Original Investigation

National survey of U.S. health professionals' smoking prevalence, cessation practices, and beliefs

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Abstract

Background: Tobacco dependence treatment efforts have focused on primary care physicians (PCPs), but evidence suggests that they are insufficient to help most smokers quit. Other health professionals also frequently encounter smokers, but their smoking prevalence, cessation practices, and beliefs are less well known.

Methods: The study included 2,804 subjects from seven health professional groups: PCPs, emergency medicine physicians, psychiatrists, registered nurses, dentists, dental hygienists, and pharmacists. Outcomes included self-reported smoking status, smoking cessation practices, and beliefs. Multivariate regression was used to examine factors associated with health professionals (except pharmacists) self-reportedly performing the “5 A’s”: asking, advising, assessing, assisting, or arranging follow-up about tobacco.

Results: Health professionals have a low smoking prevalence (<6%), except nurses (13%). Many health professionals report asking (87.3%–99.5%) and advising (65.6%–94.9%) about smoking but much less assessing smokers' interest (38.7%–84.8%), assisting (16.4%–63.7%), and arranging follow-up (1.3%–23.1%). Controlling for health professional and practice demographics, factors positively associated in the multivariate analyses with self-reportedly performing multiple components of the 5 A's include awareness of the Public Health Service guidelines, having had cessation training, and believing that treatment was an important professional responsibility. Negative associations include the health professional being a current smoker, not being a PCP, being uncomfortable asking patients if they smoke, believing counseling was not an appropriate service, and reporting competing priorities.

Conclusion: U.S. health professionals report not fully performing the 5 A's. The common barriers and facilitators identified may help inform strategies for increasing the involvement

of all health professionals in conducting tobacco dependence treatments.

Introduction

U.S. smoking prevalence has slowly declined to 20.6% (Dube, Asman, Malarcher, & Caraballo, 2009) over the past five decades, but 44.5 million Americans still smoke, of whom 70% say they would like to quit (Centers for Disease Control and Prevention, 2002), and only 2.5% are able to do so by themselves annually (Fiore et al., 2008). Smoking cessation counseling and pharmacotherapy remain key strategies to help smokers quit (Schroeder, 2005). In 2008, the U.S. Public Health Service (PHS) updated guideline describes the gold standard for initiating smoking cessation treatment, otherwise known as the “5 A's” (Fiore et al., 2008): asking about tobacco use, advising tobacco users to quit, assessing readiness to make a quit attempt, assisting with the quit attempt, and arranging follow-up care.

Primary care physicians (PCPs) have been the main focus for smoking cessation efforts, but they are insufficient to help most smokers quit (Association of American Medical Colleges, 2007; Ferketich, Khan, & Wewers, 2006; Goldstein et al., 1997; Thorndike, Regan, & Rigotti, 2007; Thorndike, Rigotti, Stafford, & Singer, 1998). If other health professionals besides physicians could be mobilized to address tobacco dependence, this would help identify more smokers and reinforce smoking cessation attempts. The workforce of U.S. health professionals that serve as an initial point of health care system contact for smokers and/or treat smokers with a high smoking prevalence (like mental health patients; Lasser et al., 2000) includes 306,130 PCPs, 30,840 emergency medicine physicians, 43,360 psychiatrists, 2,417,090 registered nurses, 174,430 dentists, 158,269 dental hygienists, and 226,160 pharmacists (Center for Health Workforce Studies, 2006; Dall et al., 2006). There is evidence that smoking cessation interventions are effective

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when delivered by nonphysician health professional groups: nurses (Rice & Stead, 2006), dentists (Gorin & Heck, 2004), dental hygienists (Binnie, McHugh, Jenkins, Borland, & Macpherson, 2007), and pharmacists (Sinclair, Bond, & Stead, 2004). The PHS guideline states that treatment delivered by a variety of clinician types increases abstinence rates and that treatments delivered by multiple types of clinicians are more effective than interventions delivered by a single type of clinician (Fiore et al., 2008). In one state survey, being asked about smoking by more than one type of health professional increased the odds of recent quitting and being advised to quit by more than one type of health professional increased the odds of having made a quit attempt in the past year or intending to quit in the next 6 months (An et al., 2008).

Our objective was to describe the smoking prevalence, smoking cessation practices, and beliefs for multiple types of health professionals across the United States. We also examined common factors associated with the self-reported delivery of tobacco dependence treatments, while controlling for health professional and practice demographics.

