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Relevance of smoking interventions for dental clinic patients with smoking-related disease

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Abstract

Objectives—Despite a decline in cigarette smoking in the United States, high rates persist among the socioeconomically underserved who consequently are at risk for smoking-related disease (SRD). Since academically-affiliated dental clinics are more likely to encounter underserved patients, smoking interventions could address both the oral and systemic risks of continued smoking. To determine the relevance of providing smoking counseling in the context of SRD, this study examined the prevalence of smoking and its associations with socioeconomic status (SES), SRD and its sequela, and medication use.

Methods—Socioeconomic and smoking status was determined from 1,797 electronic health records (EHRs) of a sample of patients at a Pennsylvania dental clinic in 2010. Low socioeconomic status (SES) included patients who were covered by a Medicaid program (MA) or “self-payers.” High SES encompassed those with an employment-based commercial dental insurance (COM). Self-reported smoking rates were compared with patients’ SES, SRDs or sequela, and medications being used for the management of their SRDs.

Results—Overall, 41.7% of these patients were smoking. Smoking was related to SES with the highest rate (52.7%) among MA patients compared with 31.5% in patients with COM. In addition, 37% of patients with SRD or sequela and 33% who were taking medications for their management were smoking.

Conclusions—Academically-affiliated dental clinics are more likely to encounter underserved patients who smoke and have SRD. For greater patient impact and receptivity, it is essential that tobacco cessation interventions emphasize the risks of smoking on systemic as well as oral health.

Keywords

smoking cessation; prescription drugs; drug therapy; tobacco use disorder; nicotine dependence; health care disparities; health status; health behavior

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Introduction

At the time of the first Surgeon General's Report on Smoking and Health in 1964 (more than 50 years ago) approximately 50% of men and 32% of women were cigarette smokers (1). As of 2009 smoking rates in the U.S. were 22–27% (2) and 20% in Pennsylvania (3). These declines have been attributed to the implementation of multiple stratagems to discourage initiation and increase cessation of cigarette smoking. These included banning of advertising of tobacco products, warning labels, anti-smoking media campaigns, higher excise taxes, establishment of smoke-free sites, regulation of the manufacture, distribution, and marketing of tobacco products by the Food and Drug Administration, providing no cost smoking intervention counseling programs, and augmenting counseling with nicotine replacement therapies and pharmacologic agents that can reduce the craving for nicotine. Despite declining smoking rates, data from 2006–2010 estimated that almost 7 million adults in the U.S. had 14 million smoking-attributable medical conditions or smoking-related disease (SRD) (4) that resulted in \$167.5 billion in health care costs in 2010 (5).

The sociodemographic attributes of the population that is most likely to initiate and continue to smoke include less education and low income in conjunction with being under- or unemployed (6,7). This population is also at risk for systemic and oral health disparities that are primarily attributable to being uninsured or underinsured that restrict access to private practitioners, the customary providers of medical and dental care (8,9). In addition, these patients' "social determinants of health" may impede access to health-related resources that could provide opportunities and motivation to engage in tobacco use interventions (6).

In order to obtain dental care, the underserved often have to rely on subsidized hospital-based clinics, Federally Qualified Health Centers, or dental school-affiliated clinics (8,9). Academically-affiliated dental clinics could, therefore, contribute to addressing inequities in providing smoking interventions. A previous study of patients in an academically-affiliated dental clinic found that 34% reported having SRD comorbidities (10). Additionally, and in the context of screening for a head and neck malignancy, among 895 smokers with this disease, 64% had SRDs (11).

The dental profession has been engaged in smoking and smokeless tobacco use interventions for more than 30 years (12). Dental care providers customarily address smoking in conjunction with its being a major risk factor for oral cancer (13), periodontal disease and tooth loss (14), and failure of dental implants (15).

The aim of the current study was to determine if smoking interventions would be relevant in an academically-affiliated dental clinic based on the prevalence of smoking, SRDs, and medications used for their treatment.

Methods

A retrospective review of the electronic health records (EHRs) was undertaken of adult patients with dental treatment codes D0150 (comprehensive oral evaluation, new patient) and D0140 (limited oral evaluation, problem focused). Access to the patients' EHRs was approved and granted exempt status by the University's Institutional Review Board. The

EHRs were de-identified in accordance with the Health Insurance Portability and Accountability Act (HIPAA) privacy and security guidelines. The sample was comprised of 1,797 patients who presented to a Pennsylvania academic dental clinic between January and June, 2010.

The methods by which the school's clinic fees were reimbursed were used as surrogate markers to determine the patients' socioeconomic status (SES). These have previously been validated (16) and were comprised of the following: low SES included patients covered under a Medicaid program (medical assistance [MA]) or uninsured patients who self-paid (SP). High SES consisted of patients with a commercial dental insurance (COM) that is usually an employment-based dental health plan (16).

