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Research

Profile of tobacco users identified in primary care practice and predictors of readiness to quit: a cross-sectional survey

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Abstract

Background: The aim of this study was to document the prevalence of tobacco use and describe the characteristics of tobacco users identified in primary care practices.

Methods: We conducted a cross-sectional survey in 49 primary care practices in the province of Ontario. Consecutive patients were screened for smoking status at the time of their clinic appointment. Patients reporting current tobacco use completed a survey, which documented sociodemographic and smoking-related characteristics. Multilevel modelling was used to examine predictors of readiness to quit smoking and the presence of anxiety and/or depression.

Results: A total of 56 592 patients were screened, and 5245 tobacco users participated in the survey. Prevalence of tobacco use was 18.2% and varied significantly across practices (range 12.4%–36.1%). Of the respondents, 46.3% reported current anxiety and/or depression, and 61.3% reported smoking within the first 30 minutes of waking. A total of 41.1% of respondents reported they were ready to quit smoking in the next 6 months, and 30.1% reported readiness to quit in the next 30 days. Readiness to quit was positively associated with higher self-efficacy, male sex, presence of chronic obstructive pulmonary disease and more years of tobacco use. The presence of anxiety and/or depression was associated with lower cessation self-efficacy and time to first cigarette within 30 minutes of waking, but did not predict readiness to quit.

Interpretation: Tobacco users identified in primary care practices reported high rates of nicotine dependence and anxiety and/or depression, but also high rates of readiness to quit. Study findings support the need to tailor interventions to address the needs of tobacco users identified in primary care settings.

Tobacco use is the leading cause of preventable death globally.[1] Primary care practice is an important setting for intervening with smokers and assisting with cessation.[1,2] In North America, an estimated 70%–80% of tobacco users will visit a primary care provider at least once annually; similar rates are reported internationally.[3–6] These visits represent an opportunity to identify the smoking status of patients, offer advice to quit and brief motivational interventions, and support cessation.[7–9]

Increasing the rates of tobacco treatment delivery in clinical settings has been identified as an important target for tobacco control and the reduction of health care costs.[1,6] Although there have been important improvements in this area, there remains a "practice gap" in the rates at which tobacco treatments are being delivered.[7–10] Many clinicians identify patient-level barriers to treatment delivery, including low patient motivation to quit, the clinical complexity of their patients and a perceived lack of effectiveness in assisting patients with cessation.[11,12] A more in-depth understanding of the characteristics of tobacco users identified in the primary care setting is critical for informing future intervention design. The purpose of this investigation was to examine the prevalence of tobacco use, the demographic and smoking-related characteristics of smokers identified in a sample of primary care practices, and predictors of readiness to quit.

Competing interests: Sophia Papadakis and Andrew Pipe contributed to the development of the Ottawa Model for Smoking Cessation. Andrew Pipe reports personal fees from Pfizer, Johnson & Johnson and Amgen. No other competing interests were declared.

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Methods

Design and setting

Data collection activities occurred in a sample of 49 primary care practices in the province of Ontario. An invitation to participate in the study was sent to all family health teams (n = 90) from 6 health regions in Ontario (Champlain Local Health Integration Network [LHIN], South East LHIN, Central East LHIN, Waterloo Wellington LHIN, Mississauga Halton LHIN and Erie St. Clair LHIN). A telephone call was also placed by a member of the project team to confirm receipt and answer any questions about study participation. From each participating primary care practice, a cross-sectional sample of patients who used tobacco completed the study survey.

Sources of data

In each primary care practice, consecutive patients scheduled for an annual examination or nonurgent appointment were screened for eligibility upon check-in to the clinic. A research assistant was located in primary care practice waiting rooms and was responsible for screening all patients for eligibility and for all data collection activities. Patients were eligible to participate if they met the following criteria: (1) a current smoker (≥ 1 cigarette per day in past 7 days); (2) 18 years of age or older; (3) had a scheduled appointment with a clinic physician or nurse practitioner; and (4) were able to read and write in English or French. All eligible patients were asked to complete a brief survey. Participants completed the survey independently and were identified only by study identification number. Participants were encouraged to complete the survey before leaving the clinic; however, if time was a barrier, participants were asked to complete the survey at home and return it by mail. A stamped envelope with the return address was provided to participants who chose this option. Data collection occurred in each primary care practice over a 1-month period to gather a representative sample. If a minimum sample of 50 eligible patients was not recruited, data collection was extended for up to 4 weeks. The minimum sampling period of 4 weeks was selected to provide a sufficient time frame to be representative of typical clinical practice. The minimum sample of 50 patients was used to ensure smaller primary care practices had a sufficient sample for which comparisons could be made.