Methods

Data source

Researchers from The Robert Wood Johnson Foundation (RWJF), the University of California at San Francisco Smoking Cessation Leadership Center, and Mathematica Policy Research collaborated to develop this health professional survey on smoking cessation practices. The survey instrument was based on the 2002 New Jersey Health Care Provider Tobacco Study (Steinberg & Delnevo, 2004) and other national surveys like the Behavioral Risk Factor Surveillance System and pretested in at least 50 subjects from each health professional group. Four additional items (see "Measures" below) were adapted from the clinical practice guidelines (Fiore et al., 2008) and developed by consensus. The survey was conducted from July 2003 to February 2004, primarily by computer-assisted telephone interview (68%) and supplemented by mailed questionnaires (32%) for those who could not be contacted or participate by telephone.

Seven health professional groups were selected who serve as an initial point of health care system contact for smokers and/or treat patients with a high smoking prevalence (e.g., mental health; Lasser et al., 2000; Scheibmeir & O'Connell, 2002; Schroeder, 2006; Tomar, 2001): PCPs (family medicine, internal medicine, and pediatrics), emergency medicine physicians, psychiatrists, registered nurses, dentists, dental hygienists, and pharmacists. The survey was limited to health professionals providing patient care 20 or more hours per week in a nonfederal practice setting. Pharmacists, who mostly worked for retail stores, were only included in an abbreviated survey because it was assumed at the time of the survey that retail pharmacist cessation interventions were much more limited in scope and subject to store policies. We report on the findings of all these health professional groups together to reflect on common factors associated with encountering these health professionals for smoking cessation across the U.S. health system.

Letters, signed by RWJF and endorsed by seven national health professional societies, were mailed describing the survey

prior to the interviewers' first call. The seven health professional societies include the American College of Physicians, American Psychiatric Association, American College of Emergency Physicians, American Nurses Association, American Dental Association, American Dental Hygienists' Association, and American Pharmacists Association. A targeted approach was undertaken for monetary incentives: \$20 honorarium was offered only to physicians and dentists, who are frequently surveyed and offered incentives, and nurses who initially refused the interview; honoraria were not offered to other professionals either because refusal rates were low or the survey was conducted at home rather than at the office. Informed consent was obtained at the beginning of the survey.

Sampling and response rates

Nationwide sampling frames were obtained from professional sampling companies that maintain databases for the American Medical Association, American Pharmacists' Association, the American Dental Association, and licensure records of dental hygienists and registered nurses. Out of a sample of 6,577 health professionals who matched the inclusion criteria (1,350 PCPs, 950 emergency medicine physicians, 1,150 psychiatrists, 900 registered nurses, 877 dentists, 750 dental hygienists, and 600 pharmacists), 1,098 were ineligible (upon verification), 502 were unlocatable, 2,173 were located nonrespondents, and 2,804 health professionals (approximately 400 in each group) completed the survey. Refusal rates were initially 17% of the released sample; 12% of the refused cases were converted to completed interviews, and 5% were deemed ineligible.

The overall response rate, defined as the ratio of completed interviews to the estimated number of eligible potential respondents, was bimodal at 59.3%. Physicians and dentists clustered at 49.5%–57.5% (PCP 49.5%, psychiatrists 50.4%, dentists 52.7%, and emergency medicine physicians 57.5%). Registered nurses, dental hygienists, and pharmacists clustered at 70%–75%. Our survey response rate for PCPs was much higher than a similarly conducted survey (using the American Medical Association [AMA] masterfile) by the American Association of Medical Colleges (AAMC) and American Legacy Foundation, for which only 17.1% of family medicine, internal medicine, obstetrics and gynecology, and psychiatrists responded (Association of American Medical Colleges, 2007).

Since physicians and dentists had a lower response rate, nonrespondents were compared with their health professional counterparts who completed the survey for differences by age (<50 and 50+ years), region, gender, and—for PCPs—specialty using chi-square statistics. Among PCPs, nonrespondents were more likely than their participating counterparts to be men (74% vs. 66%, $p = .006$), more than 50-year old (47% vs. 41%, $p = .048$) and less likely to include pediatricians (family medicine 43% vs. 40%, internal medicine 41% vs. 35%, and pediatrics 17% vs. 25%; $p = .002$). Among psychiatrists, nonrespondents were more likely to be more than 50-year old than their participating counterparts (58% vs. 64%, $p = .04$). Among dentists, nonrespondents differed across four geographic regions ($p = .006$). Among emergency medicine physicians, nonrespondents did not differ by age, region, or gender. No consistent patterns of nonresponse were observed across these four health professional groups, except that PCPs and psychiatrists tended to have nonrespondents who were older than 50 years. One possible

explanation for this finding is that older nonrespondents may have retired and did not have updated eligibility information.

Measures

Health professional demographics, practice characteristics, and smoking status were described by self-report. Never-smokers were defined as smoking less than 100 cigarettes in a lifetime. Health professional practice measures included practice setting (private practice, hospital, and clinic/health maintenance organization/other facility), proportion of vulnerable population volume (Medicaid, uninsured, black or Latino, and primary language other than English), and region since these factors may affect access to cessation treatment (Fiore et al., 2004; Houston, Scarinci, Person, & Greene, 2005). We defined a high vulnerable population volume, self-reported by health professionals, at percentages reflecting the upper third of such practices.

