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Health Service Research

Dutch practice nurses' adherence to evidence-based smoking cessation treatment guidelines

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Abstract

Background. Practice nurses in general practice sub-optimally adhere to evidence-based smoking cessation treatment guidelines, but factors explaining their adherence have not yet been investigated. Understanding such factors is important to develop interventions improving practice nurses' smoking cessation guideline adherence and patients' subsequent cessation success. This study explored the association between different socio-cognitive and predisposing factors, and practice nurses' adherence to the Dutch smoking cessation guideline in general (i.e. overall adherence) and to each guideline step individually (i.e. step-based adherence).

Methods. A cross-sectional study was conducted among practice nurses ($N = 157$) in January–March 2015 via web-based questionnaires, assessing constructs from the Integrated Change Model. Spearman's correlations and linear regression analysis were used to identify potential determinants of overall guideline adherence; Mann–Whitney U -tests and logistic regression analyses were used to identify potential determinants of step-based adherence.

Results. On average five out of nine steps were completely adhered to by practice nurses; and step-based adherence ranged from 34% to 75%. Overall guideline adherence was associated with high levels of self-efficacy to use a guideline ($\beta = 0.32$, $P = 0.00$), and step-based adherence was additionally associated with spending more time on counselling. Regression results showed positive associations between self-efficacy (8/9 steps) and perceived advantages (7/9 steps) with step-based adherence.

Conclusion. This study quantitatively confirmed practice nurses' sub-optimal guideline adherence and found associations between socio-cognitive (self-efficacy and perceived advantages) and predisposing factors (time spent on counselling), and guideline adherence. Detailed insights in these factors offer preliminary directions for intervention development to improve practice nurses' adherence to evidence-based smoking cessation guidelines.

Key words: Cross-sectional survey, general practice, guideline adherence, primary care nursing, smoking cessation.

Introduction

Smoking is still the leading cause of preventable disease and premature death worldwide (1). In the Netherlands, about 23% of the adult population still smokes (2), despite effective smoking cessation strategies like a brief advice by a general practitioner (GP), ideally followed

by more intensive forms of counselling (3). In Dutch general practices (family practice), such smoking cessation support is increasingly provided by trained practice nurses (PNs) (4), highly educated nurses who are mainly responsible for chronic patient care (5) and are now employed in over 80% of Dutch general practices (4).

To structure their smoking cessation counselling sessions, PNs are trained to use national evidence-based smoking cessation guidelines, of which the STIMEDIC® stop smoking guideline is the most recent and up-to-date (6). This guideline describes a step-wise approach of smoking cessation support combining behavioural counselling, with pharmacological support (6). Full adherence to such guidelines by health professionals positively contributes to quality of care (7) and has stronger beneficial effects on patients' quit rates than a brief quit advice (8). Nevertheless, previous research has established nurses' sub-optimal adherence to smoking cessation guidelines (9,10).

Various socio-cognitive and predisposing factors can influence PNs' adherence to these guidelines, but research into these factors is scarce. So far, only recent qualitative studies have investigated this subject, establishing that factors, such as low self-efficacy to enhance a smoker's motivation (11) and the belief that most smokers are unwilling to quit, might play an important role in explaining PNs' guideline adherence (12).

Although these studies provide some insights into the factors associated with guideline adherence, obtaining quantitative evidence about the supposed associations between these factors and guideline adherence is needed to inform guideline adherence intervention development. Additionally, no studies so far have focused on factors associated with adherence to individual guideline steps (i.e. step-based adherence), even though a previous study showed some steps are better adhered to than others (12). Moreover, since predominantly attitude and self-efficacy might play an important role in explaining PNs' smoking cessation guideline adherence (11), the association between these socio-cognitive concepts and step-based adherence is especially interesting to investigate.

Therefore, the aim of the present study was to determine the association between socio-cognitive and predisposing factors, and PNs' overall and step-based adherence to evidence-based smoking cessation guidelines in the Netherlands.

Methods

A cross-sectional questionnaire study was conducted among Dutch PNs. Online questionnaire content was based on the Integrated Change (I-Change) Model (13) and an earlier qualitative study (11).