Patients self-reported their smoking status, medical conditions, and use of prescription medications on a health history checklist. Smokers were defined by a self-reported "yes" to currently smoking cigarettes every day or some days. This is consistent with the definition used by the National Health Interview and Behavioral Risk Factor Surveillance System (BRFSS) surveys (17). There were 13 patients who were using smokeless tobacco products who were not included in the study. A self-reported medical condition that was considered to be smoking-related was based on the Surgeon General's 2010 and 2014 Reports on Smoking. (18,19).

Medications being taken for SRDs or their sequela were classified by their pharmacologic or therapeutic categories. These encompassed antihypertensive agents including diuretics, adrenergic alpha- or beta-antagonists, angiotensin-converting enzyme inhibitors, calcium channel blockers, or vasodilator agents. Anticoagulants included warfarin, clopidogrel, or aspirin. Cardiac drugs consisted of antiarrhythmics, digoxin, and nitroglycerin. Antilipemic agents included statins and drugs that lower total and LDL cholesterol and triglycerides. Respiratory system agents were comprised of inhalers and other anti-asthmatics including bronchodilators, corticosteroids or combinations. Hypoglycemic agents for diabetes types 1 and 2 included insulins and oral antidiabetics such as the biguanides, sulfonylureas, meglitinides, and thiazolidinediones. Gastrointestinal agents consisted of drugs for acid reflux or gastric ulcer such as anti-ulcer therapies, proton pump inhibitors or a histamine H₂ antagonist. Use of a bisphosphonate was considered indicative of having osteoporosis provided that the patient had no history of a malignancy. If a patient could not identify the name(s) of prescription medications being taken they were confirmed by contacting the patient's pharmacy. Data from the health history checklist were entered in the EHR by the students and reviewed by a faculty member.

Smoking status, SRDs or sequela, and medications being taken were extracted from the EHR and entered on an Excel spread sheet.

Results

The sociodemographic characteristics and smoking rates of the 1,784 patients are summarized in Table 1. Their overall smoking rate was 41% with more men than women smokers. Patients' ages ranged from 18–91 with a mean of 42.1. The mean age of smokers

(39.5) was lower than non-smokers (44.1). More than one-half of the patients on MA were smoking (52.7%). Smoking status by SRD or sequela is shown in Table 2. Of the 1,187 patients who reported having one or more SRDs or sequela, 443 (37%) were current smokers. Their smoking rates ranged from 19.4% of those who had undergone by-pass surgery to 50% who reported having chronic obstructive pulmonary disease. Overall, among the 1,234 patients who were taking medications for a SRD or sequela, 33% were smoking (Table 3).

Discussion

The overall smoking rate of 41% reported by the patients in this study was at least twice that of the 18–20% rates in 2009 in Pennsylvania and the county and city in which our clinic is located. (3) This high rate is indicative of the 52.7% smoking rate among the MA patients who constituted 38% of the study sample. These patients are more likely to initiate and continue to smoke and also have more difficulty quitting that may, in part, be attributable to psychosocial circumstances that contribute to their overall health disparities (6,7).

Continuing to smoke is particularly detrimental for patients who have developed SRD or sequela, whereas smoking cessation can reduce its morbidity and mortality that may even surpass the efficacy of medication regimens. For example, it has been shown that after a myocardial infarction, quitting smoking resulted in lower mortality rates than treatment with antilipemic agents, anticoagulants, or antihypertensives (20). Similarly, a decrease in smoking prevalence was found to have contributed to the 40% decline in mortality rates from coronary heart disease in the U.S. between 1980 and 2000 (21).

Smoking can alter the pharmacokinetics and pharmacodynamics of medications that can adversely affect the efficacy of the medications used for the treatment of SRD (22). An example of these effects has been demonstrated in a study which found that smoking among women with osteoporosis was significantly more likely to be associated with failure to respond to bisphosphonate therapy (23). Smoking can also offset the therapeutic benefits of warfarin (24). Smoking intervention counseling could, therefore, address both its impact on the progression of SRD as well as the efficacy of the medication(s) being used for the treatment of SRD. Furthermore, some patients may be under the illusion that their medications can protect them from the effects of continuing to smoke. Smoking intervention counseling in the contexts of SRD and its treatment would provide motivation, improve compliance, and contribute to decreasing the morbidity, mortality, and economic burden of SRDs.

In 2012 the Joint Commission, (previously the Joint Commission on Accreditation of Hospitals/Healthcare Organizations) implemented a set of quality performance measures that included provision of tobacco-use interventions augmented with medications while the patients were hospitalized, with follow-up and counseling after discharge (25). This was based on the likelihood that many of these patients were smokers and consequently, had the most to gain from quitting. Similarly, if academically-affiliated dental clinics are more likely to encounter patients who continue to smoke and who may have developed SRD, the

interaction with another health care professional provides an additional opportunity for a “teachable moment” that can contribute to smoking cessation.

