

Prevalence of potential smoking-related conditions among tobacco users in the emergency department and their perception that their visit may be smoking-related

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ABSTRACT

Objectives: Patients who are tobacco users present to the emergency department (ED) with many medical conditions that are causally or potentially causally related to smoking. Previous studies have shown increased cessation rates for patients who accurately perceive that their ED visit is smoking-related. Our study goals were 1) to determine the prevalence of potential smoking-related conditions among tobacco users at a tertiary care academic ED, and 2) to determine which medical conditions are more or less likely to be perceived by patients as smoking-related.

Methods: We included adults ≥ 19 years of age who reported smoking within 30 days of their ED visit, and were enrolled in a randomized controlled trial (ClinicalTrials.gov, NCT01454375) from December 1, 2011 to August 31, 2012. Patients were asked whether they perceived their ED visit to be related to smoking. ED discharge diagnoses were coded as smoking-related or not smoking-related based on the 2004 U.S. Surgeon General's Report.

Results: We included 893 patients (62% male; mean age = 40 \pm 15), of which 120 (13%) had a visit for a potential smoking-related condition: 6 (5%) of neoplasm, 18 (15%) of cardiovascular disease, 67 (56%) of respiratory disease, 3 (3%) of reproductive complication, 7 (6%) of postoperative complication, 9 (8%) of dental disease, 9 (8%) of peptic ulcer disease, 0 (0%) of eye condition, and 1 (1%) of bony condition. Of the potential smoking-related conditions, 46 (38%) were perceived by patients to be possibly smoking-related: 61% of cardiovascular disease, 33% of neoplasm, 43% of respiratory disease, 22% of dental disease, 14% of postoperative complication, 11% of peptic ulcer disease, and 0% of the remaining conditions.

Conclusion: In this study, 13% of all ED visits among smokers were for a potential smoking-related condition, of which 38% were perceived by patients to be smoking-related. Education to increase awareness of smoking-related conditions may increase cessation rates.

Keywords: health promotion, patient perception, tobacco use

INTRODUCTION

Smoking is the leading cause of preventable deaths and disability worldwide.¹ Approximately one-sixth of the world's population smoke, and smoking kills nearly 6 million people each year.¹ In Canada, about 15% of the population smoke.² Each year 37,000 Canadians die as a result of tobacco smoke.³ For every death, 20 additional smokers develop a serious smoking-related condition resulting in emergency department (ED) visits and hospital admissions.⁴ In Canada, tobacco smoke costs \$17 billion annually, including direct health care costs of \$4.4 billion per year.³

In 2004, the U.S. Surgeon General's Report⁵ compiled a list of medical conditions that were causally or potentially causally related to smoking. A causal relationship was based on the committee's considered decision of all available evidence, and was identified when there was a significant relationship between the use of tobacco and the medical condition, recognizing that many other causative factors may be at play. A causal relationship had to demonstrate "consistency, strength, specificity, temporality, and coherence." A potentially causal relationship was identified when there was "suggestive but not sufficient" evidence to imply a causal relationship. In Canada, the top three causes of death are cancer, cardiovascular disease, and stroke, which account for 30%, 20%, and 6% of all

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deaths, respectively. Close behind are chronic lower respiratory diseases, which account for 5% of all deaths.⁶ All of these conditions are causally or potentially causally related to smoking.⁵

Previous studies^{7,8} have found that smokers with a smoking-related International Classification of Diseases (ICD-9) ED discharge diagnosis were more likely to quit smoking. In these same studies, patients who perceived that their ED visit was smoking-related were also more likely to quit. It has been postulated that the higher odds of quitting among patients with a potential smoking-related ED discharge diagnosis may be the result of patients realizing that their ED visit was related to smoking,⁷ making it even more important for patients to know which diseases are potentially related to smoking. The goals of this study were 1) to determine the prevalence of potential smoking-related conditions as the ED discharge diagnosis among tobacco users, and 2) to describe which medical conditions were more or less likely to be perceived by patients as smoking-related.

METHODS

Setting

This was a cross-sectional study conducted at Vancouver General Hospital (VGH). VGH is a 700-bed adult tertiary care teaching hospital affiliated with the University of British Columbia. The VGH ED treats approximately 85,000 patients annually. Our institutional research ethics board approved this study.