Survey instrument

The survey instrument is presented in Appendix 1, available at www.cmajopen.ca/content/4/1/E41/suppl/DC1. The survey was pilot tested in 2 clinics and uses previously validated survey items. The survey assessed patient demographic characteristics (i.e., age, sex and years of formal education), self-reported presence of comorbidities ("Do you have any of the following conditions?: heart disease, stroke, heart failure; cancer; chronic obstructive pulmonary disease; diabetes; anxiety or depression"). Nicotine dependence was assessed using the Heaviness of Smoking Index, which is a well-validated self-report measure. The Heaviness of Smoking Index includes 2 items: time to first cigarette in the morning ("How soon after waking in the morning do you smoke your first cigarette?") and number of cigarettes smoked per day ("On average how many cigarettes do you smoke per day?").[13] The total number of years the patient had been smoking was documented. Participants' stage of readiness to quit smoking was assessed using an adaptation of the Prochaska and DiClemente's Transtheoretical Model, which classifies tobacco users in 1 of 3 stages: precontemplators (smokers who are not thinking about quitting), contemplators (smokers who are thinking of quitting in the next 6 months) and preparation (smokers who are thinking about quitting in the next 30 days).[14] Cessation self-efficacy (confidence in one's ability to abstain) was assessed using a previously validated single item: "On a scale of 0 to 10 how confident are you that you would be able to quit smoking at this time?"[15–17] This item has been shown to be a robust predictor of long-term smoking abstinence.[18]

Statistical analysis

Descriptive statistics were used to summarize tobacco-use prevalence and the characteristics of tobacco users. Participants' characteristics were compared using χ^2 tests or 2-sample t tests. Multilevel regression techniques were used to examine those patient characteristics associated with the presence of anxiety or depression (yes/no) as well as readiness to quit in the next 30 days, controlling for clinic and provider-level variance due to the clustered nature of the data. Odds ratios (ORs) and 95% confidence intervals (CIs) were used to summarize the effects of each explanatory variable in a final model. Self-efficacy was dichotomized based on scale (0 = under 7; 1 = 7–10). Missing data were not replaced and were less than 1% for any single variable. MLwiN version 2.02 was used to conduct multilevel modelling.

Results

Data collection occurred between September 2009 and December 2013. A total of 49 primary care practices agreed to participate and contributed data to the present analysis (54.4% response rate). Primary care practices represented 30% of all family health teams in the province of Ontario. Participating practices included a representative mix of urban and rural clinics and practices sizes, as well as small and large clinics. Participating practices were more likely to be located in rural or suburban areas than nonparticipating practices. No other differences in clinic characteristics were documented.

A total of 56 592 patients were screened, 9215 eligible participants were identified and 5245 tobacco users participated in the survey (56.9% participation). The primary reason provided for nonparticipation was lack of time. A total of 489 patients left the clinic without seeing the research assistant to complete the survey. Additionally, among participants who chose to return the survey by mail, 528 did not return their survey after 2 reminder calls. The recruitment flow diagram is presented in Figure 1.

Prevalence of tobacco use

The prevalence of tobacco use in the sample was 18.2% (SD 4.9%). Rates of tobacco use varied significantly among primary care practices sampled, ranging from 12.4% to 36.1%. The highest rates of smoking were documented in urban centres (downtown core) and rural areas.

Characteristics of tobacco users

Table 1 displays the profile of tobacco users overall and by readiness to quit categories. The mean age of the study sample was 47.4 (95% CI 47.0–47.8) years. A total of 26.8% of participants reported the presence of 1 or more smoking-related illnesses. A large proportion of patients self-reported the presence of current anxiety and/or depression (46.3%). Table 2 provides a comparison of the characteristics of tobacco users with and without anxiety or depression.