The Integrated Change Model

The I-Change Model is an integrated model for explaining motivational and behavioural change (13). Previous studies based on the I-Change Model have demonstrated its usefulness in explaining health professionals' behaviours related to smoking cessation (10,14). The I-Change Model describes that the intention to perform a behaviour is most proximally determined by the motivational constructs (i.e. socio-cognitive factors) attitude (perceived (dis)advantages), perceived social influence (norms, modelling and pressure/support) and self-efficacy. The model also includes predisposing factors (e.g. PNs' level of training) which may directly influence behaviour, or indirectly influence behaviour through the socio-cognitive factors (13).

Participants and procedure

Eligible participants were employed as a PN or specialized nurse (e.g. specialization in diabetes or lung problems) in a Dutch general practice, actively engaged in smoking cessation counselling and had Internet access. Interested PNs received information on data protection and anonymity, and all participants provided informed consent prior to completing the questionnaire, participation was voluntary. Completion of the online questionnaire took about 20 minutes.

Participants who completely filled out the questionnaire could opt to provide their email address to enter a raffle to win one of two €50 gift vouchers.

PNs were recruited between January–March 2015 via e-mails to networks of PNs and nurses; PN or nurse interest group newsletters; and recruitment messages on relevant Social Media pages (e.g. LinkedIn, Facebook). Recruitment materials included a hyperlink to the online questionnaire. Alternatively, PNs could visit the project website www.sterstudie.nl (Self-Archived at WebCite® on 26 July 2016 [<http://www.webcitation.org/6jHiDBycb>]) for more information and gain access to the online questionnaire there.

Measurements

The online questionnaire included questions about demographics, predisposing factors, smoking cessation guideline adherence, and socio-cognitive factors (attitude, self-efficacy and perceived social influence).

Demographics

Age, gender and smoking status (smoker, ex-smoker and non-smoker) were assessed.

Predisposing factors

Work experience as a nurse in general and as a smoking cessation counsellor was assessed in years. Furthermore, participants were asked whether they had attended a course on smoking cessation counselling during the last year (y/n) and whether they were registered (y/n) in the Dutch Stop Smoking quality register (www.kwaliteitsregisterstopmetroken.nl, Self-Archived at WebCite® on 26 July 2016 [<http://www.webcitation.org/6jHxBZKfn>]). Also, the average number of smoking patients counselled per year, average number of consultations per counselled smoker and the duration of an average smoking cessation consultation in minutes were assessed, which were subsequently combined to represent the total time a participant spent on smoking cessation counselling per year. Participants were also asked about percentage of smokers who's smoking cessation counselling would be reimbursed by their health insurance (1 = nobody, 5 = everyone) and in how many practices they were employed (1 = one practice; 2 = more than one practice). As part-time employment is common for PNs (5), participants were instructed to answer the questions for the general practice in which they worked most hours per week. Questions concerned the estimated number of registered patients in the practice, the presence of special smoking cessation counselling hours (y/n) and whether patients' smoking status was systematically registered in their patient file (y/n). Finally, participants were asked about their use of an evidence-based smoking cessation guideline during consultations (y/n); if yes, also for the time period in which they had been using that guideline (in years) and whether they used a visual overview of that guideline during counselling (y/n).

Guideline adherence

Questions concerned the nine counselling steps of the STIMEDIC® guideline (6): (i) offering a quit advice; (ii) assessing smoking profile and smoking history; (iii) assessing motivation to quit, (iv) increasing motivation; (v) assessing barriers to quitting; (vi) discussing barriers; (vii) informing about cessation aids; (viii) making a quit plan and setting a quit date; and (ix) arranging follow-up after the quit date. Step-based guideline adherence was assessed by asking how often participants performed each step during smoking cessation counselling sessions (1 = never, 4 = always). Data was dichotomized, using the 50th percentile as cut-off score, to create a 'not adherent' group

(scores 1–3) and an 'adherent' group (score 4). To measure overall guideline adherence, an index score was created by adding the dichotomized scores, resulting in an overall adherence score ranging from 0 to 9.

Socio-cognitive factors

For each smoking cessation counselling step, participants responded to statements regarding attitude (perceived advantages and disadvantages) and their self-efficacy to apply this step in practice (1 = completely disagree, 5 = completely agree). For example, concerning the step 'offering a quit advice' the following statements were presented: if I offer a quit advice, my patients are more likely to make a quit attempt (perceived advantage); if I offer a quit advice, this results in negative reactions of my patients (perceived disadvantage) and I think I am able to offer a quit advice to my patients (self-efficacy).

