neighbourhood, and a lack of collaboration agreements for smoking

cessation care.[49,54,55] Previous research found that while 75% of Dutch primary care providers in general practice would like to work together with other disciplines, the majority of general practices do not have any local or regional collaborations with other disciplines for smoking cessation care.[39]

ALTERNATIVES TO THE 5A APPROACH

Back in 2005, researchers already observed that the 5A approach was insufficiently adhered to by physicians.[56,57] The researchers concluded that it is not realistic to expect all physicians to routinely carry out the 5A approach, but that physicians should at least be able to determine the smoking status of patients, advise patients who smoke to quit, and refer patients who smoke to cessation counselling.[56,57] Thus, the Ask-Advise-Refer (AAR) approach was introduced. Later research found that the AAR approach is less likely to evoke a negative response from patients compared to the 5A approach, and as such may be easier to implement by GPs.[58]

Other evidence-based approaches similar to the AAR approach include the ABC approach and Very Brief Advice (VBA). The ABC approach has been standard practice in New Zealand since 2007, and includes asking (A) all patients about smoking, providing a brief (B) quit advice to patients who smoke regardless of motivation to quit, and providing evidence-based cessation (C) treatment to anyone who accepts support.[59] VBA was developed in the UK in 2012 and involves asking patients about smoking (Ask), advising all patients who smoke regardless of motivation that the best method to quit is a combination of behavioural support and medication (Advise), and referring patients interested in support to the local stop smoking service (Act).[60] In the Netherlands, the use of VBA has lately been growing in popularity. For instance, two large hospitals and one addiction care institute in the north of the Netherlands have already widely implemented VBA among practitioners.[61] Furthermore, qualitative research found that Dutch GPs feel positive towards using VBA: they perceive the method to be efficient, patient-friendly and easy to implement.[62]

Important to note, however, is that the Netherlands does not have one local stop smoking service which offers all types of behavioural support, as is the case in the UK. Moreover, passively referring patients by instructing them to contact a cessation program or counsellor themselves is not very effective at ensuring that patients receive cessation support. A randomized controlled trial conducted in the US found that only 1.6% of patients enrolled into a quitline (i.e., a telephone counselling service) after receiving the instruction to contact the quitline themselves (i.e., a passive referral).[63] In contrast, 28.2% of patients enrolled into a quitline after their contact details were sent to the quitline and the quitline then contacted the patients for enrolment (i.e., a proactive referral).[63]

The evidence-based Ask-Advise-Connect (AAC) approach is currently the only alternative to the 5A approach which contains a proactive referral.[63] The approach includes asking patients about smoking (Ask), advising all patients who smoke to quit smoking (Advise), and offering support and proactively referring those who accept support to a cessation program (Connect).[63] Within Dutch general practice, a proactive referral can for example take place by sending the contact details of the patient to a cessation program which in turn contacts the patient for enrolment, or by immediately scheduling an appointment for the patient with a counsellor. Considering that only around 5% of Dutch people who smoke receive behavioural counselling during a quit attempt,[21] AAC may be a promising approach for Dutch general practice to ensure that more patients who smoke enrol into cessation counselling.

Table 1. Different elements of alternatives to the 5A approach.

	AAR	ABC	VBA	AAC
Ask patients about smoking	■	■	■	■
Advise patients who smoke to quit	■	■		■
Advise patients who smoke on the best way to quit			■	
Passively refer patients who smoke to cessation support	■	■	■	
Proactively refer patients who smoke to cessation support				■

Note: Blue indicates that the element is part of the approach; AAR = Ask-Advise-Refer; ABC = Ask about smoking, provide Brief quit advice, offer Cessation support; VBA = Very Brief Advice; AAC = Ask-Advise-Connect

IMPLEMENTATION OF NEW EVIDENCE-BASED METHODS IN PRACTICE

Incorporating new methods into routine care does not happen overnight, but requires focused planning and execution. Studies have shown that it may take many years before evidence-based methods are incorporated into routine clinical practice.[64,65] Moreover, it is estimated that only half of all evidence-based methods eventually reach clinical practice, indicating a large research-to-practice gap.[64] In the late 1990s, recognition of this gap led to an increased interest in implementation science.[66] Over the past two decades, much progress has been made within the field of implementation science, resulting in a better understanding of factors which influence implementation and the development of strategies which can enhance implementation.[67] Over 70 strategies have been identified which can enhance implementation of evidence-based methods, such as organizing educational meetings for practitioners and providing educational materials, providing audit and feedback on performance, and reminding practitioners about the evidence-

based method.[68] Such implementation strategies may be necessary to successfully implement AAC in Dutch general practice.

AIM AND OUTLINE OF THIS THESIS

The aim of this thesis is to improve the delivery of smoking cessation care in Dutch general practice. More specifically, this thesis aims to increase: (i) the proportion of patients that are asked about smoking, (ii) the proportion of patients who smoke that receive a quit advice, and (iii) the proportion of patients who smoke that are proactively referred to behavioural counselling. Achieving these goals will eventually result in more Dutch people who make a quit attempt and receive behavioural counselling during a quit attempt.[63,69] In this thesis, we will investigate whether the implementation of the AAC approach in general practice during the COVID-19 pandemic can achieve the three abovementioned sub-aims.

As AAC was originally developed for healthcare settings in the US,[63] we first adapted the approach to the Dutch context (Figure 1). We extended the quit advice to include information on the best way to quit (as is done with VBA), and based on the patient's interest in counselling we distinguished between 'interested', 'not sure', and 'not interested' with corresponding follow-up answers, which is in line with the Dutch clinical smoking cessation guideline for general practice.[47]

To strengthen the evidence base of the adapted AAC approach, we first conducted research on different components of the approach. We also examined which factors may influence the referral of Dutch patients to cessation counselling, as this may help to select appropriate strategies for implementation. **Chapter 2** of this thesis investigates the relationship between hearing about (evidence-based) cessation assistance from a healthcare provider and using (evidence-based) cessation assistance during a quit attempt. **Chapter 3** presents the results of a systematic review on the effectiveness and implementability of proactively referring patients to behavioural smoking cessation programs. In **Chapter 4** we explore which factors play a role among Dutch healthcare providers in general practice with regard to referral for smoking cessation counselling.

Ask	Ask about smoking *"May I ask you something…: do you (still) smoke?"*		
Advise	Advise patients who smoke to quit and mention the best way to quit *"It would be good for you to quit smoking (given your complaints). If you want to quit, the best way is to receive professional counselling, optionally combined with medication.* *Are you interested?"*		
Connect	***Interested***	***Not sure***	***Not interested***
	Discuss all options for counselling and proactively refer the patient to the counselling of their choice *"May I share your contact details with the counsellor so that they can contact you to make an appointment?"* (or immediately schedule an appointment)	Schedule a follow-up meeting to increase the patient's motivation *"I would like to see you again/ put you in touch with our practice nurse to further discuss this. Are you okay with that?"*	Ensure patient knows where to find support *"You can always come back for counselling if you change your mind."*

Figure 1. The adapted AAC approach for Dutch general practice.

In March 2020, while we were busy recruiting healthcare providers in general practice for our research, the COVID-19 pandemic broke out. While evidence showed that people who smoke are more prone to developing severe or critical COVID-19,[44,45] several studies also suggested that smoking may protect against SARS-CoV-2 infection.[70,71] These conflicting results raised questions among the general public and in the medical community, and consequently jeopardized the perceived importance of our implementation research among primary care providers. Therefore, we decided to also study this important topic. In **Chapter 5** we point out the methodological flaws of various studies which claimed that smoking protects against SARS-CoV-2 infection, and we address the role of primary healthcare providers in dealing with such claims. **Chapter 6** presents the results of a study which examined the relationship between smoking and death due to COVID-19.

Despite the challenges due to COVID-19, we were able to continue our research and conducted a pre-post implementation study in general practice from late 2020 to early 2022. **Chapter 7** describes the influence of a comprehensive implementation strategy on the delivery of AAC for smoking cessation within Dutch general practice during the COVID-19 pandemic. In **Chapter 8** we evaluate which factors played a role in the implementation of AAC using a mixed-methods approach.

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CHAPTER

2

Mentioning smoking cessation assistance during healthcare consultations matters: findings from Dutch survey research

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ABSTRACT

Background

Smoking cessation assistance can help smokers to successfully quit smoking. It is unclear to what extent hearing about smoking cessation assistance from a healthcare professional is associated with using smoking cessation assistance during a quit attempt.

Methods

We used pooled survey data from the 2016, 2018 and 2020 'Module Substance Use' survey in the Netherlands (N=5928). Multivariate logistic regression analyses were used to determine the association between having heard about smoking cessation assistance from one or more healthcare professionals in the last year and the use of smoking cessation assistance during the most recent quit attempt in the last year. We used two models: model 1 included any type of assistance; model 2 included assistance typically recommended by treatment guidelines (i.e., counselling and pharmacotherapy).

Results

Hearing about any type of smoking cessation assistance from a healthcare professional in the last year was significantly associated with using any type of smoking cessation assistance during the most recent quit attempt (OR=2.96; 95% CI 2.16-4.06; $p<0.001$). We found the strongest association between hearing about counselling and/or pharmacotherapy and using counselling and/or pharmacotherapy (OR = 5.40; 95% CI 4.11-11.60; $p<0.001$). The odds of using smoking cessation assistance was not significantly higher for smokers who had heard about it from two or more healthcare professionals compared to one healthcare professional (OR=1.38; 95% CI 0.79-2.42; $p=0.26$).

Conclusions

Healthcare professionals can play a greater role in stimulating the use of smoking cessation assistance, especially counselling and pharmacotherapy, by mentioning it to smokers during consultations.

INTRODUCTION

Tobacco use continues to be the leading cause of preventable disease and death worldwide.[1] Smoking cessation is the most effective way for smokers to lower their risk of developing and dying from smoking-related illnesses.[2] The majority of smokers intend to quit smoking now or in the future.[3,4] Quitting smoking is, however, a difficult process due to the high addictiveness of tobacco products and only 3-5% of smokers who attempt to quit unaided manage to achieve abstinence after a year.[5]

For smokers who want to quit, different types of smoking cessation assistance (SCA) exist that significantly increase the chance of a successful quit attempt. These include behavioural counselling (individually or in a group), telephone support, nicotine replacement therapy (NRT) and medication (preferably in combination with behavioural support), eHealth and mHealth interventions, and print-based self-help materials.[6-12] In addition, recent research found modest evidence that nicotine e-cigarettes may also help smokers to quit.[13]

Despite the existence of SCA as well as national treatment guidelines which recommend the use of SCA,[14] more than three quarters of European smokers, including smokers in the Netherlands, do not use SCA when attempting to quit smoking.[15] There may be different reasons for this underutilisation of SCA. Examples are a lack of awareness of SCA, misconceptions about the availability and effectiveness of SCA, limited access to SCA (e.g., because of a lack of insurance coverage), overconfidence (i.e., overestimating one's ability to quit without help), and cultural values such as independence and autonomy.[16-20] According to Article 14 of the WHO Framework Convention on Tobacco Control (WHO FCTC), which has been ratified by 50 European countries, countries should "take effective measures to promote cessation of tobacco use and adequate treatment for tobacco dependence".[21] Healthcare professionals are considered to play a central role in promoting tobacco cessation and offering support to smokers.[22] Previous research suggests that the mere offer of assistance by a physician can motivate smokers to attempt to quit.[23]

Several issues, however, remain unaddressed. First, it is unclear to what extent hearing about SCA from a healthcare professional is associated with SCA use during a quit attempt. Second, it is unclear whether the association between hearing about SCA from a healthcare professionals and using SCA is influenced by the health condition of smokers. Smokers who report to suffer from a long-term illness in particular may feel a greater sense of urgency to quit smoking, as quitting is known to reduce existing health problems and prevent additional health problems.[24] It is, therefore, conceivable that the association between using SCA during a quit attempt and hearing about if from a healthcare professional is stronger for smokers who report suffering from a long-term

illness compared to smokers who do not report suffering from a long-term illness. And finally, it is unknown what the influence is of hearing about SCA from multiple healthcare professionals. Our hypothesis is that the likelihood of using SCA during a quit attempt is greater for smokers who hear about SCA from multiple (i.e., two or more) healthcare professionals than smokers who hear about SCA from one healthcare professional.

More knowledge about the potential role of healthcare professionals may help to formulate recommendations for European countries on how to increase SCA usage rates in their population. In this study we used population survey data from the Netherlands to answer the following research questions:

1. To what extent is hearing about SCA from a healthcare professional associated with SCA use during a quit attempt, and is this association moderated by the health condition of a smoker?
2. What is the likelihood of using SCA during a quit attempt for smokers who hear about SCA from multiple healthcare professionals compared to smokers who hear about SCA from one healthcare professional?

METHODS

Survey and respondents

We used cross-sectional data from the two-yearly 'Additional Module Substance Use' survey of the Lifestyle Monitor consortium in the Netherlands.[25] The Lifestyle Monitor Consortium comprises several research institutes in the Netherlands, including Statistics Netherlands (CBS), the National Institute for Public Health and the Environment (RIVM), and the Netherlands Institute of Mental Health and Addiction (Trimbos Institute). The 'Additional Module Substance Use' survey is used to investigate smoking behaviour, alcohol use and drug use of citizens in the Netherlands aged 15 years and older and is based on self-report. For the purpose of this study, we only included smokers aged 18 years or older. Smokers were defined as those who answered "yes" to the question: "Do you ever smoke any tobacco products?".

We pooled the survey data from 2016, 2018 and 2020. In each year (2016, 2018 and 2020), a representative sample of over 15,000 citizens in the Netherlands was selected from the Personal Records Database (BRP). The BRP includes personal data of all residents in the Netherlands, including residential address. Respondents first received a letter by mail in which they were invited to participate in an online version of the survey. A selection of non-respondents was reapproached to complete the survey in a face-to-face or telephone interview. The response rate was 57% in 2016, 54% in 2018 and 46% in 2020. A weighting

factor was applied to the data to correct for imbalances between the survey sample and the population of the Netherlands.

Measures

Dependent variable

Self-reported use of SCA was assessed among smokers who had made at least one serious quit attempt in the last 12 months. Respondents who answered 'yes' to the questions "Have you tried to quit smoking in the last 12 months?" and "Did you manage to refrain from smoking for at least 24 hours?" were categorized as 'having made at least one serious quit attempt in the last 12 months'. Respondents indicated for each of the following types of SCA whether they had used this during their most recent serious quit attempt: professional counselling (individually or in a group), NRT such as patches or gum, medication, e-cigarette, online programme or app, a different type of SCA not mentioned here, or none of the above.

Independent variable

Respondents reported for four types of healthcare professional whether they had consulted the healthcare professional for themselves in the last 12 months. The four types of healthcare professionals were: GPs, medical specialists, dentists, and mental health professionals. A 'mental health professional' included a psychologist, psychiatrist and psychotherapist. Respondents who answered 'yes' to the question "Did the healthcare professional advise you to quit smoking?" were subsequently asked whether they had heard about each of the following types of SCA from the healthcare professional(s): professional counselling (individually or in a group), NRT such as patches or gum, medication, e-cigarette, online programme or app, a different type of SCA not mentioned here, or none of the above.

Covariates

Several variables that are potentially associated with SCA use were included as covariates.

Demographics. Demographic variables included gender, age, educational attainment, migration background (i.e., at least one parent born in a country other than the Netherlands), and daily smoking. For 'educational attainment' we used the highest level of education either pursued (for respondents aged 18 to 24) or completed (for respondents over 24 years old). Educational attainment was categorized into 'low', 'medium' and 'high'. 'Low' corresponded to elementary school, lower secondary education or lower vocational education; 'medium' corresponded to intermediate vocational education or higher secondary education; and 'high' corresponded to higher vocational education or university.

Long-term illness. Respondents with a long-term illness included those who reported to have at least one of the following illnesses or conditions for at least 6 months: cancer, diabetes, cardiovascular disease, arrhythmia, cerebral haemorrhage, chronic

lung disease such as asthma and COPD), musculoskeletal problems, severe headaches, gastrointestinal disease, severe skin disorder, psychological complaints, hearing problems, or 'other'.

Data analysis

We first examined descriptive statistics of the study population. We used multivariate logistic regression analyses to determine the association between use of SCA during the most recent quit attempt in the last 12 months (dependent variable) and hearing about SCA from one or more healthcare professionals in the last 12 months (independent variable), while adjusting for gender, age, educational attainment, migration background, daily smoking, long-term illness and survey year. We added an interaction term between long-term illness and the independent variable.

We conducted the analyses using two different models: in model 1 we included any type of SCA, while in model 2 we only included guideline-recommended types of SCA, i.e., professional counselling and pharmacotherapy (NRT or medication). National treatment guidelines typically recommend that smokers should be offered assistance to quit with counselling and pharmacotherapy.[14,26] A model that only includes these types of SCA may therefore be most relevant to formulate recommendations for clinical practice. Statistical analyses were performed using IBM SPSS Statistics version 27.

Ethics

The Central Committee on Research Involving Human Subjects in the Netherlands required no ethical approval for this non-medical survey research study.

RESULTS

Table 1 presents the characteristics of the study population (N=5,928). Overall, most respondents were male (58.2%), had pursued or completed a medium level of education (42.4%), had no migration background (75.5%), were daily smokers (72.3%), had no long-term illness (69.4%), had not made a serious quit attempt in the last 12 months (66.4%), and had consulted at least one healthcare professional in the last 12 months (92.9%). Most respondents had consulted a dentist (73.2%) or GP (71.9%) in the last 12 months.

Table 2 presents the type(s) of SCA used by smokers during their most recent serious quit attempt in the last 12 months (N=1,973; this corresponds with 33.3% of all smokers in the study population). Most smokers did not use any type of SCA during their most recent serious quit attempt (65.0%). Among smokers who did use one or more types of

SCA during their most recent serious quit attempt, NRT was most often reported (14.3%) followed by the e-cigarette (11.2%).

A total of 5,508 smokers had consulted at least one healthcare professional in the last 12 months, of which 1,812 smokers (i.e., 32.9%) received the advice to quit smoking. Among those who received the advice to quit smoking from a healthcare professional, the majority of smokers did not hear about any type of SCA (61.1%), as presented in Table 3. Table 3 also shows that 30.2% of smokers who received the advice to quit smoking heard about any type of SCA from one healthcare professional; and 8.7% heard about any type of SCA from two or more healthcare professionals. NRT was most often mentioned by at least one consulted healthcare professional (17.6%), followed by professional counselling (16.2%).

Table 1. Characteristics of the study population (weighted data).

	All smokers
N	5,928
Gender (%)	
Male	58.2
Female	41.8
Age (%)	
18-29	25.8
30-39	18.0
40-49	17.5
50-64	25.7
65+	13.0
Educational attainment (%)	
Low	28.3
Medium	42.4
High	27.4
Unknown [a]	1.9
Migration background (%)	
Yes	24.5
No	75.5
Daily smoking (%)	
Yes	72.3
No	27.7
Long-term illness (%)	
Yes	30.6
No	69.4
At least one serious quit attempt in last 12 months (%)	
Yes	33.3
No	66.4

Table 1. Continued

Consulted at least one healthcare professional in last 12 months (%)	
Yes	92.9
No	7.1
Type(s) of healthcare professional consulted in last 12 months (%)	
GP	71.9
Medical Specialist	43.4
Dentist	73.2
Mental Health Professional	14.6

[a] Unknown due to missing values.

Table 2. Rates of SCA use during most recent quit attempt (weighted data).

	Smokers who made a serious quit attempt in last 12 months
N	1,973
Type(s) of SCA used during most recent serious quit attempt (%)	
Professional counselling	4.1
NRT	14.3
Medication	5.6
E-cigarette	11.2
Online programme or app	2.6
Other type of SCA	1.8
None of the above	65.0
Unknown [a]	3.7

[a] Unknown due to missing values.

Table 3. The number of healthcare professionals who mentioned any type of SCA and type(s) of SCA mentioned by healthcare professionals (weighted data).

	Smokers who received advice to quit smoking in last 12 months
N	1,812
Number of consulted healthcare professionals who mentioned any type of SCA in last 12 months (%)	
0	61.1
1	30.2
2 or more	8.7
Type(s) of SCA mentioned by at least one consulted healthcare professional in last 12 months (%)	
Professional counselling	16.2
NRT	17.6
Medication	11.9
E-cigarette	2.6
Online programme or app	4.2
Other type of SCA	2.3

Tables 4 and 5 present the results from the logistic regression analyses. Table 4 shows that, adjusted for all covariates, hearing about any type of SCA from a healthcare professional (model 1) was significantly associated with using any type of SCA during the most recent quit attempt in the last 12 months (OR=2.96; 95% CI 2.16-4.06; $p<0.001$). Also, hearing about guideline-recommended types of SCA from a healthcare professional (model 2) was significantly associated with use of guideline-recommended types of SCA during the most recent quit attempt in the last 12 months (OR=5.40; 95% CI 4.11-11.60; $p<0.001$). When adding the interaction between hearing about SCA from a healthcare professional and long-term illness to the model, we found that this was not significant in both models.

We conducted an additional analysis for smokers whose most recent quit attempt took place in the last month, presented in Table 6. Adjusted for all covariates, the odds of using any type of SCA in the last month was 10.95 times higher for smokers who had heard about any type of SCA from a healthcare professional in the last 12 compared to smokers who had not heard about any type of SCA from a healthcare professional in the last 12 months (95% CI 3.91-30.63; $p<0.001$).

Table 5 shows that the odds of using any type of SCA in the last 12 months was not significantly higher for smokers who had heard about any type of SCA from two or more healthcare professionals in the last 12 months compared to smokers who had heard about any type of SCA from one healthcare professional in the last 12 months (model 1; OR=1.38; 95% CI 0.79-2.42; $p=0.26$). The same also applied to guideline-recommended types of SCA (model 2; OR=1.52; 95% CI 0.83-2.76; $p=0.17$).

Table 4. Associations between use of SCA during most recent quit attempt in last 12 months and hearing about SCA from a healthcare professional in last 12 months (weighted data).

	Used SCA during most recent quit attempt in last 12 months			
	Model 1 (used any type of SCA)		Model 2 (used NRT, medication, and/or professional counselling)	
Independent variable	OR (95%CI)	P-value	OR (95%CI)	P-value
Did not hear about SCA from a healthcare professional in last 12 months [a]	ref	-	ref	-
Heard about SCA from a healthcare professional in last 12 months [b]	2.96 (2.16-4.06)	<0.001	5.40 (4.11-11.60)	<0.001
Covariates				
Gender				
Male	ref	-	ref	-
Female	1.22 (0.89-1.67)	0.22	1.07 (0.75-1.53)	0.72
Age				
18-29	ref	-	ref	-
30-39	1.85 (1.09-3.14)	0.02	2.27 (1.13-4.53)	0.02
40-49	3.33 (1.96-5.66)	<0.001	3.22 (1.64-6.34)	0.001
50-64	2.27 (1.40-3.70)	0.001	3.63 (1.94-6.78)	<0.001
65+	1.44 (0.79-2.62)	0.23	2.43 (1.16-5.10)	0.02
Educational attainment				
Low	ref	-	ref	-
Medium	1.09 (0.75-1.57)	0.67	0.90 (0.59-1.36)	0.61
High	1.03 (0.66-1.62)	0.89	0.83 (0.49-1.39)	0.48
Migration background				
No	ref	-	ref	-
Yes	0.86 (0.60-1.22)	0.40	1.10 (0.74-1.65)	0.63
Daily smoking				
No	ref	-	ref	-
Yes	1.47 (0.96-2.25)	0.08	0.93 (0.57-1.52)	0.78
Long-term illness				
No	ref	-	ref	-
Yes	1.15 (0.83-1.58)	0.40	1.25 (0.87-1.79)	0.24
Survey year				
2016	ref	-	ref	-
2018	1.14 (0.79-1.65)	0.50	1.41 (0.91-2.16)	0.12
2020	1.47 (0.99-2.17)	0.05	2.53 (1.63-3.95)	<0.001

[a] Model 1: did not hear about any type of SCA, model 2: did not hear about NRT, medication, and/or professional counselling. [b] Model 1: heard about any type of SCA, model 2: heard about NRT, medication, and/or professional counselling. P-values below 0.05 were considered statistically significant.

Table 5. Associations between use of SCA during most recent quit attempt in last 12 months and hearing about SCA from two or more healthcare professionals in last 12 months (weighted data).

	Used SCA during most recent quit attempt in last 12 months			
	Model 1 (used any type of SCA)		Model 2 (used NRT, medication, and/or professional counselling)	
Independent variable	OR (95%CI)	P-value	OR (95%CI)	P-value
heard about SCA from one healthcare professional in last 12 months [a]	ref	-	ref	-
Heard about SCA from two or more healthcare professionals in last 12 months [a]	1.38 (0.79-2.42)	0.26	1.52 (0.83-2.76)	0.17
Covariates				
Gender				
Male	ref	-	ref	-
Female	1.25 (0.78-1.98)	0.35	0.96 (0.59-1.57)	0.87
Age				
18-29	ref	-	ref	-
30-39	1.51 (0.63-3.63)	0.36	1.56 (0 .57-4.27)	0.39
40-49	2.11 (0.88-5.02)	0.09	2.37 (0.90-6.24)	0.08
50-64	1.58 (0.73-3.41)	0.24	2.70 (1.12-6.54)	0.03
65+	1.19 (0.48-2.99)	0.71	1.45 (0.52-4.07)	0.48
Educational attainment				
Low	ref	-	ref	-
Medium	0.81 (0.48-1.37)	0.44	0.76 (0.44-1.34)	0.35
High	0.61 (0.31-1.19)	0.15	0.52 (0.25-1.10)	0.09
Migration background				
No	ref	-	ref	-
Yes	0.97 (0.58-1.61)	0.90	1.14 (0.65-1.99)	0.65
Daily smoking				
No	ref	-	ref	-
Yes	0.85 (0.44-1.65)	0.63	0.70 (0.34-1.43)	0.33
Long-term illness				
No	ref	-	ref	-
Yes	0.95 (0.59-1.51)	0.81	0.95 (0.57-1.57)	0.83
Survey year				
2016	ref	-	ref	-
2018	0.76 (0.44-1.30)	0.31	0.94 (0.53-1.67)	0.84
2020	1.97 (1.07-3.48)	0.03	3.08 (1.63-5.82)	0.001

[a] Model 1: heard about any type of SCA, model 2: heard about NRT, medication, and/or professional counselling. P-values below 0.05 were considered statistically significant.

Table 6. Associations between use of SCA during most recent quit attempt in the last month and hearing about SCA from a healthcare professional in the last 12 months (weighted data).

	Used SCA during most recent quit attempt in last month			
	Model 1 (used any type of SCA)		Model 2 (used NRT, medication, and/or professional counselling)	
Independent variable	OR (95%CI)	P-value	OR (95%CI)	P-value
Did not hear about SCA from a healthcare professional in last 12 months [a]	ref	-	ref	-
Heard about SCA from a healthcare professional in last 12 months [b]	10.95 (3.91-30.63)	<0.001	30.61 (6.93-135.27)	<0.001
Covariates				
Gender				
Male	ref	-	ref	-
Female	1.14 (0.46-2.81)	0.78	0.32 (0.09-1.12)	0.07
Age				
18-29	ref	-	ref	-
30-39	1.57 (0.41-6.06)	0.51	1.33 (0.23-7.62)	0.75
40-49	0.78 (0.17-3.61)	0.75	0.94 (0.11-8.04)	0.95
50-64	0.65 (0.19-2.24)	0.49	2.11 (0.46-9.73)	0.34
65+	0.47(0.10-2.27)	0.35	0.67 (0.09-5.19)	0.71
Educational attainment				
Low	ref	-	ref	-
Medium	2.83 (0.92-8.67)	0.07	1.55 (0.37-6.50)	0.55
High	1.70 (0.50-5.80)	0.40	1.58 (0.32-7.80)	0.58
Migration background				
No	ref	-	ref	-
Yes	1.40 (0.52-3.79)	0.50	1.47 (0.44-4.95)	0.53
Daily smoking				
No	ref	-	ref	-
Yes	0.68 (0.27-1.71)	0.41	0.18 (0.05-0.71)	0.01
Long-term illness				
No	ref	-	ref	-
Yes	1.47 (0.58-3.70)	0.41	2.45 (0.77-7.78)	0.13
Survey year				
2016	ref	-	ref	-
2018	1.38 (0.46-4.09)	0.56	0.74 (0.16-3.30)	0.69
2020	3.46 (1.10-10.86)	0.03	2.65 (0.64-11.04)	0.18

[a] Model 1: did not hear about any type of SCA, model 2: did not hear about NRT, medication, and/or professional counselling. [b] Model 1: heard about any type of SCA, model 2: heard about NRT, medication, and/or professional counselling. P-values below 0.05 were considered statistically significant.

DISCUSSION

We used survey data to address three important issues. The first aim of this study was to determine the extent to which hearing about SCA from a healthcare professional is associated with SCA use during a quit attempt. In our analyses we distinguished between 'any type of SCA' and 'guideline-recommended types of SCA'. We found that smokers who had heard about any type SCA from a healthcare professional were around 3 times more likely to use any type of SCA during their last quit attempt compared to those who did not discuss any type of SCA with a healthcare professional. Moreover, smokers who reported that they had specifically heard about a guideline-recommended type of SCA (i.e., counselling and/or pharmacotherapy) from a healthcare professional were over 5 times more likely to use a guideline-recommended type of SCA during their last quit attempt. These are positive findings, because they suggest that smokers may benefit from healthcare professionals raising the topic of using (guideline-recommended) SCA during consultations. In particular healthcare professionals who are most often seen by smokers (i.e., the dentist and GP) can play an important role in promoting the use of SCA. Smokers seen in dental and general practice may benefit from SCA being provided by professionals in those practices.[27,28]

The second and third aims of this study were to investigate the role of the health condition of smokers and the role of hearing about SCA from multiple healthcare professionals. Contrary to our expectations, we did not find that the relationship between hearing about SCA from a healthcare professional and using SCA during a quit attempt is moderated by the health condition of smokers. This means that hearing about SCA from a healthcare professional is equally important for smokers with and without a long-term illness. Additionally, hearing about SCA from multiple healthcare professionals does not seem to further increase the likelihood of using SCA during a quit attempt. It should be noted that this finding only applies to a one-year timespan. Within one year, it may be sufficient to hear about SCA from just one healthcare professional. However, we do not know whether it is sufficient for smokers to hear about SCA from a healthcare professional just once, or whether they could benefit from hearing about SCA again after this one year period. Further research on this issue is recommended.

Smoking cessation guidelines

We found that when smokers in the Netherlands hear about SCA from healthcare professionals, they usually hear about guideline-recommended types of SCA. Health care professionals in the Netherlands thus take their professional responsibility and promote guideline-recommended cessation strategies. However, they can do this more often. The majority of smokers (>60%) report that SCA was not discussed at all after receiving the advice to quit smoking.