Participants were relatively heavy smokers, consuming a mean of 16.6 (95% CI 16.3–16.9) cigarettes per day for a mean of 27.5 (95% CI 27.1–27.9) years. Of respondents, 61.3% reported smoking within 30 minutes of waking, a proxy for significant nicotine addiction. A total of 30.1% of participants reported they were ready to quit in the next 30 days. An additional 41.1% of participants reported that they were ready to quit smoking in the next 6 months (Table 1).

Multilevel modelling

Readiness to quit in the next 30 days was associated with significantly greater cessation self-efficacy, male sex, having smoked between 5 and 15 years, and the presence of chronic obstructive pulmonary disease (COPD) (Table 3). There was no association between readiness to quit smoking and reported anxiety and/or depression.

Multilevel modelling found tobacco users with self-reported anxiety or depression were significantly more likely to be female, to be over the age of 25, to report the presence of COPD, to commence smoking within 30 minutes of waking in the morning and to report lower cessation self-efficacy (Table 4).

Interpretation

Increasing the delivery of cessation treatment within primary care settings is an identified target for many provincial tobacco control strategies in Canada and is one of the goals of the World Health Organization's MPOWER initiative.[1,2,19] (The acronym MPOWER is derived from "Monitor tobacco use and prevention policies; Protect people from tobacco smoke; Offer help to quit tobacco use; Warn about the dangers of tobacco; Enforce bans on tobacco advertising, promo-