Subsequent questions about perceived social influence addressed participants' overall adherence to evidence-based guidelines (1 = completely disagree, 3 = neutral/not applicable, 5 = completely agree). Participants responded to five items about the degree to which important others (their GP, PNs working in the same practice or in other practices, the practice manager and practice patients) considered using a smoking cessation guideline as important (social norm) and supported them (social support) to use such a guideline. Finally, participants responded to three items about whether their GP and other PNs (within the same practice and in other practices) make use of such guidelines while counselling smokers (modelling).

Data analysis

Analyses were conducted using SPSS version 21.0. To investigate the association between socio-cognitive factors and guideline adherence, scales were created. Reliability analyses showed sufficient internal consistency for perceived advantages ($\alpha = 0.78$), perceived disadvantages ($\alpha = 0.77$), self-efficacy ($\alpha = 0.75$), social norms ($\alpha = 0.82$) and social support ($\alpha = 0.70$) scales. The three modelling items were included separately in analyses.

Several non-parametric analyses were performed, as normality of main variables was not established. To investigate associations between socio-cognitive and predisposing factors, and PNs' overall guideline adherence, Spearman's rank correlation coefficients were calculated. Predisposing factors (using a visual guideline overview, recently completing a smoking cessation training, the availability of special counselling hours, counselling experience and time spent on counselling) were selected for inclusion in these analyses based on earlier research findings (14,15). Next, hierarchical backward linear regression analysis was conducted to assess which socio-cognitive factors could explain variance in overall guideline adherence, correcting for predisposing factors that significantly correlated with overall guideline adherence.

Differences between adherers and non-adherers in terms of their step-based adherence were assessed using Mann–Whitney *U*-tests. Moreover, hierarchical backward logistic regression analyses were conducted to assess which socio-cognitive factors could explain variance in adherence to each guideline step, correcting for the same predisposing factors as in the linear regression analysis.

Results

Sample characteristics

Characteristics of participating PNs ($N = 157$, response rate 70.1%) are shown in Table 1. Estimations of the number of

registered patients at their general practice showed great variation, though was on average rather high compared to a Dutch standard size practice (2168 patients) per fulltime GP (16). This may indicate that most respondents were employed within a group practice. The reported amount of time spent on cessation counselling also showed a lot of variation, ranging from 2.1 to 264 hours per year. Overall, PNs reported to completely adhere to five out of nine steps. The highest percentage of PNs (75%) fully adhered to 'assessing motivation to quit', whereas only 40% and 34% of PNs reported to fully adhere to 'increasing motivation' and 'discussing barriers', respectively.

Overall guideline adherence and potential determinants

PNs' overall guideline adherence was found to significantly and positively correlate with perceived advantages ($r_s = 0.36$; $P = 0.00$) of guideline use and PNs' self-efficacy ($r_s = 0.40$; $P = 0.00$) to use such a guideline (Table 2). Furthermore, the amount of time spent on counselling was found to significantly correlate with guideline adherence, indicating that adherent PNs spent more time on counselling per year. Results from the backward linear regression analysis showed however that only self-efficacy ($\beta = 0.32$, $P = 0.00$) significantly contributed to explaining PNs' overall guideline adherence.

Step-based adherence and potential determinants

Results from Mann–Whitney *U*-tests show that higher self-efficacy and more perceived advantages were significantly associated with complete adherence to all guideline steps, except for 'offering a quit advice' and 'assessing motivation to quit' (Table 3). Results from backward logistic regression analyses, showing only factors contributing to the model, indicate that higher self-efficacy and spending

Table 1. Characteristics of Dutch practice nurses ($N = 157$), recruited between January–March 2015

Characteristics	%	Mean (SD)
Female gender	98.0	
Age		47.3 (9.8)
Smoking status:		
non-smoker	55.4	
ex-smoker	44.1	
Employed in 1 practice	64.5	
Number of registered patients in practice		4647 (2864)
Using evidence-based guidelines	86.5	
Recently followed smoking cessation course	67.3	
Experience in using a guideline in years		4.6 (2.6)
Using visual guideline overview	54.7	
Special smoking cessation hours in practice	50.0	
Experience in smoking cessation counseling in years		5.6 (3.1)
Patients' smoking status systematically registered	100.0	
Reimbursement for smoking cessation counseling ^a		4.1 (1.3)
Registered in quality register for smoking cessation	72.8	
Time spent per year on counseling smokers in hours		45.9 (44.8)
Overall adherence score (Md) ^b		5