There may be multiple explanations why Dutch healthcare professionals do not frequently mention SCA after advising patients to quit. First, Dutch treatment guidelines typically use the '5A' model for smoking cessation. This model recommends that all smokers seen during consultation should be advised to quit smoking.[29] Smokers who are found to be willing to make a quit attempt at that time should be offered an evidence-based treatment.[29] Consequently, smokers who are not yet ready to quit do not hear about evidence-based treatment during consultation. It may, therefore, be necessary to extend treatment guidelines to include offering evidence-based treatment even to smokers who are not ready to quit at the time of the consultation. This recommendation applies to both national treatment guidelines and those guidelines in European countries which still use the '5A' model for smoking cessation.[26] Healthcare professionals that use new methods, such as the Very Brief Advice method, actively mention counselling and pharmacotherapy to all smokers, regardless of their readiness to quit.[23] For nondaily smokers it may be most appropriate to mention counselling only and not pharmacotherapy, since nondaily smokers show less signs of nicotine dependence.[30]

A second reason why Dutch healthcare professionals do not frequently mention SCA may be that the majority of healthcare professionals in the Netherlands still consider smoking a personal choice and above all the responsibility of the smoker.[31] As a result, they are less inclined to provide smoking cessation care to smokers compared to healthcare professionals who perceive smoking as an addiction and thus hold factors beyond smokers' own choice more accountable.[31] This barrier has also been reported in other European countries, where healthcare professionals perceive addiction and lifestyle to be the patient's own choice and responsibility.[32,33] A change in perception is needed towards one in which healthcare professionals view smoking as a serious addiction which needs to be addressed.

Types of SCA used

A notable finding is that over 10% of smokers in the Netherlands used e-cigarettes during their most recent quit attempt, while e-cigarettes are not often mentioned by healthcare professionals during consultations. A similar pattern is found in other European countries, where e-cigarettes are often used during a quit attempt but rarely discussed with healthcare professionals.[3] One reason why healthcare professionals not often mention the use of e-cigarettes may be that in many European countries e-cigarettes are currently not recommended in treatment guidelines for cessation. As there is growing evidence for the effectiveness of nicotine e-cigarettes,[13] it is possible that treatment guidelines may change in the future and consequently also the advice of healthcare professionals.

Interestingly, we found that smokers were more likely to use any type of (guideline-recommended) SCA in 2020 compared to 2016. As of 2020, smoking cessation programmes

in primary care which offer counselling and pharmacotherapy are fully reimbursed in the Netherlands, meaning that SCA has become more accessible to smokers. The existence of adequate financial reimbursement is an important determinant of smokers' interest in using SCA,[18] and may also be an extra reason for healthcare professionals to mention SCA to patients. Another explanation for the increase in SCA use in 2020 may be that more smokers became aware of the urgency to quit smoking due to the Covid-19 crisis and sought out (effective) methods to quit smoking. More research is needed to confirm this.

Limitations

To our knowledge, this is the first study to investigate the relationship between smokers' use of SCA and hearing about SCA from healthcare professionals. However, a few limitations should be acknowledged. First, due to the cross-sectional design of the study it is difficult to draw conclusions on the extent to which hearing about SCA influences the use of SCA. It is possible that survey respondents used SCA during their most recent quit attempt before they heard about SCA from a healthcare professional, or that SCA was used in the last 12 months but not during the most recent quit attempt. Our findings may therefore be an underestimation of the actual relationship between hearing about SCA and using SCA. This was also confirmed by our additional analysis: among smokers whose most recent quit attempt took place in the last month, and for whom it is thus more likely that they heard about SCA before their most recent quit attempt, we found a stronger relationship between hearing about SCA and using SCA.

A second limitation is that respondents might not have reported all conversations in which SCA was mentioned by a healthcare professional. As the survey was based on self-reports, respondents may have either forgotten or may have been unaware that a healthcare professional advised them to quit smoking and/or mentioned the use of SCA. Additionally, it is possible that a healthcare professional mentioned the use of SCA during a consultation without first giving the advice to quit smoking; unfortunately these conversations were not assessed in the survey.

A third limitation was that the data collection faced some challenges in 2020. First, fewer people were approached for a telephone or face-to-face interview compared to previous years. Second, in 2020 no face-to-face interviews could take place for several months due to Covid-19 measures. Third, the sampling method contained a small number of inaccuracies which partially affected the telephone and face-to-face re-approach. While these three challenges did not affect the 2016 and 2018 data, additional analyses showed that without these challenges, the smoking prevalence in the sample would have most likely been higher in 2020. However, we expect that these challenges had limited influence on our conclusions, as this study only focused on associations between hearing about SCA from a healthcare professional and using SCA, and not on prevalence rates.

Conclusion

This study shows that healthcare professionals can play a greater role in stimulating the use of SCA. They can do this by mentioning different types of SCA, especially counselling and pharmacotherapy, more often to patients who smoke.

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CHAPTER

3

Proactive referral to behavioral smoking cessation interventions: a systematic review

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ABSTRACT

Background

Behavioral smoking cessation programs are an effective tool for quitting smoking, yet remain underused by smokers. Proactive referral may be a promising strategy for healthcare staff to connect smokers to such programs. The aim of this study was to gain insight into the effectiveness and implementability of proactive referral of smokers to behavioral smoking cessation programs by healthcare staff.

Methods

A systematic review was conducted using five databases. Effectiveness of proactive referral was defined as the proportion of referred smokers who enrolled in a behavioral smoking cessation program. To determine the implementability of proactive referral, measures of feasibility, acceptability, adoption and referral rates were included as variables of interest. Out of 6,686 screened records, 34 articles were eligible for review. A narrative synthesis approach was used.

Results

The majority of the included studies investigated proactive referral within an e-referral system, combined with one or more intervention components which enhance implementation. Overall, proactive referral resulted in higher enrolment rates, especially among low-income smokers, and was found to be feasible, adoptable, and acceptable to healthcare staff. E-referral systems performed better in terms of implementability compared to fax referral systems. About half of the studies were of good quality. Many studies lacked information which resulted in lower quality scores.

Conclusions

The literature provides evidence that the proactive referral of smokers to behavioral smoking cessation programs by healthcare staff is effective and implementable across different settings. Based on the results, e-referral systems may be preferable to fax referral systems in terms of implementability.

Implications

This systematic review demonstrated that proactive referral has the potential to increase the reach of smoking cessation programs and reduce inequalities in the access to such programs. In the selection and implementation of behavioral smoking cessation programs with a proactive referral component, stakeholders (e.g., policymakers, healthcare funders, and healthcare professionals) may benefit from taking different aspects of proactive referral systems into account, such as the type of proactive referral system used and additional strategies which can enhance the implementability of the system.

INTRODUCTION

Smoking tobacco is a major public health issue with over 1.14 billion smokers worldwide.[1] It is a significant cause of morbidity and mortality, causing more than 7 million deaths and 200 million disability-adjusted life-years each year.[1] Smoking cigarettes has been shown to increase a person's risk of acquiring many different diseases and disorders, including cancer, respiratory disease, and cardiovascular disease.[2] Secondhand tobacco smoke exposure also poses a great risk to the health and lives of non-smokers.[3] Based on global data, previous research found that the secondhand tobacco smoke exposure produced by an equivalent of 52 smokers is associated with the death of one non-smoker.[4] Tobacco use and exposure to tobacco smoke harms health.

Quitting smoking is one of the most effective ways of reducing the harms of tobacco use and exposure.[5] Behavioral health programs have been shown to be the most effective method of providing smoking cessation assistance.[6,7] Behavioral health programs are programs that provide education, guidance, and support to help individuals improve their health behavior.[8] Evidence-based behavioral health programs for smoking cessation include one-on-one counseling delivered by a smoking cessation counselor or a healthcare provider, group counseling, telephone-based counseling provided by coaches or counselors at telephone quitlines, and internet-based and mobile-based smoking cessation resources and tools.[9-13] The primary aim of such programs is to help people to quit smoking through behavior change techniques. Research conducted on the tobacco treatment guidelines in 61 countries shows that the majority of clinical treatment guidelines recommend smoking cessation medications in combination with intensive specialist support, such as the support provided through a behavioral smoking cessation program, for those who want to quit smoking.[14]

While behavioral smoking cessation programs, with or without medication, can be an effective tool for quitting smoking, they are generally underused.[15,16] Most smokers try to quit smoking unaided, which is associated with success rates as low as 3-5% per quit attempt.[17] Though not everyone may need intensive specialist support to quit (e.g., in many cases the use of self-help material is sufficient), behavioral smoking cessation programs may be especially beneficial for those who need extra help to overcome their tobacco addiction. People who want to quit smoking may not know of effective tools and programs to help them quit smoking or may not believe that such interventions may increase their chance of success substantially.[18,19] Increasing smokers' use of behavioral smoking cessation programs could result in a higher number of people who quit smoking and stay quit.

Different strategies exist to increase the usage of behavioral smoking cessation programs among smokers, such as informing smokers about such programs through mass media campaigns, or inviting smokers to participate in behavioral smoking cessation programs.[20,21] Healthcare staff, such as clinicians, administrators, volunteers, and students in healthcare-related fields, can play an important role in stimulating the use of behavioral smoking cessation programs. Firstly, they can do this by discussing program options with smokers.[22] Secondly, healthcare staff may actively refer patients who smoke to cessation programs. Identifying patients who smoke and actively referring patients to existing programs is a crucial step in ensuring that smokers receive effective, evidence-based smoking cessation support. In many cases this may need to be facilitated by system changes in the clinic setting, such as implementing tobacco-user identification and referral systems.[23] Implementation strategies can support the implementation and adoption of such systems,[24] for example by providing training, reminders and feedback to healthcare staff.[23,25]

The way in which healthcare staff refer smokers to behavioral smoking cessation programs may have an impact on enrollment rates. Healthcare staff may refer smokers to smoking cessation programs either through passive referral (i.e., patients who smoke contact a behavioral smoking cessation provider themselves after being referred by healthcare staff), or through proactive referral (i.e., healthcare staff actively connects a smoker to a behavioral smoking cessation program). Research has shown that smokers who are passively referred to behavioral smoking cessation programs often fail to enroll in treatment. A study conducted in the United States found that only 9 out of 564 smokers who received a quitline referral card from a family-practice nurse or medical assistant and were instructed to contact the quitline themselves eventually enrolled in the quitline.[26] In contrast, the same study found that 160 out of 567 smokers who were proactively referred to the quitline enrolled.[26] Proactive referral may be a promising and potentially more effective strategy for healthcare staff to connect smokers to behavioral smoking cessation programs. Proactive referral by healthcare staff, however, remains understudied in systematic reviews.

Research questions

We conducted a systematic literature review to gain insight into the proactive referral of smokers to behavioral smoking cessation programs by healthcare staff. Specifically, we sought to answer six research questions. The first research question was related to the effectiveness of proactive referral:

1. Does proactively referring smokers to behavioral smoking cessation programs by health care staff result in higher enrollment rates compared to passively referring smokers?

The remaining questions were related to four aspects of the implementability of proactive referral: feasibility, adoption, acceptability, and referral rates.

2. To what extent is proactively referring smokers to behavioral smoking cessation programs *feasible* for healthcare staff?
3. To what extent is proactively referring smokers to behavioral smoking cessation programs *adoptable* by healthcare staff?
4. To what extent is proactively referring smokers to behavioral smoking cessation programs *acceptable* to healthcare staff?
5. To what extent is proactively referring smokers to behavioral smoking cessation programs *acceptable* to smokers?
6. Do referral rates improve after informing healthcare staff about proactive referral options?

Information about the effectiveness, feasibility, adoption, acceptability, and rates of proactive referral provides insight into whether proactive referral 'works' as a tool for healthcare staff to use when helping people to quit smoking. The findings of this systematic literature review can help policymakers, healthcare funders, and healthcare professionals to decide on implementing a proactive referral component within their smoking cessation care.

METHODS

Search strategy and criteria

A systematic search of relevant literature was performed using five databases: PubMed, Embase (OVID), Web of Science, CINAHL, and PsycINFO. The search was conducted in January 2021 by NvWL and included keywords related to smoking cessation, referral, and healthcare staff. The identified records were exported into EndNote. Before screening, we defined several inclusion and exclusion criteria.

Types of studies

We included peer-reviewed primary research studies written in English and published after the year 2000. We excluded reviews, conference abstracts, letters, editorials, and study protocols. To answer the first research question regarding effectiveness, only (cluster) randomized controlled trials (RCTs) and quasi-randomized controlled trials were included. For the remaining five research questions, we also accepted non-randomized studies, quantitative descriptive studies, qualitative studies, and mixed-methods studies.

Types of participants of published studies

We included studies of adult smokers, with adults defined as 18 years or older. Articles which specifically focused on adolescents were excluded. We also excluded articles in which the number of smokers was unclear, for example studies in which smokers and alcohol users were grouped together.

Types of interventions

Articles were included if they described a study that investigated, at least in part, proactive referral by healthcare staff to a behavioral smoking cessation program, defined as any type of evidence-based program with the primary aim of helping people to quit smoking through behavior change techniques. We included studies in which healthcare staff were involved in referring smokers to a behavioral smoking cessation program; we excluded studies in which the study personnel was responsible for delivering the intervention. Healthcare staff were defined as any type of employed healthcare worker, volunteer, or student studying in a healthcare-related field.

A referral qualified as 'proactive' if the healthcare staff was responsible for connecting patients to a behavioral smoking cessation program. Examples of proactive referral included:

- Forwarding the patient's contact details to a smoking cessation program, for example by using a fax machine or by placing a referral order in the electronic health record system (i.e., an e-referral). Staff from the smoking cessation program then contacts the patient to enroll.
- Scheduling an appointment directly with a counsellor of a smoking cessation service during the patient's visit.
- Providing any practical assistance to the smoker to make contact with and enroll in a behavioral smoking cessation program. Practical assistance can include handing a computer tablet to the patient which assesses the patient's interest in quitting smoking and then sends the patient's contact details to a smoking cessation program (i.e., an e-referral). It may also include calling a smoking cessation counsellor while the patient is in-patient at a hospital, and then transferring the call to the bedside hospital phone for the patient to pick up (i.e., a bedside warm transfer call).

We included opt-in as well as opt-out referrals. 'Opt-in' means that patients explicitly give consent for the referral; 'opt-out' means that patients are always referred unless they explicitly decline the referral.

To answer the effectiveness research question, we excluded studies in which the effect of proactive referral could not be independently evaluated from additional components of an intervention which may also influence enrollment rates. For example, studies which investigated a combination of proactive referral and reminders for the patient to enroll in a program and compared this to passive referral without reminders for the patient to enroll were excluded. We also excluded studies which did not investigate passive referral by healthcare staff in the comparison condition. Referrals were considered to be passive when patients were asked or expected to contact a behavioral smoking cessation program themselves. Regarding the implementability research questions, we did not specify necessary comparison conditions except for one outcome (i.e., referral rates) described below.

Types of outcome measures

Table 1 provides an overview of the different included outcome measures per research question.

Table 1. Included outcome measures per research question.

Research question	Included outcome measures	Our definition	If relevant: based on definition from literature
1. Effectiveness	Enrollment	The proportion of referred smokers who enrolled in a behavioral smoking cessation program, compared between the proactive referral group and the passive referral group.	n/a
2. Feasibility	Any assessment of feasibility from the perspective of healthcare staff	The extent to which proactively referring smokers to behavioral smoking cessation programs can be successfully carried out by healthcare staff.	Proctor et al.: "Feasibility is defined as the extent to which a new treatment, or an innovation, can be successfully used or carried out within a given agency or setting."[67]
3. Adoption	Adoption of proactive referral	The proportion of healthcare staff individuals who proactively referred smokers to behavioral smoking cessation programs.	Proctor et al.: "Adoption is defined as the intention, initial decision, or action to try or employ an innovation or evidence-based practice."[67]
4. Acceptance	Any measure of perceived acceptability of proactive referral from the perspective of healthcare staff and smokers	The extent to which proactively referring smokers to behavioral smoking cessation programs is perceived to be agreeable or satisfactory by healthcare staff and smokers.	Proctor et al.: "Acceptability is the perception among implementation stakeholders that a given treatment, service, practice, or innovation is agreeable, palatable, or satisfactory."[67]
	Smokers' acceptance of referral	The proportion of smokers that agreed to be proactively referred to a behavioral smoking cessation program.	n/a

Table 1. Continued

5. Referral rates	Referral rates after the introduction of proactive referral	- The proportion of referred smokers before and after implementation of proactive referral. - The proportion of referred smokers between a proactive referral group and a comparison group, with the comparison group being either usual care or passive referral. - The proportion of referred smokers between different types of proactive referral groups.	n/a

Study selection

Before screening, duplicates were automatically removed. We also removed records published before the year 2000. Any remaining duplicates were manually removed during the screening process. NvWL and FP screened titles and abstracts of the records using a screening sheet which was tested beforehand on 10 records. Based on the inclusion criteria, we determined whether the records were eligible for full-text assessment. NvWL screened 30% of the records, FP screened 70%. Of all records, 10% was randomly selected and screened by a third reviewer (BHW) to check for interrater reliability. Full texts of all potentially relevant studies were obtained and reviewed by NvWL and FP for eligibility using a screening sheet which was tested beforehand. We excluded studies that did not meet the inclusion criteria. The remaining studies were included in the data extraction and analysis.

Data extraction and analysis

Data was extracted using a form which was adapted from the data extraction template developed by the Cochrane Collaboration. The adapted form was first tested by FP and NvWL on three articles with different study designs: an RCT, a non-randomized study, and a qualitative study. The data extraction form included details of publication (e.g., title, authors, journal, country, year), study characteristics (e.g., study design, setting, type of behavioral smoking cessation program referred to, type of referring healthcare staff), patient characteristics (e.g., number of smokers, age, gender, SES, motivation to quit), intervention and comparison characteristics (e.g., description of proactive referral, description of passive referral), outcomes (e.g., outcome definitions, results), discussion (e.g., limitations) and key conclusions. Data was extracted independently by FP, and checked for accuracy by NvWL. Any disagreements between the authors were resolved through discussion.

The extracted data was used for the analysis. The included studies varied greatly in setting, patient population, type of proactive referral, type of referring healthcare staff, and outcome definitions. Due to this heterogeneity, we took a narrative synthesis approach in describing the results.

Quality assessment

The methodological quality of the included studies was assessed using the Mixed Methods Appraisal Tool (MMAT).[27] The MMAT is an appraisal tool for systematic reviews which include quantitative, qualitative and mixed methods studies. For each study design, the MMAT provides five criteria that must be rated with "yes", "no", or "can't tell". In addition, we added the rating 'not applicable' to the criterion "Are the confounders accounted for in the design and analysis?". NvWL and BHW independently rated the included studies. Any disagreements between the authors were resolved through discussion. We scored each criterion depending on the rating it received: "yes" corresponded with 1 point, "no" corresponded with -1 points, and "can't tell" and "not applicable" corresponded with 0 points. For each included study an overall score was calculated based on the ratings of the five criteria. We considered studies with an overall score of at least 3 points to be of good quality.

RESULTS

In total 6,686 records were screened, resulting in 34 included articles. Figure 1 illustrates the screening process. While the search criteria included articles published from 2000 onwards, the 34 included articles were published between 2008 and 2020. An overview of the study characteristics and findings are presented in Table 2. The articles included 11 RCTs (3 parallel RCTs and 8 cluster RCTs),[26,29-32,40,45,52,53,56,59] 18 non-randomized studies,[28,36,38,39,41-44,46,47,49-51,54,55,57,58,60] 2 qualitative studies,[33,37] and 3 mixed-methods studies.[34,35,48] The majority of the studies were conducted in the United States (n=24).[26,29-32,35-45,47,49,54-59] Six studies were conducted in the United Kingdom,[33,34,48,50,51,60] two in Canada,[28,46] one in Australia,[53] and one in Hong Kong.[52]

The programs and studies were conducted in many different settings, but most often in a specialized clinic, including clinics for cancer, pediatrics, antenatal care, family planning, internal medicine or pulmonary medicine (n=14),[28-30,33,34,41,43,44,46-48,51,58,60] primary care or general practice (n=11),[26,29,35,36,40,53-56,58,59] or a hospital (n=5).[38,39,42,45,50] Several studies were also conducted in a community or outpatient clinic which primarily serves low-income smokers (n=3),[32,37,57] dental practices (n=2),[31,36] a pharmacy (n=1),[49] and community sites such as housing estates, shopping malls, and public transport hubs (n=1).[52]

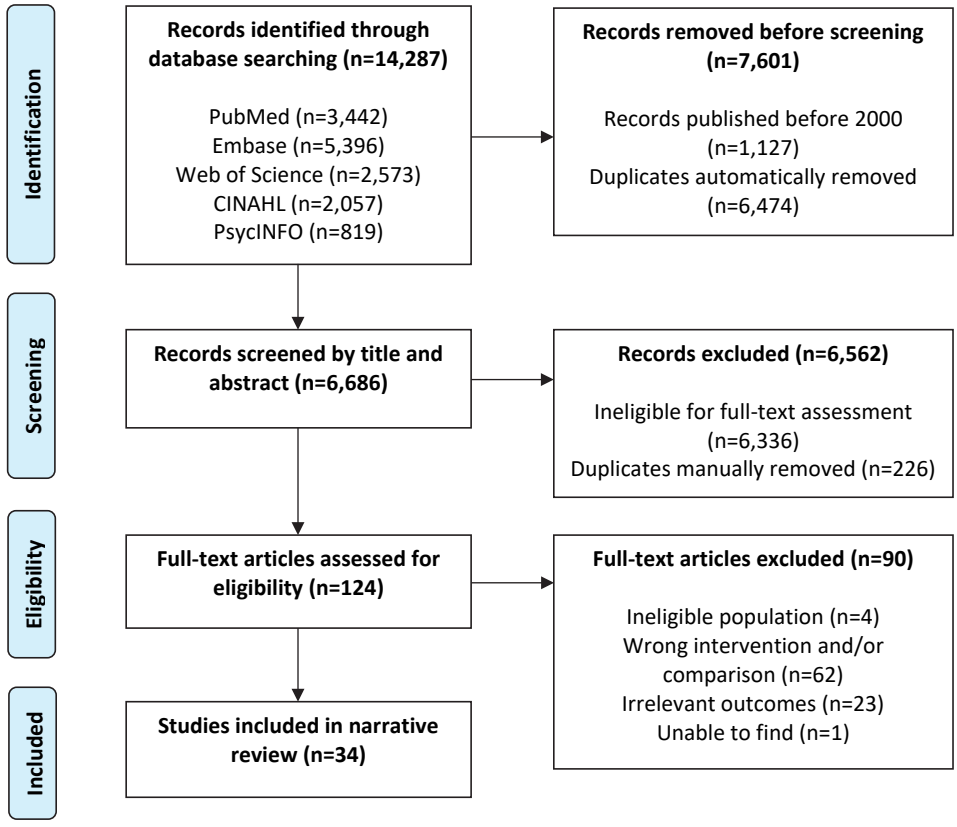

Figure 1. PRISMA flow diagram.

As for the type of proactive referral which was investigated in the studies: 21 studies investigated e-referrals,[26,28-36,39,40,44,46,48,50,54,55,58-60] 10 investigated fax referrals,[37,38,40-43,45,48,56,57] two investigated the immediate scheduling of an appointment with a smoking cessation service,[47,52] and one study investigated bedside warm transfer calls to an in-hospital tobacco cessation service.[45] In three studies, it was unclear how patients were referred to a behavioral smoking cessation program.[49,51,53] The research team assumed that these three studies investigated proactive referral since the smokers were contacted by a counsellor or representative of the program after referral. Of the 34 included studies, 31 investigated proactive opt-in referrals,[26,28-32,34-47,49-59] and 3 studies investigated proactive opt-out referrals.[33,48,60]

In most studies, smokers were proactively referred to a (state) quitline (n=18)[26,30,32,34,37-43,45,54-59] or a (local) smoking cessation service (n=9).[28,33,34,46,48,50-52,60] In a smaller number of studies, smokers were proactively referred to a group cessation program (n=3),[49,54,55] a web-based intervention (n=3),[29,31,36] a tobacco treatment specialist or coordinator (n=3),[35,40,47] an in-hospital cessation service (n=2),[45,50] or a trained nurse (n=1).[53] The majority of the studies (n=28) included one or more components in their intervention in addition to proactive referral. These additional components were mostly targeted at healthcare staff, rather than at patients; they consisted of training/education (n=19),[26,29,31-33,35-37,41,44,47-50,52,54,55,57,60] reminders/prompts (either through the electronic health record system or a chart stamp) to screen for tobacco use and/or offer referral (n=13),[30,33,35,37,40,41,47,50,56-60] and/or performance feedback reports (n=7).[29,31,35,37,54,55,57]

Study quality

Results of the quality assessment are presented in Table 3. The quality of the included studies ranged from –1 to 5 points (on a scale ranging from –5 to 5 points). One study was excluded from the quality appraisal due to the lack of a clear research question or aim, as recommended by the MMAT.[28] Overall, most quantitative descriptive studies, qualitative studies, and mixed-methods studies scored well (≥3 points). RCTs and nonrandomized studies generally scored lower. Most RCTs lacked detailed information on how randomization was performed. Further, most RCTs did not describe if and/or how those conducting outcome assessments were blinded as to the study condition or aims of the study. In addition, in the majority of RCTs and nonrandomized studies, it was not clear whether the data for the outcome(s) of interest was complete and whether the intervention was administered as intended (i.e., whether all included patients were offered a proactive referral by healthcare staff). Due to these shortcomings, only 42% of RCTs and nonrandomized studies combined scored well (≥3 points).

Table 2. Study characteristics and findings.

First author, year, country	Design	Study population and setting (n)	Type of proactive referral	Other components of intervention	Comparison	Outcome: Effectiveness	Outcome: Feasibility	Outcome: Adoption:	Outcome: Acceptability	Outcome: Referral rates
Abdelmutti, 2019, Canada [28]	Non-randomized	New ambulatory cancer patients who smoke or have recently quit (within 6 months) seen in one large cancer center (n=1,914)	E-referral was automatically generated by a tablet and sent to a smoking cessation counselling service (opt-in)	At point of care, patients received a tablet which assessed smoking status and provided smokers with brief education regarding smoking; smokers could choose which service to be referred to	n/a	n/a	n/a	n/a	Acceptance rate: 20% of current smokers and those who had recently quit accepted referral to a smoking cessation counselling service	n/a
Adsit, 2014, United States [58]	Non-randomized	Smokers seen in one family medicine clinic and one pulmonary medicine clinic (n=4,121)	Staff used EHR system to send e-referral to the state quitline (opt-in)	EHR prompted medical assistant or rooming staff* to screen for tobacco use and offer referral to smokers	Staff asked patients about tobacco use and faxed referral forms of smokers interested in quitting to the state quitline	n/a	n/a	n/a	n/a	Referral rates: 13.9% of smokers were referred in the intervention (e-referral) group compared to 0.3% of smokers in the comparison (fax referral) group
Boykan, 2016, United States [44]	Non-randomized	Parents and caregivers who smoke seen in one children's hospital (n=1,308)	Nurses used a referral window in the EHR to send smoker's information to the state quitline (opt-in)	- Nursing staff received educational sessions - Smokers were identified through a standard questionnaire filled out by all caregivers	n/a	n/a	n/a	n/a	Acceptance rates: - In 2 pilot units, 2013: 62% accepted referral - In all inpatient units, 2014: 36% accepted referral - In all inpatient units, 2015: 34% accepted referral	n/a

Campbell, 2017, United Kingdom [60]	Non-randomized	Pregnant women who smoke seen in two antenatal clinics within one hospital trust (n=1,216)	Healthcare staff referred pregnant women attending their dating scan appointment (12 weeks) with CO levels ≥ 4 ppm to the local stop smoking service by using an electronic system (opt-out); this opt-out referral pathway existed in addition to the opt-in referral pathway (see 'comparison')	- Healthcare staff received training about the new referral pathway - CO testing and referrals were prompted by the EHR	Pregnant women attending their first antenatal scan appointment (8-12 weeks) were asked about smoking by midwives and referral forms of smokers interested in support were sent electronically to a stop smoking service (opt-in)	n/a	n/a	n/a	n/a	Referral rates: 61.9% of smokers were referred in the intervention (opt-out + opt-in) group compared to 54.1% of smokers in the comparison (opt-in) group
Campbell, 2016, United Kingdom [33]	Qualitative	11 healthcare staff who work at two antenatal clinics within one hospital trust	Healthcare staff referred pregnant women attending their first antenatal scan appointment (8-14 weeks) with CO levels ≥ 4 ppm to the local stop smoking service by using an electronic system (opt-out)	- Healthcare staff received training to address concerns about the referral pathway - CO testing and referrals were prompted by the EHR	n/a	n/a	Perceived ease of use: The opt-out referral pathway impacted workload less than expected	n/a	Perceived acceptability among staff: Healthcare staff perceived women to be generally accepting of opt-out referrals	n/a

Table 2. Continued

First author, year, country	Design	Study population and setting (n)	Type of proactive referral	Other components of intervention	Comparison	Outcome: Effectiveness	Outcome: Feasibility	Outcome: Adoption:	Outcome: Acceptability	Outcome: Referral rates
Campbell, 2019, United Kingdom [34]	Mixed-methods	Quantitative analysis: Pregnant women who smoke, attending dating (10-14 weeks) and anomaly (18-21 weeks) ultrasound scan appointments in two antenatal clinics within one hospital trust (n=199) Qualitative analysis: Three reception staff members who work at two antenatal clinics within one hospital trust	Reception staff sent referral forms of smokers interested in support via secure mail to a stop smoking service (opt-in)	Women were asked by reception staff to fill out an opt-in referral form	n/a	n/a	Perceived ease of use: While the opt-in referral pathway had minimal impact on workload, reception staff reported that it was easy to forget Barrier to referral: Reception staff felt they did not have enough knowledge about smoking in pregnancy and the stop smoking service to confidently discuss referrals		Acceptance rate: 23.1% of women who reported smoking via the opt-in referral form requested a referral Perceived acceptability among reception staff: - Paper opt-in referral forms were considered acceptable, but not engaging enough and easy to misinterpret - The reception was considered not private enough to discuss smoking in detail	

Cantrell, 2009, United States [37]	Qualitative	34 healthcare staff who work at two outpatient clinics serving a primarily Hispanic low-income population	Clinic staff faxed referral forms to the state quitline (opt-in)	- Chart stamp prompted staff to ask patients about tobacco use, advise them to quit, assess readiness to quit, offer assistance and arrange follow-up - Staff received training on the new referral system - Staff received performance feedback reports	n/a	n/a	Perceived ease of use: Referral form was lengthy and complicated, especially for the literacy level of the patient population Barriers to fax referral: - Process of faxing cost extra time and not all clinics had a reliable fax machine	n/a	n/a	n/a
Carpenter, 2012, United States [38]	Non-randomized	Healthcare providers from different settings, i.e., inpatient, outpatient and emergency care (n=179)	Healthcare providers received a web-based skills training, called Refer2Quit, which informed them about quitline interventions and how to fax refer patients to a quitline (opt-in)	n/a	n/a	n/a	Most commonly reported barriers to fax referral: - Not enough time to fill out a fax referral form - Patients are not able to fill out a fax referral form - Not knowing how to get a fax referral form	n/a	n/a	n/a
Faseru, 2011, United States [42]	Non-randomized	Smokers treated by UKanQuit, a tobacco treatment service within a large academic medical center (n=513)	Staff sent fax referrals to the state quitline for follow-up treatment after hospital discharge (opt-in)	UKanQuit staff visited hospital patients at the bedside to deliver tobacco cessation treatment	n/a	n/a	n/a	n/a	Acceptance rate: 55.8% of smokers accepted referral to the state quitline for follow-up treatment	n/a