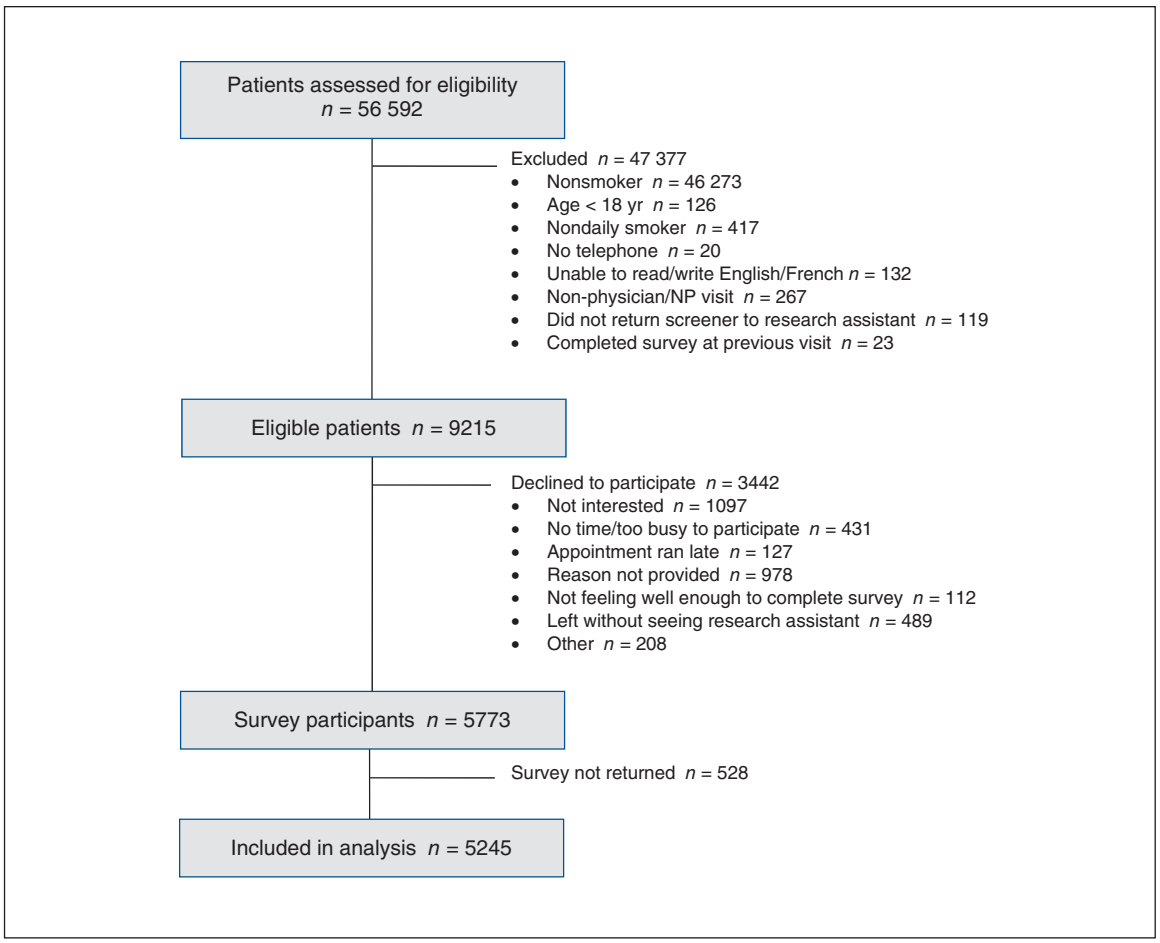

Figure 1: Recruitment flow diagram. Note: NP = nurse practitioner.

tion and sponsorship; Raise taxes on tobacco.") In our study, 18.2% of all patients screened reported current use of tobacco products. Tobacco users identified in primary care practices reported high rates of nicotine dependence and anxiety and/or depression, but also high rates of readiness to quit. Readiness to quit was positively associated with higher self-efficacy, male sex, presence of COPD and more years of tobacco use.

The prevalence of tobacco use reported in our study is slightly higher than current rates of smoking in Canada (17.3%).[4] There was large variation in prevalence rates of tobacco use across primary care practices, with higher rates of tobacco use documented in the downtown core of urban centres and in rural areas, consistent with previous reports.[20] The distribution of tobacco users across age categories was similar to the distribution reported in available provincial and national reports of population-based tobacco use.[4] The only exception was that the proportion of younger (18–39 yr) male tobacco users identified in primary care practices

Table 1: Profile of tobacco users identified in primary care practices, by readiness to quit*

Characteristic	Total *n* = 5245	Readiness to quit, %†			*p* value‡
		Ready in next 30 d *n* = 1547	Ready in next 6 mo *n* = 2115	Not ready *n* = 1479	
Age, mean (95% CI), yr	47.4 (47.0–47.8)	46.1 (45.4–46.8)	46.5 (45.9–47.1)	49.8 (49.0–50.6)	< 0.001
Sex					
Male	42.2	44.6	40.6	42.1	0.07
Female	57.8	55.4	59.4	57.9	
Education level					
< High school	22.3	21.2	20.4	26.2	< 0.001
High school	33.2	31.0	33.2	35.4	
Some postsecondary	23.9	25.1	25.0	21.1	
University degree	20.6	22.7	21.5	17.3	
Smoking-related illness	26.8	27.3	25.9	27.2	0.7
Heart disease, heart attack, heart failure, stroke	10.9	10.2	10.3	12.3	0.2
Diabetes	13.1	13.0	13.0	13.3	0.9
Cancer	3.9	3.9	3.4	4.5	0.2
COPD	8.7	11.0	8.2	7.1	< 0.001
Anxiety/depression, self-reported§	46.3	45.9	47.0	45.7	0.7
Cigarettes per day, mean (95% CI)	16.6 (16.3–16.9)	15.7 (15.2–16.3)	16.3 (15.9–16.7)	18.0 (17.4–18.5)	< 0.001
No. of years smoking, mean (95% CI)	27.5 (27.1–27.9)	25.4 (24.7–26.2)	26.7 (26.1–27.3)	30.7 (29.9–31.5)	< 0.001
Time (min) to first cigarette in the morning¶					
> 60	19.5	21.5	18.9	18.2	< 0.001
31–60	19.2	18.9	20.6	17.3	
6–30	35.0	33.5	37.1	33.6	
≤ 5	26.3	26.1	23.4	30.8	
Readiness to quit*					
Ready in next 30 d	30.1	—	—	—	—
Ready in next 6 mo	41.1	—	—	—	—
Not ready	28.8	—	—	—	—
Cessation self-efficacy, mean score (95% CI)**	5.1 (5.0– 5.2)	6.6 (6.5– 6.7)	5.4 (5.3– 5.5)	2.8 (2.6– 2.9)	< 0.001