^arange from 1 to 5

^brange from 0 to 9

Table 2. Spearman's rank correlation matrix

Adherence and potential determinants	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Overall guideline adherence	1.00	0.36**	-0.10	0.40**	0.02	0.01	-0.05	-0.06	-0.01	0.01	-0.02	0.09	0.09	0.23**
2. Perceived advantages		1.00	-0.44**	0.75**	-0.08	-0.02	-0.09	-0.02	0.03	0.03	-0.01	0.16	0.10	0.24**
3. Perceived disadvantages			1.00	-0.46**	0.05	-0.01	0.07	-0.14	-0.02	-0.01	-0.05	-0.10	0.05	-0.15
4. Self-efficacy				1.00	-0.02	0.02	-0.01	-0.04	0.01	0.00	0.05	0.17*	0.07	0.26**
5. Social norms					1.00	0.42**	0.27**	0.25**	0.32**	0.04	0.12	-0.01	-0.04	0.13
6. Social support						1.00	0.27**	0.13	0.47**	0.28**	0.26**	0.05	-0.10	0.10
7. Social modelling: PN ^a							1.00	0.15	0.12	0.26**	0.14	0.07	-0.07	0.18*
8. Social modelling: PN ^b								1.00	0.22**	0.03	0.15	-0.11	0.00	0.01
9. Social modelling: GP									1.00	0.16*	0.15	0.06	-0.05	0.14
10. Visual guideline overview										1.00	0.13	0.11	-0.11	-0.01
11. Smoking cessation course											1.00	0.09	-0.03	0.15
12. Special counselling hours												1.00	-0.03	0.13
13. Counselling experience													1.00	0.24**
14. Time spent on counselling														1.00

* $P < 0.05$ ** $P < 0.01$ ^awithin the same practice.^bin other practices.

more time on counselling were found to be significantly associated with better adherence to six and five guideline steps, respectively (Table 4). Moreover, more perceived advantages was significantly associated with better adherence to 'discussing barriers' (OR = 2.09) and more perceived disadvantages to 'informing about cessation aids' (OR = 1.87).

Discussion of results

The present study investigated the extent of PNs' smoking cessation treatment guideline adherence and explored associations between their adherence and its potential determinants. Results illustrated Dutch PNs' sub-optimal adherence to evidence-based smoking cessation guidelines; overall PNs reported to adhere to five of nine guideline steps and their step-based adherence ranged from 34% to 75%. Self-efficacy and time spent on counselling were important factors explaining variation in PNs' overall and step-based adherence. Moreover, perceived advantages of guideline use were positively associated with PNs' step-based adherence fairly consistently.

PNs' self-reported adherence was lowest for guideline steps 'increasing motivation' (40%) and 'discussing barriers' (34%). These findings corroborate results from earlier qualitative studies, in which PNs describe often skipping these steps when smokers are perceived to be not motivated enough to quit (11) or when they perceive it as smokers' own responsibility to become motivated to quit smoking (12). This could also explain why 75% of PNs in the present study completely adhered to 'assessing motivation to quit', but only 34% to 55% reported to adhere to the next five guideline steps. As these five steps address key elements (i.e. behavioural and pharmacological support) from evidence-based smoking cessation guidelines that have shown to significantly improve cessation success in smokers (7,8), it could hence be worthwhile to especially target these elements in adherence-promoting interventions or trainings for PNs.

Spending more time on counselling, perceiving more advantages and having high self-efficacy were associated with better overall adherence by PNs, which matches findings from previous research identifying barriers to guideline adherence among nurses (17). Yet, a PN spending a lot of time on counselling could either counsel many patients, or spend more time per patient. Our data shows that adherent PNs counselled approximately twice as many patients than non-adherent PNs, whereas the time spent per consultation was similar for all PNs (data not shown). Thus, adherent PNs seem more engaged in smoking cessation counselling, which may not only increase their efficiency in applying the guideline, but also increase their self-efficacy to use such a guideline. Although our results indeed showed that PNs' self-efficacy was positively correlated with time spent on counselling, we cannot determine causality from the present data.