Table 2. Continued

First author, year, country	Design	Study population and setting (n)	Type of proactive referral	Other components of intervention	Comparison	Outcome: Effectiveness	Outcome: Feasibility	Outcome: Adoption:	Outcome: Acceptability	Outcome: Referral rates
Fellows, 2016, United States [45]	RCT	Hospitalized smokers seen in three large hospitals, allocated to proactive referral group (n=597)	Tobacco treatment specialists arranged either a bedside warm transfer call to an in-hospital tobacco cessation service or fax referral to the state quitline (opt-in)	- Tobacco treatment specialists identified smokers and provided a brief bedside consultation - Smokers received interactive voice recognition follow-up	n/a	n/a	n/a	n/a	Acceptance rate: 57.5% of smokers accepted referral to the in-hospital cessation service or state quitline	n/a
Fiore, 2019, United States [59]	Cluster RCT	Smokers seen in 23 primary care clinics from 2 healthcare systems called A and B (n=14,636)	Clinicians used EHR system to send e-referral to the state quitline (opt-in)	EHR prompted the rooming staff* to ask and document smoking status for all adult patients, after which clinicians advised smokers to quit and offered referral to the state quitline	EHR prompted the rooming staff* to ask and document smoking status for all adult patients, after which clinicians advised smokers to quit and offered referral to the state quitline; interested smokers completed referral forms which were faxed to the state quitline (opt-in)	n/a	n/a	n/a	n/a	Referral rates: - In system A, 17.9% of smokers were referred in the intervention (e-referral) group compared to 3.8% in the comparison (fax referral) group - In system B, 18.9% of smokers were referred in the intervention (e-referral) group compared to 5.2% in the comparison (fax referral) group

Flocke, 2019, United States [55]	Non-randomized	Smokers seen in two primary care practice sites (n=10,415)	Medical assistants and nurses were alerted by the EHR system to offer referral to smokers interested in quitting within the next 30 days; an e-referral was then sent to the state quitline or a group clinic program (opt-in)	- Medical assistants and nurses were trained to ask all patients about their smoking status, advise smokers to quit, assess readiness to quit within 30 days and offer referral to those ready to quit - Practice manager received performance feedback reports	Before intervention, the roles of the medicals assistants and nurses involved asking about and documenting smoking status	n/a	n/a	n/a	n/a	Referral rates: 21.7% of smokers had a documented referral to a tobacco cessation program 6 months after intervention implementation, compared to 1.3% of all smokers 1-3 months before intervention implementation
Flocke, 2020, United States [55]	Non-randomized	Smokers seen in eight primary care safety-net clinics (n=37,909)	Medical assistants and nurses were alerted by the EHR system to offer referral to smokers interested in quitting within the next 30 days; an e-referral was then sent to the state quitline or a group clinic program (opt-in)	- Medical assistants and nurses were trained to ask all patients about their smoking status, advise smokers to quit, assess readiness to quit within 30 days and offer referral to those ready to quit - Practice manager received performance feedback reports	Before intervention, the roles of the medicals assistants and nurses involved asking about and documenting smoking status	n/a	n/a	n/a	n/a	Referral rates: 30.9% of smokers had a documented referral to a tobacco cessation program 12 months after intervention implementation, compared to 0.5% of all smokers 1-3 months before intervention implementation

Table 2. Continued

First author, year, country	Design	Study population and setting (n)	Type of proactive referral	Other components of intervention	Comparison	Outcome: Effectiveness	Outcome: Feasibility	Outcome: Adoption:	Outcome: Acceptability	Outcome: Referral rates
Giuliani, 2019, Canada [46]	Non-randomized	Newly diagnosed cancer patients who smoke seen in one large cancer center (n=737)	E-referral was automatically generated by a tablet and sent to a smoking cessation counselling service (opt-in)	At point of care, patients received a tablet which assessed smoking status and provided smokers with brief education regarding smoking; smokers could choose which service to be referred to	Unclear	n/a	n/a	n/a	Acceptance rate: 20.4% of smokers accepted referral to a smoking cessation counselling service	Referral rates: 20.2% of smokers were referred to the smoking cessation counselling service 6 months after full intervention implementation, compared to 7.7% 6 months before intervention implementation
Hood-Medland, 2019, United States [39]	Non-randomized	1,600 clinicians who work at one medical center	Clinicians placed an e-referral order in the EHR after which the patient's information was automatically sent to the state quitline (opt-in)	n/a	n/a	n/a	n/a	Adoption: 17% of clinicians used the e-referral order at least once	n/a	n/a
Houston, 2015, United States [29]	Cluster RCT	Smokers seen in 174 community-based general, family or internal medicine practices (n=4,789)	Healthcare provider used e-referral portal on ReferASmoker.org to send e-mail address of the smoker to the web-based intervention Decide2Quit.org (opt-in)	- Practices received training on how to refer patients - Practices received real-time dashboard monitoring of smokers' registration and progress - Practices received feedback reports on how many patients they had referred	- Practices received training on how to refer patients - Smokers received the web address of Decide2Quit.org	Enrolment: 31% of referred smokers in intervention group enrolled in the web-based intervention compared to 11% of referred smokers in control group (p=0.001)	n/a	n/a	n/a	n/a

Jenssen, 2019, United States [30]	RCT	Urban population of predominantly low-income, black parents/caregivers who smoke seen in one pediatric primary care site (n=484)	Pediatric clinicians used e-referral embedded within clinical decision support system to send contact details of the smoker to the state quitline (opt-in)	Clinical decision support system prompted clinicians to screen for tobacco use and advise quitting	Identical to intervention, except for referral: smokers received quitline number and were encouraged to call on their own	Enrolment: 10.3% of referred smokers in intervention group enrolled in the state quitline compared to 2.0% of referred smokers in control group ($p<0.001$).	n/a	n/a	n/a	n/a
Jose, 2020, United States [47]	Non-randomized	Cancer patients who smoke seen in one oncology center (n=210)	Rooming staff* ordered referral via EHR (opt-out) after which the scheduling staff made an appointment for the patient with a tobacco treatment specialist at the time of check out (opt-in)	- Staff received training on the new workflow - Rooming staff* received alerts within the EHR to ask patients about tobacco use and to inform smokers of referral	n/a	n/a	n/a	n/a	Acceptance rate: 71% of smokers accepted an appointment with a tobacco treatment specialist	n/a
Kruse, 2012, United States [35]	Mixed-methods	36 primary care providers who work at two community health centers	Providers used a one-click referral option in the EHR; clicking the referral option generated an email to a tobacco treatment coordinator (opt-in)	- Providers received a reminder in the EHR to record smoking status - Providers received training about the new referral option - Providers received a monthly performance report of the number of referrals made	n/a	n/a	Perceived ease of use: All providers felt the one-click referral option was easy to use	Adoption: 92% of providers used the one-click referral option at least once	Perceived acceptability among staff: - Providers were discouraged when patients were not reached or declined enrolment after referral - Lack of information about cessation outcomes after referral	n/a

Table 2. Continued

First author, year, country	Design	Study population and setting (n)	Type of proactive referral	Other components of intervention	Comparison	Outcome: Effectiveness	Outcome: Feasibility	Outcome: Adoption:	Outcome: Acceptability	Outcome: Referral rates
Linder, 2009, United States [40]	Cluster RCT	Smokers seen in 26 primary care practices (n=12,207) by 207 clinicians	Clinicians used a Tobacco Smart Form embedded in the EHR system to refer smokers by e-mail to a tobacco treatment counselor or by fax to the state quitline (opt-in)	- Clinicians received reminders in the EHR system to document smoking status, assess readiness to quit and offer assistance - The Tobacco Smart Form also included ordering of smoking cessation medications and printing of patient education materials	Clinicians received no reminders and did not have access to the Tobacco Smart Form	n/a	n/a	Adoption: 44% of clinicians used the Tobacco Smart Form at least once	n/a	Referral rates: 4.5% of smokers were referred in the intervention group compared to 0.4% of smokers in the comparison group
McEwen, 2012, United Kingdom [48]	Mixed-methods	Parents and caregivers who smoke or who live in a household with someone who smokes seen in 13 children's centers in Liverpool and Nottingham (n=432)	Liaison advisers sent referrals to local stop smoking services; referrals in Liverpool were made using a fax referral system; in Nottingham an online referral system was used (opt-out)	The referral liaison advisers received brief training on how to refer parents	n/a	n/a	n/a	n/a	Acceptance rates: - In Liverpool 54.7% of identified smokers did not refuse opt-out referral - In Nottingham 30.7% of identified smokers did not refuse opt-out referral	n/a

Philbrick, 2009, United States [49]	Non-randomized	Smokers seen in two hospital ambulatory care pharmacies (n=478)	Pharmacy staff documented which patients motivated to quit within 30 days were interested in a call by the pharmacist to receive more information about and enroll in a group cessation clinic (opt-in)	- Pharmacy staff received educational sessions - Staff used a documentation form to ask all patients about tobacco use, advise smokers to quit, and offer referral to a group cessation clinic - Smokers interested in quitting were given a brochure about the clinic	n/a	n/a	n/a	n/a	Acceptance rate: 30% of smokers agreed to be contacted by a pharmacist	n/a
Ray, 2014, United States [31]	Cluster RCT	Smokers seen in 100 community-based dental practices (n=1814)	Practice coordinator used e-referral portal on ReferASmoker.org to send e-mail address of the smoker to the web-based intervention Decide2Quit.org (opt-in)	- Practices received training on how to refer patients - Practices received feedback on the number of smokers referred and enrolled	- Practices received training on how to refer patients - Smokers received the web address of Decide2Quit.org and were advised to visit the website on their own	Enrolment: 29.5% of referred smokers in intervention group enrolled in web-based intervention compared to 7.6% of referred smokers in control group (adjusted mean percentages; p<0.001)	n/a	n/a	n/a	n/a
Robbins, 2015, United States [43]	Non-randomized	Women who smoke seen in one family planning clinic (n=148)	Clinic nurse faxed a referral form to a quitline (opt-in)	Clinic nurse first provided cessation counseling based on the 5 A's (Ask, Advise, Assess, Assist, Arrange), followed by an offer of additional support by the quitline	n/a	n/a	n/a	n/a	Acceptance rate: 5.4% of smokers accepted referral to the quitline	n/a

Table 2. Continued

First author, year, country	Design	Study population and setting (n)	Type of proactive referral	Other components of intervention	Comparison	Outcome: Effectiveness	Outcome: Feasibility	Outcome: Adoption:	Outcome: Acceptability	Outcome: Referral rates
Rothemich, 2010, United States [56]	Cluster RCT	Smokers seen in 16 primary care practices (n=1,817)	Staff faxed a referral form to a quitline (opt-in)	Chart stamp prompted rooming staff* to ask about tobacco use, advice smokers to quit, and assess readiness to quit	Chart stamp prompted rooming staff* to ask about tobacco use	n/a	n/a	n/a	n/a	Referral rates: 21.4% of smokers were referred in the intervention group compared to 8.7% of smokers in the comparison group
Sadasivam, 2013, United States [36]	Non-randomized	155 primary care medical providers and 71 dental providers	Providers used e-referral portal on ReferASmoker.org to send e-mail address of the smoker to the web-based intervention Decide2Quit.org (opt-in)	Implementation protocol, which included training, booster calls, and support materials (such as information prescription pad)	n/a	n/a	Best practices which facilitated referrals: - Using the patients' time in the waiting room to discuss referral - Setting up reminders in EHR to refer patients - Keeping information prescription pad within view to remember to discuss smoking with the patient	n/a	n/a	n/a

Sharifi, 2014, United States [41]	Non-randomized	Urban population of predominantly low-income, racial/ethnic minority parents screened positive for household tobacco smoke exposure, seen in one pediatric primary care center (n=229)	Clinicians were alerted by the EHR system to print a fax referral form for parents interested in quitting; the fax referral form was then sent by the practice to QuitWorks, a telephone smoking cessation program (opt-in)	- Clinicians received a brief training - Modifications made in EHR system: 1) prompts to assess tobacco smoke exposure at home and interest in quitting, 2) decision support guiding management, 3) printing of educational literature	n/a	n/a	n/a	n/a	Perceived acceptability among staff: 82% of the clinicians agreed that the fax referral form available through the EHR was helpful	Referral rates: 27.7% of parents screened positive for household tobacco smoke exposure were referred to QuitWorks 3 months after intervention implementation, compared to 0.9% 3 months before intervention implementation
Shelley, 2010, United States [57]	Non-randomized	Mostly low-income, Latino immigrant smokers seen in four community health centers (n=460)	Staff faxed a referral form to the state quitline (opt-in)	- Chart stamp which prompted staff to ask about tobacco use, advice smokers to quit, assess readiness, and offer assistance - Staff received training and additional materials as needed - Staff received feedback on their adherence to the intervention	Chart stamp which prompted staff to ask about tobacco use, advice smokers to quit, assess readiness, and offer assistance	n/a	n/a	n/a	n/a	Referral rates: Among intervention sites, referrals to the quitline increased from 17% to 35% ($p<0.001$); among comparison sites, referrals to the quitline did not change significantly between baseline and follow-up ($p=0.40$)

Table 2. Continued

First author, year, country	Design	Study population and setting (n)	Type of proactive referral	Other components of intervention	Comparison	Outcome: Effectiveness	Outcome: Feasibility	Outcome: Adoption:	Outcome: Acceptability	Outcome: Referral rates
Spaducci, 2020, United Kingdom [50]	Non-randomized	Smokers seen in four psychiatric hospitals (n=2,513)	Staff used referral system embedded in the EHR to send patients' details to a local community stop smoking service or a hospital tobacco dependence advisor (opt-in)	- Staff received training on the referral system - Modifications made in EHR system: 1) prompts to complete a form which recorded whether staff had checked the smoking status and offered referral to smokers, 2) mandatory recording of smoking status, 3) integration of an electronic national referral system in the EHR	n/a	n/a	n/a	n/a	Acceptance rate: 23.2% of smokers accepted the referral	n/a
Tang, 2014, United Kingdom [51]	Non-randomized	Smokers seen in one head and neck cancer clinic (n=102)	Hospital's stop smoking coordinator collected the referrals and sent these to the local stop smoking service (opt-in)	During the patient's first consultation the surgeon followed a scripted intervention to identify smokers and offer referral	n/a	n/a	n/a	n/a	Acceptance rate: 78% of smokers accepted referral to the local stop smoking service	n/a
Vidrine, 2013, United states [26]	Cluster RCT	Smokers seen in 10 family practice clinics (n=3,663)	Licensed vocational nurses and medical assistants used an automated link in the EHR to send smokers' names and phone numbers to the research team, who then sent the information to the state quitline (opt-in)	Licensed vocational nurses and medical assistants were trained to ask all patients at every visit about their smoking status, briefly advise all smokers to quit and connect smokers to ta quitline	Identical to intervention, except for referral: smokers received quitline referral cards and had to contact the quitline themselves	Enrolment: 28.2% of referred smokers in intervention group enrolled in the quitline compared to 1.6% of referred smokers in control group	n/a	n/a	Acceptance rate: 27.6% of smokers in the intervention group accepted referral to the quitline	n/a

Vidrine, 2013, United states [32]	Cluster RCT	Mostly low-income smokers from racial/ ethnic minority groups seen in 10 community safety net clinics (n=17,959)	Licensed vocational nurses used an automated link in the EHR to send smokers' names and phone numbers to the research team, who then sent the information to the state quitline (opt-in)	Licensed vocational nurses were trained to ask all patients at every visit about their smoking status, briefly advise all smokers to quit and connect smokers to ta quitline	Identical to intervention, except for referral: smokers received quitline referral cards and had to contact the quitline themselves	Enrolment: 36.0% of referred smokers in intervention group enrolled in the quitline compared to 1.4% of referred smokers in control group	n/a	n/a	Acceptance rate: 40.6% of smokers in the intervention group accepted referral to the quitline	n/a
Weng, 2020, Hong Kong [52]	Cluster RCT	Smokers seen in community sites, allocated to proactive referral group (n=395)	Trained smoke-free ambassadors (i.e., students and volunteers) helped smokers make appointments with a smoking cessation service of their choice (opt-in)	- Ambassadors were trained to ask people about smoking, advise smokers to quit or reduce smoking, warn smokers about the harms of smoking using a health warning leaflet, and refer smokers to a smoking cessation service - Smokers received mobile messages and reminders	n/a	n/a	n/a	n/a	Acceptance rate: 76.7% of smokers agreed to be referred to a smoking cessation service	n/a
Young, 2008, Australia [53]	RCT	Smokers seen in general practice, allocated to proactive referral group (n=169)	GP proactively referred patients to telephone cessation counselling by a trained nurse (opt-in)	n/a	n/a	n/a	n/a	n/a	Acceptance rate: 45% of smokers accepted a referral to the nurse	n/a

*Staff which are responsible for rooming patients, typically nurses and medical assistants.

Table 3. Results from the quality appraisal.

Randomized controlled trial studies	Randomization appropriately performed?	Groups comparable?	Complete outcome data?	Assessors blinded?	Adhered to intervention?	Overall score
Fellows et al.[45]	+1	+1	0	+1	+1	4
Fiore et al.[59]	0	-1	0	0	0	-1
Houston et al.[29]	0	0	0	0	0	0
Jenssen et al.[30]	+1	+1	+1	0	0	3
Linder et al.[40]	0	+1	0	0	0	1
Ray et al.[31]	0	+1	-1	0	0	0
Rothemich et al.[56]	0	+1	0	-1	0	0
Vidrine et al.[26]	0	+1	+1	0	0	2
Vidrine et al.[32]	0	+1	+1	0	0	2
Weng et al.[52]	+1	+1	0	+1	0	3
Young et al.[53]	+1	+1	+1	0	+1	4
Quantitative nonrandomized studies	Representative of the target population?	Appropriate measurements?	Complete outcome data?	Confounders accounted for?	Intervention administered as intended?	Overall score
Abdelmutti et al.[28]	-	-	-	-	-	-
Adsit et al.[58]	0	+1	0	-1	0	0
Boykan et al.[44]	0	-1	0	n/a	0	-1
Campbell et al.[60]	+1	+1	0	-1	0	1
Faseru et al.[42]	0	+1	0	n/a	0	1
Flocke et al.[54]	+1	+1	+1	+1	0	4
Flocke et al.[55]	+1	+1	0	+1	+1	4
Giuliani et al.[46]	+1	+1	0	n/a	+1	3
Hood-Medland et al.[39]	+1	+1	+1	n/a	0	3
Jose et al.[47]	+1	+1	+1	n/a	+1	4

Philbrick et al.[49]	-1	+1	0	n/a	0	0
Robbins et al.[43]	0	+1	0	n/a	0	1
Sharifi et al.[41]	+1	+1	-1	+1	0	2
Shelley & Cantrell [57]	+1	+1	0	+1	0	3
Spaducci et al.[50]	+1	+1	+1	n/a	-1	2
Tang et al.[51]	+1	+1	+1	n/a	0	3
Quantitative descriptive studies	Appropriate sampling strategy?	Representative of the target population?	Appropriate measurements?	Risk of nonresponse bias low?	Appropriate statistical analysis?	Overall score
Carpenter et al.*[38]	+1	0	+1	+1	+1	4
McEwen et al.*[48]	+1	-1	+1	0	+1	2
Qualitative studies	Qualitative approach appropriate?	Data collection methods adequate?	Findings adequately derived from data?	Results interpreted sufficiently from data?	Coherence in data, analysis and interpretation?	Overall score
Campbell et al.[33]	+1	+1	+1	+1	+1	5
Cantrell & Shelley [37]	+1	+1	+1	+1	+1	5
Sadasivam et al.*[36]	+1	+1	+1	+1	+1	5
Mixed methods studies	Adequate rationale for design?	Different components integrated?	Outputs of integration adequately interpreted?	Divergences or inconsistencies addressed?	Components adhered to quality criteria?	Overall score
Campbell et al.[34]	+1	+1	+1	+1	+1	5
Kruse et al.[35]	+1	+1	+1	+1	+1	5

Effectiveness

We identified five RCTs (one parallel RCTs and four cluster RCTs) which reported the enrollment of smokers in behavioral smoking cessation programs. Four out of the five studies had low quality scores (<3 points) due to lack of information. The five studies all investigated opt-in e-referrals as intervention and each study found that proactively referred smokers were significantly more likely to enroll in behavioral smoking cessation programs compared to passively referred smokers.[26,29-31] The smallest, yet still significant, difference was reported by Houston et al. who found that, compared to passive referral, proactive referral resulted in 2.8 times more patients enrolling in a web-based program.[29] The largest difference was reported by Vidrine et al.; they found that, among a population of mostly low-income smokers, proactive referral resulted in 25.7 times more patients enrolling in the state quitline.[32]

Feasibility

Six studies, which all scored well on quality (≥3 points), reported a qualitative assessment of feasibility from the perspective of healthcare staff (i.e., the extent to which proactively referring smokers to smoking cessation programs can be successfully carried out by healthcare staff). Three studies which investigated e-referrals all found that the process of using an e-referral system to proactively refer patients was easy or had minimal impact on workload.[33-35] While two of these studies provided healthcare staff with training or prompts in the electronic health record, one study did not and reported that reception staff easily forgot about the process of using the e-referral system and did not always feel confident enough to discuss referrals.[34] According to Sadasivam et al., setting up a reminder to refer smokers (e.g., a prompt in the electronic health record or a physical reminder on the desk) helped to facilitate e-referrals.[36]

Two studies investigated fax referrals and found several barriers related to its feasibility: time consuming process; lack of reliability of the fax machine; lack of knowledge where to get a fax referral form; lack of patient ability to fill out a fax referral form.[37,38]

Adoption

Three studies, of which two scored well on quality (≥3 points), reported adoption rates of proactive referral (i.e., the proportion of healthcare staff who proactively referred smokers to behavioral smoking cessation programs). One study found that among 1,600 clinicians, 17% had proactively referred patients using an e-referral system at least once.[39] In two others studies, e-referral adoption rates of 92% and 44% were reported.[35,40] Important to note is that in these two studies, healthcare staff received prompts in the electronic health record to document the patient's smoking status and use the e-referral system, which was not the case in the study which found an adoption rate of 17%.

Acceptability

Four studies, of which three scored well on quality (≥3 points), reported a quantitative or qualitative measure of providers' or smokers' perceived acceptability of proactive referral (i.e., the extent to which proactively referring smokers to behavioral smoking cessation programs is perceived to be agreeable or satisfactory). One study found that over 80% of clinicians agreed that a fax referral system was helpful in referring patients.[41] In two qualitative studies, proactive referral (opt-in as well as opt-out) was found to be acceptable to both healthcare staff and pregnant women, as reported in interviews with healthcare staff.[33,34] One study, in which reception staff were involved in the proactive referral, however also found that the reception may not be the most suitable setting for providing referrals and discussing smoking with patients.[34] Another study reported that healthcare staff were discouraged when patients were not reached or declined enrollment after referral, and that healthcare staff did not receive enough information about cessation outcomes after referral, which decreased their motivation to refer.[35]

We found 16 studies (of which seven of good quality, i.e., ≥3 points) which reported the patients' acceptance rate with regard to proactive referral. Among smokers who first received cessation counselling in a clinic or hospital and were then offered a referral for follow-up support, the acceptance rate ranged from 5.4% to 55.8%.[42,43] The acceptance rate ranged from 20% to 78% among smokers who were referred without first receiving cessation counselling.[26,28,32,34,44-53]

Referral rates

Ten studies (of which four of good quality, i.e., ≥3 points) reported rates of referral to behavioral smoking cessation programs. In seven studies, referral rates were compared between an intervention group (proactive referral) and comparison group (usual care or pre-implementation). These studies found that between 2.1 and 61.8 times more smokers were referred in the intervention group compared to the comparison group.[40,41,46,54-57]

Three studies compared referral rates between different types of proactive referral groups. Two studies found that between 3.6 and 46.3 times more smokers were referred through e-referral compared to fax referral.[58,59] Another study found that implementing a combination of both opt-out and opt-in referrals resulted in a higher referral rate of pregnant smokers compared to implementing only opt-in referrals (61.9% vs 54.1% respectively).[60]

DISCUSSION

Key findings

To our knowledge, the current review was the first to systematically assess the effectiveness and implementability of proactive referral of smokers to behavioral smoking cessation programs by healthcare staff. Proactively referring patients, particularly with the use of an e-referral system and in combination with one or more other intervention components, was found to be effective, feasible, adoptable, and acceptable to healthcare staff across different settings. Also, the implementation of proactive referral was found to result in higher referral rates, further indicating that proactive referral can be successfully implemented in practice.

Interpretation of the findings

With regard to effectiveness, only five studies investigated enrollment rates.[26,29-32] These studies all reported significantly higher enrollment rates among proactively referred smokers compared to passively referred smoker. Taking into account the low uptake of smoking cessation programs by smokers who attempt to quit smoking,[15,16] these results demonstrate the potential of proactive referral in increasing the reach of smoking cessation programs. More specifically, proactive referral by healthcare staff most strongly improves enrollment rates among low-income smokers.[32] Considering that especially low-income smokers experience a multitude of barriers which limit their ability to access smoking cessation support,[61] proactive referral may thus help to reduce inequalities in the access to cessation services by directly connecting low-income smokers to cessation services.

With respect to the implementation of proactive referral, healthcare staff may encounter barriers both at the provider level (e.g., too little time to refer patients, or forgetting to refer patients) and organizational level (e.g., lack of reliable equipment needed to refer patients).[34,37,38] Reported barriers were mostly related to fax referrals, which may explain why e-referral systems were found to generate more referrals to smoking cessation programs compared to fax referral systems.[58,59] Previous research concluded that e-referral systems in healthcare can help to improve the quantity and quality of referrals and are also received well by healthcare staff in different settings.[62]

Interestingly, 60% of the studies specifically focused on e-referrals. The results suggest that e-referral may be preferable to fax referral in terms of implementability. It remains unclear whether e-referral may also be preferable to other types of proactive referral, such as bedside warm transfer calls to a quitline or the immediate scheduling of an appointment with a smoking cessation counsellor. The advantage of such types of proactive referral is that the patient is immediately enrolled into a smoking cessation program. For hospitals,

a warm transfer call is a less expensive and more effective method for enrolling smokers in quitlines compared to fax referral.[63] It would be interesting to conduct a similar cost-effectiveness analysis for e-referral versus warm transfer calls, for example to a quitline or an in-hospital cessation service. The cost-effectiveness may differ depending on whom patients are referred to. Furthermore, >90% of the studies examined opt-in proactive referrals. We found few studies which compared opt-in to opt-out proactive referrals. Only one study investigated the addition of opt-out referrals to an opt-int referral system and found promising results.[60] More future studies on opt-out referrals, and specifically the addition of opt-out referrals to an opt-in system, are therefore recommended.

Regarding the implementability of proactive referral, we noticed that in addition to proactive referral most studies included one or more provider-targeted components in their intervention which in fact function as implementation strategies. Implementation strategies can help to overcome barriers and thus enhance the implementability of new systems and practices in healthcare.[24,25] These strategies, which may include provision of training, adding prompts to the electronic health record, or working with performance feedback reports, have been found to help healthcare staff to identify smokers and increase the number of smokers that receive evidence-based cessation support.[64-66] A systems approach, in which healthcare staff are provided with training, support and organizational structures to systematically identify and refer smokers, may hence be necessary to ensure that all smokers are offered tobacco-dependence treatment as a routine part of care.[23]

While proactive referral was generally found to be acceptable to healthcare staff, the proportion of smokers that agreed to be proactively referred (i.e., the patients' acceptance rate) varied greatly between studies (5.4%-78%). This wide range of patients' acceptance rates between studies might be explained by the great diversity of settings as well as differences in the delivery of the intervention. For example, patients' acceptance rates of over 50% were only reported in Western countries among hospitalized patients, parents and caregivers, and cancer patients,[42,44,45,47,48,51] indicating that proactive referral may be more acceptable among patients for whom quitting smoking is most urgent. The only study conducted in a non-Western setting found a remarkably high acceptance rate of 77% among smokers in community sites,[52] which may indicate a difference in the acceptability of proactive referral between Western and non-Western cultures.

Surprisingly, in three studies conducted among cancer patients and pregnant women, acceptance rates of around 20% were reported.[28,34,46] We suspect that these low acceptance rates are the result of how the intervention was delivered. In these studies, healthcare staff handed a computer tablet or form to the patient which assessed smokers' interest in proactive referral, after which the referral was sent to the smoking cessation program.

The healthcare staff did not further discuss the referral with smokers. While the use of a tablet or form may be an efficient way for healthcare staff to refer patients, this may not outweigh the lower number of patients which accept the referral.

We encountered several issues while appraising the quality of the different studies which may explain the mixed quality we found for RCTs and nonrandomized studies. For example, limitations in the data of the different studies (such as patient recall, the use of survey data and the use of non-traditional data sources) made it harder to appraise the quality of the data used. Also, it was a challenge to determine whether data could be considered complete, especially in studies where electronic health record data was used, and studies often did not explicitly mention whether healthcare staff had adhered to the assigned intervention. Due to this lack of information, many studies scored low on quality. For future research on this topic, it is important that researchers explicitly address these aspects. Adherence to the intervention by healthcare staff may, for example, be assessed from electronic health record data.

Limitations

Several study limitations need to be addressed. First, there was a great deal of variation in study designs, settings, types of interventions and measurements which limits the generalizability of the findings. Due to the lack of comparability between studies it was not possible to conduct a pooled analysis. In addition, most studies were conducted in English-speaking, Western countries, limiting the generalizability of the results to other countries. Second, we did not pre-register a protocol for this systematic review. Third, this review did not take into account difficulties that may be experienced in enrolling patients after referral. Smoking cessation programs may not always be able to reach patients after receiving a referral, or patients may eventually decide to not enroll in the program.[52] These issues may undermine the effectiveness of proactive referral. Finally, based on our results, we do not know whether proactive referral also increases smoking cessation. It is, however, conceivable that the question of smoking abstinence is less relevant in relation to the type of referral (passive or proactive), as smoking abstinence may be more strongly predicted by other factors such as the number of (attended) sessions in a smoking cessation program.[9]

Conclusion

The current evidence clearly suggests that proactive referral by healthcare staff is effective and implementable across different settings. Proactive referral has the potential to increase the reach of smoking cessation programs and reduce inequalities in the access to such programs. In the selection and implementation of smoking cessation care with a proactive referral component, it appears important to take into account different aspects, such as the type of proactive referral system used and additional strategies which can

enhance implementability. Based on the results, e-referral systems may be preferable to fax referral systems. Further research is needed to determine the value of other types of proactive referral, such as warm transfer calls.