Note: CI = confidence interval, COPD = chronic obstructive pulmonary disease.
*In response to the question, "Which of the following best describes your feelings about quitting smoking right now?"
†Unless stated otherwise.
‡*p* values have been adjusted for clinic-level clustering.
§Self-reported presence of current anxiety or depression: "Do you have any of the following conditions?: anxiety or depression."
¶In response to the question, "How soon after you wake up do you smoke your first cigarette?"
**In response to the question, "On a scale of 0 to 10 how confident are you that you would be able to quit smoking at this time? (0 = not at all confident, 10 = extremely confident)."

surveyed was lower than the reported prevalence of men who smoke in Canada. This is consistent with previous reports that have found that a third of men aged 20–39 years in Canada have not seen a general practitioner in the previous 12 months.[3] Study participants also reported higher levels of university education than the known population of smokers in Canada.[21]

Most participants reported high rates of nicotine dependence, with 61.3% of tobacco users reporting smoking within the first 30 minutes of waking compared with 42% identified in population surveys in Ontario.[4] This observation is important, given that individuals with higher levels of nicotine dependence report fewer quit attempts and less success with quitting.[22–25] We found that a large proportion of tobacco users reported the presence of a smoking-related illness. Importantly, 46.3% of tobacco users screened self-reported current anxiety and/or depression. Available data suggests the rate of lifetime anxiety and major depression in the general Canadian population is 12% and 8%, respectively.[26] Vermani and colleagues[27] found rates of major depression (27.2%) and generalized anxiety disorder (31.2%) to be higher among patients in Canadian primary care practice settings than in the general population. The co-occurrence of smoking with anxiety, depression and other mental health disorders is well known, with rates of nicotine dependence 3–6 times higher in such individuals.[28–30] Consistent with previous research, female tobacco users reported they were currently suffering from anxiety and depression significantly more frequently than males (47.7% v. 36.3%).[31,32] Heavier rates of smoking and higher levels of nicotine addiction were also reported among tobacco users who reported anxiety or depression compared with those without mental health illness. The rates of anxiety and depression observed is particularly relevant given

Table 2: Profile of tobacco users by presence of self-reported anxiety or depression*

Characteristic	Self-reported anxiety or depression, %†	
	Reported *n* = 2379	Not reported *n* = 2787
Age, mean (95% CI), yr	46.2 (45.6–46.7)	48.4 (47.9–49.0)
Sex		
Male	36.3	63.7
Female	47.7	52.3
Years of formal education, mean (95% CI)	13.3 (13.2–13.4)	13.3 (13.2–13.4)
Smoking-related illness, %		
Heart disease, heart attack, heart failure, stroke	11.6	10.3
Diabetes	13.8	12.4
Cancer	4.0	3.7
COPD	11.7	5.9
Cigarettes per day, mean (95% CI)	17.5 (17.1–17.9)	15.8 (15.5–16.2)
No. of years smoking, mean (95% CI)	26.5 (25.9–27.1)	28.3 (27.8–28.9)
Time (min) to first cigarette in the morning‡		
> 60	16.2	22.7
31–60	17.6	20.4
6–30	34.4	35.6
≤ 5	31.8	21.3
Readiness to quit§		
Ready in next 30 d	29.8	30.3
Ready in next 6 mo	41.7	40.6
Not ready	28.5	29.2
Cessation self-efficacy, mean score (95% CI)¶	4.9 (4.7–5.0)	5.3 (5.2–5.4)

Note: CI = confidence interval, COPD = chronic obstructive pulmonary disease.
*Self-reported presence of current anxiety or depression: "Do you have any of the following conditions?: anxiety or depression."
†Unless stated otherwise.
‡In response to the question, "How soon after you wake up do you smoke your first cigarette?"
§In response to the question, "Which of the following best describes your feelings about quitting smoking right now?"
¶In response to the question, "On a scale of 0 to 10 how confident are you that you would be able to quit smoking at this time? (0 = not at all confident, 10 = extremely confident)."