Health professionals were asked if they conducted the PHS guideline 5 A's: asking, advising, assessing, assisting, and arranging follow-up for smoking cessation. "Assisting" reflected four items in the survey: setting a quit date, referring to a cessation program, providing materials with quitline information, and (for physicians and dentists who have prescribing capacity) discussing medication options. We dichotomized the responses into "yes" or "no"; for survey questions that allowed a response on a 4-point Likert scale, we categorized "always" or "often" as "yes."

Health professionals were also asked about beliefs regarding smoking cessation, with responses of "strongly agree" or "agree" (out of a 4-point Likert scale) recategorized as "agree." Questions included awareness of the PHS guideline, whether the health professional had cessation training, beliefs about assistance effectiveness (face-to-face advice, phone counseling, interactive Internet, cessation programs, nicotine patch, and bupropion), whether the health professional reported being uncomfortable asking if the patient smokes (new survey item), believing smoking cessation was an important professional responsibility, thinking patients would resist advice, thinking smoking cessation was not an appropriate service to offer in the practice (new survey item), reporting that competing priorities led to not having time to help smokers quit, believing that smokers should seek help from their PCP instead of other health professionals (new survey item), and agreeing that there was little or no reimbursement for smoking cessation.

A few survey questions had a considerable number of "don't know" responses about assistance effectiveness ($n = 120$ – $1,104$) and reimbursement ($n = 644$). We decided to combine the "don't know" with the "no" responses since it is unlikely that a health professional would base their decision-making process on something they did not know. Thus, this coding represents the most conservative estimation of influence of these responses on the health professionals' actions for our multivariate analysis. Otherwise, there was not a significant level ($>5\%$) of missing data in the survey responses.

Statistical analysis

The seven health professional groups were compared in terms of demographics, smoking-related behavior, conduct of the PHS smoking cessation guideline 5 A's, and beliefs regarding smoking cessation services using an adjusted F test suitable for

complex survey data. Multivariate logistic regression was used to examine factors associated with health professionals self-reportedly performing each of the 5 A's. Independent variables in the regression analyses included health professional smoking status, health professional subgroup, and beliefs about smoking cessation. We also controlled for health professional demographics, practice setting and characteristics, and survey modality. The "assist" outcome was a composite of setting quit dates, referring to cessation programs, and providing materials with quitline information. We conducted separate analyses of each of the three assist components to compare with the composite assist outcome along with a separate analysis for discussing medication options since this was asked only of physicians and dentists. Pharmacists were not included in the regression models since their abbreviated survey did not include all 5 A's. Weights for all the health professional samples were computed to correct for differential sampling rates, nonresponse, and frame under coverage for the analyses, with the goal of reflecting the characteristics of the sample population. Statistical analyses were performed with STATA 9.0 (College Station, TX) using the "svy" command.

Results

Demographics, practice characteristics, and smoking prevalence

The survey included 2,804 subjects, with approximately 400 subjects for each health profession (Table 1). Nearly half of the health professionals were younger than 45-year old. Women comprised almost all of registered nurses and dental hygienists, less than half of pharmacists, and less than a third of physicians and dentists. Most health professionals were non-Latino Whites. Private practice settings predominated for dentists, dental hygienists, PCPs, and psychiatrists; hospital settings predominated for emergency medicine physicians and registered nurses. Pharmacists practiced primarily in a nonhospital retail setting (68%). Emergency medicine physicians and registered nurses tended to report higher vulnerable population volumes, except dentists, and dental hygienists reported higher uninsured populations.

All the health professional groups examined, but one, had smoking prevalence rates of less than 6%; registered nurses had a smoking prevalence of 13%. With the exception of registered nurses, more than two thirds of each group were classified as never having smoked.

Self-reported performance of the PHS guideline 5 A's

Table 2 demonstrates that most health professionals reported ever asking if a patient smokes. While most health professionals reported advising smokers to stop smoking, the proportion was lower in the nonphysician groups. Compared with asking or advising, Table 2 also shows that health professionals generally reported much less assessing of smokers' interest in quitting, assisting smokers to quit (by setting a quit date, referring to a cessation program, and providing materials with quitline information), and especially arranging follow-up. For assisting smokers by discussing a medication option, the majority of PCPs and psychiatrists reported doing so compared with less than a quarter of emergency physicians and dentists. Of the two

Table 1. U.S. health professionals' demographics, practice characteristics, and smoking prevalence