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CHAPTER

4

The referral of patients to smoking cessation counselling: perceptions and experiences of healthcare providers in general practice

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ABSTRACT

Background

Few European smokers receive professional counselling when attempting to quit smoking, resulting in suboptimal success rates and poor health outcomes. Healthcare providers in general practice play an important role in referring smokers to smoking cessation counselling. We chose the Netherlands as a case study to qualitatively explore which factors play a role among healthcare providers in general practice with regard to referral for smoking cessation counselling organised both inside and outside general practice.

Methods

We conducted four focus groups and 18 telephone interviews, with a total of 31 healthcare providers who work in general practice. Qualitative content analysis was used to identify relevant factors related to referral behaviours, and each factor was linked to one of the three main components of the COM-B behaviour model (i.e., capability, opportunity and motivation) as well as the six sub-components of the model.

Results

Dutch healthcare providers in general practice typically refer smokers who want to quit to counselling inside their own general practice without actively discussing other counselling options, indicating a lack of shared decision making. The analysis showed that factors linked to the COM-B main components 'capability' and 'opportunity', such as healthcare providers' skills and patients' preferences, play a role in whether patients are referred to counselling inside general practice. Factors linked to all three COM-B components were found to play a role in referrals to counselling outside general practice. These included (knowledge of) the availability and quality of counselling in the region, patients' requests, reimbursement, and sense of urgency to refer. The identified factors can both act as barriers and facilitators.

Conclusions

The findings of this research suggest that more smokers can be reached with smoking cessation counselling if implementation interventions focus on: i) equipping healthcare providers with the knowledge and skills needed to refer patients; ii) creating more opportunities for healthcare providers to refer patients (e.g., by improving the availability and reimbursement of counselling options); and iii) motivating healthcare providers to discuss different counselling options with patients.

INTRODUCTION

Tobacco use remains a major public health issue, especially in Europe where it is estimated that 29% of citizens above 15 years old use tobacco products.[1] As many European countries strive towards becoming tobacco-free, ensuring that smokers have access to evidence-based cessation methods is becoming increasingly important. The most effective cessation method is a combination of pharmacotherapy and intensive behavioural counselling, the latter provided either face-to-face (individually or in a group) or via telephone.[2]

Currently, use of evidence-based cessation methods is low across European countries,[3-5] and even declined between 2012 and 2017.[6] As such, despite the availability of many types of evidence-based interventions, the impact on public health remains low. General practice is an important source for smokers to access evidence-based cessation care.[7] National guidelines in many countries recommend primary healthcare providers to ask patients whether they smoke, to advise smokers to quit smoking, and to offer behavioural counselling and pharmacological support to smokers who want to quit smoking.[8] Healthcare providers (HCPs) in general practice typically refer patients to smoking cessation counselling (SCC) organised either inside or outside general practice, depending on a country's smoking cessation infrastructure. The referral behaviour of HCPs in general practice may, however, be influenced by various factors such as patient reimbursement, the awareness and knowledge of (the quality of) local smoking cessation services, and patients' and HCPs' attitudes towards SCC.[9-13]

In order to reach more smokers with SCC, it is important to know which factors are related to the referral behaviour of HCPs in general practice. According to the COM-B behaviour model, behaviour (B) is generated by three components: capability (C), opportunity (O), and motivation (M).[14] Capability refers to the knowledge and skills which are necessary to perform a certain behaviour; opportunity refers to the external factors which make a certain behaviour possible; motivation refers to internal processes such as decision making and emotions which influence behaviour.[14] Each component can be further divided into two sub-components. With regard to capability, one can distinguish between physical capability (e.g., physical strength and skills) and psychological capability (e.g., knowledge, comprehension and reasoning). Opportunity comprises physical opportunity (i.e., opportunity afforded by the environment, such as time and location) and social opportunity (i.e., opportunity which is a result of social factors, such as cultural norms). Motivation involves reflective processes (e.g., making plans and evaluations) and automatic processes (e.g., emotions, desires and impulses).[14] The COM-B behaviour model has successfully been used in other studies aimed at improving the behaviour of HCPs involved in smoking cessation care.[15,16] By using this model, one can identify which

components play a role in the referral behaviour of HCPs in general practice and thus select appropriate behaviour change interventions.[14]

Within Europe, the Netherlands is an interesting case to examine, as SCC is organised both inside and outside the general practice setting. Most Dutch general practices have a practice nurse (PN) whose main task is to provide chronic disease care, including counselling smokers.[17,18] As a result, smokers are usually referred by the general practitioner (GP) to the PN. Two types of PNs exist within general practice: PNs who are specialised in somatic care and PNs who are specialised in mental health care.[17,18] Typically, SCC is provided by a PN who is specialised in somatic care.[18]

Also, many options for SCC exist outside general practice, which may be especially useful for general practices faced with a high workload (e.g., due to COVID-19) or a lack of expertise to counsel patients. Commercial organisations, self-employed coaches and smoking cessation outpatient clinics are examples of options outside general practice which patients can be referred to.[19,20] While counselling inside general practice typically involves individual and/or telephone counselling, counsellors outside general practice often also offer group counselling and/or more specialised care for particular subgroups (such as pregnant women and heavily addicted smokers).[20] Some of these counsellors require an official referral letter by the GP,[20] indicating the central role of the GP as gatekeeper to SCC.

Only SCC provided by qualified counsellors is reimbursed by healthcare insurance companies once a year; this includes SCC both inside and outside general practice.[19] Despite the many possibilities for SCC in the Netherlands, no more than 5% of smokers who make a serious quit attempt (i.e., refraining from smoking for at least 24 hours) currently receive professional counselling provided either inside or outside general practice,[21] which may partly be explained by the fact that Dutch GPs often prescribe cessation medication without behavioural counselling.[22] The aim of this study was to qualitatively explore, from the perspective of Dutch HCPs in general practice, which factors play a role in the referral of smokers to SCC organised both inside and outside general practice.

METHODS

Study Design and Participants

This qualitative study was based on the answers of 31 HCPs who work in general practice. We conducted four semi-structured focus groups on smoking cessation care in general, followed by 18 semi-structured individual telephone interviews on referrals to SCC specifically. The focus groups were part of a larger study, aimed at developing a new

referral strategy to ensure that more smokers are referred to behavioural counselling (the focus groups were presented to HCPs within this context). While the interviews were also part of this study, they were solely focused on exploring the experiences of HCPs regarding the referral of patients and not aimed at developing a new referral strategy.

For the focus groups, we recruited HCPs from both primary and secondary care. Participants were not required to be actively involved in smoking cessation care. Different recruitment channels were employed: newsletters sent out through professional associations, e-mails sent directly to practices in the regions of the research institutes, e-mails sent directly to HCPs registered in the Quit Smoking Quality Register, and e-mails sent directly to HCPs who participated in an earlier study on implementation of smoking cessation care.[9] We aimed for a minimum of five and maximum of eight participants per focus group, as recommended in the literature.[23] We recruited 22 HCPs; however, due to three last-minute withdrawals we included 19 HCPs (five participants in three focus groups and four participants in one focus group). Thirteen HCPs worked in general practice at the time, of which three GPs, seven PNs who are specialised in somatic care, two doctor's assistants (DAs), and one pulmonary nurse. For the purpose of this study, only the results of these 13 HCPs will be reported.

Considering the small number of GPs that participated in the focus groups compared to the other professions, we decided to only conduct additional telephone interviews with GPs. A total of 18 GPs were recruited through our professional network as well as e-mails sent directly to GPs who participated in an earlier study on smoking cessation.[9]

Procedure

The focus groups were conducted in May and June 2019 in the cities of Utrecht and Leiden. The telephone interviews were conducted in February and March 2020, just before the COVID-19 pandemic impacted healthcare in the Netherlands. All participants received written information about the study before participation and were informed about the purpose of the study and confidentiality procedures. Participants were informed that participation is voluntary and that participation may be discontinued at any time. The travel expenses of the focus group participants were reimbursed.

The focus groups were led by the first and second author. The first author moderated two focus groups, while the second author made field notes, and vice versa. Both authors were doctoral researchers with a background in health policy (first author) and medicine (second author), and with experience in conducting qualitative research; they had no relationship with the participants prior to study commencement. Before the start of the focus groups, participants were asked to sign an informed consent form. The telephone interviews were conducted by the first author. Interview participants received the informed consent form

beforehand through e-mail and provided verbal informed consent which was recorded at the start of the interview, as approved by the Trimbos Institutional Ethics committee.

Semi-structured focus group and interview guides were used to guide the conversations (see Appendix 1 for the questions). In the focus groups, participants were asked to share their experiences with smoking cessation care and their views on how to improve smoking cessation care in the Netherlands. The 'referral of patients to SCC' was one of the discussed topics. In the interviews, participants were asked why they do or do not refer patients to SCC, and which factors (would) make it easier for them to refer patients to SCC.

The focus groups lasted between 83 and 96 minutes (90 minutes on average) and the telephone interviews lasted between 11 and 23 minutes (15 minutes on average). The focus groups and telephone interviews were recorded and transcribed verbatim. Quotes presented in this article were translated from Dutch to English by the first author.

Ethics

This study was conducted according to the guidelines of the Helsinki Declaration of Good Clinical Research Practice and was approved by the Trimbos Institutional Ethics committee.

Analysis

Qualitative content analysis was conducted after all focus groups and interviews were completed and transcribed, using the software package ATLAS.ti. The first and second author independently coded one randomly selected focus group transcript and two randomly selected interview transcripts, using the topics of the focus group and interview guides (thematic coding). In addition, they applied open coding to capture relevant data. Through discussing their codes, the authors resolved discrepancies in coding and agreed upon new codes and categories (axial coding). The first author coded the remaining transcripts. New codes that emerged were discussed between the two authors (see Appendix 2 for the final codes). Theme saturation was established following analysis of the four focus groups and the first 13 conducted interviews, meaning that analysis of the remaining five interviews did not lead to any new emergent themes.

For the purpose of this study, only the final codes of the HCPs who work in general practice were used to identify factors related to referrals. This included the codes from all 18 interview participants, as well as the 13 focus group participants who work in general practice. Using the final codes, the first author made two overviews: firstly of factors related to in-practice referrals (i.e., referrals to the PN), and secondly of factors related to referrals to counselling outside general practice. The identified factors were continuously compared against the transcripts and adjusted if necessary. The first and second author then independently linked each factor to one of the three main components as well

as the six sub-components of the COM-B behaviour model and resolved most of their discrepancies. Any remaining discrepancies were resolved with the help of the fourth author.

RESULTS

Table 1 presents the characteristics of the participants. Thirty-one HCPs who work in general practice participated, of which 12 were male (39%). The mean age was 51 years (SD 9), the mean professional experience was 16 years (SD 10) and none of the participants smoked. About half of the participants (52%) worked at a practice situated in a large urban area (i.e., a municipality with 1500 or more housing units per square kilometre). All participants indicated that they often ask patients whether they smoke, especially if there is a smoking-related health problem, and usually provide a quit advice to those who smoke.

Table 1. Characteristics of the participants.

Characteristics	**n = 31**
Gender – n (%)	
Male	12 (39)
Female	19 (61)
Age (in years)	
Mean (SD)	51 (9)
Profession – n (%)	
General practitioner	21 (68)
Practice nurse	7 (23)
Doctor's assistant	2 (6)
Pulmonary nurse	1 (3)
Professional experience (in years)	
Mean (SD)	16 (10)
Smoking status – n (%)	
Non-smoker	31 (100)
Smoker	0 (0)
Practice location – n (%)	
Large urban area (1500 or more housing units per km^2)	16 (52)
Small urban or suburban area (1000 to 1500 housing units per km^2)	3 (9)
Rural area (fewer than 1000 housing units per km^2)	12 (39)

SCC organised within general practice

Twenty-nine (out of 31) participants mentioned that patients who want to quit are usually offered individual face-to-face or telephone counselling within their practice. Most participants indicated that they only discuss other types of counselling if patients actively inquire about other options or when counselling within practice is not sufficient (e.g., due to multiple addictions).

The participating PNs, one DA and the pulmonary nurse are all qualified to deliver SCC in their practice. In the practices of the other participating DA and 18 (out of 21) GPs, a qualified PN specialised in somatic care delivers SCC. Seven HCPs mentioned that they sometimes refer patients to their PN specialised in mental health care, mainly when patients experience psychological or psychosocial barriers in quitting.

Three participating GPs mentioned that they do not have a qualified PN in their practice. As a result, two of these GPs always refer to counselling outside the practice; despite the lack of qualification the third GP still offers counselling inside the practice, which is not reimbursed.

Overall, participants were satisfied with the counselling offered in their practice, although they were less positive about the low financial compensation they received for it. Several participants also mentioned that they experience difficulty in counselling certain groups of patients, especially those who are severely addicted to smoking.

> *'I personally have a need for sending patients to addiction care when smoking is really persistent. You can go there for an alcohol or drug addiction, but for some reason smoking is hardly treated there, while quitting smoking is not necessarily easier than quitting alcohol or drugs. (…) I notice that we sometimes get stuck and I think that is a shame. Perhaps those patients could get further with [addiction care].'*
>
> *(P17, GP)*

While patients are typically referred to the PN for counselling, we found that this is not always the case: sometimes GPs decide to offer patients medication and/or behavioural counselling themselves, without referring to the PN. We identified four factors related to referrals inside general practice, presented in Table 2. We linked one factor to the COM-B sub-component 'psychological capability', one factor to 'social opportunity' and two factors to 'physical opportunity'.

Most GPs mentioned that they leave the responsibility with their patients to plan an appointment for SCC.

'[To patients who smoke] I say: "know that the door is open", but I let them take the next step. So when I ask them if they want to quit smoking, and they say "yes I want to", then they need to take the next step to plan an appointment with me or the practice nurse.' (P19, GP)

Several focus group participants remarked that leaving the responsibility with patients often resulted in no-shows. These same participants experienced it works better if HCPs are more directive and take the responsibility to plan a follow-up appointment for their patients.

'For lifestyle issues, the GP now asks patients if they are interested to see me, after which I will call the patients to make an appointment. (…) Before, when they had to make an appointment themselves, they often didn't show up.' (P11, DA)

SCC organised outside general practice

Regarding counselling organised outside general practice, 16 participants mentioned they occasionally refer patients to a commercial organisation (mostly group counselling; two HCPs also referred patients to telephone counselling), an addiction care specialist, or a specialist at the hospital. Referrals to counselling outside general practice are mostly made upon patients' request. All but one of the participants never refer patients to a self-employed coach. Most participants mentioned being open to the idea of referring patients outside general practice, especially to group counselling and addiction care.

Table 3 shows an overview of all the factors related to referrals outside general practice (n=20), each linked to a COM-B sub-component. We identified three factors linked to the sub-component 'psychological capability'; seven factors linked to 'physical opportunity'; two factors linked to 'social opportunity'; five factors linked to 'reflective motivation'; and three factors linked to 'automatic motivation'. The six most mentioned factors were: 1) knowledge of counselling in the region (psychological capability), 2) the actual availability of counselling in the region (physical opportunity), 3) requests from patients to be referred to counselling outside general practice (social opportunity), 4) reimbursement of counselling (physical opportunity), 5) perceptions of the quality of counselling outside general practice (reflective motivation), 6) sense of urgency to refer patients to counselling outside general practice (reflective motivation).

Table 2. Factors related to referrals inside general practice.

COM-B main component	Factor	COM-B sub-component	Examples of quotes	Mentioned by	Source(s)
Capability	HCPs' skills	Psychological capability	*'I'm not very good at conversation techniques and behavioural change, but I am good at delegating, so I like to delegate [those tasks] to the PN.' (P24, GP)*	6 GPs, 1 DA	Focus groups & interviews
Opportunity	Patients' preferences, e.g. some patients only want medication, or only want to be treated by the GP	Social opportunity	*'[There are] people who don't have time for [counselling], who immediately say 'I want Champix'. (…) I give them a prescription because they don't want to be referred [to the PN].' (P14, GP)* *'There are some people who do not like going to a PN because they feel it is better to stay with the GP.' (P29, GP)*	7 GPs	Focus groups & interviews
	HCP's time for counselling	Physical opportunity	*'I always provide counselling, because I have a lot more time for it. The GP does not have time for that.' (P6, PN)* *'I refer 9 out of 10 [patients] to our PN, who then starts the smoking cessation process with them. However, I treat some people myself, especially when I see an opportunity at that moment and I don't want to have a delay. ' (P1, GP)*	5 GPs, 2 PNs	Focus groups & interviews
	Capacity in the practice	Physical opportunity	*'We have 4 PNs in our practice who can all provide counselling. However, two of them are ill at the moment, so I now counsel one patient myself.' (P30, GP)*	1 GP	Interviews
Motivation	-	-	-	-	-

Important to note is that several identified factors can both act as barriers and facilitators (in Table 3 these factors are supported by two quotes). For example, regarding the availability of counselling in the neighbourhood, the absence or lack of counselling in the neighbourhood inhibits referrals, while the presence of counselling in the neighbourhood stimulates HCPs to refer. Overall, barriers were more often mentioned than facilitators.

Table 3. Factors related to referrals outside general practice.

COM-B main component	Factor	COM-B sub-component	Examples of quotes	Mentioned by	Source(s)
Capability	Knowledge of counselling in the region, especially group counselling	Psychological capability	*'I think [group counselling is offered] at the hospital, but I'm not sure. No, group counselling is actually quite unknown to me.' (P23, GP)* *"I don't know anything [about the availability of external counselling. If I did], I would definitely refer [patients]." (P14, GP)*	11 GPs, 2 PNs	Focus groups & interviews
	Ability to convince/ motivate patients to go to counselling outside general practice	Psychological capability	*'If I were to mention [counselling outside the practice], I think there would be a few patients who would say 'doctor, I will do that.' (…) If I were to encourage that, I think I would be able to only motivate a few patients.' (P26, GP)*	2 GPs	Interviews
	Ability to successfully help patients to quit within practice	Psychological capability	*'We refer patients to group counselling when we notice that the individual counselling by our PN doesn't work well.' (P20, GP)*	1 GP, 1 PN	Focus groups & interviews

Table 3. Continued

Opportunity	The actual availability of counselling in the region	Physical opportunity	*'There really is a lack of group counselling. My patients regularly say: 'I would like to do something in a group, to share experiences.' I just can't find out where that is.' (P12, DA)* *'There is no [addiction care] in the neighbourhood. (…) [Otherwise] I would definitely [refer patients there].' (P14, GP)*	9 GPs, 2 PNs, 1 DA	Focus groups & interviews
	Requests from patients to be referred to counselling outside general practice	Social opportunity	*'The main reason I don't mention [counselling outside general practice] is because patients don't ask for it.' (P26, GP)* *'Each year there are a couple of people who say 'I want to go to the smoking cessation outpatient clinic'. (…) They already looked into it beforehand. I don't want to argue with them.' (P18, GP)*	9 GPs	Interviews
	Reimbursement of counselling	Physical opportunity	*'What I especially want is an offer for people who are severely addicted to smoking. (…) You can't send someone to [an addiction care specialist] for a nicotine addiction [only].' (P15, GP)* *'[I] sometimes [refer to counselling outside general practice], especially when patients want to have it reimbursed.' (P21, GP)*	6 GPs, 2 PNs	Focus groups & interviews
	Patient barriers, especially towards group counselling	Social opportunity	*'When you offer group counselling to people, they say 'that might be good for my neighbours, but not for me.' I think the threshold is very high.' (P30, GP)*	5 GPs, 1 PN	Focus groups & interviews

Table 3. Continued

The location of counselling	Physical opportunity	*'[The distance to group counselling] is 12 or 15 kilometres. For some people, that's just too much to bridge when they don't have transportation.' (P20, GP)* *'I think it's good if [group counselling] is neighbourhood-oriented, meaning it's present in the neighbourhood of the patient and patients can easily contact them.' (P24, GP)*	3 GPs	Interviews
Referral system	Physical opportunity	*'Referring to a group should be: I know where a group is and [patients] can sign up there, and there's no administrative hassle. (…) The referral system should be really simple.' (P24, GP)*	2 GPs, 1 PN	Focus groups & interviews
Stability of external counsellors	Physical opportunity	*'I find it a bit inconvenient that [counsellors] are here for a while and there for a while (…) and then they leave again. I think that if they were a bit bigger, they would be more stable.' (P21, GP)*	1 GP	Interviews
Time to look into referral options	Physical opportunity	*'I have never looked into [referral options] before. But that is really because I am not a very motivated GP anymore, and the practice I work at (…) is so crazy busy. I'm stressed out all the time.' (P14, GP)*	1 GP	Interviews
Availability of counselling outside working hours for patients who don't have time during the day	Physical opportunity	*'If [patients] are not able to go [to our PN] during the day, we refer them to [another] general practice for group counselling.' (P11, DA)*	1 DA	Focus groups

Table 3. Continued

Motivation	Sense of urgency to refer patients to counselling outside general practice	Reflective motivation	*'No I don't feel the urge [to refer]. If people want to quit smoking and we can offer help and they think it's fine, then I'm okay with that.' (P24, GP)* *'Look, my PN does a great job but (…) smoking cessation is so important that we have to reach a much larger group [of patients].' (P27, GP)*	7 GPs	Interviews
	Perceptions of the quality of counselling outside general practice	Reflective motivation	*'The problem with self-employed counsellors is: how do you know if someone delivers quality work? (…) If I refer a patient, then I actually want to know if that counsellor is a good one.' (P3, GP)*	5 GPs, 1 PN, 1 DA	Focus groups & interviews
	Preference to keep patients within the practice	Reflective motivation	*'I try to keep [patients] within my own practice, because I then (…) know what happens and can see and monitor them myself.' (P25, GP)*	6 GPs	Interviews
	Personally knowing and trusting a counsellor	Automatic motivation	*'You can have a social map, but if you don't actually know anybody, then you won't refer either.' (P10, PN)* *'I only send people to [counselling outside general practice] when I know who [the counsellor] is, and when I trust [the person]. (…) [It helps] when I have met the person first.' (P15, pulmonary nurse)*	3 GPs, 1 PN, 1 pulmonary nurse	Focus groups & interviews
	Resistance towards commercial counsellors	Automatic motivation	*'I have some resistance towards a commercial party which the patient has to pay for. (…) Commercial coaches need to get money from somewhere, so they treat patients from a commercial point of view, while I as a GP have no commercial interest in someone who quits smoking. ' (P19, GP)*	2 GPs	Interviews

Table 3. Continued

Motivation to look into referral options	Automatic motivation	*'I have never looked into [referral options] before. But that is really because I am not a very motivated GP anymore, and the practice I work at (…) is so crazy busy. I'm stressed out all the time.' (P14, GP)*	1 GP	Interviews
Not wanting to argue with patients	Reflective motivation	*'Each year there are a couple of people who say 'I want to go to the smoking cessation outpatient clinic'. (…) They already looked into it beforehand. I don't want to argue with them.' (P18, GP)*	1 GP	Interviews
Not wanting to miss out on income	Reflective motivation	*'I organized [group counselling] for the whole region, and I had to deal with resistance from colleagues from other practices. They said: "now I am going to miss out on income."' (P27, GP)*	1 GP	Interviews

DISCUSSION

This study identified a multitude of factors which play a role in the referral behaviour of HCPs. Regarding in-practice referrals, factors linked to the COM-B main components 'capability' and 'opportunity' played a role; regarding referrals to counselling outside general practice, factors linked to all three COM-B main components (capability, opportunity and motivation) were found to be relevant.

Interpretation of Findings

Our results seem to be consistent with previous research which suggested that the referral behaviour of HCPs in general practice is associated with patient reimbursement, collaboration agreements between primary HCPs, the awareness and knowledge of (the quality of) local smoking cessation services, and patients' and HCPs' attitudes towards SCC.[9-13] Using the Netherlands as a case study, we propose new factors that may play a role in the referral behaviour of HCPs in general practice, such as the actual availability of counselling in the region, requests from patients, personally knowing counsellors, a sense of urgency to refer, and HCPs' own (perception of) skills and abilities in counselling and referring patients. These factors, especially those related to counselling outside general practice, likely also play a role in other countries where SCC is mostly provided outside general practice.

We found that quite a number of factors were related to whether HCPs refer to counselling outside general practice, while only a few factors were mentioned in relation to in-practice referrals, underlining the importance of distinguishing between these two types of referrals. Moreover, motivational factors appear to play a role in referrals to counselling outside general practice, but not in-practice referrals. A possible explanation is that in-practice referrals take place between two HCPs who already know and trust each other, while referrals to counselling outside general practice are usually made to an unknown counsellor, and therefore factors such as the quality and trustworthiness of the counsellor are considered before such a referral is made.

In addition, most HCPs work in a practice with a PN whom they can refer patients to for individual face-to-face or telephone counselling and whom they are usually satisfied with, thus lowering their need for counselling outside general practice. This may also explain why HCPs appear to be more open towards referring patient to group counselling and addiction care: since PNs typically do not offer group counselling and addiction care within practice, HCPs may feel a greater sense of urgency to refer to these types of counselling.

A notable finding is that the referral behaviour of HCPs appears to be strongly related to their perceptions of what patients do or do not want. These perceptions seem to be partly based on experience: for example, smokers may express negative attitudes towards counselling,[24,25] and may only want medication. On the other hand, HCPs' perceptions also seem to be partly based on assumptions: when patients do not actively request to be referred to a specific type of counselling, many HCPs directly refer to the PN without discussing alternative options. However, an overlooked reason why smokers may not ask for a specific type of counselling, is because they may not be aware of its availability.[24,26] Research suggests that many smokers will accept smoking cessation support if it is actively offered by HCPs.[27] A culture shift is needed in which HCPs actively discuss all options for counselling and explain the benefits of each option, and/or provide a decision aid, to help smokers make an informed choice while stimulating a more positive attitude towards counselling. Ultimately, this will increase decisional quality, patient satisfaction and quit attempts.[28-30]

Implications

Our findings provide a basis for developing and implementing interventions to ensure that more smokers receive behavioural counselling.[14] First, our findings show that Dutch HCPs who work in general practice typically refer smokers who want to quit to individual or telephone counselling within general practice and hardly actively discuss other options for SCC. As a result, patients may not receive the type of SCC which is best suited to their needs. We, therefore, propose that HCPs should be educated about the importance of shared decision making. Moreover, HCPs who prefer to keep patients within their own

practice should be encouraged to offer different types of SCC within their practice, for example by working together with a counsellor who can provide a different type of SCC within the practice.

Second, barriers may exist which make referring difficult or even impossible, resulting in less smokers being reached with SCC. For example, an important barrier is the lack of (knowledge of) referral options for HCPs who want to refer their patients to SCC outside general practice. Primary care organisations may play a role in creating more referral options and informing HCPs about the availability and quality of different options. As a result of the current limitations in face-to-face counselling due to COVID-19, more counsellors are now providing their services at a distance (e.g., through video calls or by telephone). Counselling at a distance may also be a solution for HCPs who work in a region where counselling is hardly available.

Another frequently encountered barrier is the preference of patients to quit without counselling, thus making it impossible for HCPs to refer patients. As long as patients are not convinced of the added value of SCC, the public health impact of improving the referral system will remain limited. Therefore, providing HCPs with training on how to convince patients of the added value of SCC, as well as launching mass media campaigns to inform smokers about the importance and benefits of counselling, may be necessary to improve the utilisation of SCC among smokers.

On a final note, the effect of all abovementioned interventions will remain limited if referral options are not reimbursed by healthcare insurance companies. It is, therefore, imperative that countries implement policies which ensure full reimbursement of SCC by healthcare insurance companies.

Strengths and limitations

To our knowledge, this study was the first exploration of the factors related to referrals to different types of SCC from the perspective of HCPs in general practice. The generalisability of the results is, however, subject to some limitations. First, our results are based on the Dutch smoking cessation infrastructure in which the PN holds a unique position, and may therefore be less applicable to other countries. Nonetheless, as mentioned earlier, some of the challenges presented in this paper likely apply to other countries as well. Researchers interested in studying this topic and comparing countries may find it useful to replicate our approach. Also, countries that wish to adopt a SCC system similar to the Dutch system may use the insights from this study.

Second, our sample of participants mainly included HCPs who are actively involved in smoking cessation care and who do not smoke. Quantitative research may inform whether the identified factors are representative of the larger population of HCPs.

Third, the conversations tended to focus on referrals to counselling outside general practice, since participants were mostly positive about the counselling offered in their own practice. This means we may have missed some factors related to in-practice referrals. Also, we decided to use the COM-B behaviour model in the analysis after the data was collected. This means our questions in the focus group and interviews did not specifically address the three main components of the model, and we may thus have missed some factors. On the other hand, not having a theoretical model at the beginning of the research allowed for an inductive approach during the analysis in which factors were identified which otherwise would have been missed.

Fourth, we included two data collection methods (focus groups and interviews) which both had different sets of questions. This may partly explain why we found several additional factors in the interviews which were not mentioned in the focus groups. Nevertheless, the use of both focus groups and interviews contributed to a more comprehensive understanding of the referral behaviour of HCPs, since we would have missed the additional factors if we had only analysed the focus groups.

Finally, the interviews were conducted a year after the focus groups, which means that societal developments may have impacted some of the findings. As of 2020, more smoking cessation programmes are fully reimbursed, meaning that SCC has become more accessible to patients. Most participants, however, mentioned that they had not noticed any differences in the requests of patients, which shows that the development probably had a minor effect on our results.

Conclusions

The present research identified several new factors which play a role in the referral behaviour of HCPs in general practice with regard to SCC. The findings of this research suggest that more patients can be reached with SCC if implementation interventions focus on equipping HCPs' with the knowledge and skills needed to refer patients; creating more opportunities for HCPs to refer patients; and motivating HCPs to discuss different SCC options with patients.

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Appendix 1 - Focus group and interview guides

Focus group questions

Only the questions relevant for this study are presented here. Demographic questions were asked in a separate questionnaire.

1) What is your profession and to what extent are you involved in smoking cessation care?
2) Who is responsible for smoking cessation care in your general practice?
3) Do you refer patients to other healthcare providers for smoking cessation care?
   a. If yes: What is the referral process like? What are areas for improvement? What are best practices?
4) Are patients referred to you by other healthcare providers for smoking cessation care?
   b. If yes: What is the referral process like? What are areas for improvement? What are best practices?
5) What are your thoughts on the organisation of smoking cessation care in the Netherlands? What are areas for improvement? What are best practices?

Interview questions

1) What is your age?
2) How long have you been working as a general practitioner?
3) Do you smoke?
4) What percentage of your patients do you think smokes?
5) What is the most common socioeconomic status among your patients (high/middle/low)?
6) Recently, smoking cessation has received much attention. Have you noticed any change among your patients?
7) How important is the subject smoking cessation for you on a scale from 1 to 10, and why?
8) How is smoking cessation care organised in your practice?
9) What is your role in smoking cessation care in your practice?
   - What are your actions with regard to patients who smoke and why/when do you take these actions?
   - What kind of support do you offer?
10) Have you been trained to provide smoking cessation care?
11) Do you refer smokers to behavioural counselling?
   - If yes: What kind of behavioural counselling do you refer to and why? Who offers that kind of counselling? What is the referral process like? What are you satisfied or dissatisfied with?
   - If no: Why not? (Or: why do you not refer to a certain type of counselling?)
12) Do you refer patients to alternative therapy?