that poorer cessation outcomes have been documented among individuals who report anxiety or depression.[33] We did not find, however, that the presence of anxiety or depression predicted readiness to quit smoking, which is consistent with previous reports by Hall and colleagues.[34,35] About a third of tobacco users reported an interest in quitting in the next 30 days. Patients not ready to quit reported lower rates of confidence with quitting than those ready to quit. Increasing patient confidence in their ability to quit is an important goal for patients not ready to quit in the next 30 days. An association was also documented between readiness to quit and years of smoking, which suggests individuals who have been smoking less than 5 years are less likely to be ready to quit in the immediate future.

Limitations

The following limitations should be considered when interpreting our findings. First, the study was conducted in a sample of primary care practices in Ontario, Canada, and may not be generalizable to other primary care practices. We had a greater rate of nonparticipation from urban primary care clinics. Clinics in urban centres were more likely to identify competing demands as the reason for nonparticipation. A total of 56.9% of eligible tobacco users participated in the survey. Unfortunately, 528 patients who agreed to participate did not return their survey. Future studies should examine methods of reducing barriers to participation to increase representativeness. Additionally, self-report was used for data collection and may be subject to respondent error. The use of standardized assessment for screening of anxiety and depression would be valuable in future studies to validate our findings.

Conclusion

This study provides a profile of tobacco users identified in a large sample of primary care practices in Ontario. Tobacco users reported high rates of nicotine dependence and anxiety and/or depression, but also high rates of readiness to quit. Our findings may have important implications for informing future research and practice, and increasing both the uptake and outcomes of tobacco treatment interventions delivered in primary care settings. Given the high rates of anxiety and depression among tobacco users in primary care settings, integrated interventions in which both nicotine addiction and anxiety/depression are addressed is an important focus for future research.

Table 3: Final multilevel logistic regression model* examining variables associated with readiness to quit in next 30 days†

Variable	OR (95% CI)
Sex	
Male	1.00
Female	0.85 (0.74–0.97)
COPD	
No	1.00
Yes	1.76 (1.4–2.2)
No. of years smoking	
< 5	1.00
5–15	1.54 (1.19–2.11)
> 15	1.12 (0.93–1.36)
Cessation self-efficacy score‡	
< 7	1.00
≥ 7	3.58 (3.13–4.10)

Note: CI = confidence interval, COPD = chronic obstructive pulmonary disease, OR = odds ratio.
*Model adjusted for clinic-level clustering effects.
†"Which of the following best describes your feelings about quitting smoking right now?" Response: "I would like to quit in the next 30 days."
‡In response to the question, "On a scale of 0 to 10 how confident are you that you would be able to quit smoking at this time? (0 = not at all confident, 10 = extremely confident)."

Table 4: Final multilevel logistic regression model* examining variables associated with the presence of self-reported anxiety or depression

Variable	OR (95% CI)†
Age, yr	
≤ 24	1.00
25–44	1.53 (1.10–2.14)
45–64	2.24 (1.79–2.80)
≥ 65	1.70 (1.39–2.09)
Sex	
Male	1.00
Female	1.66 (1.47–1.88)
COPD	
No	1.00
Yes	2.16 (1.73–2.67)
No. of years smoking	
< 5	1.00
5–15	1.68 (1.24–2.27)
>15	1.15 (0.97–1.37)
Time (min) to first cigarette in the morning‡	
> 60	1.00
31–60	1.21 (0.99–1.47)
6–30	1.37 (1.15–1.62)
≤ 5	2.00 (1.66–2.40)
Cessation self-efficacy§	
< 7	1.00
≥ 7	0.78 (0.69–0.90)

Note: CI = confidence interval, COPD = chronic obstructive pulmonary disease, OR = odds ratio.
*Model adjusted for clinic-level clustering effects.
†1 = self-reported anxiety or depression (n = 2379); 0 = did not self-report anxiety or depression (n = 2787).
‡"How soon after you wake up do you smoke your first cigarette?"
§"On a scale of 0 to 10 how confident are you that you would be able to quit smoking at this time? (0 = not at all confident, 10 = extremely confident)."

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