In contrast to previous research findings (9,10), no associations between PNs' overall adherence and perceived social influence and perceived disadvantages were found. This may be explained by all PNs in our study scoring rather neutral regarding perceived social influence and somewhat low on perceived disadvantages of applying a guideline. Whereas the latter suggest that there might not be much room for improvement, neutral results regarding perceived social influence might indicate that PNs' social environment is not very important when it comes to their guideline adherence. Though, many PNs indicated that no practice manager (up to 65%) or other PNs (up to 46%) were employed in their practice, probably pushing mean scores on perceived social influence towards a more neutral mean. Not considering these neutral scores, PNs still reported mostly neutral perceived social influence (social norms 3.29, social support 3.14, social

Table 3. Results of Mann-Whitney *U*-tests showing differences regarding socio-cognitive factors between practice nurses (*N* = 157) based on their step-based adherence.

Guideline steps	Step 1		Step 2		Step 3		Step 4		Step 5		Step 6		Step 7		Step 8		Step 9		
	Not adherent	Adherent	Not adherent	Adherent	Not adherent	Adherent	Not adherent	Adherent	Not adherent	Not adherent	Adherent	Not adherent	Not adherent	Adherent	Not adherent	Not adherent	Adherent	Not adherent	
Socio-cognitive factors	42.7%	57.3%	31.2%	68.8%	25.5%	74.5%	59.9%	40.1%	46.5%	53.5%	33.8%	45.2%	54.8%	45.2%	54.8%	45.2%	54.8%	31.2%	68.8%
<i>Self-efficacy</i>	Mean 4.01	4.41	4.31	4.60	3.93	4.12	3.68	4.09	4.08	4.25	3.67	4.31	4.55	3.89	4.20	4.00	4.31	4.00	4.31
	Z (U)	-4.19 (2237)**	-2.96 (2202)**	-1.92 (2160)	-1.92 (2160)	-3.96 (2197)**	-3.96 (2197)**	-3.96 (2197)**	-2.48 (2752)*	-2.48 (2752)*	-3.63 (2029)**	-2.94 (2505)**	-2.94 (2505)**	-3.43 (2418)**	-3.43 (2418)**	-3.15 (2086)**	-3.15 (2086)**	-3.15 (2086)**	-3.15 (2086)**
<i>Perceived advantage</i>	Mean 3.31	3.53	4.17	4.50	3.86	4.06	3.97	4.28	4.08	4.28	4.24	4.14	4.41	3.85	4.11	3.84	4.10	3.84	4.10
	Z (U)	-1.56 (2939)	-2.73 (2242)**	-1.34 (2249)	-1.34 (2249)	-3.55 (2364)**	-3.55 (2364)**	-3.55 (2364)**	-2.73 (2671)**	-2.73 (2671)**	-3.65 (2119)**	-3.13 (2477)**	-3.13 (2477)**	-2.59 (2637)**	-2.59 (2637)**	-2.46 (2275)*	-2.46 (2275)*	-2.46 (2275)*	-2.46 (2275)*
<i>Perceived disadvantage</i>	Mean 2.35	2.35	1.88	1.79	2.00	1.93	2.27	2.09	2.12	2.05	1.98	1.74	1.81	1.99	1.93	2.14	2.04	2.14	2.04
	Z (U)	-0.029 (3365)	-1.18 (2644)	-0.63 (2425)	-0.63 (2425)	-1.66 (2789)	-1.66 (2789)	-1.66 (2789)	-0.64 (3149)	-0.64 (3149)	-1.40 (2642)	-0.54 (3134)	-0.54 (3134)	-0.42 (3176)	-0.42 (3176)	-0.90 (2631)	-0.90 (2631)	-0.90 (2631)	-0.90 (2631)
<i>Social norms</i>	Mean 3.16	3.23	3.26	3.18	3.09	3.24	3.24	3.14	3.19	3.21	3.16	3.27	3.15	3.23	3.18	3.31	3.15	3.31	3.15
	Z (U)	-0.98 (2741)	-0.35 (2556)	-1.31 (2017)	-1.31 (2017)	-0.26 (2888)	-0.26 (2888)	-0.26 (2888)	-1.03 (2776)	-1.03 (2776)	-0.03 (2747)	-0.55 (2900)	-0.55 (2900)	-0.04 (3041)	-0.04 (3041)	-0.50 (2515)	-0.50 (2515)	-0.50 (2515)	-0.50 (2515)
<i>Social support scale</i>	Mean 3.08	3.12	3.09	3.11	3.04	3.12	3.15	3.03	3.08	3.12	3.06	3.12	3.05	3.08	3.12	3.11	3.09	3.11	3.09
	Z (U)	-0.51 (2904)	-0.47 (2547)	-1.28 (2078)	-1.28 (2078)	-1.02 (2708)	-1.02 (2708)	-1.02 (2708)	-0.73 (2896)	-0.73 (2896)	-0.43 (2667)	-0.70 (2889)	-0.70 (2889)	-0.10 (3068)	-0.10 (3068)	-0.22 (2642)	-0.22 (2642)	-0.22 (2642)	-0.22 (2642)
<i>Social modeling: PN-F^a</i>	Mean 3.54	3.47	3.57	3.47	3.54	3.49	3.53	3.46	3.51	3.49	3.45	3.52	3.45	3.60	3.42	3.66	3.43	3.66	3.43
	Z (U)	-0.20 (2997)	-0.29 (2601)	-0.11 (2373)	-0.11 (2373)	-0.37 (2896)	-0.37 (2896)	-0.37 (2896)	-0.15 (3062)	-0.15 (3062)	-0.27 (2716)	-0.97 (2833)	-0.97 (2833)	-1.08 (2812)	-1.08 (2812)	-1.29 (2382)	-1.29 (2382)	-1.29 (2382)	-1.29 (2382)
<i>Social modeling: PN-O^b</i>	Mean 3.70	3.60	3.59	3.67	3.59	3.67	3.68	3.59	3.62	3.67	3.60	3.67	3.62	3.75	3.56	3.74	3.60	3.74	3.60
	Z (U)	-1.16 (2748)	-0.82 (2471)	-0.20 (2354)	-0.20 (2354)	-0.84 (2777)	-0.84 (2777)	-0.84 (2777)	-0.22 (3044)	-0.22 (3044)	-0.45 (2672)	-0.67 (2915)	-0.67 (2915)	-1.67 (2660)	-1.67 (2660)	-0.74 (2521)	-0.74 (2521)	-0.74 (2521)	-0.74 (2521)
<i>Social modeling: GP</i>	Mean 3.16	3.24	3.20	3.21	3.22	3.21	3.27	3.11	3.22	3.20	3.19	3.22	3.14	3.17	3.24	3.22	3.20	3.22	3.20
	Z (U)	-0.38 (2944)	-0.01 (2668)	-0.01 (2396)	-0.01 (2396)	-0.92 (2744)	-0.92 (2744)	-0.92 (2744)	-0.01 (3100)	-0.01 (3100)	-0.10 (2756)	-0.95 (2828)	-0.95 (2828)	-0.46 (2969)	-0.46 (2969)	-0.01 (2697)	-0.01 (2697)	-0.01 (2697)	-0.01 (2697)