Additional questions that may be asked if they haven't come up yet:

13) What makes referring easy for you as a general practitioner?
14) What are your thoughts on referring patients to counselling outside general practice?
15) What are your thoughts on the availability of counselling in the region?

Appendix 2 - Final codes

Category	Codes
1. HCP characteristics	1.1 Experience 1.2 Training 1.3 Importance smoking cessation 1.4 Smoking history
2. Current smoking cessation care in practice	2.1 Patient population 2.1.1 Percentage smokers 2.1.2 Socioeconomic status 2.2 Organisation smoking cessation care 2.2.1 Type of counselling 2.3 Addressing the subject 2.4 Advising to quit 2.5 Discussing options 2.5.1 Responsibility patient 2.6 Treating patients 2.6.1 Prescribing medication 2.7 Referring patients 2.7.1 In-practice referrals 2.7.1 External referrals 2.8 Receiving referrals 2.9 Alternative therapy 2.10 Best practices
3. Factors related to referrals	3.1 Availability in region 3.1.1 Knowledge of availability 3.1.2 Contact with counsellors 3.1.3 Group counselling 3.2 Reimbursement 3.2.1 Health insurers 3.2.2 Addiction care 3.3 HCP factors 3.3.1 Added value 3.3.2 Perceptions of counsellors 3.4 Patient factors 3.5 Referral system 3.6 Other
4. Role of HCPs	4.1 Role GP 4.2 Role PN 4.3 Role DA 4.5 Role other primary HCPs 4.6 Role healthcare organisations 4.7 Role external counsellors

CHAPTER

5

Are smokers protected against SARS-CoV-2 infection (COVID-19)? The origins of the myth

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ABSTRACT

A number of recent studies have found low percentages of smokers among COVID-19 patients, causing scientists to conclude that smokers may be protected against SARS-CoV-2 infection. National and international media were interested in this story and we soon began receiving questions about this topic in general practice. In this article we shed light on the process which resulted in the misinterpretation of observational research by scientists and the media. We also point out the methodological flaws of various studies on which hasty conclusions were based. Finally, we address the role of primary healthcare providers in mitigating the consequences of erroneous claims about a protective effect of smoking.

MAIN TEXT

Recently, a number of observational studies found an inverse relationship between smoking and SARS-CoV-2 infection (COVID-19), leading to a (social) media hype, and confusion among scientists and to some extent the medical community. The finding that smoking is not associated with SARS-CoV-2 infection contradicts earlier studies which found that smokers are more vulnerable to infections in general and to respiratory infections in particular. Smoking is known to increase the risk of infection of both bacterial and viral diseases, such as the common cold, influenza, and tuberculosis,[1] and smoking is a putative risk factor for Middle East respiratory syndrome coronavirus (MERS-CoV) infection.[2] Could it be possible that SARS-CoV-2 is the big exception to the rule? To date, there is no strong evidence (i.e., evidence based on causal research) that smokers are protected against SARS-CoV-2 infection. Moreover, there is growing evidence that smokers have worse outcomes after contracting the virus than non-smokers.[3]

If there is no strong evidence that smokers are protected against SARS-CoV-2 infection, how is it possible that such a potentially dangerous claim gained so much attention? Due to the great need for knowledge about COVID-19 and the associated 'publication pressure', several manuscripts were quickly published in peer-reviewed journals without undergoing adequate peer review. Also, many manuscripts did not initially follow the traditional time-consuming peer review process, but were immediately shared online as a preprint. Although scientific discussions could be continued afterwards on the preprint servers, the media and many scientists did not follow these discussions. As a result, studies designed to report correlations within a non-causal framework were quickly picked up via (social) media and presented within a causal framework. We now know that less than 20% of COVID-19 preprints actually received comments.[4] Also, less than 50% of the COVID-19 preprints uploaded in the first few months of the pandemic (January-April) have been published in peer-reviewed journals so far.[5] Both findings emphasize the great caution needed in interpreting (social) media claims of preprint results.

It seems the tobacco industry benefited from the (social) media hype, since exposure to claims about a protective effect of smoking was associated with an increase in tobacco consumption among Chinese citizens during the pandemic.[6] Also in other countries an increase in tobacco consumption among smokers has been reported,[7,8] possibly influenced by this hype. In France, researchers first suggested that nicotine may play a role in protecting smokers,[9] triggering a run on nicotine products among the general public. Interestingly, the lead author of this research has been funded by the tobacco industry in the past, and also other researchers who have made similar claims can be linked with the tobacco industry, indicating a possible conflict of interest. According to the Global Center for Good Governance in Tobacco Control, the tobacco industry was actively involved

in downplaying the role of smoking in COVID-19 by spreading claims that smoking or vaping protects against COVID-19.[10]

So, what research was this claim based on in the first place? In the early months of the COVID-19 pandemic, most studies describing the relationship between smoking and COVID-19 were based on Chinese patient groups.[11-18] These studies, in which smoking status was not a primary exposure of interest, were subsequently brought together in several systematic reviews and meta-analyses.[19-25] Soon after, hospital data from other countries became available too.[26,27] Overall, the findings suggested that smokers were underrepresented among COVID-19 patients based on the prevalence of smoking in the general population. The studies, however, made comparisons without adjusting for a number of factors that are associated with smoking status, such as age, gender, socio-economic status, ethnicity and occupation. The studies also contained other major methodological flaws including incompleteness of data (the majority of the studies had >20% missing data on smoking status[3]), selection bias[28] and misclassification bias[3]. Here we use two examples (one Chinese and one French study) to illustrate the most common problems with these studies.

1) Guan et al. is one of the largest Chinese studies on smoking and COVID-19, with data on 1,590 patients from 575 hospitals across China.[11] Interestingly, the scientists received mostly one patient file per hospital. It is unclear on what grounds these patients were selected for inclusion in the study. Furthermore, 93% of all patients were categorized as: 'smoking status: never/unknown'.[11] According to a peer reviewer of a different study, 'unknown' can be explained by the fact that many patients were too ill to answer the questions about smoking.[29] When we look more closely at specific patient groups in the data, we see that of the 24 included COPD patients, only 3 had ever smoked (12.5%); the other 21 patients are found in the category 'smoking status never/unknown'.[11] This is quite remarkable, considering that smoking is the most important risk factor for COPD, causing up to 80% of all cases.[30] Guan et al. also found an unusually low number of smokers among patients with a cardiovascular or cerebrovascular disease.[11]

2) A university hospital in Paris appears to have collected their data more systematically: they asked 482 COVID-19 patients whether they smoked or had done so in the past, resulting in only nine missing answers.[27] They reported only 5% of current daily smokers in their patient group. But what was left out of the (media) attention was that 32% of patients reported being former smokers, defined as "anyone having smoked in the past, occasionally or daily, and had abstained from smoking prior to COVID-19 onset".[27] This definition allows individuals to have been a smoker the day before development of COVID-19 symptoms. There were more serious limitations of

this study: a relatively small patient group recruited in an affluent neighbourhood with many hospital staff among the patients; exclusion of the most critical cases of COVID-19 (i.e., all COVID-19 patients in the intensive care unit); and no biochemical verification of the self-reported smoking status.[27]

Aside from the methodological issues in these studies, there are more reasons why hospital data is not suitable for determining the risk of SARS-CoV-2 infection among smokers. First, many critically ill COVID-19 patients have severe comorbidities that may exclude them from being admitted to a hospital or intensive care unit. This may, for example, apply to patients with serious cardiovascular and lung diseases, which are often the result of long-term smoking. Second, many smokers have already died of smoking-related illnesses (far) before they reach the age of the average COVID-19 hospital inpatient (around 68 years).[31, 32] And the final and most important reason is that hospital data is collected cross-sectionally (i.e., determining risk factor and disease at the same time). In epidemiology, cross-sectional studies are the weakest form of observational studies. The highest achievable outcome in cross-sectional research is to find a correlation, not causation. Only cohort studies of sufficient size, in which a group of patients is followed over a longer period of time, would be able to determine whether smokers are actually protected against SARS-CoV-2 infection or not.

In the meantime, it is imperative that any myths about smoking and COVID-19 among the general public are expelled, especially considering the growing evidence that smokers have worse outcomes once infected.[3] There is no easy solution to the spread of health misinformation through social media, but primary healthcare providers (HCPs) can play an important role in mitigating its harmful effects. What are some practical steps primary HCPs can take? First, in line with national guidelines, primary HCPs can choose to ask patients about their smoking status during consultations, inform smokers about the dangers of smoking, advise smokers to quit smoking, and offer cessation support to all smokers. As face-to-face cessation support may now be limited, primary HCPs can point out the availability of support at a distance, such as telephone quitlines or eHealth interventions. Second, primary HCPs can inform patients about the harmful relationship between smoking, COVID-19 and other serious illnesses, for example by addressing the issue on their website or on posters/television screens in the waiting room. We encourage HCPs to use the information provided by recognised international organisations such as the WHO. Third, since exposure to health misinformation on social media is more common among youth and young adults,[6] primary HCPs may choose to actively bring up the subject of smoking and COVID-19 in consultations with youth and young adults, and advise non-smokers to never start smoking.

A healthcare provider's advice for smoking cessation has always been very important, but in these COVID-19 times it is more urgent than ever before.

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CHAPTER

6

Risk of death due to COVID-19 among current and former smokers in the Netherlands: a population-based quasi-cohort study

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Revised and resubmitted for publication

CHAPTER

7

The delivery of Ask-Advise-Connect for smoking cessation in Dutch general practice during the COVID-19 pandemic: results of a pre-post implementation study

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ABSTRACT

Background

The Ask-Advise-Connect approach can help primary care providers to increase the number of smokers that attempt to quit smoking and enrol into cessation counselling. The approach has not yet been implemented in general practice in the Netherlands. The aim of this study was to investigate the influence of a comprehensive implementation strategy on the delivery of Ask-Advise-Connect for smoking cessation within Dutch general practice during the COVID-19 pandemic.

Methods

A pre-post study was conducted between late 2020 and early 2022, and included 106 Dutch primary care providers (GPs, practice nurses and doctor's assistants). Participation lasted nine months: during the first three months participants delivered smoking cessation care as usual (pre-intervention); the implementation strategy came into effect after three months and participants were followed up for another six months (post-intervention). The implementation strategy consisted of two meetings in which participants were educated about Ask-Advise-Connect, made agreements on the implementation of Ask-Advise-Connect and reflected on these agreements. Participants also received online educational materials and a desk card as reminder. The changes in the proportions of 'Ask' and 'Advise' over time were modelled using linear mixed effects models. A descriptive analysis was conducted with regard to referrals to cessation counselling.

Results

Participants provided consultations to 29,112 patients (both smokers and non-smokers). Results of the linear mixed effects model show that the proportion of patients that were asked about smoking ('Ask') significantly decreased in the first three months (pre-intervention), but slightly increased again after the implementation strategy came into effect (post-intervention). No significant change over time was found with regard to the proportion of patients advised to quit smoking ('Advise'). Descriptive statistics suggested that more participants proactively (vs. passively) referred patients to cessation counselling post-intervention ('Connect').

Conclusions

The findings indicate that a comprehensive implementation strategy can support primary care providers in offering smoking cessation care to patients, even under stressful COVID-19 conditions. Additional implementation efforts are needed to increase the proportion of patients that receive a quit advice and proactive referral.

INTRODUCTION

Primary care practice, or general practice, is an important setting for promoting tobacco cessation and supporting smokers in their endeavour to quit smoking.[1] The World Health Organization and most national clinical guidelines recommend that primary care providers document the smoking status of patients and offer advice and support to quit smoking to patients who smoke.[1,2] A brief advice from a physician to quit smoking can increase quit rates by as much as 60%.[3] In addition, evidence suggests that the provision of behavioural counselling, pharmacotherapy, and tailored printed materials within the primary care setting contribute to more people who successfully quit smoking.[4]

Previous research has shown that primary care providers in the Netherlands do not routinely implement the clinical guidelines for smoking cessation care in practice.[5-7] Time constraints, (expectations of) low motivation to quit among patients, and the assumed sensitivity of the subject are important barriers which prevent primary care providers from discussing smoking cessation and offering support.[6-8] This is unfortunate as primary care providers can play an important role in stimulating quit attempts and the use of professional support (i.e., behavioural counselling and pharmacotherapy).[3,9] Currently, the majority of European smokers, including those in the Netherlands, have not attempted to quit smoking in the last 12 months.[10] In addition, the majority does not make use of smoking cessation support during a quit attempt.[10] Around 95% of smokers who try to quit smoking without any professional support relapse within one year.[11] Increasing the uptake of smoking cessation support is therefore necessary to increase the number of smokers who successfully achieve abstinence.

In the Netherlands, the general practitioner (GP) is the most consulted healthcare professional, with over two-thirds of Dutch smokers consulting their GP every year.[9] The Dutch clinical guideline for smoking cessation follows the 5A approach, which recommends that GPs **ask** patients about tobacco use, **advise** smokers to quit smoking, and **assess** the willingness to quit among smokers.[12] Only smokers who are motivated to quit are offered **assistance**; preferably behavioural counselling.[12] For patients who smoke more than 10 cigarettes a day a combination of counselling and pharmacotherapy (nicotine replacement therapy or medication) is most effective and therefore recommended. Finally, follow-up is **arranged** for those who accept support.

Typical for the Dutch context is that smokers who accept support are usually referred to the practice nurse (PN) for behavioural counselling. Most Dutch general practices have such a PN.[13,14] However, GPs may also decide to refer patients to counselling outside general practice, for example if the practice is faced with a high workload or if patients want or need a specific type of counselling which is not offered within practice, such as

group counselling or specialized addiction care.[15] Counselling outside general practice is typically reimbursed in the Netherlands, as long as the counselling is evidence-based.

Considering the barriers which primary care providers experience in implementing the guidelines for smoking cessation care,[6-8] alternatives to the 5A approach have been proposed which may offer a more feasible and quicker way of providing smoking cessation care, such as the Ask-Advise-Refer (AAR) approach. This approach limits the tasks of the GP and PN to asking, advising and arranging follow-up.[16] There is some evidence to suggest that leaving out the assessment of motivation and offering support to all smokers, results in more quit attempts.[17]

Another effective approach is the Ask-Advise-Connect (AAC) method, which includes asking patients about tobacco use, advising all smokers to quit smoking, offering evidence-based support to all smokers, and proactively referring smokers to a counsellor.[19] Proactively referring smokers (i.e., ensuring that a patient is directly connected to a counsellor) results in higher enrolment rates compared to passively referring smokers as is done in the AAR approach (i.e., instructing patients to contact a counsellor themselves).[18] A proactive referral can, for example, be provided by forwarding the contact details of the patient to a counsellor who in turn contacts the patient, or by directly scheduling an appointment for the patient with a counsellor. Considering the low quit attempt rates and the low uptake of smoking cessation counselling among Dutch smokers,[9] AAC may be a promising approach to ensure that more smokers attempt to quit smoking and enrol into counselling. AAC has not yet been implemented in Dutch general practice.

Implementing new evidence-based approaches or guidelines in healthcare practice can be challenging, as different barriers may prevent primary care providers from translating guidelines into daily practice.[6-8] In addition, the ongoing COVID-19 pandemic poses new organisational challenges for general practices in the delivery of care, further complicating the translation of guidelines into practice. A comprehensive set of strategies aimed at enhancing the adoption and implementation of evidence-based guidelines may be necessary to successfully implement AAC in Dutch general practice, especially during COVID-19 times.[19] The current study investigated the influence of a comprehensive implementation strategy on the delivery of AAC for smoking cessation within Dutch general practice during the COVID-19 pandemic. We used several strategies which are known to be effective, including educating primary care providers about AAC, facilitating a collaboration in which primary care providers make agreements and reflect on the implementation of AAC, reminding primary care providers to use the new approach, and connecting primary care providers to counsellors outside the practice whom they can refer patients to.[19,20]

METHODS

Design and intervention

From late 2020 to early 2022, we conducted a pre-post study among primary care providers in the Netherlands. We considered Pharmaceutical Therapeutic Audit Meeting (PTAM) groups ('FTO' groups in Dutch) to be a suitable structure for implementing the AAC method. In the Netherlands, most GPs participate in a PTAM group. A PTAM group is a local collaboration with an average of 12 primary care providers (i.e., GPs and pharmacists) per group. Members meet several times per year to discuss and agree on the implementation of clinical guidelines around various topics. Members receive accreditation points for participation.

Before the start of this study, we conducted focus groups with primary care providers to determine which factors may influence the delivery of AAC within general practice.[15] Based on the results and on effective strategies described in literature,[21,22] we developed a comprehensive implementation strategy which consisted of different elements. See Table 1 for an overview of these elements.

With regard to the AAC method, we included the components as described in the literature by Vidrine et al. (i.e., asking patients about tobacco use, advising all smokers to quit smoking, offering evidence-based support to all smokers, and proactively referring smokers to cessation support).[18] We also extended the quit advice to include information on the best way to quit, and based on the patient's interest in counselling we distinguished between 'interested', 'not sure', and 'not interested' with corresponding follow-up answers (see Figure 1).

The duration of study participation was nine months. During the first three months participants delivered smoking cessation care as usual. The AAC method was introduced after three months of participation, during a first PTAM. After six months, participants attended a second PTAM to reflect on the implementation of AAC. Participants were then followed for another three months. See Figure 2 for an overview of the study timeline.

Ask	*"May I ask you something…: do you (still) smoke?"* **If *Yes***		
Advise	*"It would be good for you to quit smoking (given your complaints). If you want to quit, the best way is to receive professional counselling, optionally combined with medication. Are you interested?"*		
Connect	***Yes***	***Not sure***	***No***
	Discuss all options for counselling and let the patient choose *"May I share your contact details with the counsellor so that they can contact you to make an appointment?"* Ensure a warm transfer and check the progress	*"I would like to see you again/ put you in touch with our practice nurse to further discuss this. Are you okay with that?"* Schedule a follow-up meeting to increase the patient's motivation	*"You can always come back for counselling if you change your mind."* Keep checking the patient's smoking status yearly

Figure 1. Ask-Advise-Connect desk card.

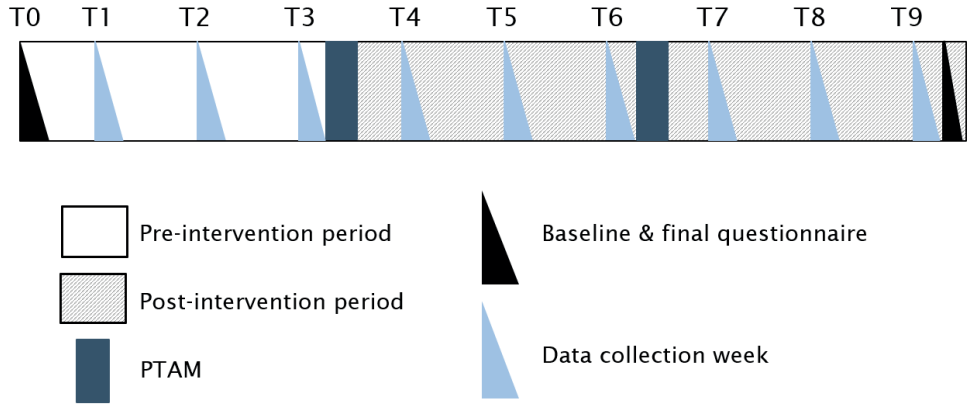

Figure 2. Study timeline.

Table 1. Elements of the Ask-Advise-Connect implementation strategy.

Element	Description	Corresponding strategy from literature [19,20]	Definition of strategy
First PTAM	During the first PTAM[a] (either on location or online), participants learned about the AAC method and made agreements about the implementation of the new method in practice (the agreements specified when, how and by whom AAC would be delivered in practice). Participants were also informed about different options for smoking cessation counselling and, if possible, introduced to a local counsellor outside the practice. The first PTAM was facilitated by a trained employee of the Dutch Institute for Rational Use of Medicine.	Conduct educational meetings	"Hold meetings targeted toward different stakeholder groups to teach them about the clinical innovation."
		Create a learning collaborative	"Facilitate the formation of groups of providers or provider organizations and foster a collaborative learning environment to improve implementation of the clinical innovation."
		Engage community resources	"Connect practices and their patients to community resources outside the practice."
Desk card	During the first PTAM, participants received a desk card which describes the AAC method (see Figure 1).	Remind clinician	"Develop reminder systems designed to help clinicians to recall information and/or prompt them to use the clinical innovation."
E-toolkit	After the first PTAM, participants received access to an online toolkit in which more information can be found about the AAC method.	Distribute educational materials	"Distribute educational materials (including guidelines, manuals, and toolkits) in person, by mail, and/or electronically."
Second PTAM	Three months after the first PTAM, a second meeting was organized in which participants reflected on the previously made agreements and discussed best practices and possible solutions to encountered barriers. Aggregated data on Ask and Advise of T1-T3 versus T3-T6 was presented, except for in one PTAM group where not enough data was collected on Ask and Advise. The second PTAM was facilitated by one of the study researchers.	Organize clinician implementation team meetings	"Develop and support teams of clinicians who are implementing the innovation and give them protected time to reflect on the implementation effort, share lessons learned, and support one another's learning."
		Audit and provide feedback	"Collect and summarize clinical performance data over a specified time period and give it to clinicians and administrators to monitor, evaluate, and modify provider behaviour."
Document 'tips for barriers'	After the second PTAM, participants received an online document with an overview of the most frequently mentioned barriers and tips on how to overcome these barriers.	Distribute educational materials	"Distribute educational materials (including guidelines, manuals, and toolkits) in person, by mail, and/or electronically."

[a] PTAM = Pharmaceutical Therapeutic Audit Meeting

Participants and recruitment

Eligible participants were employed in general practice as a GP, PN or doctor's assistant (DA). We recruited PTAM groups which consisted of GPs and pharmacists, and asked the GPs to invite their PN and/or DA to enrol in the study as well. Different recruitment channels were used: newsletters directed at PTAM groups (through the Dutch Institute for Rational Use of Medicine, i.e., the organization which facilitates PTAM groups), newsletters of professional associations, e-mails sent directly to care groups throughout the Netherlands (in Dutch 'zorggroepen'; these are management organisations which coordinate chain-based care for chronically ill patients), e-mails sent directly to contact persons of PTAM groups which participated in earlier research projects of the Dutch Institute for Rational Use of Medicine, e-mails sent directly to GPs working within two regions via two primary care research networks, and e-mails sent directly to practitioners who participated in an earlier study on implementation of smoking cessation care.[7]

Procedure and data collection

Participants received information on the study procedure, data protection and the anonymisation of research data. Subsequently, written informed consent was obtained from each participant before inclusion in the study. Participation was completely voluntary; participants were allowed to withdraw from the study at any time. During the study several variables were measured, of which those included in the current analyses are described below.

Main outcomes

Participants were asked to keep track of how many patients consulted them, how many patients they asked about smoking, how many smokers they advised to quit smoking, and how many smokers they referred to smoking cessation counselling. This data was collected during one week each month for the total duration of the study (resulting in nine timepoints T1-T9). The numbers were recorded in paper booklets. With regard to referrals, we also asked participants to note how they referred patients and whom they referred patients to. At the end of each data collection week, participants received an online questionnaire in which they could report their numbers and notes based on the booklet.

Baseline characteristics and evaluation

Participants also received additional online questionnaires: (i) a questionnaire at baseline to assess participant characteristics (e.g., age, profession, smoking status) and characteristics related to practice (e.g., socioeconomic position of patients, type of smoking cessation counselling offered in practice, number of referral options and interest in additional referral options, influence of COVID-19 on smoking cessation care); (ii) a questionnaire at the end of the study to evaluate AAC and assess effects of study participation on implementation

of smoking cessation care (e.g., "As a result of this study I make sure to ask patients without smoking-related complaints about smoking").

At the end of the study, participants received €50. We also distributed €500 (3x) and €1000 (1x) among those who completed all questionnaires.

Statistical analysis

Statistical analysis was performed using IBM SPSS v27. Based on the self-reported data of the participants, we calculated for each timepoint (T1-T9) the proportion of patients that were asked about smoking ('Ask') and the proportion of patients that were advised to quit ('Advise'). The changes in the proportions of 'Ask' and 'Advise' over time were modelled using linear mixed effects models. Model 1 included time (T1-T9) and intervention (pre-post) as fixed effects, and individual participants and PTAM groups as random effects. Model 2 additionally included an interaction term between time and intervention, and profession (GP vs. PN/DA) and negative influence of COVID-19 at baseline (no vs. yes) as fixed effects. We only included participants with data on at least one timepoint before the intervention (T1-T3) and at least one timepoint after the intervention (T4-T9).

We conducted a descriptive analysis with regard to referrals to smoking cessation counselling, because the numbers were too small to conduct a linear mixed effects analysis. We first determined, based on the self-reported data, whether participants had passively or proactively referred their patients at each timepoint, and also whether participants had referred patients internally or externally (i.e., inside or outside the practice). We then calculated for each participant which part of their referred patients (i.e., none/minority/half/majority/all) had been referred proactively (vs. passively) and externally (vs. internally) before (T1-T3) and after (T4-T9) introduction of the intervention. Using the final questionnaire, we also conducted a descriptive analysis with regard to self-reported effects of study participation on implementation of smoking cessation care.

Ethics

The study was cleared for ethics by a local Medical Research Ethics Committee in the Netherlands (METC LDD), as the study was not considered to be subject to the Medical Research Involving Human Subjects Act (WMO). The study was conducted in line with the declaration of Helsinki and applicable laws on privacy.

RESULTS

Ten PTAM groups with a total of 106 participants were included in the study. Participant characteristics are presented in Table 2. Most participants were female (81.9%), non-smoker (98.1%), and worked as a GP (60.0%). A small majority had previously received training in smoking cessation care (56.2%). All participants worked in a general practice which offered smoking cessation counselling, mostly individual counselling (99.0%) and telephone counselling (95.2%). At baseline, the majority of participants indicated that they would appreciate to have an additional referral option to smoking cessation counselling offered outside their practice (77.1%). At baseline, 40.0% reported that COVID-19 negatively influenced smoking cessation care within their practice.

Table 2. Characteristics of the participants and their general practice at baseline (N = 105).[a]

Variable	Category	n (%) / mean (SD)
Age		45.3 (9.2)
Gender	Male	19 (18.1)
	Female	86 (81.9)
Profession	General practitioner	63 (60.0)
	Practice nurse	36 (34.3)
	Doctor's assistant	6 (5.7)
Smoking status	Smoker	2 (1.9)
	Non-smoker	103 (98.1)
Type of practice	Solo practice	17 (16.2)
	Duo practice	37 (35.2)
	Group practice	51 (48.6)
Socioeconomic position of patients	Mostly low	6 (5.7)
	Mostly middle	36 (34.3)
	Mostly high	4 (3.8)
	Mixed	52 (49.5)
	Don't know	7 (6.7)
Received training in smoking cessation care	Yes	59 (56.2)
	No	46 (43.8)
Uses smoking cessation guideline with smokers	Never	44 (41.9)
	Sometimes	33 (31.4)
	Often	19 (18.1)
	(Almost) always	9 (8.6)
Attention in practice for smoking cessation	Almost no attention	3 (2.9)
	Some attention	58 (55.2)
	A lot of attention	44 (41.9)
Type of smoking cessation counselling offered within practice (multiple answers possible)	Individual counselling	104 (99.0)
	Group counselling	16 (15.2)
	Telephone counselling	100 (95.2)
Number of referral options for smoking cessation counselling [b]		2.0 (1.2)
Would appreciate additional referral option outside practice for smoking cessation counselling	Yes	81 (77.1)
	No	24 (22.9)
Smoking cessation care negatively influenced by COVID-19 [c]	Yes	42 (40.0)
	No	63 (60.0)

[a] While 106 participants were included in the study, one participant did not complete the baseline questionnaire and therefore only the characteristics of 105 participants are presented here.

[b] One participant who reported '99' referral options was excluded.

[c] We asked participants to describe the influence of COVID-19 on smoking cessation care, and categorised their answers into 'negative influence' versus 'other' (i.e., 'positive/mixed/no/unclear influence').

Table 3. Differences in baseline characteristics between participants included in the analysis and participants not included in the analysis.

Variable	Category	Included in analysis (n=83)	Not included in analysis (n=22)[a]
Age		45.4 (9.1)	45.0 (9.9)
Gender	Male	8 (9.6)	11 (50.0)*
	Female	75 (90.4)	11 (50.0)
Profession	General practitioner	45 (54.2)	18 (81.8)*
	Practice nurse	35 (42.2)	1 (4.5)
	Doctor's assistant	3 (3.6)	3 (13.6)
Smoking status	Smoker	0 (0.0)	2 (9.1)*
	Non-smoker	83 (100.0)	20 (90.9)
Type of practice	Solo practice	12 (14.5)	5 (22.7)
	Duo practice	30 (36.1)	7 (31.8)
	Group practice	41 (49.4)	10 (45.5)
Socioeconomic status of patients	Mostly low	5 (6.0)	1 (4.5)
	Mostly middle	28 (33.7)	8 (36.4)
	Mostly high	4 (4.8)	0 (0.0)
	Mixed	40 (48.2)	12 (54.5)
	Don't know	6 (7.2)	1 (4.5)
SCC training	Yes	50 (60.2)	9 (40.9)
	No	33 (39.8)	13 (59.1)
Use of SCC guideline with smokers	Never	32 (38.6)	12 (54.5)
	Sometimes	25 (30.1)	8 (36.4)
	Often	17 (20.5)	2 (9.1)
	(Almost) always	9 (10.8)	0 (0.0)
Attention in practice for smoking cessation	Almost no attention	2 (2.4)	1 (4.5)
	Some attention	45 (54.2)	13 (59.1)
	A lot of attention	36 (43.4)	8 (36.4)
Type of smoking cessation counselling offered within practice	Individual counselling	83 (100.0)	21 (95.5)
	Group counselling	12 (14.5)	4 (18.2)
	Telephone counselling	80 (96.4)	20 (90.9)
Number of referral options for smoking cessation counselling		2.1 (1.1)	1.8 (1.5)
Would appreciate additional referral option outside practice for smoking cessation counselling	Yes	66 (79.5)	15 (68.2)
	No	17 (20.5)	7 (31.8)

[a] Officially 23 participants were excluded from the linear mixed effects models, but one participant did not complete the baseline questionnaire and therefore only the characteristics of 22 participants are presented here.

*Chi-square test showed significant difference ($p<0.05$).

Ask and Advise

A total of 83 participants were included in the linear mixed effects models, as 23 participants did not report enough data to be included in the analyses. The group that was excluded from the analyses consisted of more men, GPs (vs. PN/DA) and smokers (vs. non-smokers) compared to the group that was included in the analyses, as shown in Table 3.