Characteristic	Primary care physician (n = 437)	Emergency medicine (n = 408)	Psychiatry (n = 400)	Registered nurse (n = 388)	Dentist (n = 391)	Dental hygienist (n = 377)	Pharmacist (n = 403)
Age (years) ^a							
22–44	194 (45.2)	191 (48.4)	103 (25.6)	175 (45.0)	142 (38.5)	218 (57.7)	219 (55.2)
45–64	211 (48.2)	210 (50.4)	239 (60.8)	208 (54.0)	218 (54.0)	156 (41.5)	162 (41.1)
65+	28 (6.5)	5 (1.1)	53 (13.6)	4 (1.0)	31 (7.4)	3 (0.8)	15 (3.7)
Sex (% female) ^a	150 (31.4)	86 (21.0)	141 (32.8)	364 (93.9)	96 (22.9)	371 (98.4)	174 (43.2)
Race/ethnicity ^a							
White	281 (66.0)	335 (83.0)	274 (69.8)	335 (86.6)	309 (79.2)	344 (92.6)	328 (82.3)
Black	26 (5.9)	23 (5.8)	21 (5.0)	24 (6.2)	21 (5.6)	7 (1.9)	18 (4.4)
Latino	30 (7.0)	15 (3.7)	23 (6.0)	11 (2.9)	16 (4.3)	11 (3.0)	13 (3.3)
Asian	83 (19.2)	24 (6.0)	69 (17.4)	10 (2.6)	34 (9.2)	7 (1.9)	33 (8.5)
Other	8 (1.9)	6 (1.6)	7 (1.7)	6 (1.6)	7 (1.6)	2 (0.6)	6 (1.5)
Practice setting ^a							
Private practice	313 (71.4)	115 (29.0)	200 (50.5)	35 (8.9)	366 (93.6)	358 (94.9)	N/A ^b
Hospital	45 (10.6)	258 (62.6)	75 (18.2)	237 (61.4)	6 (1.4)	2 (0.5)	
Clinic/health maintenance organization/ facility	79 (18.0)	35 (8.4)	125 (31.4)	116 (29.7)	19 (5.0)	17 (4.5)	
Region ^a							
Central northeast	92 (21.2)	90 (19.0)	134 (33.8)	83 (22.7)	83 (23.4)	69 (19.5)	86 (21.8)
South	162 (34.3)	124 (31.1)	110 (27.3)	145 (38.0)	119 (29.4)	141 (37.5)	171 (40.6)
Midwest	105 (24.2)	88 (22.9)	80 (18.6)	95 (22.2)	110 (24.8)	112 (28.1)	106 (26.6)
West	78 (20.2)	106 (27.0)	76 (20.2)	65 (17.0)	79 (22.3)	55 (14.9)	40 (10.9)
Vulnerable population volume (self-report) ^a							
>30% Medicaid	108 (25.7)	146 (37.7)	170 (43.9)	191 (54.3)	56 (16.1)	51 (15.9)	
>20% uninsured	52 (12.5)	157 (40.3)	68 (17.5)	99 (28.3)	183 (49.0)	171 (47.8)	
>30% Black/Latino	141 (32.5)	196 (50.5)	118 (29.5)	172 (46.3)	110 (29.5)	75 (20.6)	N/A ^b
>10% primary language other than English	132 (30.8)	175 (43.8)	79 (20.1)	147 (39.8)	103 (28.4)	94 (25.4)	
Smoking status ^a							
Current	7 (1.7)	23 (5.7)	13 (3.2)	51 (13.1)	22 (5.8)	20 (5.3)	18 (4.4)
Former	98 (23.2)	76 (18.4)	114 (28.8)	115 (29.5)	82 (20.3)	78 (20.7)	65 (16.0)
Never	330 (75.1)	309 (75.8)	273 (68.0)	222 (57.4)	287 (73.9)	279 (73.9)	320 (79.5)

Note. "Other" in race/ethnicity refers to American Indian, Alaskan native, Pacific Islander, or other category.

^aF tests for bivariate analyses of sociodemographic characteristic across health professional subgroups are all $p < .0001$.

^bN/A = question not asked of pharmacists in survey.

Table 2. U.S. health professionals' self-report of asking, advising, assisting, and arranging follow-up on tobacco use