Step 1 = offering a quit advice, step 2 = assessing smoking profile and smoking history, step 3 = assessing motivation to quit, step 4 = increasing motivation, step 5 = assessing barriers to quitting, step 6 = discussing barriers, step 7 = informing about cessation aids, step 8 = making a quit plan and setting a quit date and step 9 = arranging follow-up after the quit date.

Means are calculated from Likert scale scores (1–5).

All available data were used, resulting in small variations in *n* per guideline step analysis which are not shown (smallest *n* = 157).

**P* < 0.05

***P* < 0.01

^awithin the same practice.

^bin other practices.

Table 4. Results of hierarchical logistic regression analyses with potential determinants of practice nurses' step-based adherence ($n = 148$)

Guideline steps	OR	95% CI	
		Lower	Upper
Offering a quit advice			
Time spent on counselling	1.00	0.99	1.01
Self-efficacy	2.75**	1.52	4.98
Assessing smoking profile and smoking history			
Time spent on counselling	1.00	.99	1.01
Self-efficacy	2.13*	1.11	4.09
Assessing motivation to quit			
Time spent on counselling	1.01	0.99	1.03
Increasing motivation			
Time spent on counselling	1.02**	1.01	1.03
Self-efficacy	2.68**	1.39	5.15
Assessing barriers to quitting			
Time spent on counselling	1.02**	1.01	1.04
Discussing barriers			
Time spent on counselling	1.02**	1.01	1.03
Self-efficacy	1.89	0.96	3.70
Perceived advantage	2.09*	1.04	4.23
Informing about cessation aids			
Time spent on counselling	1.01*	1.00	1.02
Self-efficacy	2.87**	1.43	5.76
Perceived disadvantage	1.87*	1.07	3.27
Making a quit plan and setting a quit date			
Time spent on counselling	1.01*	1.00	1.02
Self-efficacy	1.99*	1.08	3.66
Modelling PNs in other practices	0.64	0.40	1.01
Arranging follow-up after the quit date			
Time spent on counselling	1.00	0.99	0.101
Self-efficacy	2.54**	1.34	4.79