The 83 included participants provided consultations to a total of 29,112 patients (both smokers and non-smokers) during the entire study (10,427 patients before intervention, and 18,685 patients after intervention). Figure 3 shows the unadjusted proportions over time of patients asked about smoking, advised to quit, and referred to behavioural counselling. Most patients were asked about smoking at timepoint T1, and advised to quit smoking at timepoint T8. Results of the linear mixed effects models are presented in Table 4. The results of the fully adjusted model show that the proportion of patients that were asked about smoking ('Ask') significantly decreased with 0.049 (equivalent to roughly 5%) per timepoint between T1 and T3 ($p<0.001$). The significant interaction effect between 'Time' and 'Intervention' shows that 'Ask' did not further decrease after T4, but slightly increased again with a difference of 0.005 (equivalent to 0.5%) per timepoint between T4 and T9 ($p<0.001$). With regard to 'Advise' we found no significant change over time in both models.

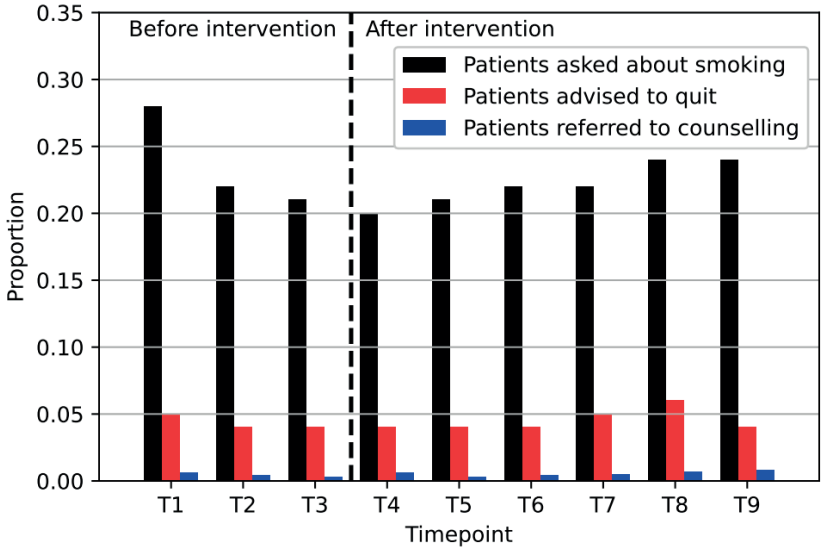

Figure 3. Unadjusted proportions over time of patients asked about smoking, advised to quit, and referred to behavioural counselling (n=83).

Table 4. Results of the linear mixed effects models (N = 83).

	Ask				***Advise***			
	Model 1		***Model 2***		***Model 1***		***Model 2***	
Model components	**Estimate**	**SE**	**Estimate**	**SE**	**Estimate**	**SE**	**Estimate**	**SE**
Intercept	0.338*	0.041	0.063	0.126	0.061*	0.009	0.006	0.030
Time (T1-T9)	-0.002	0.004	-0.049*	0.010	0.002	0.002	-0.001	0.006
Intervention (pre vs. post)	-0.011	0.020	-0.148*	0.035	-0.013	0.010	-0.021	0.019
Time x Intervention			0.054*	0.011			0.003	0.006
Profession (GP vs. PN/DA)			0.288*	0.052			0.055*	0.011
Negative influence COVID-19 at baseline (no vs. yes)			-0.038	0.054			-0.013	0.012

* $p<0.001$

Referrals

During the entire study, 41 participants referred a total of 147 patients to smoking cessation counselling. Descriptive statistics suggested that more proactive (vs. passive) referrals and more external (vs. internal) referrals took place after the intervention was introduced. Specifically, before the intervention 63.2% of participants proactively referred all interested patients to counselling. After the intervention, 76.7% of participants proactively referred their patients to counselling: 60.0% referred all patients proactively; 16.7% referred the minority, half or majority of their patients proactively. Also, before the intervention 13.6% of the participants referred their patients to counselling outside the practice (9.1% referred all patients externally, 4.5% referred half of their patients externally); this was 41.2% after the intervention (26.5% referred all patients externally, 2.9% referred a minority of their patients externally, 11.8% referred a majority of their patients externally).

Other effects

A total of 65 participants completed the final questionnaire. Table 5 shows that the majority of these participants reported effects of study participation on the implementation of smoking cessation care. Participants mostly reported that the study convinced them of the added value of proactive referral of smokers (78.5%) and that they now know what the regional and/or national possibilities are for smoking cessation counselling (70.8%). These effects seemed more pronounced among GPs compared to PNs/DAs.

Table 5. Self-reported effects of study participation on implementation of smoking cessation care based on the last questionnaire (n=65).

Effect	**Yes – n (%)**			**No, and this was also not the case before participating in this study – n (%)**			**No, but this was already the case before participating in this study – n (%)**		
"As a result of this study I…	Total	GP	PN/DA	Total	GP	PN/DA	Total	GP	PN/DA
…make sure to ask patients without smoking-related complaints about smoking."	33 ***(50.8)***	19 ***(57.6)***	14 (43.8)	13 (20.0)	8 (24.2)	5 (15.6)	19 (29.2)	6 (18.2)	13 (40.6)
…make sure to give smokers a quit advice regardless of their motivation."	40 ***(61.5)***	24 ***(72.7)***	16 ***(50.0)***	7 (10.8)	3 (9.1)	4 (12.5)	18 (27.7)	6 (18.2)	12 (37.5)
…make sure to mention in the quit advice that counselling is the best way to quit smoking."	42 ***(64.6)***	24 ***(72.7)***	18 ***(56.3)***	6 (9.2)	2 (6.1)	4 (12.5)	17 (26.2)	7 (21.2)	10 (31.3)
…make sure to discuss different types of behavioural counselling with patients who want to quit smoking."	33 ***(50.8)***	16 (48.5)	17 ***(51.3)***	12 (18.5)	9 (27.3)	3 (9.4)	20 (30.8)	8 (24.2)	12 (37.5)
…know what the regional and/or national possibilities are for smoking cessation counselling."	46 ***(70.8)***	24 ***(72.7)***	22 ***(68.8)***	7 (10.8)	3 (9.1)	4 (12.5)	12 (18.5)	6 (18.2)	6 (18.8)
…am convinced of the added value of proactive referral of smokers."	51 ***(78.5)***	26 ***(78.8)***	25 ***(78.1)***	5 (7.7)	3 (9.1)	2 (6.3)	9 (13.8)	4 (12.1)	5 (15.6)

Note. Data were collected among 33 GPs and 32 PNs/DAs. Percentages over 50% are printed in bold.

DISCUSSION

Main findings

To our knowledge, this was the first study that investigated the influence of a comprehensive implementation strategy on the delivery of AAC within general practice during the COVID-19 pandemic. During the entire study, consultations were provided to 29,112 patients by 83 participants. The findings of this study show that the implementation strategy resulted in more patients being asked about smoking ('Ask'). We observed an increase in the proportion of participants that proactively and externally referred their patients during the intervention period. Participants also reported positive effects of participating in the study, such as improved knowledge of the possibilities for smoking cessation counselling. The implementation strategy did not result in more patients being advised to quit smoking ('Advise').

Interpretation of the findings

Our AAC implementation strategy consisted of different components, of which the main components were the two PTAMs in which participants were educated about the AAC method, made agreements on the implementation of AAC and reflected on these agreements. Previous research found that educational programs can be effective in helping primary care providers to identify smokers and offer advice and support.[21] Educational programs are especially effective when they actively engage primary care providers with the information they receive by providing a support tool, such as a physical card with information or an online toolkit, which we also provided to our participants.[22] A study conducted among Dutch GPs also found that formulating an action plan which states when, how, and by whom patients will be asked about smoking positively influenced GPs' asking patients about smoking.[23]

Our study shows that the implementation strategy was successful in two ways. First, we found that the proportion of participants that proactively referred a part of their patients increased with 13.5% after the intervention. Assuming that 17.6 times more proactively referred patients enrol in treatment compared to passively referred patients,[18] our implementation strategy translated into roughly 5% more patients who enrolled into counselling during the COVID-19 pandemic. Considering the challenges faced by general practices during the COVID-19 pandemic,[25] it is a positive finding that more participants were able to proactively refer a part of their patients. It is, however, important to note that the estimated impact would have been much greater (i.e., around 20% more patients enrolled into counselling) if participants had proactively referred all of their patients. Future implementation efforts should focus on increasing the proportion of patients that are proactively referred, for example by including prompts in the electronic health record or by providing performance feedback reports. Second, our results show that

participants more often referred their patients to an external counsellor as a result of our implementation strategy. These are positive findings as most participants indicated that they would appreciate an extra referral option for patients who want to quit smoking. Especially during times in which general practices are faced with a high workload, being able to refer patients to an external counsellor ensures that patients receive cessation support while relieving the burden on healthcare providers within primary care.

Only two other studies have previously assessed the impact of an implementation strategy on the provision of AAC. One study conducted in primary care found that a comprehensive AAC implementation strategy consisting of training, performance feedback reports and the incorporation of an e-referral functionality in the electronic health record, resulted in more patients being asked about smoking and more smokers being advised to quit and connected to cessation support.[26] However, another study conducted in a Dutch university hospital found that an AAC implementation strategy consisting of education and reminders through text messages did not result in more patients being asked about smoking or more smokers being connected to a smoking cessation program.[27] According to the researchers the lack of an effect could be explained by other priorities and time pressure on the healthcare providers.[27]

Considering the evidence in the literature, it is surprising that our comprehensive implementation strategy had a small positive effect on 'Ask' and no significant effect on 'Advise'. Notably, most patients were asked about smoking at the beginning of the study, indicating that study participation may have been an intervention in itself. Although the proportion of 'Ask' sharply declined after timepoint T1, and significantly increased again after the implementation strategy was introduced, the level of 'Ask' displayed at timepoint T1 was not achieved again later in the study.

There may be several explanations for the modest effects we found. First, even though the need for providing smoking cessation support increased during the pandemic due to the fact that smokers face worse outcomes once infected with COVID-19,[28] we noticed that the COVID-19 pandemic adversely influenced the provision of smoking cessation care by our participants. In the questionnaires as well as the PTAMs, participants indicated that it was more difficult to discuss smoking with patients due to the telephone/online consultations and shifted priorities resulting from the COVID-19 pandemic. Also, several participants indicated that they experienced difficulty in staying engaged with the study as they did not have enough time to record notes in the paper booklet.

Second, the desk card we provided to physically remind participants of AAC may not have been sufficient, as desk cards may be easily discarded. Reminders built into the electronic health record may be necessary to enhance the implementation of AAC in general practice.

Third, several participants indicated during the second PTAM that most patients are not yet sure about quitting smoking, and as such cannot directly be referred to counselling. These patients are often first referred to the PN for one or more motivational conversations, and are later on referred to counselling once they are motivated to quit. Therefore, the low number of referrals which we found may be an underestimation.

And finally, many participants, especially PNs, already quite actively provided smoking cessation care before participating in the study. Several participants indicated in the PTAMs that they already knew the smoking status of many of their patients or had already provided a quit advice in the previous year, and therefore did not bring up the subject again. Also, the descriptive results showed that the majority of participants already proactively referred their patients before the intervention. As such, selection bias in our sample of participants likely limited the extent to which improvements could be made in the delivery of AAC. We assume that, following nationwide rollout of the intervention, larger effects will be found among primary care providers who are less actively involved in providing smoking cessation care. We, however, also expect such primary care providers to be less inclined to receive the intervention in their PTAM groups. Thus, additional efforts may be needed to motivate primary care providers to address smoking cessation care in their PTAM groups.

Limitations

A few limitations of this study must be addressed. First, it was not possible to extract the data from the electronic health record since our variables of interest are not routinely recorded in the system. As such, findings are based on self-report. It is possible that the recording of notes in the paper booklet may have made participants more aware of the care they provide and may have thus resulted in them more often providing smoking cessation care (Hawthorne effect).[29] However, in view of the stressful conditions under which primary care providers worked during the COVID-19 pandemic,[25] it is also likely that participants forgot or did not have enough time to record how often they asked patients about tobacco use, advised smokers to quit and referred smokers to counselling. We are therefore unsure whether data reported by the participants truly reflects what took place during a patient's visit. However, this potential bias is likely to be the same before and after the intervention, such that results for differences should not be affected.

Second, we could not determine the proportion of smokers that received a quit advice, because that would require knowing the smoking status of all patients, which typically is not the case in Dutch primary care. Therefore we could only compare proportions of all patients that received a quit advice before and after the intervention, which is sufficient to determine whether 'Advise' changed over time (assuming that the smoking prevalence did not change over time).

Third, we were unable to statistically compare the proportion of referrals before and after intervention as the numbers of referrals were too low. Ideally, data should have been collected during the entire study. However, this was not possible as the burden of data collection would have been too high for many participants resulting in higher attrition rates. Fourth, although we collected data over nine months, we could not assess the sustainability of the intervention in the long term. This should be the topic of further research.

Finally, we encountered difficulty in recruiting participants during the COVID-19 outbreak. We initially planned on conducting a stepped wedge cluster randomized trial, but were unable to recruit enough participants and therefore had to resort to a pre-post design which is associated with lower internal validity. On the other hand, switching to a simpler and more flexible design contributed to the feasibility of the study and thus the generalizability of the findings.

Conclusions

Our findings indicate that a comprehensive implementation strategy can support primary care providers in offering smoking cessation care to patients, even under stressful COVID-19 conditions. The implementation strategy has the potential to increase the number of primary care providers who proactively refer patients to cessation counselling, which in turn would result in more smokers enrolling into treatment and ultimately quitting smoking. Additional implementation efforts are needed to increase the proportion of patients who receive a quit advice and proactive referral, for example by embedding reminders in the electronic health record. Further research should be undertaken to determine what is needed to sustain the implementation of AAC in the long term.

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CHAPTER

8

Implementation of Ask-Advise-Connect for smoking cessation in Dutch general practice during the COVID-19 pandemic: a mixed-methods evaluation using the CFIR framework

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ABSTRACT

Background

The Ask-Advise-Connect (AAC) approach can help primary care providers to increase the number of people who attempt to quit smoking and enrol into cessation counselling. We implemented AAC in Dutch general practice during the COVID-19 pandemic. In this study we describe how AAC was received in Dutch general practice and assess which factors played a role in the implementation.

Methods

A mixed-methods approach was used to evaluate the implementation of AAC. Implementation took place between late 2020 and early 2022 among 106 Dutch primary care providers (general practitioners (GPs), practice nurses and doctor's assistants). Quantitative and qualitative data were collected through four online questionnaires. A descriptive analysis was conducted on the quantitative data. The qualitative data (consisting of answers to open-ended questions) were inductively analysed using axial codes. The Consolidated Framework for Implementation Research was used to structure and interpret findings.

Results

During the study, most participants felt motivated (84-92%) and able (80-94%) to apply AAC. At the end of the study, most participants reported that the AAC approach is easy to apply (89%) and provides advantages (74%). Routine implementation of the approach was, however, experienced to be difficult. More GPs (30-48%) experienced barriers in the implementation compared to practice nurses and doctor's assistants (7-9%). The qualitative analysis showed that especially external factors, such as a lack of time or priority to discuss smoking due to the COVID-19 pandemic, negatively influenced implementation of AAC.

Conclusions

Although AAC was mostly positively received in Dutch general practice, implementation turned out to be challenging, especially for GPs. Lack of time to discuss smoking was a major barrier in the implementation. Future efforts should focus on providing additional implementation support to GPs, for example with the use of e-health.

INTRODUCTION

Each year, smoking tobacco accounts for approximately 7.7 million deaths and 200 million disability-adjusted life-years worldwide.[1] Stimulating people to quit smoking and offering assistance in quitting is necessary to reduce the high mortality and morbidity of smoking-related disease.[2] The importance of smoking cessation has recently received more attention due to the evidence that people who smoke have an increased risk of developing severe COVID-19.[3] Quitting smoking has, however, been challenging for many people during the COVID-19 pandemic. While some people who smoke decreased their tobacco use during the COVID-19 pandemic, others maintained or even increased their use of tobacco.[4] Research also found that fewer people tried to quit smoking during the pandemic and that people who smoke were less successful at quitting compared to before the pandemic.[5,6] These findings emphasize the need for efforts to increase successful quit attempts, especially in turbulent times, such as the COVID-19 pandemic.

A quit attempt is most likely to be successful when evidence-based cessation assistance is used, such as behavioural counselling and pharmacotherapy.[7,8] Healthcare professionals can play an important role in identifying patients who smoke, stimulating quit attempts and increasing the use of evidence-based support. They can do this by providing a quit advice and offering assistance to all patients who smoke,[9] and by proactively referring motivated patients to a smoking cessation program.[10] Proactively referring patients means that healthcare professionals actively connect the patient to a cessation program, for example by directly scheduling an appointment for the patient with a counsellor or by forwarding the patient's contact details to a cessation program which in turn contacts the patient. Proactive referrals result in higher treatment enrolment rates compared to passive referrals, which require patients to contact a counsellor or cessation program on their own.[10]

The Ask-Advise-Connect (AAC) approach is a brief and effective method which includes the abovementioned steps (i.e., asking patients about tobacco use, advising all patients who smoke to quit, and proactively referring patients who smoke to counselling).[11] Although the feasibility and effectiveness of AAC has already been studied in several healthcare settings,[11-15] only a few studies have investigated which strategies are needed to successfully implement AAC in practice.[16,17] Specifically in stressful times, a comprehensive implementation strategy may be needed to implement AAC in practice.

We implemented AAC for smoking cessation within Dutch general practice during the COVID-19 pandemic by using a comprehensive implementation strategy (described in the 'Methods' section). Originally, AAC was designed to directly connect patients to cessation treatment of telephone quitlines through an automated link within the electronic health

record (EHR).[11] In the Netherlands, however, public telephone quitlines for cessation treatment do not exist. Instead general practice plays a central role in providing smoking cessation care to patients. As of 2019, indicated prevention is officially seen as a 'core task' of the Dutch general practitioner (GP).[18] This means that GPs are responsible for discussing risk factors such as smoking with patients and preventing (complications of) chronic diseases among patients by offering support to quit. As GPs often do not have enough time to provide smoking cessation counselling themselves, they typically delegate this task to a trained practice nurse (PN) or doctor's assistant (DA) who works under supervision of the GP.[19] Patients can also be referred to a cessation program outside general practice, for example if more specialised addiction care is required or if the patient wants to receive group therapy. In 2022, 18.9% of the adult population in the Netherlands smoked, and each year only around 5% receives cessation counselling when attempting to quit smoking.[20,21] Therefore, implementing AAC within Dutch general practice may help to ensure that more people who smoke enrol into cessation counselling.

The present study describes how AAC was received in Dutch general practice during the COVID-19 pandemic and assesses which factors played a role in the implementation. We used the Consolidated Framework for Implementation Research (CFIR) to guide the assessment.[22] CFIR is one of the most commonly used frameworks in implementation science, and can be used to assess contextual factors which influence implementation.[22] CFIR provides an overview of 48 constructs organized into five domains: innovation (i.e., attributes of AAC, for example its perceived ease of use and advantages), outer setting (i.e., the social and political context in which AAC is implemented), inner setting (i.e., aspects of the organisation in which AAC is implemented), characteristics of individuals involved (i.e., the needs, capabilities, motivation, and opportunities of the primary care providers who implement AAC), and the implementation process (i.e., approaches used in different stages to implement AAC, and their outcomes).[22]

METHODS

Study design and participants

We used a mixed-methods approach to describe how AAC was received in general practice and assess which factors played a role in the implementation of AAC. The implementation of AAC among 106 Dutch primary care providers took place within the context of a pre-post study between late 2020 and early 2022. Participants were employed in general practice as a GP, PN or DA, and all voluntarily participated in a Pharmaceutical Therapeutic Audit Meeting (PTAM) group (in Dutch: 'FTO' group). PTAM groups are existing local collaborations of around 12 primary care providers, and these groups come together

several times per year to discuss and agree on the implementation of various clinical guidelines.

We approached primary care providers for participation through different recruitment channels, such as newsletters directed at PTAM groups, e-mails sent directly to contact persons of PTAM groups, and newsletters of professional associations. PTAM groups interested in participating first received information on the study procedure, data protection and data anonymisation. Each participant of a PTAM group then signed informed consent before inclusion in the study. The first PTAM group enrolled into the study late 2020. We continued recruiting PTAM groups until mid-2021. For the pre-post study design, it was not necessary for all PTAM groups to begin at the same time.

Study participation lasted nine months. Participants first delivered smoking cessation care as usual (pre-implementation). We developed a comprehensive implementation strategy which came into effect after three months of participation. During a first PTAM, participants were educated about AAC and made agreements on the delivery of AAC. Participants also received a desk card as a physical reminder, and access to online educational materials. Participants reflected on the implementation of AAC during a second PTAM after six months of participation. Study participation ended after nine months. At the end of the study, all participants received €50.

Data collection and measures

Quantitative and qualitative data were collected during the nine months of study participation. For the current study, we used notes on the experiences of participants with implementing AAC which were taken during the two PTAMs by the first author. We also used the self-reported quantitative and qualitative data that were collected through four online questionnaires: a baseline questionnaire was sent to the participants at the beginning of the study (Q1), followed by questionnaires after the first and second PTAM (Q2 and Q3), and a final questionnaire at the end of the study (Q4). Figure 1 shows the timeline of the study, including how many participants completed each questionnaire.

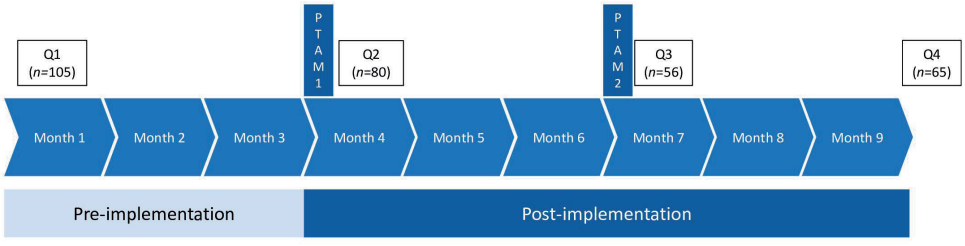

Figure 1. Timeline of the study, including the number of participants per questionnaire

The questionnaires included questions about smoking cessation care in general and the perceived influence of COVID-19, as well as perceptions of AAC and participants' experiences with applying the AAC approach. All four questionnaires included both closed-ended and open-ended questions. Open-ended questions were answered in an open text field. The questionnaire items are described below and in Table 1.

Changes in smoking cessation care

After the first and second PTAM, participants indicated, with 'yes' or 'no', whether anything had changed with regard to smoking cessation care in their practice within the last three months, apart from the COVID-19 pandemic. Those who answered 'yes' were asked to describe what had changed.

Self-efficacy, motivation, expectations and beliefs with regard to AAC

After the first PTAM, participants indicated on a 5-point Likert scale whether they felt able (i.e., self-efficacy) and motivated to apply each step of the AAC approach, and whether they expected patients to react positively to each step of the AAC approach. For nine statements (e.g., "I feel able to ask patients about smoking"), participants could choose between 'completely disagree', 'disagree', 'neutral', 'agree' and 'completely agree'. In the final questionnaire, participants were asked to indicate on a 5-point Likert scale whether they 'completely disagree', 'disagree', were 'neutral', 'agree' or 'completely agree' with the following statement: "I think Ask-Advise-Connect is a good method to reach patients with smoking cessation counselling." Participants were also asked to explain their answer.

Compliance with the AAC agreements

After the second PTAM, participants were asked to describe the extent to which they and their colleagues complied with the agreements on AAC made during the first PTAM.

Barriers, (dis)advantages and ease of use with regard to AAC

After the second PTAM, participants indicated, with 'yes' or 'no', whether they had experienced any barriers in applying AAC within the last three months, and if so, which barriers. In the final questionnaire, participants indicated, with 'yes' or 'no', whether they currently encounter barriers when applying AAC, and if so, which barriers. Furthermore, participants indicated, with 'yes' or 'no', whether AAC provides advantages/disadvantages, and if so, which advantages/disadvantages. And lastly, participants were asked whether AAC is more often easy or more often difficult to implement. They could choose between 'more often easy than difficult' and 'more often difficult than easy'.

Influence of COVID-19 on smoking cessation care

At baseline, participants indicated, with 'yes' or 'no', whether the COVID-19 pandemic currently affected smoking cessation care in their practice, and if so, were asked to describe how. After both the first and second PTAM, participants were asked the same question with regard to the last three months.

Analysis

A descriptive analysis was conducted using the quantitative data (i.e., the answers to the closed-end questions in the questionnaires). We computed percentages for all answer categories of each question, stratified by profession (total, GP, PN/DA). A qualitative analysis was performed by the first author using the notes from the PTAMs and the answers to the open-ended questions in the questionnaires; the analysis was checked by the last author. The notes from the PTAMs were summarized, after which key points were identified. The answers to the open-ended questions in the questionnaires were analysed using axial codes to categorize the answers. The axial codes were continuously refined during the analysis, until we arrived at the final categories which we considered to be the factors that played a role in the implementation of AAC. For each factor, we indicated whether it appeared to act as a barrier or facilitator to implementation. In the final step of the analysis, we connected each factor to a domain and construct of the CFIR framework. The analysis was thus mainly inductive, with the CFIR framework being used to structure and interpret findings.

Ethics

The study was cleared for ethics by a local Medical Research Ethics Committee in the Netherlands (METC LDD), as the study was not considered to be subject to the Medical Research Involving Human Subjects Act (WMO). The study was conducted in line with the declaration of Helsinki and applicable laws on privacy.

Table 1. Overview of the survey questions and at which point they were measured during study participation.

Theme	Closed-ended question	Open-ended question	Measured after
Changes in smoking cessation care	Did anything change with regard to smoking cessation care in your practice within the last three months, apart from the COVID-19 pandemic?	If yes: What changed?	- 3 months (Q2) - 6 months (Q3)
Influence of COVID-19 on smoking cessation care	Does the COVID-19 pandemic currently affect smoking cessation care in your practice?	If yes: How is smoking cessation care currently affected?	Baseline (Q1)
	Did the COVID-19 pandemic affect smoking cessation care in your practice within the last three months?	If yes: How did it affect smoking cessation care?	- 3 months (Q2) - 6 months (Q3)
Self-efficacy with regard to AAC	Please indicate to what extent you agree with the following statements: - I feel able to ask patients about smoking. (Ask) - I feel able to advise patients who smoke to quit. (Advise) - I feel able to proactively refer patients who smoke. (Connect)	*n/a*	3 months (Q2)
Motivation with regard to AAC	Please indicate to what extent you agree with the following statements: - I feel motivated to ask patients about smoking. (Ask) - I feel motivated to advise patients who smoke to quit. (Advise) - I feel motivated to proactively refer patients who smoke. (Connect)	*n/a*	3 months (Q2)
Expectation with regard to AAC	Please indicate to what extent you agree with the following statements: - I expect patients to react positively when I ask them about smoking. (Ask) - I expect patients who smoke to react positively when I advise them to quit. (Advise) - I expect patients who smoke to react positively when I proactively refer them. (Connect)	*n/a*	3 months (Q2)
Belief with regard to AAC	Please indicate to what extent you agree with the following statement: "I think Ask-Advise-Connect is a good method to reach patients with smoking cessation counselling."	Please explain your answer.	9 months (Q4)
Compliance with AAC agreements	n/a	To what extent are the agreements on Ask-Advise-Connect from the first PTAM complied with by you and your colleagues?	6 months (Q3)

Barriers with regard to AAC	Have you experienced any barriers in applying Ask-Advise-Connect within the last three months?	If yes: which barriers?	6 months (Q3)
	Are there any barriers which you currently encounter when applying Ask-Advise-Connect?	If yes: which barriers?	9 months (Q4)
(Dis)advantages with regard to AAC	Do you think applying Ask-Advise-Connect provides advantages?	If yes: which advantages?	9 months (Q4)
	Do you think applying Ask-Advise-Connect provides disadvantages?	If yes: which disadvantages?	9 months (Q4)
Ease of use with regard to AAC	Is it more common that Ask-Advise-Connect is easy or difficult for you to implement?	*n/a*	9 months (Q4)

RESULTS

General findings

Ten PTAM groups, with a total of 64 GPs and 42 PNs/DAs, participated in our study. Most PNs and DAs in our study were responsible for providing smoking cessation counselling in their practice. An overview of the characteristics of the participants and their general practice can be found in Table 2. Most participants were female (82%) and worked as a GP (60%). The majority of the participants (73%) indicated that they never or sometimes apply smoking cessation care as outlined in a clinical guideline with patients who smoke. Differences in characteristics between participants who completed at least one of the three follow-up questionnaires (i.e. Q2, Q3 or Q4) and participants who completed none of the three follow-up questionnaires are presented in Table 3.

Table 2. Characteristics of the participants and their general practice at baseline (N = 105).[a]

Variable	Category	n (%) / mean (SD)
Age		45.3 (9.2)
Gender	Male	19 (18)
	Female	86 (82)
Profession	General practitioner	63 (60)
	Practice nurse	36 (34)
	Doctor's assistant	6 (6)
Smoking status	Smoker	2 (2)
	Non-smoker	103 (98)
Socioeconomic position of patients	Mostly low	6 (6)
	Mostly middle	36 (34)
	Mostly high	4 (4)
	Mixed	52 (50)
	Don't know	7 (7)
Received training in smoking cessation care	Yes	59 (56)
	No	46 (44)
Applies smoking cessation guideline with patients who smoke	Never	44 (42)
	Sometimes	33 (31)
	Often	19 (18)
	(Almost) always	9 (9)
Attention in practice for smoking cessation	Almost no attention	3 (3)
	Some attention	58 (55)
	A lot of attention	44 (42)

[a] Although 106 participants were included in the study, one participant did not complete the baseline questionnaire and therefore only the characteristics of 105 participants are presented here.

Table 3. Differences in baseline characteristics between participants who completed at least one follow-up questionnaire (i.e., Q2, Q3 or Q4) and participants who did not complete any follow-up questionnaire (i.e., Q2, Q3 or Q4).

Variable	Category	Completed at least one follow-up questionnaire (n=89) n (%) / mean (SD)	Did not complete any follow-up questionnaire (n=16)[a] n (%) / mean (SD)
Age		45.3 (9.0)	45.5 (10.8)
Gender	Male	11 (12.4)	8 (50.0)*
	Female	78 (87.6)	8 (50.0)
Profession	General practitioner	49 (55.1)	14 (87.5)*
	Practice nurse	36 (40.4)	0 (0.0)
	Doctor's assistant	4 (4.5)	2 (12.5)
Socioeconomic status of patients	Mostly low	6 (6.8)	0 (0.0)
	Mostly middle	30 (33.7)	6 (37.5)
	Mostly high	4 (4.5)	0 (0.0)
	Mixed	42 (47.2)	10 (62.5)
	Don't know	7 (7.9)	0 (0.0)
Received training in smoking cessation care	Yes	54 (60.7)	5 (31.3)*
	No	35 (39.3)	11 (68.8)
Applies smoking cessation guideline with patients who smoke	Never	37 (41.6)	7 (43.8)
	Sometimes	26 (29.2)	7 (43.8)
	Often	17 (19.1)	2 (12.5)
	(Almost) always	9 (10.1)	0 (0.0)
Attention in practice for smoking cessation	Almost no attention	3 (3.4)	0 (0.0)
	Some attention	47 (52.8)	11 (68.8)
	A lot of attention	39 (43.8)	5 (31.3)

[a] Officially 17 participants did not complete any follow-up questionnaire, but one participant did not complete the baseline questionnaire and therefore only the characteristics of 16 participants are presented here.