	Primary care physician (n = 437)	Emergency medicine (n = 408)	Psychiatry (n = 400)	Registered nurse (n = 388)	Dentist (n = 391)	Dental hygienist (n = 377)	Pharmacist (n = 403)
Ever ask if patient smokes ^{a,b}	427 (97.7)	406 (99.5)	382 (95.4)	339 (87.3)	350 (89.7)	358 (95.0)	N/A ^c
Advises smokers to stop smoking ^a	405 (94.9)	331 (81.7)	305 (80.3)	222 (65.6)	243 (70.6)	277 (77.5)	N/A ^c
Assesses smokers if interested in quitting ^a	361 (84.8)	158 (38.7)	276 (72.7)	175 (52.2)	171 (49.6)	234 (65.6)	N/A ^c
Assists smokers to quit							
Sets quit date ^a	257 (63.7)	65 (16.4)	103 (28.9)	78 (24.5)	60 (18.1)	88 (25.4)	N/A ^c
Refer cessation program ^a	203 (46.7)	107 (26.1)	161 (40.0)	132 (34.0)	94 (23.6)	142 (37.7)	130 (32.3)
Provides material with quitline information ^a	235 (54.5)	121 (29.1)	119 (30.0)	191 (49.4)	88 (22.7)	139 (36.8)	195 (48.4)
Discuss medication ^a	289 (68.5)	59 (14.5)	242 (63.8)	N/A ^c	79 (22.6)	N/A ^c	N/A ^c
Arranges follow-up ^a	98 (23.1)	5 (1.3)	76 (20.6)	27 (8.0)	16 (5.1)	22 (6.1)	N/A ^c

Note. ^aF tests for bivariate analyses of action across health professional subgroups are all $p < .01$.

^bResponse to this question is either "yes" or "no," whereas all other responses reflect "always" or "often."

^cN/A = question not asked of this health professional group in the survey.

assistance questions asked of pharmacists, they reported assisting smokers at rates similar to other health professionals with referrals to cessation programs (32.3%) and distributing materials with quitline information (48.4%).

Compared with other health professionals, PCPs most frequently reported assessing smoker interest in quitting, assisting smokers to quit, and arranging follow-up. However, even PCPs did not report fully implementing the guidelines, with less than two third frequently assisting smokers to quit and less than a quarter frequently following up on quitting.

Beliefs regarding smoking cessation

Table 3 demonstrates that less than a third of health professionals, excepting PCPs, reported cessation training or awareness of the PHS guideline. Many health professionals believed that face-to-face advice, cessation programs, nicotine patches, and bupropion were effective; however, less than half of health professionals felt similarly about phone counseling and even fewer for Internet services. Addressing smoking was generally agreed to be an important professional responsibility, and few felt uncomfortable asking patients if they smoked, except for up to a fifth of dentists and dental hygienists. Approximately half of the health professionals agreed that smokers would resist their advice, except for almost a third of PCPs and less than a fifth of psychiatrists. Over half of emergency medicine physicians agreed that smoking cessation counseling was not an appropriate service to offer in their practice compared with less than a fifth of PCPs; other health professionals fell in between. Higher proportions of health professionals agreed that competing priorities led to not having time to help smokers quit, that smokers who want to quit should get help from their PCPs rather than other health care professionals, and there is little or no reimbursement for smoking cessation.

Factors associated with self-reported performance of the 5 A's

In the multivariate logistic regression analyses (Table 4), controlling for health professional and practice demographics, factors positively associated with reportedly performing multiple components of the 5 A's include awareness of the PHS guideline ("assess" and "assist"), having had cessation training ("advise," "assess," and "assist"), and believing that addressing tobacco was an important professional responsibility ("ask," "advise," "assess," and "arrange"). For items associated with only one outcome, positive attitudes about the effectiveness of advice were associated with "advising," positive attitudes about the effectiveness of quitlines or cessation programs were associated with "assisting," and agreeing that smoking cessation provided little or no reimbursement was associated with "assisting."

Table 4 also demonstrates that negative associations with reportedly performing multiple components of the 5 A's include the health professional being a current smoker ("advise," "assess," and "assist"), not being a PCP (except for emergency medicine physicians "asking" and "advising" and psychiatrists "asking" and "arranging"), being uncomfortable asking patients if they smoke ("ask" and "advise"), believing smoking cessation counseling was not an appropriate service (all 5 A's), and reporting competing priorities ("advise," "assess," "assist," and "arrange"). For items associated with only one outcome, the