In a recent systematic review of dental students’ perspectives of providing smoking interventions, a majority of the 38 studies found a perception that dental patients were resistant and not motivated to receiving smoking cessation counseling (26). One of the studies also found that a majority of the students indicated that smoking cessation counseling would be more effective if it was provided in the context of a “related health problem” (27). The current study found that at least one-third of the patients with hypertension and histories of a myocardial infarction or an arrhythmia were smoking, as were 19% who had bypass surgery. The associations among these conditions and their consequences should make affected patients more receptive to smoking cessation counseling.

The previous Report on Smoking and Health by the Surgeon General in 2010 stated that “smoking affects nearly every organ of the body” (18). In the 2014 Report “diabetes,... orofacial clefts,... rheumatoid arthritis,...inflammation, and impaired immune function...” were added to the conditions that were causally associated with smoking (19).

Limitations of this study include its convenience sampling from one clinic. Smoking rates may have been under reported, although the validity of self-reported smoking in a sample of clinic patients in a dental school was confirmed when compared with exhaled carbon monoxide levels (28).

Conclusions

This study supports our hypothesis that smoking interventions in the context of concurrent SRD may be particularly applicable to patients who rely on academically-affiliated dental clinics, one of the constituents of the “dental safety net” that provides dental care for the underserved (8). In 2011, the Institute of Medicine Report on *Improving Access to Oral Health Care for Vulnerable and Underserved Populations* stated that “good health requires good oral health,” and accomplishing this will require collaboration in the provision of health care and “integrating oral health care into overall health care” (29). Addressing the consequences of smoking will, therefore, be relevant to both oral as well as systemic health and can focus on the oral and systemic benefits of quitting.

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Table 1

Smoking status among 1,784 patients by sex, age and socioeconomic status

	<u>Total Patients</u>		<u>Current Smoker</u>		<u>Non-Smoker</u>	
	<u>N</u>	<u>(%)</u>	<u>N</u>	<u>(%)</u>	<u>N</u>	<u>(%)</u>
Total	1,784	(100)	730	(41.0)	1,054	(59.0)
Men	802	(45.0)	352	(43.9)	450	(56.1)
Women	982	(55.0)	378	(38.5)	604	(61.5)
Ages						
18-44	1,005	(56.3)	460	(45.8)	545	(54.2)
45-64	595	(33.4)	251	(42.2)	344	(57.8)
65-74	122	(6.8)	30	(24.6)	92	(75.4)
75+	62	(3.5)	3	(4.8)	59	(95.2)
Socioeconomic status						
Medicaid	679	(38.1)	358	(52.7)	321	(47.3)
Self-pay	696	(39.0)	257	(36.9)	439	(63.1)
COM insurance	409	(22.9)	129	(31.5)	280	(68.5)

Table 2

Smoking status among 1,784 patients by smoking-related disease or sequela

<u>SRD or sequela</u>	<u>Total patients</u>		<u>Current Smokers</u>		<u>Non-smokers</u>	
	<u>N</u>	<u>(%)</u>	<u>N</u>	<u>(%)</u>	<u>N</u>	<u>(%)</u>
Hypertension	434		146	33.6	288	66.4
Sinus disease	293		130	44.4	163	55.6
Asthma	199		80	40.2	119	59.8
Diabetes	165		42	25.4	123	74.6
Previous malignancy	100		38	38.0	62	62.0
Arrhythmia	91		30	33.0	61	67.0
Myocardial infarction	59		22	37.3	37	62.7
Cerebrovascular accident	39		9	23.1	30	76.9
By-pass surgery	36		7	19.4	29	80.6
COPD	34		17	50.0	17	50.0
<u>All SRD or sequela</u>	<u>1,187*</u>		<u>443*</u>	<u>37.0</u>	<u>744*</u>	<u>63.0</u>

* Patients may have multiple SRD or sequela

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Table 3
Smoking status among 1,784 patients taking medications for smoking-related disease or sequela

	Total Patients		Current Smoker		Non-smoker	
	N	(%)	N	(%)	N	(%)
<u>Medications used</u>						
Antihypertensive agent	406		128	31.5	278	68.5
Hypolipemic agent	193		48	24.9	145	75.1
Gastrointestinal agent	189		81	42.9	108	57.1
Anticoagulant	187		60	32.1	127	67.9
Respiratory system agent	165		64	38.8	101	61.2
Hypoglycemic agent	131		34	26.0	97	74.0
Bisphosphonate	49		12	24.5	37	75.5
Anti-arrhythmic/cardiotonic	30		10	33.3	20	66.7
All SRD or sequela	1,234*		407	33.0	827	67.0

* Patients may be taking more than one medication for SRD or sequela