*Chi-square test showed significant difference ($p<0.05$).

Table 4. Overview of factors which played a role in the implementation of AAC, based on participants' answers to the open-ended questions in the questionnaires.

CFIR domain	CFIR construct	Factor	Mentioned by
Innovation	Evidence-base	(+) AAC is scientifically proven*	GP
	Relative advantage	***(+) AAC makes it easier to discuss smoking cessation and provide advice***	GP and PN/DA
		(+) AAC results in more active provision of smoking cessation care	GP
		(+) AAC results in improved communication towards patient	GP and PN/DA
		(+) AAC results in more patients who enrol into counselling	GP and PN/DA
		(-) Not better than other methods*	GP
	Complexity	***(+) AAC is convenient and simple***	GP and PN/DA
		(+) AAC can be quickly applied	GP and PN/DA
		(+) AAC provides structure	GP and PN/DA
		(-) 'Connect' takes more time and can be more difficult to carry out	GP
Outer setting	Critical incidents	***(+) More people motivated to quit smoking due to COVID-19***	GP and PN/DA
		(+) Easier to discuss smoking due to COVID-19	GP
		(-) Lack of time/priority in practice to discuss smoking (due to COVID-19)	GP and PN/DA
		(-) Consultations more often by telephone due to COVID-19	GP and PN/DA
		(-) Fewer patients seen due to COVID-19	GP and PN/DA
		(-) Patients less motivated to quit or they delay quit attempt due to COVID-19	GP and PN/DA
		(-) Problems with availability of smoking cessation medication	GP
	Local attitudes of innovation recipients	(+) AAC offers patient advantages, such as not needing to make an appointment themselves	GP
		(-) AAC is not always received well by patients	GP
	Partnerships & connections	(-) Lack of group counselling nearby	GP and PN/DA
	Financing	*(-) Lack of time during consultation to discuss smoking*	GP and PN/DA

Inner setting	Compatibility	(+) AAC already known and applied in practice	GP and PN/DA
		(-) Did not use the method or used a different method	PN/DA
	Available resources	(+) A professional who offers counselling was employed in the practice during the study	GP and PN/DA
		(-) No counselling offered within the practice	GP and PN/DA
Characteristics of individuals	Motivation of innovation deliverers	(-) AAC sometimes feels inappropriate or pushy	GP
Implementation process	Engaging innovation deliverers	(+) More (knowledge of) possibilities for external smoking cessation counselling	GP and PN/DA
	Reflecting & Evaluating: Implementation	***(+) AAC carried out as planned, on individual level and/or practice level***	GP and PN/DA
		(+/-) Attempts made to implement AAC but not completely successful yet	GP and PN/DA
		(-) AAC insufficiently implemented	GP and PN/DA

* Only mentioned by one participant.
Note: the ten most mentioned factors are printed in bold; '(+)' indicates facilitators to implementation and '(-)' indicates barriers to implementation.

Based on our notes from the PTAMs, we observed that while AAC was mostly perceived to be relevant and helpful, applying AAC was also challenging at times due to several barriers which participants encountered in practice. The GPs in particular indicated that applying the first step of 'Ask' was not always feasible, due to for example a lack of time (often caused by the COVID-19 pandemic). In one PTAM group there was a discussion about whether 'Ask' should remain the responsibility of the GP, or whether other methods for identifying patients who smoke should be used which do not involve the GP.

The quantitative analysis showed that at six months of participation (i.e., after the second PTAM), 29% of the participants (*n*=56) had experienced one or more barriers in applying AAC. This was 48% among GPs and 7% among PNs/DAs. At the end of the study, still 20% of the participants (*n*=65) experienced barriers in applying AAC; this was 30% among GPs and 9% among PNs/DAs. Table 4 provides an overview of the identified factors which acted as barriers and facilitators in the implementation of AAC, based on participants' answers to the open-ended questions in the questionnaires. Table 4 shows that the most frequently mentioned barriers were related to the CFIR construct 'critical incidents' (within the domain 'Outer setting') as a result of COVID-19. The different barriers and facilitators to implementation of ACC, categorized under the five CFIR domains, will be discussed further below.

Innovation

In the last questionnaire, 89% of the participants (*n*=65) reported that applying AAC is more often easy than difficult for them. Also, 74% reported that applying AAC provides advantages, whereas only 9% reported that applying AAC provides disadvantages. Table 4 shows that participants most often mentioned as advantage that AAC makes it easier to discuss smoking cessation and provide a quit advice. As one PN wrote: *"[AAC] provides a nice and light start of the conversation about smoking cessation."* Other important facilitators were related to the 'complexity' of the approach: AAC was mostly considered to be convenient and simple, and can be quickly applied. Some GPs, however, found the last step of 'Connect' to be a little more challenging and time-consuming. During the PTAMs, it was mentioned that most patients are not ready to be directly connected to a counsellor and first need to be motivated, and also that proactively referring patients costs extra time which GPs usually do not have.

Outer setting

At baseline, 51% of the participants (*n*=105) reported that the COVID-19 pandemic currently impacted smoking cessation care in their practice. After six months of participation (i.e., after the second PTAM), 34% of the participants (*n*=56) reported that the COVID-19 pandemic had impacted smoking cessation care in their practice in the last three months. Table 4 shows that an important barrier to applying AAC and smoking cessation care in

general experienced by participants was a lack of time or priority to address smoking. Several participants indicated that a lack of time in consultations is a structural problem in practice. One GP wrote: *"When patients consult me for something completely unrelated to smoking, there often isn't enough time to start a conversation [about smoking]."* During the study, a lack of time or priority to discuss smoking with patients was also partly driven by the COVID-19 pandemic. A GP mentioned, when asked how the COVID-19 pandemic had impacted smoking cessation care: *"[Due to COVID-19] less attention could be paid to smoking cessation care because of all the other care which first needed to be caught up with."* Here the GP refers to the lag in non-urgent care caused by the COVID-19 pandemic. Another GP wrote: "*Care has been very busy. That's why I haven't been able to ask [patients about smoking] as much as wanted.*"

Other COVID-19 related barriers were that consultations could not take place face-to-face anymore and that fewer patients consulted the practice. One GP wrote: *"Due to more telephone consultations, smoking is less easily brought up."* Also, patients with smoking-related complaints or illnesses, such as asthma and chronic obstructive pulmonary disease (COPD), were seen less often during the COVID-19 pandemic. As one GP mentioned: *"We have seen fewer people in our consultations, especially fewer people with respiratory complaints. As a result, quitting smoking is less often discussed."* Several participants also mentioned that smoking was less often discussed because fewer spirometry tests were performed.

Interestingly, while some participants perceived patients to be less motivated to quit due to COVID-19, other participants perceived patients to be more motivated to quit. Especially PNs/DAs mentioned that they received more requests for smoking cessation counselling from patients.

Inner setting

With regard to the compatibility of AAC within practice, several PNs and DAs mentioned that they did not use the method or used a different method (see Table 4). One PN wrote: *"After 16 years of providing smoking cessation counselling, I have developed my own method which is difficult to change."* Some GPs and PNs/DAs also mentioned that they already knew AAC and applied it in practice, and therefore the approach was not new to them. Within two practices, a professional who offers counselling was coincidentally employed during the study, which may have helped to implement AAC.

Characteristics of individuals

After the first PTAM, most participants indicated that they felt able and motivated to apply the different steps of AAC in practice (*n*=80). Table 5 shows that around 90% of the participants (completely) agreed that they felt able and motivated to ask patients about

smoking and advise patients who smoke to quit, and around 80% of the participants (completely) agreed that they felt able and motivated to proactively refer patients who smoke. Only 60% of the participants (completely) agreed that they expected patients to react positively to 'Ask' and 'Connect', and 40% (completely) agreed that they expected patients who smoke to react positively to 'Advise'. A chi-square test showed no significant differences between GPs and PNs/DAs. In the last questionnaire at the end of the study, the majority of the participants (i.e., 63%) agreed or completely agreed that Ask-Advise-Connect is a good method to reach patients with smoking cessation counselling (n=65). A few GPs, however, felt that AAC is sometimes inappropriate or pushy (see Table 4). One GP wrote: *"As a general practitioner, I continue to find it difficult to ask every patient about smoking. For someone with a sore toe or vaginal complaints, that feels very inappropriate. With other complaints such as chest pain or dyspnoea this is much more logical."*

Implementation process

As described before, participants made agreements on the delivery of AAC and reflected on these agreements during the PTAMs. Table 4 shows that the process of implementing AAC was perceived by many participants to have gone well, on an individual level and/or practice level. For example, one GP wrote: *"We now more actively ask [patients] about smoking, for example on the registration form for new patients."* One PN wrote: *"It is nice that everyone in our practice is cooperating [in implementing AAC]."* It was, however, also often mentioned by participants that they had insufficiently implemented AAC according to plan. One GP wrote: *"[AAC] is not sufficiently ingrained in my consultation behaviour."* Another GP wrote: *"I have difficulty with remembering to ask patients without smoking-related complaints whether they smoke."* During the PTAMs, especially GPs indicated that they found it difficult to comply with the agreements, and that additional support would be helpful.

An important outcome of the implementation strategy (which was used to engage participants in implementing AAC), was that several participants indicated that they acquired more (knowledge of) possibilities for referring patients to external smoking cessation counselling (see Table 4). In fact, during the meetings three out of ten PTAM groups showed interest in working together with an external organisation offering group counselling. Eventually, this collaboration did not work out due to several reasons: in one PTAM group, the main healthcare insurance company did not reimburse counselling provided by an external organisation; another PTAM group failed to find a location for group counselling; in the third PTAM group, group counselling was organised once, but was cancelled a second time due to a lack of referrals.

Table 5. Proportion of participants who (completely) agreed with AAC-related statements, reported after the first PTAM (*n*=80).

Statement	Total	GP	PN/DA
I feel **able** to ask patients about smoking. (Ask)	94%	98%	90%
I feel **motivated** to advise patients who smoke to quit. (Advise)	92%	95%	89%
I feel **motivated** to ask patients about smoking. (Ask)	91%	95%	87%
I feel **able** to advise patients who smoke to quit. (Advise)	90%	93%	87%
I feel **motivated** to proactively refer patients who smoke. (Connect)	84%	88%	79%
I feel **able** to proactively refer patients who smoke. (Connect)	80%	83%	76%
I **expect patients who smoke to react positively** when I proactively refer them. (Connect)	61%	60%	63%
I **expect patients to react positively** when I ask them about smoking. (Ask)	60%	60%	60%
I **expect patients who smoke to react positively** when I advise them to quit. (Advise)	40%	40%	39%

DISCUSSION

This study aimed to identify which factors played a role in the implementation of AAC in Dutch general practice. A strength of this study is that we triangulated quantitative and qualitative findings in order to identify which factors played a role in the implementation of AAC. Another strength is that we included different types of healthcare providers who work in general practice, which allows us to make comparisons. In general, the AAC approach was received well by Dutch healthcare professionals in general practice: they viewed AAC as convenient, quick and simple, and felt that it made it easier for participants to discuss smoking cessation with patients who smoke and to give them a quit advice. Successful implementation of AAC was, however, hindered by several barriers, with the COVID-19 pandemic being the most important one. In particular a lack of time due to COVID-19 related priorities and consequent reduced priority to address smoking resulted in limited implementation of AAC. Important to note is that a lack of time to address smoking was already a problem for GPs before the COVID-19 pandemic.[23] Our findings show that the COVID-19 pandemic worsened this issue, despite the increased relevance of smoking cessation during the pandemic.[3]

Not only was the implementation of AAC negatively affected by a lack of time and priority among healthcare providers, but also by the cancellation of consultations. Previous research found that patients refrained from visiting their GP because they did not want to burden their GP or feared getting infected with COVID-19.[24] Also, as mentioned by our participants, and confirmed by previous research,[25] especially patients with chronic

lung diseases such as asthma and COPD were less often seen in practice during the pandemic. As patients with chronic lung diseases have an increased risk of developing severe COVID-19, general practices were advised at the beginning of the pandemic to not perform spirometry tests and to postpone the care for asthma and COPD patients.[25] With fewer options to provide regular care and fewer patients seen in practice, our participants had limited opportunities to discuss smoking with patients.

We noticed that more GPs compared to PNs/DAs, experienced difficulty implementing AAC. We suggest two possible explanations. First, most PNs and DAs in our study were already responsible for providing smoking cessation counselling in their practice (mostly for patients with chronic illnesses), even before the study started. They had their own procedures and systems in place to identify patients who smoke, provide a quit advice, and offer support. This may explain why only 7-9% of the PNs/DAs experienced barriers in applying AAC during the study, compared to 30-48% of the GPs, who were less used to provide smoking cessation support. Second, as observed in our own study and reported by other studies too,[19,23] many GPs only address smoking when they consider smoking to be relevant for the consultation (e.g., when a patient has smoking-related complaints). Previous research found that this is less of an issue for PNs, as most PNs find it important to address smoking regardless of the reason for the consultation,[19] likely because the delivery of smoking cessation care is included as quality indicator in the care for chronically ill patients. Our results show that GPs have various reasons for not asking all of their patients about smoking, and that these reasons are found across different CFIR domains. GPs may not have enough time to address smoking during all consultations (domain 'Outer setting'); GPs may not find it appropriate to ask about smoking if the patient has a complaint which the GP perceives to be unrelated to smoking (domain 'Characteristics of individuals'); and some GPs simply forget to ask patients who have no smoking-related complaints about smoking, likely because there is no system which reminds them to do so (domain 'Implementation process').

With regard to the PNs and DAs, we found that several of them did not use the AAC method or used a different method. As mentioned in the results, most PNs and DAs were responsible for providing smoking cessation counselling in their practice, and thus were already quite experienced with delivering smoking cessation care. For these experienced practitioners the AAC method may have been too simple, implying that the method should perhaps be tailored according to the role and experience of the healthcare provider. For example, for experienced practitioners the AAC method may be extended to include more complicated skills, such as increasing the motivation of patients who smoke. As the GP has limited time to motivate patients to quit smoking, the PN and/or DA can play an important role in this.

Implications

Considering that especially GPs experienced difficulty with implementing AAC, future implementation efforts should focus on providing additional support to GPs. For example, developing systems for building smoking cessation care into practice may help GPs to routinely carry out AAC. This may include incorporating an alert in the EHR which reminds GPs to ask about smoking, as well as a referral option in the EHR which automatically sends the patient's contact details to a smoking cessation specialist who then may proactively contact the patient for an intake.[11-14,16,17]

Also, e-health systems can help to reduce the workload of GPs, especially during stressful times. Research found that, as a result of the COVID-19 pandemic, e-health support interventions became more popular and more often used by Dutch healthcare professionals, and 48% of the GPs became more positive about options for digital contact with patients, for example through patient portals.[26] A digital patient portal offers patients access to their own medical data, and can also be used by patients to order repeat prescriptions and plan an appointment with their primary care provider. In 2021, 79% of Dutch general practices worked with digital patient portals, compared to only 42% in 2019.[26] Future implementation efforts should consider using such digital patient portals to identify the smoking status of patients and motivate patients who smoke to quit, after which the GP receives an alert in the EHR to offer cessation support to identified patients who smoke during consultation.

Our findings also show that more is needed to make smoking cessation a priority within general practice, especially during stressful times in which the topic is easily put on the back burner. More attention could, for example, be paid to prevention and smoking cessation care during the training of medical students. Also, multimedia campaigns can be used to stimulate people to quit smoking and contact their GP office, which may put smoking cessation care higher on the agenda of general practices. Multimedia campaigns may also prevent patients from cancelling their appointments during future pandemics.

Limitations

A few limitations of this study should be addressed. First, since we only collected qualitative data through open-ended questions in surveys, we were not able to ask further questions and thus our interpretations of the answers may be limited. The advantage of collecting data in this way, however, was that we were able to collect qualitative data from a large group of respondents. Second, not all participants completed all four surveys and we may have therefore missed certain views or experiences with regard to the implementation of AAC. Third, the study sample may not have been entirely representative of the larger population of primary care providers in general practice. Most PNs/DAs in our study already actively provided smoking cessation care, which is not necessarily the case for all PNs and

DAs in the Netherlands. Also, AAC was not new to some participants, indicating an active interest of our participants in smoking cessation care. We expect the larger population of primary care providers to be less familiar with AAC, and as such, we expect that especially barriers with regard to its adoption will be encountered when AAC is implemented on a larger scale.

Conclusions

Even though AAC was mostly positively received in general practice and primary care providers felt motivated and able to apply AAC, implementation turned out to be challenging, especially for GPs. Particularly external factors, such as a lack of time or priority to discuss smoking (due to COVID-19), negatively influenced implementation. Future efforts should focus on providing additional implementation support to GPs, for example with the use of e-health.

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CHAPTER

9

General discussion

This discussion presents the major conclusions with regard to the aims of this thesis, provides a reflection on the findings and implications for practice and policy, and discusses methodological considerations and implications for future research.

CONCLUSIONS WITH REGARD TO AIM

The research in this thesis was conducted against a backdrop of increasing societal and political support in the Netherlands for tobacco control measures and initiatives, including recent attempts to provide more adequate help to people who want to quit smoking. Healthcare providers, and in particular primary care providers in general practice, play an indispensable role in addressing smoking and providing evidence-based cessation support to patients who smoke. As smoking cessation care is suboptimally delivered within Dutch general practice, this thesis aimed to improve the delivery of smoking cessation care in Dutch general practice, specifically by increasing: (i) the proportion of patients that are asked about smoking, (ii) the proportion of patients who smoke that receive a quit advice, and (iii) the proportion of patients who smoke that are proactively referred to counselling. This thesis investigated whether a comprehensive implementation strategy, used to implement an adapted version of the AAC approach in general practice, was able to achieve these three aims.

Regarding the first aim, the implementation strategy was successful at increasing the proportion of patients in general practice that were asked about smoking, which is a positive result, especially considering that the research was conducted during the COVID-19 pandemic. With regard to the second aim, unfortunately the implementation strategy did not increase the proportion of patients that received a quit advice in general practice. Thirdly, more primary care providers proactively referred their patients to counselling after the implementation strategy came into effect. We estimated that this translates into roughly 5% more patients in general practice who enrolled into smoking cessation counselling during the study.

REFLECTIONS ON THE FINDINGS AND IMPLICATIONS FOR PRACTICE AND POLICY

Directions for smoking cessation care in general practice

Chapters 2 and 3 of this thesis demonstrated that healthcare providers can have a large impact on patients who smoke simply by advising them to quit with professional help and by proactively referring them to professional help. Seizing the moment of the patient consultation to apply AAC should, therefore, become standard care in general practice.

Chapter 8 showed that practice nurses (PNs) and trained doctor's assistants (DAs) who are responsible for counselling patients who smoke usually already have procedures and systems in place to routinely deliver AAC. This is, however, not the case for general practitioners (GPs). In **chapter 8** we noted that especially GPs experienced difficulty with applying AAC, mostly due to other priorities (as a result of COVID-19), time constraints, and their own struggle with remembering to apply the method.

Two improvements in the GP practice appear necessary. First, system-level changes are needed to make it easier for GPs to apply AAC. This may include building an alert in the electronic health record (EHR) which reminds GPs to apply AAC, and integrating an electronic referral system in the EHR which automatically sends the patient's contact details to a counsellor.[1-3] Second, it is important that GPs become motivated to prioritize smoking cessation care and address smoking among all patients who smoke. This requires a real culture shift, as many GPs only address smoking when they feel it is relevant for the consultation.[4] Several approaches can be used to motivate GPs, such as providing adequate reimbursement or financial incentives for smoking cessation care activities, setting requirements for the delivery of smoking cessation care based on selected quality indicators (similar to the quality indicators in the care provided by PNs), and providing performance feedback reports to GPs.[1,2,5] These approaches can be viewed as external motivators which influence behaviour when they are adopted, but may lose effect once they are discontinued.

It is, therefore, a crucial prerequisite that GPs become personally motivated to prioritize smoking cessation care. This can be accomplished by, for example, paying more attention to role identity (i.e., the perception that smoking cessation care is part of a GP's role) and the importance of smoking cessation during the education of GP trainees. Furthermore, it may be helpful to share examples and best practices of other GPs who actively provide smoking cessation care, for example through campaigns or during ongoing training sessions and meetings which GPs regularly attend. In that way the 'early adopters' can positively influence their colleagues who do not yet actively provide smoking cessation care, and thereby change the social norm among GPs. In addition, at health policy level it is necessary to communicate towards healthcare providers (e.g., in clinical guidelines and official documents) that smoking is a serious addiction and should be viewed as a tobacco use disorder, as outlined in the DSM-5 (Diagnostic and Statistical Manual of Mental Disorders).[6] Currently, in the official 'core tasks' of Dutch GPs, smoking is conveyed to be a lifestyle risk factor which precedes disease, rather than a disease (i.e., tobacco use disorder) itself.[7] It is, thus, no surprise that that majority of Dutch GPs hold patients who smoke themselves responsible for their smoking.[8] Therefore, in order to realise a culture in which smoking cessation care is prioritized by GPs, it is necessary that GPs perceive smoking as a serious addiction which requires treatment and not just a lifestyle.

We need to, however, acknowledge that changing the behaviour of GPs is an arduous task. Previous research, as well as **chapters 4 and 8** of this thesis, clearly show that many barriers exist to the delivery of smoking cessation care in general practice, both at the provider-level and the organizational level.[8-12] Moreover, not only the delivery of smoking cessation care is a challenge for GPs, but the delivery of care in general. In 2021, almost 10% of all Dutch GPs supported the manifesto 'Help, the GP is drowning' (in Dutch: 'Help de huisarts verzuipt'), in which they demand a reduction of the GP's workload.[13] This raises the question whether we should continue focusing on improving the behaviour of GPs and thereby stimulating them to do more than they already do, or rather focus on solutions which help to decrease the workload of GPs.

In **chapter 8** we discussed how e-health systems may help to reduce the workload of GPs, for example by identifying the smoking status of patients prior to a consultation, after which the GP receives a notification in the EHR to offer cessation support to patients who smoke. This may be especially helpful for GPs who are hesitant to raise the subject among patients without smoking-related complaints. A solution like this could help to quickly reduce the workload of GPs, though the question remains whether it is enough. Another option could be to instruct a PN or trained DA to directly contact all identified patients who smoke and offer cessation support, since PNs and trained DAs have more time to discuss quitting smoking with patients, are better equipped to motivate patients to quit, and experience fewer barriers with applying AAC compared to GPs.

While delegating smoking cessation care tasks to the PN or trained DA can help to more strongly reduce the workload of the GP, a potential pitfall is that GPs may believe that it is not necessary to address smoking anymore. Even if the smoking status of all patients were to be known and the PN or trained DA would address smoking among all identified patients who smoke, it still remains important that GPs address smoking during consultations with patients who smoke. The reason is that many patients who smoke will not immediately want to quit smoking when the PN or trained DA approaches them, and there may still be urgent reasons during the GP consultation to discuss smoking, such as a pregnancy, the use of oral contraceptives, or a planned operation. Thus, delegating all smoking cessation care tasks to the PN or trained DA may not be optimal. Rather, solutions at the health policy level are needed to drastically reduce the overall workload of GPs. For example, professional GP organisations could evaluate the current tasks of the GP and decide, in consultation with other professional organisations, which low-priority tasks may be removed or delegated to other healthcare providers so that GPs have more time left for smoking cessation care activities.

The importance of our findings from a societal perspective

In the Netherlands 9.4% of the total burden of disease can be attributed to smoking, costing around €2.8 billion in healthcare each year.[14,15] Moreover, from a societal perspective, smoking costs the Netherlands €33 billion each year. [16] These costs can mostly be attributed to loss of healthy years of life, quality of life, and productivity due to smoking.[16] It is estimated that a smoke-free society (i.e., a society in which less than 5% of all adults smoke) in 2050 results in a positive net benefit of €9.1 billion,[17] underlining the importance of developing interventions that contribute to achieving a smoke-free society. In **chapter 7** we found that the proportion of primary care providers who proactively, rather than passively, referred all or a part of their patients to counselling increased with 13.5% after the implementation strategy came into effect. Assuming that 17.6 times more patients enrol into counselling after a proactive referral compared to a passive referral,[18] we estimated that the implementation strategy resulted in 5% more patients in general practice who enrolled into smoking cessation counselling during our study. So if, for example, 100 patients who smoke normally enrol into counselling each year, the implementation strategy would result in an additional five patients who enrolled into counselling. From the perspective of an individual healthcare provider this effect appears rather small. However, from a societal perspective this effect could become highly relevant if many healthcare providers receive the implementation strategy. An important question to address is whether the implementation strategy is a cost-effective addition to care-as-usual from a societal perspective. Using the European study on Quantifying Utility of Investment in Protection from Tobacco model (EQUIPTMOD),[19] an economic model for determining the cost-effectiveness of smoking cessation interventions (see Box 1), we estimate that nationwide rollout of our implementation strategy corresponds with an incremental cost-effectiveness ratio (ICER) of €78,780 per quality-adjusted life-year (QALY), assuming that the effectiveness of the implementation strategy is sustained in the long-term. This is above the threshold of what is considered to be acceptable in the Netherlands for preventive care (i.e., €20,000 per QALY).[20] Important to note, however, is that the implementation strategy was tested during a difficult time in which COVID-19 complicated the implementation of AAC. It is, therefore, plausible that the implementation strategy is more cost-effective outside the context of COVID-19. Also, the effect of the implementation strategy may increase in the future if applying AAC becomes the norm among primary care providers.

If healthcare providers would proactively refer all their patients interested in counselling (instead of only a part, as mentioned in **chapter 7**) this could result in 20% more patients who enrol into counselling, which corresponds with an ICER of €19.357 per QALY. Therefore, in order to be a cost-effective addition to care-as-usual, it is important that primary care providers proactively, instead of passively, refer all patients interested in counselling. We previously proposed several ideas to further optimize the delivery of AAC, such as

incorporating reminders or a referral button in the EHR. The question is whether such changes to the EHR are enough to ensure that primary care providers only proactively, instead of passively, refer patients to counselling, or whether more is needed to make proactive referrals part of standard care. As the availability of cessation counselling is constantly changing (especially outside general practice), it is imaginable that primary care providers do not have time to keep up with all the changes and figure out how to proactively refer patients to each new counsellor or smoking cessation program.

Box 1. Using the EQUIPTMOD to calculate the cost-effectiveness of the implementation strategy.

The EQUIPTMOD was designed to assess the cost-effectiveness of packages of smoking cessation interventions and uses a Markov model to estimate life-time costs, QALYs, and life years associated with current and former smoking. The model contains relevant parameters for the smoking cessation infrastructure in the Netherlands (e.g., number of smokers/non-smokers, quit attempts, the use of cessation support during a quit attempt). In addition, the EQUIPTMOD includes population measures (e.g., tax increases, mass media campaigns) which may increase the number of quit attempts and enhance the use of cessation support. The EQUIPTMOD allows us to add the implementation strategy to the current package which can then be compared to the current provision of smoking cessation services in the Netherlands. The EQUIPTMOD incorporates both a healthcare and societal perspective and results are accumulated for different time horizons (i.e. two years, five years, ten years, and lifetime). For the societal perspective, EQUIPTMOD only includes productivity losses (i.e., it lacks patient and family costs). The model provides average total costs per smoker and QALYs gained. As EQUIPTMOD was developed in 2014, the following parameters were changed in order to provide estimates on the cost-effectiveness of the implementation strategy: the numbers of smokers, and the use of cessation support during a quit attempt.

It may, thus, be useful to appoint a local or regional tobacco treatment coordinator who keeps track of the local/regional availability of cessation counselling, and who can function as intermediary between primary care providers and cessation counsellors.[21] The idea is that primary care providers proactively refer all patients interested in cessation counselling to the coordinator, who then contacts the patient to discuss counselling options and connects the patient to appropriate counselling.[21] The tobacco treatment coordinator may, for example, be a professional who works at the Municipal Public Health Service (in Dutch: GGD). In the Netherlands, several GGDs already provide an overview of the counselling options in their region, and one GGD already actively links people who smoke who contact them to a counsellor.[22] A GGD may also be able to educate professionals to become smoking cessation counsellors if there is a lack of counselling in the region.[22] Thus, the GGDs may be a logical party to appoint a tobacco treatment

coordinator who can keep track of counselling options, link patients who smoke to those options, and if necessary, advise the GGD to create more counselling options. Another idea may be to develop a decision-making tool which shows all the current available options for counselling and allows primary care providers to proactively refer patients to those options. Ideally, such a tool would be maintained by a local tobacco treatment coordinator. Further research is needed to determine which interventions are feasible and effective within the Dutch context.

Important to realise is that even if future interventions result in 20% more patients in general practice who enrol into counselling, on a population-level this translates into roughly 6% of all people who smoke who use effective cessation care during a quit attempt. This is still far below the goal of the Dutch National Prevention Agreement (i.e., 20% of all people who smoke receive effective cessation care during a quit attempt),[23] implying that it is necessary to also focus on other types of healthcare providers and national level policy interventions. As shown in **chapter 2,** people who smoke may be stimulated to receive cessation assistance through the dentist, medical specialist and mental health professional. These healthcare providers see many patients who smoke each year and can also play an important role in advising patients who smoke to quit and connecting them to professional help. Also, other studies found that mass media campaigns,[24] community-based interventions,[25,26] tax increases,[27,28] and financial incentives can motivate people to attempt to quit smoking with professional help.[29]

Opt-in versus opt-out

Another aspect to keep in mind is that AAC was delivered within an opt-int system, in which patients who smoke must agree to being referred to cessation treatment. A limitation of this system is that only a small group of patients who are motivated enough to quit will accept a referral. Several studies have shown that an opt-out referral system, in contrast to the opt-in system which is currently the default within Dutch smoking cessation care, can help to increase the proportion of patients that are referred to and receive cessation treatment.[30-32] Within an opt-out system, all patients who smoke are referred to cessation treatment unless they refuse. A randomized clinical trial conducted in the United States found that providing cessation treatment in an opt-out manner doubled the use of cessation counselling and medication and increased quit attempts, without diminishing patient autonomy and control.[33] Figure 1 presents a possible example of AAC for general practice within an opt-out system.

In 2015, researchers already argued that the default in the treatment of smoking should be opt-out because "it accords with treatment guidelines for other health conditions, tobacco is the top cause of death in many countries and opt-out care is more ethical."[34] In fact, for most chronic health conditions, such as hypertension, diabetes and asthma,

Dutch clinical guidelines direct primary care providers to immediately initiate treatment after identifying the health condition.[35-37] In 2021, a report from the Royal College of Physicians in the United Kingdom recommended that all patients who smoke seen in the National Health Service treatment setting should be provided with smoking cessation treatment on an opt-out basis.[38] To further increase the proportion of Dutch patients who receive cessation treatment, it may thus be necessary to switch to an opt-out system for the delivery of AAC. Further research is needed to explore whether adopting an opt-out system for smoking cessation care is feasible and acceptable within the Dutch healthcare system.