Table 3. U.S. health professionals' beliefs regarding smoking cessation

	Primary care physician (n = 437)	Emergency medicine (n = 408)	Psychiatry (n = 400)	Registered nurse (n = 388)	Dentist (n = 391)	Dental hygienist (n = 377)	Pharmacist (n = 403)
Aware Public Health Service guideline ^a	174 (39.7)	73 (17.6)	121 (30.1)	69 (18.0)	80 (20.8)	46 (12.3)	58 (14.5)
Had cessation training ^a	146 (33.8)	77 (19.1)	105 (26.3)	64 (16.4)	84 (21.3)	122 (32.3)	N/A ^b
Effectiveness attitudes							
Face-to-face advice ^a	348 (79.7)	290 (70.9)	301 (75.1)	252 (65.0)	250 (64.4)	263 (70.0)	288 (71.5)
Phone counseling ^a	199 (45.7)	167 (40.7)	132 (33.2)	156 (40.3)	148 (38.6)	187 (49.7)	193 (48.2)
Interactive Internet	107 (24.5)	93 (22.6)	95 (23.8)	121 (31.1)	105 (27.5)	129 (34.3)	125 (31.0)
Cessation programs ^a	323 (73.7)	307 (75.5)	335 (83.8)	296 (76.4)	297 (76.8)	300 (79.8)	335 (83.2)
Nicotine patch ^a	344 (78.9)	330 (80.5)	333 (83.5)	302 (78.0)	289 (74.6)	311 (82.7)	364 (90.3)
Bupropion ^a	353 (80.8)	310 (75.8)	328 (82.2)	230 (59.3)	239 (61.7)	287 (76.4)	347 (86.2)
Uncomfortable to ask ^a	16 (3.6)	15 (3.7)	13 (3.4)	30 (7.7)	62 (15.4)	77 (20.5)	N/A ^b
Important professional responsibility ^a	413 (94.3)	363 (88.7)	355 (88.8)	348 (90.1)	346 (88.7)	359 (95.7)	N/A ^b
Patients resist advice ^a	138 (31.9)	192 (47.0)	73 (18.5)	202 (52.0)	219 (55.7)	188 (50.2)	N/A ^b
Not appropriate service ^a	81 (18.6)	233 (57.2)	93 (23.5)	98 (25.4)	181 (45.4)	117 (31.2)	N/A ^b
Competing priorities ^a	164 (37.7)	280 (69.6)	177 (44.2)	216 (55.8)	186 (46.2)	119 (31.8)	N/A ^b
Smoker seek primary care physician's help ^a	279 (63.3)	313 (77.2)	183 (46.0)	207 (53.4)	242 (62.2)	180 (48.0)	N/A ^b
Little/no reimbursement ^a	296 (68.0)	217 (53.4)	237 (59.3)	192 (49.4)	251 (64.4)	155 (41.5)	N/A ^b

Note. ^aF tests for bivariate analyses of knowledge/attitude across health professional subgroups are $p < .05$ except "interactive Internet" with $p = .06$.

^bN/A = question not asked of pharmacists in survey.

Table 4. Multivariate analysis of factors associated with U.S. health professionals self-report of asking, advising, assessing, assisting, and arranging follow-up about tobacco use

	Ever asks patient about smoking	Advises patient to quit	Assess patient	Assist patient ^b	Arrange follow-up
Health professional's smoking status					
Never (ref)	—	—	—	—	—
Current	0.58 (0.27–1.23)	0.44 (0.26–0.72)	0.57 (0.35–0.92)	0.50 (0.32–0.80)	1.37 (0.62–3.06)
Former	0.76 (0.46–1.23)	0.95 (0.69–1.28)	0.83 (0.64–1.08)	1.04 (0.79–1.35)	1.33 (0.90–1.98)
Health profession					
Primary care (ref)	—	—	—	—	—
Emergency medicine	3.95 (0.65–23.86)	0.55 (0.30–1.00)	0.20 (0.13–0.30)	0.27 (0.17–0.43)	0.10 (0.04–0.27)
Psychiatry	0.42 (0.14–1.27)	0.23 (0.13–0.41)	0.53 (0.35–0.79)	0.31 (0.20–0.48)	0.93 (0.61–1.41)
Registered nurse	0.10 (0.03–0.35)	0.17 (0.09–0.33)	0.24 (0.15–0.40)	0.44 (0.26–0.74)	0.43 (0.22–0.83)
Dentist	0.16 (0.06–0.46)	0.18 (0.10–0.34)	0.23 (0.16–0.35)	0.22 (0.14–0.34)	0.23 (0.12–0.44)
Dental hygienist	0.14 (0.04–0.49)	0.18 (0.10–0.31)	0.31 (0.19–0.50)	0.28 (0.16–0.46)	0.21 (0.11–0.41)
Effectiveness attitudes					
Face-to-face advice	N/A ^a	1.41 (1.08–1.84)	N/A ^a	N/A ^a	N/A ^a
Quitline	N/A ^a	N/A ^a	N/A ^a	1.38 (1.09–1.74)	N/A ^a
Cessation program	N/A ^a	N/A ^a	N/A ^a	1.58 (1.21–2.08)	N/A ^a
Aware Public Health Service guideline	1.12 (0.61–2.03)	1.25 (0.89–1.74)	1.57 (1.20–2.06)	2.04 (1.54–2.71)	1.40 (0.98–2.00)
Had cessation training	1.41 (0.77–2.58)	2.10 (1.40–2.96)	2.32 (1.77–3.05)	2.32 (1.77–3.06)	1.40 (0.98–1.98)
Patients resist advice	1.16 (0.71–1.91)	0.62 (0.47–0.81)	0.80 (0.63–1.00)	0.84 (0.66–1.06)	0.69 (0.46–1.04)
Uncomfortable to ask	0.38 (0.21–0.70)	0.55 (0.37–0.83)	0.74 (0.49–1.10)	0.81 (0.55–1.20)	1.49 (0.75–2.98)
Important professional responsibility	4.07 (2.31–7.19)	2.61 (1.71–3.98)	2.01 (1.30–3.09)	1.47 (0.96–2.24)	6.22 (1.96–19.7)
Not appropriate service	0.46 (0.29–0.75)	0.59 (0.44–0.78)	0.55 (0.43–0.71)	0.50 (0.39–0.64)	0.59 (0.37–0.95)
Competing priorities	1.07 (0.66–1.74)	0.75 (0.57–0.99)	0.63 (0.50–0.79)	0.58 (0.45–0.73)	0.54 (0.37–0.78)
Smoker seek primary care physician's help	1.01 (0.63–1.62)	0.80 (0.61–1.05)	0.75 (0.60–0.94)	0.97 (0.77–1.23)	0.96 (0.68–1.34)
Little/no reimbursement	0.97 (0.61–1.56)	1.26 (0.97–1.64)	1.23 (0.98–1.54)	1.28 (1.02–1.61)	0.97 (0.69–1.37)