* $P < 0.05$ ** $P < 0.01$

modelling 3.58; on a five-point scale) from their GP, patients and PNs in other practices regarding their use of an evidence-based guideline. As previous studies did find associations of social influence with intention to use a smoking cessation protocol by health care professionals (10,14), in future studies it could be worthwhile to examine how such associations can also be established for PNs to improve their smoking cessation guideline adherence.

Regarding step-based adherence, self-efficacy and perceived advantages were found to be associated with PNs' complete adherence to most guideline steps, corresponding with previous findings among nurses (9). Especially PNs' level of self-efficacy appears to play an important role as it significantly explained variance in adherence to eight of the nine guideline steps. It would hence be key to further investigate this, for instance by assessing PNs' step-based self-efficacy in a range of situations where it might prove more difficult to adhere to these guideline steps, such as when they are behind schedule or when they experience rejection from smokers (18). This could produce detailed information on circumstances and situations that are associated with PNs' (non-)adherence to individual guideline steps and provide specific directions for intervention.

Finally, results concerning the guideline step 'informing about cessation aids' showed that adherent PNs felt more strongly about the disadvantage (i.e. patients believe that merely using a cessation aid is sufficient to quit smoking) associated with performing this counselling step. Though only found for a single step, this finding is not in line with our theoretical framework (13) and previous research (9,10).

However, as adherent PNs apply this particular guideline step more often in practice, they could also more often encounter patients believing that merely cessation aids are sufficient to quit smoking, but not perceiving this as a reason to stop applying guideline-based cessation counselling on a regular basis.

Practice implications

In general, our results showed that similar socio-cognitive (perceived advantages and self-efficacy) and predisposing factors (time spent on counselling) were associated with both PNs' overall and step-based adherence. These associations combined with detailed results regarding PNs' step-based adherence, provide good foci to improve PNs' guideline adherence via interventions or training. Taking PNs' time constraints (12) and interest in a personally relevant, practically applicable program (11) into consideration, an internet-based intervention that is tailored to determinants of PNs' adherence could be a feasible support tool for PNs (19). Though research has established the effectiveness of tailored interventions in changing various health behaviours and their determinants (20), so far such interventions for health care professionals to improve their smoking cessation guideline adherence do not yet exist. Therefore, the present study's results can potentially be used as a starting point for developing (tailored) interventions for PNs to support them with adhering to evidence-based smoking cessation guidelines.

Strengths and limitations

A strength of the present study is that its design was based on the I-Change Model (13), and previous studies investigating the use of smoking cessation interventions among health care professionals (10,14). Also, to the best of our knowledge, the present study is the first to operationalize a step-based approach to guideline adherence and therefore the results provide a more detailed picture of factors associated with PNs' adherence to smoking cessation guidelines.

However, the study's cross-sectional nature prevents us from drawing conclusions about how and to what extent constructs are causally linked. For this purpose, longitudinal follow-up studies are needed. Results are also limited to our self-selected sample, of potentially more motivated participants, recruited from the population of Dutch PNs and some caution is therefore warranted when generalizing results to other professions and health care systems. Nevertheless, the number of complete questionnaires filled out by PNs was found to be quite reasonable (response rate 70.1%). Finally, PNs might have over-estimated their guideline adherence, as is often observed when collecting self-reported data (21). To account for this, we have considered only those PNs who reported to always perform a guideline step as adherent.

Conclusions

This study confirmed Dutch PNs' sub-optimal overall (five out of nine steps) and step-based (34% to 75%) adherence to evidence-based smoking cessation guidelines. Detailed insights in associations between PNs' guideline adherence and socio-cognitive (perceived advantages and self-efficacy) and predisposing factors (time spent on counselling), can inform the development of interventions for PNs to improve their overall and step-based adherence to evidence-based smoking cessation guidelines.

Declaration

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The study is registered with the Dutch Trial Register (NTR4436).