Case identification

All patients who were enrolled in a randomized controlled trial (ClinicalTrials.gov Identifier NCT01454375) looking at the effectiveness of referring ED smokers to a telephone “quit line” from December 1, 2011 to August 31, 2012 were included in this study. For the randomized controlled trial, an admitting clerk screened all patients presenting to the VGH ED for study eligibility. Medically stable patients age 19 years and older who were able to give informed consent in English and who had used tobacco in the last 30 days were eligible. Patients were excluded if they could not provide informed consent, did not reside in British Columbia, or were unable to provide a telephone number for follow-up. Screening was performed

24 hours a day, 7 days a week. All patients completed a baseline questionnaire, which included the question, “Do you believe that this ED visit is related to a smoking-related illness: Yes or No?”

Chart abstraction

A retrospective chart review was conducted to determine whether each ED discharge diagnosis was potentially smoking-related. To perform the chart review, two trained abstractors, who were blinded to whether the patients perceived their ED visits to be related to smoking, independently abstracted data from all patient charts on standardized data abstraction forms. Abstractor performance was monitored by an attending emergency physician. For each identified patient, the patient’s age, gender, chief complaint, triage acuity, ED discharge diagnosis, and discharge disposition were recorded. The ED discharge diagnosis was defined as potentially smoking-related if it was listed as being causally related or potentially causally related to smoking as per the 2004 U.S. Surgeon General’s Report (see Table 1 for a list of medical conditions).⁵ This method of identifying potential smoking-related conditions has been used in previous ED studies.⁷⁻⁹ All potential smoking-related conditions were placed under nine major disease categories: neoplasm, cardiovascular disease, respiratory disease, reproductive complication, postoperative complication, dental disease, peptic ulcer disease, eye condition, or bony condition. For admitted patients, where there were discrepancies, final diagnoses from in-hospital discharge summaries superseded preliminary ED diagnoses. When final diagnoses were not clear and discrepancies still remained, disagreement was resolved by consensus or third party adjudication. Approximately 20% percent of all charts were reviewed by both abstractors to assess inter-rater agreement.

Data analysis

Descriptive statistics were used to report the prevalence of potential smoking-related conditions among ED tobacco users and the proportion of potential smoking-related conditions that were perceived by patients to be attributable to tobacco. Subsequently, we described whether certain medical conditions were more likely to be perceived by patients as being related to smoking. Discrete variables were summarized as

Table 1. Adults' medical conditions that are causally or potentially causally related to smoking*

<u>Cancer</u>
Oral cavity/pharynx/esophagus/stomach
Pancreas/liver/colon (including colon polyps)
Larynx/lung
Kidney/bladder
Cervical
Acute myeloid leukemia
<u>Cardiovascular diseases</u>
Abdominal aortic aneurysm
Atherosclerosis
Cerebrovascular disease
Coronary heart disease
<u>Respiratory diseases</u>
Acute respiratory illness/pneumonia (in patients without COPD)
Acute respiratory illnesses (in patients with COPD)
Chronic obstructive pulmonary disease
Accelerated lung function decline
Poor asthma control
<u>Reproductive complications</u>
Reduced fertility in women
Ectopic pregnancy
Spontaneous abortion
Premature rupture of membranes, placenta previa, placenta abruption
Preterm delivery
Erectile dysfunction
<u>Postoperative complications</u>
Poor wound healing
Respiratory complications
<u>Dental diseases</u>
Periodontitis
Root-surface dental caries
<u>Peptic ulcer disease related conditions</u>
Peptic ulcer disease in <i>Helicobacter pylori</i> positive patients
<u>Eye conditions</u>
Cataracts
Exudative and atrophic age-related macular degeneration
Ophthalmopathy associated with Graves disease
<u>Bony conditions</u>
Low bone density in postmenopausal women
Low bone density in men
Hip fractures

*Causal relationship identified for all conditions listed in the table, except for italicized conditions, where evidence is suggestive but insufficient to infer causal relationship with smoking.⁵ COPD = chronic obstructive pulmonary disease.

frequencies and percentages, and continuous variables were summarized as means \pm standard deviation. Agreement between the two abstractors as to whether the ED diagnosis was potentially smoking-related, coded as a dichotomous variable, was measured using the kappa statistic.¹⁰

Table 2. Baseline characteristics (n = 893)

Demographic	Mean (\pm SD) or number (%)
Age (years)	40 (\pm 15)
Gender	
Male	550 (62%)
Female	343 (38%)
Smoking at baseline	
1–9 cigarettes/day	444 (50%)
10–19 cigarettes/day	274 (31%)
20–39 cigarettes/day	163 (18%)
\geq 40 cigarettes/day	8 (1%)
Chief complaints	
Pain	360 (40%)
Injury	186 (21%)
Infection	104 (12%)
Psychiatric	7 (1%)
Miscellaneous	236 (26%)
Canadian Triage and Acuity Scale	
1	2 (0%)
2	74 (8%)
3	441 (49%)
4	348 (39%)
5	28 (3%)
Disposition	
Discharged	756 (85%)
Admitted	137 (15%)

The subset of patients with potential smoking-related diagnoses was explored further to examine whether patient perception differed by disease category. Simple logistic regression was used to generate unadjusted odds ratios and 95% confidence intervals (CIs). All data were entered into a Microsoft Excel spreadsheet (2008, Microsoft, Redmond, WA) and analysed using STATA (2009, Statacorp, College Station, TX).