Ask	Ask about smoking *"May I ask you something…: do you (still) smoke?"*	
Advise	Advise patients who smoke to quit, mention the best way to quit and initiate referral *"It would be good for you to quit smoking (given your complaints). The best way to quit is to receive professional counselling, optionally combined with medication. I would like to refer you to a professional counsellor who can help you quit."*	
Connect	***Patient does not refuse***	***Patient refuses***
	Discuss all options for counselling and proactively refer the patient to the counselling of their choice *"May I share your contact details with the counsellor so that they can contact you to make an appointment?"* (or immediately schedule an appointment)	Schedule a follow-up meeting to increase the patient's motivation *"I would like to see you again/put you in touch with our practice nurse to further discuss this."* If patient refuses a follow-up meeting: *"You can always come back for counselling if you change your mind."*

Figure 1. Example of AAC within an opt-out system.

Misinformation and smoking cessation care in COVID-19 times

In **chapter 5** we discussed how easily misinformation regarding smoking and COVID-19 spread during the pandemic. It is crucial that researchers and healthcare providers are better prepared for the spread of misinformation in the future. Researchers could, for instance, be more careful with the conclusions they draw from research and the findings which they communicate through (social) media. Also, within the scientific community, system changes may be needed to prevent the production of poor-quality science, such as alleviating the publication pressure for researchers, increasing the use of statistical review and plagiarism tools by academic publishers, mandating study protocol registration, and introducing transparent peer review.[39]

Regarding healthcare providers, in **chapter 5** we suggested that they should view a respiratory pandemic such as COVID-19 as an opportunity to inform patients about the

harmful relationship between smoking, respiratory infections and other serious illnesses, and also advise non-smoking adolescents to never start smoking. The relationship between former smoking and COVID-19 death which we found in **chapter 6** underscores the importance of preventing smoking among youth. **Chapter 8**, however, showed that the COVID-19 pandemic was a difficult time for addressing smoking in general practice. This raises the question whether it is reasonable to expect healthcare providers to prioritize smoking cessation care during a respiratory pandemic. Based on the findings in **chapter 7,** one can argue that it is feasible to increase the attention for smoking cessation in general practice during a pandemic, as long as a comprehensive strategy is in place to support healthcare providers. Moreover, actively addressing smoking during a pandemic may not be as difficult for healthcare providers if it is already part of their standard care. Therefore, realising a culture in which actively addressing smoking becomes standard care, may help primary care providers to prioritize smoking cessation care during future crises. In future scenarios where it is impossible to provide cessation support in general practices, the government may use mass media campaigns to stimulate people who smoke to use other types of cessation assistance, such as telephone quitlines or mobile applications.[40,41]

METHODOLOGICAL CONSIDERATIONS AND IMPLICATIONS FOR FUTURE RESEARCH

The studies in this thesis each have their strengths and limitations which have already been discussed in-depth in **chapters 2-8.** Frequently encountered limitations were the measurement bias in self-reported data, and selection bias in the sample of participants. In the following paragraphs, other methodological considerations and implications for future research are presented.

Study design and data collection

To evaluate the AAC implementation strategy, the initial plan was to conduct a stepped wedge cluster randomized trial (SW-CRT). The SW-CRT is an alternative to the traditional CRT and is mainly used for evaluating interventions in the real-world that have already proven to be effective in more controlled research settings.[42] The SW-CRT design involves a sequential crossover of clusters from the control to the intervention arm. This means that every PTAM group begins in the control condition (i.e., they deliver care-as-usual) and eventually receives the implementation strategy according to a predefined schedule. Unfortunately, we were unable to recruit enough participants (i.e., at least 240 healthcare providers were needed) to continue with the SW-CRT design. Healthcare providers mentioned several reasons for not wanting or being able to participate, such as no time or headspace to participate in research due to the high workload caused by the COVID-19

pandemic; some perceived the data collection procedures to be too demanding; smoking cessation care had already previously been discussed in their PTAM group; or the predefined schedule of the stepped wedge design was not flexible enough to fit their own PTAM group schedule. A lack of flexibility in the stepped wedge design has also been reported by other researchers.[43] For future research it is important to take into account that a study design like the SW-CRT may not always be feasible, especially when the time schedule of participants does not fit the predefined schedule of the study. Using a non-randomized study design may be preferable in such cases in order to increase the feasibility and thus the external validity of the study.

Another challenge that we faced during the implementation study in general practice was the high attrition rate, likely influenced by the manual data collection which resulted in extra work for the participants. Ideally, data should have been extracted from the EHR, to limit the burden on the participants. However, this was not possible as the outcome measures of interest are not routinely recorded in the EHR by practitioners (i.e., how often the smoking status is identified; how often a quit advice is provided; and how often a (proactive) referral is made). Moreover, there are no structured codes available in the EHR for these specific measures of interest. This means that even if practitioners wanted to record 'Ask', 'Advise' or 'Connect' in the EHR, they would have to enter this information in an unstructured free text field. For future research these problems can be addressed by either choosing measures of interest which can be easily extracted from the EHR, or by using techniques which can retrieve data from free text fields, such as natural language processing or data mining algorithms.[44,45] Eventually, however, the best solution for both practice and research would be to introduce new structured codes in the EHR so that practitioners can easily record their smoking cessation care activities. Introducing structured codes in the EHR for smoking cessation care may also contribute to realising an organisational culture in which addressing smoking is seen as part of standard care. Future implementation efforts may be needed to ensure that the provision of smoking cessation care is routinely recorded in the EHR.

Knowledge gaps with regard to the implementation of AAC

With regard to the implementation of AAC, several aspects require further research. First, it is unclear which elements of the implementation strategy are most responsible for its effects, as the pre-post design did not allow such an investigation. Such research would require a study design in which primary care providers are divided among different treatment arms (e.g., a factorial cluster randomized trial). Second, although participants reflected in **chapter 8** on how well they had complied with their own AAC implementation agreements, we do not know whether primary care providers applied AAC exactly as instructed, or how well they were able to apply AAC among specific types of patients (e.g., patients with a low socioeconomic position). Addressing these questions would

have required more intensive research (e.g., video-based observation research), which we did not have the means for at the time and would likely have resulted in a lower number of participants. And finally, in **chapter 7** we made the assumption that proactive referral resulted in 17.6 times more patients that enrolled into counselling compared to passive referral, based on the literature.[18] However, as briefly mentioned in **chapter 3**, it is possible that enrolment rates differ according to the type of proactive referral which is used. It is, for example, imaginable that immediately scheduling an appointment with the PN results in higher enrolment rates compared to forwarding the contact details of the patient to an external counsellor (as not all patients may be reached for follow-up). Therefore, further research that investigates the (cost-)effectiveness of different types of proactive referral in the Dutch setting is recommended.

GENERAL CONCLUSION

General practice continues to play an important role in seizing the moment of the patient consultation to address smoking and connect patients who smoke to professional cessation counselling. This thesis demonstrated that different elements of the adapted AAC approach can increase the proportion of people who receive professional cessation counselling during a quit attempt. This thesis also showed that a comprehensive implementation strategy can help to implement AAC in general practice, and thus improve the delivery of smoking cessation care. More efforts are, however, needed to further increase the proportion of patients that receive a quit advice and proactive referral to cessation counselling, especially in light of the ambitious national tobacco control aims of 50% of people who smoke making a quit attempt yearly and less than 5% people who smoke by 2040. Such efforts may include motivating primary care providers to prioritize smoking cessation care in general practice, optimizing the delivery of AAC by introducing changes in the EHR, reducing the workload of GPs, and switching to an opt-out system for smoking cessation care. These efforts can help to change the norm among primary care providers and make AAC part of standard care. In the end, the goal is that more Dutch people receive professional counselling during a quit attempt, which eventually contributes to achieving a smoke-free society in which no more than 5% of all adults smoke.

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APPENDICES

A

APPENDICES

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IMPACT PARAGRAPH

In the Netherlands, smoking continues to be the number one cause of preventable disease and death, amounting to around €2.8 billion in healthcare costs each year. Since 2018, the Dutch government has partnered together with over 70 civil society organisations to achieve a society in 2040 in which less than 5% of all Dutch adults smoke. To achieve this goal, it is crucial that people who currently smoke quit smoking. As smoking is highly addictive, quitting smoking is a difficult process for most people. Healthcare providers, particularly those working in general practice, can play an important role in encouraging people who smoke to quit by offering advice and support. Healthcare providers in general practice see many people who smoke each year. Quitting smoking is, however, not always discussed with patients who smoke, and not all patients who smoke are offered a quit advice and cessation support. As a result, only few patients who smoke end up receiving cessation support. To ensure that more patients successfully quit smoking, it is important that more patients receive professional support.

THE RESEARCH IN THIS THESIS

This thesis aimed to improve the delivery of smoking cessation care in Dutch general practice by implementing an effective and brief intervention for offering a quit advice and referral to cessation support, called Ask-Advise-Connect. The approach includes asking patients about tobacco use ('Ask'), advising all patients who smoke to quit ('Advise'), and proactively referring patients who smoke to professional counselling ('Connect'). Proactively referring patients means that the provider directly connects the patient to a counsellor instead of telling patients that they need to contact a counsellor themselves.

We adapted the Ask-Advise-Connect approach to fit within the Dutch context, and conducted research to strengthen the evidence base for the adapted Ask-Advise-Connect approach. Our research in chapters 2 and 3 of this thesis showed that mentioning professional counselling to patients who smoke (which is included in the advice of the adapted Ask-Advise-Connect approach) and proactively referring patients to counselling, results in more patients that receive cessation counselling during a quit attempt. We additionally conducted research on the relationship between smoking and COVID-19 (chapters 5 and 6), showing the increased relevance of addressing smoking during the COVID-19 pandemic.

Furthermore, we developed a comprehensive implementation strategy to implement the adapted Ask-Advise-Connect approach within Dutch general practice during the COVID-19 pandemic, and evaluated whether the implementation strategy helped to improve the delivery of Ask-Advise-Connect (chapters 7 and 8). The adapted Ask-Advise-Connect approach was mostly positively received in general practice, but routine implementation

turned out to be difficult, especially due to the urgency and challenges of the COVID-19 pandemic. Despite these challenges, we were able to show that healthcare providers more often asked patients about smoking ('Ask') after the implementation strategy came into effect. More healthcare providers also proactively referred their patients to professional support ('Connect').

RELEVANCE FOR SCIENCE AND SOCIETY

The results of this thesis are relevant to both science and society in two ways:

1. This thesis provides evidence that the adapted Ask-Advise-Connect approach is an effective and brief intervention which can be further used in research and practice.
2. This thesis helps scientific researchers and health policy makers to understand which factors influence the delivery of smoking cessation care in Dutch general practice and what is needed to successfully implement a new approach for smoking cessation care.

First, by demonstrating in chapters 2 and 3 that the advice and proactive referral of the adapted Ask-Advise-Connect approach result in more patients who receive cessation counselling during a quit attempt, we have provided researchers and stakeholders within society (e.g., healthcare providers, health policy makers, developers of educational programs for professionals and medical students) with an effective and brief intervention which can be further used in research and practice. Our implementation research in general practice furthermore shows that the adapted Ask-Advise-Connect approach is especially useful for general practitioners (GPs) who often find it challenging and time-consuming to address smoking among patients. The approach appears to be less interesting for practice nurses (PNs), as they are typically experienced in providing smoking cessation care and often have their own methods and procedures to address smoking. These findings, thus, indicate that the adapted Ask-Advise-Connect approach may be particularly useful for healthcare providers who have limited time or expertise to discuss smoking with patients and offer advice and support.

According to the Dutch *Zorgstandaard Tabaksverslaving*, each healthcare provider in the Netherlands should at least be able to identify people who smoke, advise patients who smoke to quit, and refer patients who smoke to professional cessation support. Several brief interventions exist which include these three steps, such as the Very Brief Advice (VBA) approach. However, based on the findings of this thesis, we advise that the adapted Ask-Advise-Connect approach should become standard practice among healthcare providers who have limited time or expertise to address smoking. The adapted Ask-Advise-Connect approach is more effective than other brief interventions, as it results in

more patients who end up receiving the best cessation help available, and thus more people who successfully quit smoking. Also, for patients who still have doubts about quitting, the adapted Ask-Advise-Connect approach can be used by healthcare providers to connect them to a counsellor who can further discuss quitting smoking with them and increase their motivation to quit. If Ask-Advise-Connect were to be implemented on a large scale, this could significantly increase quit rates, eventually resulting in a lower prevalence of chronic diseases in the Netherlands and a reduced workload for healthcare providers in the long term.

At the end of the project, we changed the name of the approach to 'Very Brief Advice Plus' (VBA+), as it is in fact an extension of the popular VBA approach. Currently, staff of the team 'Smoking Cessation Care for Professionals' at the Netherlands Institute of Mental Health and Addiction (Trimbos Institute) are taking steps to ensure that VBA+ becomes widely known and used among healthcare providers in the Netherlands. We have already developed several materials and tools for healthcare providers, such as a VBA+ 'FTO module' for general practices, a VBA+ desk card and pocket card for all healthcare providers, and an implementation guideline for stakeholders who want to implement VBA+ in their own organisation or practice. These materials and tools are being promoted and distributed through different channels of the Trimbos Institute, such as newsletters and conferences for professionals. Moreover, we are disseminating VBA+ through different projects of the Trimbos Institute. A next important step will be to disseminate VBA+ through the new Smoking Cessation Care Taskforce. The goal of this new Taskforce is to motivate all healthcare providers in the Netherlands to actively address smoking and offer advice and support to patients who smoke through targeted media campaigns. Our developed VBA+ materials and tools can be perfectly integrated in these campaigns. Another important next step to ensure that VBA+ becomes widely implemented, is to reach out to developers of educational programs and guidelines, so that VBA+ can be incorporated in the education of medical students and training of professionals, as well as clinical guidelines. So far, two educational programs for GPs have expressed interest in incorporating VBA+ in their curriculum, and we are confident that more will follow. We strongly believe that educating GP trainees about VBA+ and the importance of smoking cessation care will eventually result in more GPs who actively deliver smoking cessation care in practice.

Second, by publishing our results in Dutch scientific journals and presenting the findings at national conferences and symposiums, we help scientific researchers and stakeholders within society (e.g., healthcare providers, health policy makers) to understand which factors influence the delivery of smoking cessation care in Dutch general practice, and what is needed to successfully implement a new approach for smoking cessation care in practice. Specifically for researchers, this thesis shows that using a combination of

quantitative and qualitative research methods helps to gain a good understanding of the multitude of factors which influence the behaviour of healthcare providers in Dutch general practice. The research in this thesis, furthermore, confirms that especially GPs are faced with a high workload in practice and that researchers should thus aim to keep the burden of study participation as low as possible for GPs. For future research, we strongly advise to introduce structured codes for smoking cessation care in the electronic health record so that healthcare providers can easily record their smoking cessation care activities, which in turn makes it easier for researchers to study the delivery of smoking cessation care.

Specifically for stakeholders within society, an important lesson is that a comprehensive evidence-based implementation strategy can help to implement a new approach for smoking cessation care in general practice, even during highly stressful times. Another important lesson is that additional efforts are needed to support and motivate GPs, as they continue to experience difficulty with discussing smoking and offering advice and support to patients who smoke. Reducing the workload of GPs by using e-health or delegating more tasks to the practice nurse can help to support GPs in the short term. Directions which may be worth exploring by societal stakeholders in the long term include paying more attention to smoking cessation care in the education of GPs, switching to a system in which all patients who smoke are referred to cessation support (i.e., an opt-out system), or appointing a local tobacco treatment coordinator who can help healthcare providers to connect patients to cessation counselling. We expect that such measures can help to improve the delivery of smoking cessation care in general practice, ultimately translating into more patients who enrol into cessation counselling and successfully quit smoking.

SUMMARY

Smoking is the leading cause of preventable disease and death in the Netherlands. Currently, approximately 2.6 million Dutch adults smoke. The adoption of national tobacco control measures is necessary to decrease tobacco use in the population. This includes offering people help to quit smoking. Healthcare providers can play an important role in stimulating patients to quit and increasing the likelihood of success by offering advice and support. Especially professionals working in general practice play an important role in addressing smoking. As smoking cessation guidelines are suboptimally adhered to within Dutch general practice, this thesis aimed to improve the delivery of smoking cessation care in Dutch general practice. The Ask-Advise-Connect (AAC) approach was chosen as intervention to implement in general practice, as this approach can potentially stimulate more patients to quit and ensure that more patients receive professional counselling during a quit attempt.

We adapted the AAC approach to fit within the Dutch context, and conducted research to strengthen the evidence base for the adapted AAC approach. We also examined which factors may influence the referral of Dutch patients to cessation counselling, as this may help to select appropriate strategies for implementation. **Chapter 2** reports the results of a cross-sectional survey-based study that investigated the extent to which hearing about smoking cessation assistance from a healthcare provider is associated with using smoking cessation assistance during a quit attempt. We found that people who smoke were over five times more likely to receive behavioural counselling and/or pharmacotherapy during their most recent quit attempt when a healthcare provider had mentioned behavioural counselling and/or pharmacotherapy in the last year. This finding demonstrates the importance of not only advising patients to quit, but also advising patients on the best way to quit. **Chapter 3** presents the results of a systematic review which aimed to gain insight into the effectiveness and implementability of proactive referral of patients to behavioural smoking cessation programs by healthcare staff. The systematically collected evidence shows that the proactive referral of patients to behavioural smoking cessation programs by healthcare staff is effective and implementable across different healthcare settings, particularly with the use of an e-referral system and in combination with additional strategies which enhance implementation. **Chapter 4** presents the results of a qualitative study that aimed to provide insight into the factors that play a role in the referral of patients to cessation counselling. We found that Dutch healthcare providers in general practice typically only refer patients to individual counselling provided inside general practice, and that potentially more patients can be reached with cessation counselling if healthcare providers discuss different counselling options with patients. Our findings also showed that healthcare providers need to be equipped with the knowledge and skills to refer patients, and that opportunities need to be created for healthcare providers to refer patients to cessation counselling.

In 2020, the COVID-19 pandemic introduced new challenges in general practice, further complicating the delivery of smoking cessation care. In addition, scientific research claimed that people who smoke may be protected against COVID-19. In **chapter 5** we reviewed the literature and concluded that the literature with regard to smoking and COVID-19 contains many contradictions and methodological flaws, and that we therefore cannot conclude that smoking protects against SARS-CoV-2 infection. We also suggested that primary healthcare providers may play a role in mitigating the consequences of erroneous claims about a protective effect of smoking by addressing smoking among patients. In **chapter 6** we conducted a population-based quasi-cohort study to assess the relationship between smoking and death due to COVID-19. The findings show that the risk of death due to COVID-19 does not significantly differ between people who currently smoke and people who have never smoked, indicating that smoking does not protect against COVID-19 death. Also, people who previously smoked were found to have a higher risk of death due to COVID-19 compared to people who have never smoked. More research is needed to explore which mechanisms may explain these findings.

Despite the challenges of COVID-19, we managed to continue our implementation research in Dutch general practice. **Chapter 7** presents the results of a pre-post implementation study conducted during the COVID-19 pandemic. To implement AAC in general practice, a comprehensive implementation strategy was developed which consisted of two meetings in which healthcare providers (general practitioners (GPs), practice nurses and doctor's assistants) were educated about AAC, made agreements on how to apply AAC, and in which they reflected on these agreements. If possible, healthcare providers were introduced to a local counsellor who offers cessation counselling outside general practice. Healthcare providers additionally received online educational materials and a desk card as reminder. The findings show that the implementation strategy helped healthcare providers to ask patients about smoking and to proactively refer patients to cessation counselling, even during stressful COVID-19 times. The implementation strategy, however, did not result in more patients receiving a quit advice. In **chapter 8** we used a mixed-methods approach to evaluate factors influencing the implementation of AAC in general practice. The evaluation showed that healthcare providers were generally positive about the AAC approach, but that especially barriers related to COVID-19 had negatively impacted implementation of the approach. We also found that GPs in particular experienced difficulty with implementing AAC, indicating that they need additional support.

The general discussion in **chapter 9** provides further reflections on the findings of this thesis, and discusses the implications of the findings for practice, policy, and future research. The findings of this thesis clearly show that more efforts are needed to ensure that addressing smoking and delivering AAC becomes part of routine care in general practice, especially among GPs. These efforts may include optimizing the delivery of

AAC in general practice (for example by incorporating reminders or a referral button in the electronic health record), motivating GPs to prioritize smoking cessation care, and reducing the workload of GPs. Introducing new structured codes to the electronic health record is necessary to ensure that practitioners can easily record their smoking cessation care activities. Furthermore, to further increase the proportion of patients who receive cessation counselling, it may be useful to appoint a local tobacco treatment coordinator and/or switch to an to an opt-out system for the delivery of smoking cessation care. Further research is needed to determine whether these ideas are feasible and effective within the Dutch context. On a final note, while healthcare providers in general practice can make a meaningful contribution to achieving a smoke-free society in which no more than 5% of all adults smoke, tobacco control interventions and measures outside the context of general practice also remain necessary.

SAMENVATTING

Roken is de belangrijkste oorzaak van vermijdbare ziekte en sterfte in Nederland. Op dit moment roken ongeveer 2,6 miljoen Nederlandse volwassenen. De invoering van maatregelen om roken te ontmoedigen is noodzakelijk om het gebruik van tabak in de bevolking te verminderen. Hieronder valt ook het aanbieden van hulp aan mensen om te stoppen met roken. Zorgverleners kunnen een belangrijke rol spelen bij het stimuleren van mensen om te stoppen met roken, en kunnen de kans van slagen vergroten door advies en ondersteuning te bieden. Vooral zorgverleners in de huisartsenpraktijk spelen een belangrijke rol hierin. Aangezien richtlijnen voor stoppen-met-rokenzorg niet goed worden nageleefd door zorgverleners in de huisartsenpraktijk, had dit proefschrift als doel om de stoppen-met-rokenzorg in de Nederlandse huisartsenpraktijk te verbeteren. De 'Ask-Advise-Connect' (AAC) aanpak werd gekozen om in de huisartsenpraktijk te implementeren, omdat deze aanpak potentieel meer mensen kan stimuleren om te stoppen met roken en ervoor kan zorgen dat meer mensen professionele begeleiding krijgen bij een stoppoging.

We pasten de AAC-aanpak aan zodat het beter aansluit op de Nederlandse context en verrichtten onderzoek naar verschillende onderdelen van de aangepaste AAC-aanpak. We onderzochten ook welke factoren van invloed kunnen zijn op de verwijzing van Nederlandse patiënten naar stoppen-met-rokenbegeleiding, aangezien dit kan helpen bij het selecteren van geschikte strategieën voor implementatie. **Hoofdstuk 2** rapporteert de resultaten van een cross-sectionele vragenlijststudie die onderzocht in hoeverre het horen over stoppen-met-rokenhulp van een zorgverlener gerelateerd is aan het gebruik van stoppen-met-rokenhulp tijdens een stoppoging. We ontdekten dat mensen die roken een meer dan vijf keer grote kans hadden om gedragsmatige begeleiding en/of farmacotherapie te ontvangen tijdens hun meest recente stoppoging wanneer een zorgverlener gedragsmatige begeleiding en/of farmacotherapie had genoemd in het afgelopen jaar. Deze bevinding toont aan dat het niet alleen belangrijk is om mensen te adviseren om te stoppen met roken, maar ook om hen te adviseren over de beste manier om te stoppen. **Hoofdstuk 3** presenteert de resultaten van een systematische review die als doel had om inzicht te krijgen in de effectiviteit en implementeerbaarheid van proactief verwijzen van patiënten naar gedragsmatige stoppen-met-rokenprogramma's door zorgpersoneel. Het systematisch verzamelde bewijs laat zien dat het proactief verwijzen van patiënten naar gedragsmatige stoppen-met-rokenprogramma's door zorgpersoneel effectief en implementeerbaar is in verschillende zorgsettings, met name met behulp van een elektronisch verwijssysteem en in combinatie met aanvullende strategieën die bijdragen aan de implementatie. **Hoofdstuk 4** presenteert de resultaten van een kwalitatieve studie die als doel had om inzicht te bieden in de factoren die een rol spelen bij het verwijzen van patiënten naar stoppen-met-rokenbegeleiding. We ontdekten dat Nederlandse zorgverleners in de huisartsenpraktijk over het algemeen patiënten alleen doorverwijzen naar individuele begeleiding binnen de huisartsenpraktijk, en dat er

potentieel meer patiënten kunnen worden bereikt met stoppen-met-rokenbegeleiding als zorgverleners verschillende begeleidingsopties met patiënten bespreken. Onze bevindingen lieten ook zien dat zorgverleners kennis en vaardigheden nodig hebben om patiënten door te kunnen verwijzen, en dat er meer mogelijkheden gecreëerd moeten worden voor zorgverleners om patiënten door te verwijzen naar stoppen-met-rokenbegeleiding.

In 2020 bracht de COVID-19-pandemie nieuwe uitdagingen met zich mee in de huisartsenpraktijk, waardoor de levering van stoppen-met-rokenzorg bemoeilijkt werd. Bovendien beweerde wetenschappelijk onderzoek destijds dat mensen die roken mogelijk beschermd zijn tegen COVID-19. In **hoofdstuk 5** bestudeerden wij de literatuur en kwamen tot de conclusie dat de literatuur met betrekking tot roken en COVID-19 veel tegenstrijdigheden en methodologische fouten bevat, en dat we daarom niet kunnen concluderen dat roken beschermt tegen het oplopen van het SARS-CoV-2-virus. We suggereerden ook dat eerstelijnszorgverleners een rol kunnen spelen bij het verminderen van de gevolgen van onjuiste claims over een beschermend effect van roken door het onderwerp aan te kaarten bij patiënten. In **hoofdstuk 6** voerden wij, op basis van bevolkingsdata, een quasi-cohortonderzoek uit om de relatie tussen roken en overlijden door COVID-19 te bepalen. De bevindingen tonen aan dat het risico op overlijden door COVID-19 niet significant verschilt tussen mensen die roken en mensen die nooit hebben gerookt, wat aangeeft dat roken niet beschermt tegen COVID-19-sterfte. Ook bleken mensen die vroeger hebben gerookt een hoger risico op overlijden door COVID-19 te hebben in vergelijking met mensen die nooit hebben gerookt. Verder onderzoek is nodig om te verkennen welke mechanismen deze bevindingen kunnen verklaren.

Ondanks de uitdagingen van COVID-19 slaagden we erin ons implementatieonderzoek in de Nederlandse huisartsenpraktijk voort te zetten. **Hoofdstuk** 7 presenteert de resultaten van een voor-na-implementatiestudie uitgevoerd tijdens de COVID-19-pandemie. Om AAC in de huisartsenpraktijk te implementeren, werd een uitgebreide implementatiestrategie ontwikkeld die bestond uit twee bijeenkomsten waarin zorgverleners (huisartsen, praktijkondersteuners en doktersassistenten) werden onderwezen over AAC, afspraken maakten over hoe AAC toe te passen, en op deze afspraken reflecteerden. Indien mogelijk maakten zorgverleners kennis met een externe aanbieder van stoppen-met-rokenbegeleiding. Zorgverleners ontvingen ook toegang tot een online e-toolkit met meer verdieping en een bureaukaart als geheugensteuntje. De resultaten tonen aan dat de implementatiestrategie zorgverleners hielp om naar de rookstatus van patiënten te vragen, en om patiënten proactief door te verwijzen naar stoppen-met-rokenbegeleiding, zelfs tijdens de stressvolle COVID-19 periode. De implementatiestrategie leidde echter niet tot meer patiënten die het advies kregen om te stoppen. In **hoofdstuk 8** hebben we een mixed-methods aanpak gebruikt om de factoren

te evalueren die de implementatie van AAC in de huisartsenpraktijk beïnvloedden. De evaluatie toonde aan dat huisartsenpraktijken over het algemeen positief waren over AAC, maar dat vooral barrières gerelateerd aan COVID-19 de implementatie van AAC negatief hadden beïnvloed. We concludeerden ook dat met name huisartsen moeite hadden met het implementeren van AAC, wat erop wijst dat zij extra ondersteuning nodig hebben.

De algemene discussie in **hoofdstuk 9** biedt verdere reflecties op de bevindingen van dit proefschrift en bespreekt de implicaties van de bevindingen voor de praktijk, beleid en toekomstig onderzoek. De bevindingen van dit proefschrift laten duidelijk zien dat er meer inspanningen nodig zijn om ervoor te zorgen dat het aankaarten van roken en het toepassen van AAC een vast onderdeel wordt van de routinezorg in de huisartsenpraktijk, met name onder huisartsen. Denk hierbij aan het optimaliseren van de toepassing van AAC in de huisartsenpraktijk (bijvoorbeeld door herinneringen of een automatische verwijsknop in het elektronisch patiëntendossier in te bouwen), het motiveren van huisartsen om stoppen-met-rokenzorg te prioriteren, en het verminderen van de werkdruk van huisartsen. Het invoeren van nieuwe codes in het elektronisch patiëntendossier is nodig om te zorgen dat zorgverleners de geleverde stoppen-met-rokenzorg kunnen registreren. Verder kan het nuttig zijn om een lokale stoppen-met-rokenconsulent aan te stellen en/of over te stappen op een opt-out systeem voor de levering van stoppen-met-rokenzorg om het aantal mensen dat stoppen-met-rokenbegeleiding ontvangt verder te verhogen. Verder onderzoek is nodig om te bepalen of deze ideeën haalbaar en effectief zijn binnen de Nederlandse context. Tot slot blijven ook interventies en maatregelen buiten de context van de huisartsenpraktijk noodzakelijk om een rookvrije samenleving te bereiken waarin niet meer dan 5% van alle volwassenen rookt.

CURRICULUM VITAE

Naomi van Westen-Lagerweij (née Lagerweij) was born on 16 January 1995 in Amsterdam, the Netherlands. After graduating from high school at the Vechtstede College in Weesp in 2012, she studied Psychobiology at the University of Amsterdam and obtained her Bachelor's degree in 2015. Naomi obtained her Master's degree in Management, Policy Analysis and Entrepreneurship in the Health & Life Sciences at VU Amsterdam in 2017. During her Master's programme in 2016, she did a research internship at the department of Public Health at Amsterdam UMC, investigating the extent to which Dutch youth support future tobacco control measures.

In 2018, Naomi worked at the same department where she had previously conducted her research internship. She was involved in the SILNE-R project as junior researcher, and published two scientific papers on smoking among youth. At the end of 2018, Naomi started her PhD at the Trimbos Institute and Maastricht University. For four years she worked on the research described in this thesis under supervision of prof. dr. Marc Willemsen, prof. dr. Niels Chavannes, dr. Esther Croes and dr. Eline Meijer. As part of her PhD research, Naomi developed the Very Brief Advice Plus (VBA+) approach which was subsequently incorporated in materials and tools for healthcare professionals developed by the Trimbos Institute. During her PhD, Naomi was also involved in several other projects at the Trimbos Institute, such as the PURE smoke-free campaign and research projects on smoking and COVID-19. As of March 2023 she works as researcher at the Trimbos Institute and continues to be involved in projects focused on smoking cessation care.

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