Conflict of interest: none.

References

1. WHO. *WHO report on the global tobacco epidemic 2015: Raising taxes on tobacco*. Geneva, Switzerland: World Health Organization, 2015.
2. RIVM. *Volksgezondheid Toekomst Verkenning (VTV) 'Een gezonder Nederland'*. Bilthoven, The Netherlands: Rijksinstituut voor Volksgezondheid en Milieu, 2014.
3. Stead LF, Buitrago D, Preciado N *et al*. Physician advice for smoking cessation. *Cochrane Database Syst Rev* 2013; 5: CD000165.
4. Freund T, Everett C, Griffiths P, Hudon C, Naccarella L, Laurant M. Skill mix, roles and remuneration in the primary care workforce: who are the healthcare professionals in the primary care teams across the world? *Int J Nurs Stud* 2015; 52: 727–43.
5. Heiligers PJM, Noordman J, Korevaar JC *et al*. *Kennisvraag: praktijkondersteuners in de huisartspraktijk (POH's), klaar voor de toekomst?* Utrecht, The Netherlands: NIVEL, 2012.
6. Stop Smoking Partnership. *Guideline treatment tobacco addiction [Richtlijn behandeling van tabaksverslaving]*. Alphen aan den Rijn, The Netherlands: Stop Smoking Partnership, 2009.
7. Miller M, Kearney N. Guidelines for clinical practice: development, dissemination and implementation. *Int J Nurs Stud* 2004; 41: 813–21.
8. Rice VH, Hartmann-Boyce J, Stead LF. Nursing interventions for smoking cessation. *Cochrane Database Syst Rev* 2013; 8: CD001188.
9. Segaar D, Willemsen MC, Bolman C, De Vries H. Nurse adherence to a minimal-contact smoking cessation intervention on cardiac wards. *Res Nurs Health* 2007; 30: 429–44.
10. Berndt NC, Bolman C, de Vries H *et al*. Smoking cessation treatment practices: recommendations for improved adoption on cardiology wards. *J Cardiovasc Nurs* 2013; 28: 35–47.
11. de Ruijter D, Smit ES, de Vries H *et al*. Understanding Dutch practice nurses' adherence to evidence-based smoking cessation guidelines and their needs for web-based adherence support: results from semi-structured interviews. *BMJ Open* 2017; 7: e014154.
12. van Rossem C, Spigt MG, Kleijns JR *et al*. Smoking cessation in primary care: Exploration of barriers and solutions in current daily practice from the perspective of smokers and healthcare professionals. *Eur J Gen Pract* 2015; 21: 111–7.
13. de Vries H, Mudde A, Leijts I *et al*. The European Smoking Prevention Framework Approach (EFSA): an example of integral prevention. *Health Educ Res* 2003; 18: 611–26.
14. Smit ES, de Vries H, Hoving C. Determinants of practice nurses' intention to implement a new smoking cessation intervention: the importance of attitude and innovation characteristics. *J Adv Nurs* 2013; 69: 2665–74.
15. van der Weide M, Smits J. Adoption of innovations by specialised nurses: personal, work and organisational characteristics. *Health Policy* 2004; 68: 81–92.
16. Batenburg R. *Praktijkovername in de eerste lijn: huisartsen, tandartsen en apothekers over hun overnamewensen als praktijkhouder of praktijkzoeker*. Utrecht, The Netherlands: NIVEL, 2016.
17. Abrahamson KA, Fox RL, Doebbeling BN. Facilitators and barriers to clinical practice guideline use among nurses. *Am J Nurs* 2012; 112: 26–35; quiz 46,36.
18. Smit ES, Hoving C, Schelleman-Offermans K, West R, de Vries H. Predictors of successful and unsuccessful quit attempts among smokers motivated to quit. *Addict Behav* 2014; 39: 1318–24.
19. Tate DF, Finkelstein EA, Khavjou O, Gustafson A. Cost effectiveness of internet interventions: review and recommendations. *Ann Behav Med* 2009; 38: 40–5.
20. Kohl LE, Crutzen R, de Vries NK. Online prevention aimed at lifestyle behaviors: a systematic review of reviews. *J Med Internet Res* 2013; 15: e146.
21. Gnams T, Kaspar K. Socially desirable responding in web-based questionnaires: a meta-analytic review of the candor hypothesis. *Assessment* 2016; 1–17.