RESULTS

Nine hundred and seven patients were eligible for inclusion. Of these, 893 charts were reviewed to determine whether the ED discharge diagnosis was potentially smoking-related (14 charts were unattainable from health records). The baseline characteristics of the study population are presented in Table 2. The mean age was 40 (\pm 15) years, 62% were male, 15% were admitted to the hospital, and 85% were treated and discharged home from the ED. The majority of patients had a Canadian Triage and Acuity Scale (CTAS) of 3 or 4. Table 3 summarizes the proportion of study patients with a potential smoking-related discharge diagnosis. In total,

Table 3. Patient perception of smoking-related condition (SRC) (n = 893)

	SRC +	SRC -	Total
Perceive <i>yes</i>	46	60	106
Perceive <i>no</i>	74	713	787
Total	120	773	893

Perceive *yes* among patients with an SRC: OR 7.4 (95% CI: 4.7–11.6)

Table 4. Potential smoking-related conditions and patient perception (n = 120)

Smoking-related conditions	Prevalence n (%)	Perceived by patient as smoking-related n (%)	Unadjusted odds ratio 95% (CI)*
Neoplasm	6 (5)	2 (33)	0.8 (0.1–4.5)
Cardiovascular disease	18 (15)	11 (61)	3.00 (1.1–8.4)
Respiratory disease	67 (56)	28 (41)	1.6 (0.8–3.4)
Peptic ulcer disease	9 (8)	1 (11)	0.2 (0.0–1.5)
Postoperative complication	7 (6)	1 (14)	0.3 (0.0–2.1)
Reproductive complication	3 (3)	0 (0)	–
Dental disease	9 (8)	2 (22)	0.4 (0.1–2.2)
Other (hip fracture)	1 (0)	0 (0)	–

*Calculated for disease categories with n > 5.

120 (13%) of the study patients had a potential smoking-related discharge diagnosis and 46/120 (38%) accurately perceived that their ED visit might be related to smoking. Patients who were diagnosed with a potential smoking-related condition were seven times more likely to attribute tobacco use to their ED visit compared to smokers visiting the ED for a non-related condition (OR 7.4, 95% CI 4.7–11.6).

Table 4 describes the prevalence of potential smoking-related conditions and patient perception, and Table 5 shows a complete breakdown of each broader category of smoking-related conditions. Of the potential smoking-related conditions, there were 6 (5%) of neoplasm, 18 (15%) of cardiovascular disease, 67 (56%) of respiratory disease, 3 (3%) of reproductive complication, 7 (6%) of postoperative complication, 9 (8%) of dental disease, 9 (8%) of peptic ulcer disease, 0 (0%) of eye condition, and 1 (1%) of bony condition. Of the 164 (18%) charts that were reviewed by both data abstractors, there was almost

Table 5. Breakdown of potential smoking-related conditions

Smoking-related conditions: n	120
Neoplasm: n (%)	6 (5)
Lung neoplasm	4 (3)
Colon cancer (including polyps)	1 (1)
Hepatocellular carcinoma	1 (1)
Cardiovascular disease: n (%)	18 (15)
Cerebrovascular disease	9 (7.5)
Coronary heart disease	9 (7.5)
Respiratory disease: n (%)	67 (56)
Acute respiratory illness/URTI without COPD	21 (18)
Pneumonia without COPD	15 (13)
COPD/COPDE	12 (10)
Coughing, wheezing, phlegm, shortness of breath	19 (16)
Peptic ulcer disease: n (%)	9 (8)
Dyspepsia/gastritis/abdominal pain NYD discharged on antacid	9 (8)
Postoperative complication: n (%)	7 (6)
Wound infection	6 (5)
Wound dehiscence	1 (1)
Reproductive complication: n (%)	3 (3)
Spontaneous miscarriage/abortion	3 (3)
Dental disease: n (%)	9 (8)
Dental infection	6 (5)
Dental abscess	2 (2)
Root surface dental caries	1 (1)
Other (hip fracture): n (%)	1 (0)

perfect agreement as to whether the ED diagnosis was potentially smoking-related (kappa 0.87).