Note. Reference is within subgroup for beliefs. Each multivariate model includes the following variables: age, sex, ethnicity (black, Latino, and other were combined due to small sample size), practice setting, region, proportion of vulnerable population in the practice, and method of data collection by telephone or mail. Pharmacists are not included in these multivariate models since they participated in an abbreviated survey.

^aN/A = variable not included in model a priori.

^bAssist consists of setting a quit date, distributing materials with quitline information, or referring to a cessation program.

belief that patients would resist advice was associated with being less likely to “advise,” and the belief that smokers should seek their PCP’s help was associated with being less likely to “assess.”

In comparing the three components that make up the composite “assist” outcome (not shown), there were some minor differences, mostly with referring to a cessation program. Negative associations with referring to a cessation program include health professionals who were former smokers, being a dentist or dental hygienist (relative to PCPs), and believing that patients would resist advice; the only positive association was agreeing that there was little or no reimbursement for cessation services. For differences among the other “assist” components, all non-PCP health professional groups were less likely than PCPs to assist with a quit date, and emergency medicine, psychiatrists, and dentists were less likely than PCPs to provide materials with quitline information.

Factors positively associated with physicians or dentists discussing a medication option (not shown) include having had cessation training, awareness of the PHS guideline, and

believing that the medication Zyban (but not the patch) was effective. Factors negatively associated with discussing medication options include being an emergency medicine physician or dentist (relative to PCPs), believing that counseling was not an appropriate service, and reporting competing priorities.

Discussion

In this simultaneous survey of multiple U.S. health professionals, health professionals have a low reported smoking prevalence of less than 6%, except for registered nurses who have a smoking prevalence of 13%. U.S. health professionals are not reporting full performance of the PHS guideline’s 5 A’s. While many health professionals state they ask and advise about smoking, they report much less assessing, assisting, and especially arranging follow-up. Controlling for health professional and practice demographics, factors positively associated in the multivariate analyses with health professional groups reportedly performing multiple components of the 5 A’s include awareness of PHS guidelines, having had cessation training, and believing that

treatment was an important professional responsibility. Negative associations include being a current smoker, not being a PCP, being uncomfortable asking patients if they smoke, believing counseling was not an appropriate service, and reporting competing priorities.

Our finding that being a current smoker may affect performance of the 5 A's underscores that smoking cessation among health professionals, particularly nurses, is still of the utmost importance. Nurses represent the largest group of health care professionals, and the 13% smoking prevalence in our survey translates to more than 310,000 smoking registered nurses. Estimates from the 2001 to 2002 Current Population Survey Tobacco Use Supplement have been higher, at 15% for registered nurses, and as high as 28% for licensed practical nurses (Tobacco Free Nurses, 2009), the latter having fewer educational requirements and more restricted job responsibilities. Smoking among nurses is more prevalent in those with lower incomes, fewer years of formal education, and certain nursing specialties (Tobacco Free Nurses).

Our findings for PCPs and psychiatrists are consistent with a national survey by the AAMC (Association of American Medical Colleges, 2007). Similar to our study findings, but with lower proportions, PCPs in the AAMC report reported frequently "asking" (84%) and "advising" (86%) but much less "assessing" (63%), "assisting" (13%–37%), and "arranging" (17%); psychiatrists were also less likely than PCPs to participate in most cessation activities. Barriers and facilitators similarly identified in the AAMC report include limited reports of cessation training, reporting that most cessation interventions have some effectiveness, agreeing that patients have low motivation to quit, describing competing priorities, and agreeing that there is little or no reimbursement; however, these factors (which did not include smoking status) were not examined in relation to self-reported performance of the 5 A's. Other studies have described barriers qualitatively (Blumenthal, 2007), similar to factors in our study, and that positive PCP beliefs about cessation are associated with increased rates of counseling, referring, and patient-reported smoking cessation behavior (Meredith, Yano, Hickey, & Sherman, 2005).