Descriptively, ED visits for cardiovascular diseases, respiratory diseases, and neoplasms were most likely to be perceived as potentially smoking-related (67%, 46%, and 33%, respectively). Dental disease, postoperative complications, and peptic ulcer disease were less likely to be attributed to smoking by patients (22%, 14%, and 11%, respectively). None of the ED smokers seeking treatment for reproductive complications or bony conditions attributed their ED visit to their tobacco use (see Table 4).

Unadjusted odds ratios were calculated for the subset of patients with potential smoking-related conditions, based on specific disease categories (see Table 4). Patients visiting the ED for cardiovascular disease were three times more likely to perceive that their condition was potentially related to tobacco use compared to the other smoking-related disease categories (OR 3.00, 95% CI [1.07–8.44]). None of the other disease categories differed significantly in odds of patient perception (see Table 4).

DISCUSSION

The ED has been identified as an important arena for encouraging smoking cessation, according to the “teachable moment” theory, an intervention model suggesting that naturally occurring health events can motivate patients to change specific behaviours that contribute to ill health.¹¹ Patient perception of risk associated with a specific behaviour is vital to promoting behavioural change.¹¹

In this study, 13% of ED visits among smokers were potentially related to smoking. This is slightly lower than ED studies conducted in the United States, which have found that 15%-20% of ED visits among smokers may be related to smoking.^{7,8} This may be because one of these studies⁸ included up to a total of four secondary discharge diagnoses in their evaluation of whether a patient presented to the ED with a potential smoking-related discharge diagnosis, whereas we only considered the single most responsible ED diagnosis.

In our study, patients with potential smoking-related conditions were seven times more likely to attribute tobacco use to their ED visit compared to patients without smoking-related conditions. Despite this, among those with a potential smoking-related ED discharge diagnosis, only 38% accurately perceived that their ED visit might be related to smoking. This means that a significant majority, 62%, of our patients with a potential smoking-related ED discharge diagnosis did not perceive that their ED visit was a result of their smoking. This knowledge gap is even larger than that found in another ED study, where 45% with a potential smoking-related discharge condition did not recognize the connection.⁷

Among patients with a potential smoking-related discharge diagnosis, those with cardiovascular/cerebrovascular-related conditions had higher odds of perceiving that their ED visit was related to smoking. Sixty-one percent of cardiovascular conditions were accurately perceived by patients to be potentially related to smoking. Similar to other studies,^{12,13} we also found that patients diagnosed with respiratory or neoplastic disorders tended to be more likely to believe that their conditions were related to smoking. However, this trend was not statistically significant.

Most patients with a potential smoking-related ED discharge diagnosis did not realize that their ED visit might be related to tobacco. This knowledge gap provides an important area for further patient

education. Multiple studies have found that patients are more interested in quitting smoking¹² and are more likely to quit smoking^{7,8} if they realize that their ED visit may be related to smoking, with one ED study demonstrating an increased odds of quitting of 2.47 (95% CI: 1.17-5.21) at 3 months.⁸ It has been postulated that personalized education of patients during ED visits for potential smoking-related conditions may be more beneficial than general public health education campaigns.⁷ Patients who do not realize that their ED visit may be secondary to a potential smoking-related condition may stand to benefit the most when they are informed.⁸

LIMITATIONS

There were several important limitations to our study. Patients included in this study were derived from a subset of patients enrolled in a randomized controlled trial (ClinicalTrials.gov, NCT01454375) to determine the effectiveness of referring ED patients to a telephone quit line. As such, this study population may not be representative of the ED smoking population as a whole. However, the original randomized controlled trial sought to enrol all ED patients who had used tobacco within the last 30 days prior to the ED visit, and enrolled patients 24 hours a day, 7 days a week. Second, this study only enrolled patients from one academic urban ED, and results may not necessarily be generalizable to other departments. Third, we did not assess the educational level of patients in this study. It is possible that EDs that see patients with a generally higher or lower level of education may see differences with respect to accuracy of perception rates. Finally, although we used the 2004 U.S. Surgeon General’s Report to determine which conditions were potentially smoking-related, a method that has been used in previous studies,⁷⁻⁹ we could not confirm that all of the identified potential smoking-related conditions were directly and most responsibly caused by tobacco.

CONCLUSION

In our study, 13% of ED visits among smokers were for a potential smoking-related condition. Among these patients with a potential smoking-related ED discharge diagnosis, only 38% perceived that their ED visit was related to smoking. The perception that one’s ED visit may be related to smoking has been correlated with

increased interest in quitting and increased cessation rates. Personalized education in the ED may close this knowledge gap and could potentially increase smoking cessation rates.

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Competing interests: None declared.

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