For the other health professional groups, there is a growing literature that suggests rates of performing the 5 A's at similar or lower rates than our study. A study of nurses in 35 U.S. hospitals demonstrated lower rates of "asking" (73%) but higher rates of "assistance" (73%) than our study, although similarly few made referrals (Sarna et al., 2009). Two studies of dentists in various states (D. Albert, Ward, Ahluwalia, & Sadowsky, 2002; D. A. Albert et al., 2005) demonstrate much lower rates of "asking" and "advising" than our study. Only 25% of dental hygienists in a national survey had been reported to ask about tobacco (Dolan, McGorray, Grinstead-Skigen, & Mecklenburg, 1997). There is little literature on emergency medicine physicians since research on tobacco treatment has only recently been a priority (Bernstein & Boudreaux, 2008).

A Canadian study recently surveyed six health professional groups for their self-reported performance of the 5 A's (Tremblay, Cournoyer, & O'Loughlin, 2009). The health professional groups included general practitioners (similar to PCPs), nurses, dentists, dental hygienists, pharmacists, and respiratory therapists. Similar

to our study, general practitioners undertook more counseling, but overall rates for other health professionals reportedly performing the 5 A's were significantly lower than our study. This Canadian study also identified three factors positively associated with counseling across most groups: belief that counseling is the role of health professionals, perceived self-efficacy to engage in effective counseling, and knowledge of community cessation resources. Since the Canadian health care system is markedly different than the United States, these findings are not necessarily translatable, but it is noteworthy that positive factors toward cessation were associated with increased rates of self-reported counseling across most health professional groups.

Our study findings of common barriers and facilitators may be important in developing strategies for increasing the involvement of all U.S. health professionals in conducting tobacco dependence treatment. Although this study examined the extent of self-reported performance of the 5 A's at the individual health professional level, the PHS guideline suggests that the 5 A's do not need to be rigidly applied; various health professionals could share the responsibilities in a team care approach. Also, the PHS guidelines recommend that systems-level change in conducting the 5 A's" which was not analyzed for this study, is important in effectively promoting tobacco dependence treatment. This team care approach and systems-level change may be important in addressing our finding that health professionals reported less performance of the 5 A's by believing that counseling was not an appropriate service and reporting competing priorities.

Telephone quitlines in particular may play a key role in increasing all health professionals to be more involved in providing tobacco dependence treatment. Although health professionals in this study rated telephone quitlines and Internet services as lower in effectiveness than other forms of assistance, this study was conducted before the National Smokers' Quitline was introduced (Schroeder, 2005), which may affect respondents' familiarity with quitlines. While Internet interventions vary widely and common characteristics of effective interventions have not yet been defined (Walters, Wright, & Shegog, 2006), telephone quitlines increased the use of behavioral and pharmacological assistance in one randomized controlled trial, leading to higher smoking cessation rates compared with a routine primary care provider intervention (An et al., 2006). Telephone quitlines also have evidence of a dose response: ≥ 3 calls increase the odds of quitting compared with a minimal intervention such as providing standard self-help materials or brief advice; quitlines are also important for support and follow-up (Stead, Perera, & Lancaster, 2007).

The strength of our analysis is that this simultaneous survey of multiple U.S. health professionals asks specifically about their smoking status and cessation practices, allowing us to examine common barriers and facilitators to improve delivery of tobacco dependence treatment among a diverse range of health professionals who encounter smokers on the front lines of clinical care. The novel aspect of our study is that the focus expands beyond PCPs to include emergency physicians and psychiatrists, plus a national sample of nonphysicians (registered nurses, dentists, dental hygienists, and to a lesser extent pharmacists). Also, our multivariate analyses controlled for provider demographics, practice settings, and patient population characteristics that may affect access to cessation services.

Several limitations in our study should be noted. First, this study relies on self-reported responses. Smoking status in our survey is not biochemically verified. Also, studies of actual smoking cessation practices by patient report (Goldstein et al., 1997) or medical records, such as the National Ambulatory Medical Care Survey (Ferketich et al., 2006; Thorndike et al., 2007), suggest that physicians conducted the 5 A's at lower rates than health professionals report in our study. Second, physicians and dentists had a lower response rate compared with the other health professional groups, but as noted above, this study had a much higher response rate than a similar study surveying physicians from the AMA masterfile (Association of American Medical Colleges, 2007). Our nonrespondent analyses suggest that, at least for PCPs and psychiatrists, the response rate may be underestimated; since the response rate denominator is the number of eligible potential respondents, having more nonrespondents older than 50 years and perhaps retired and ineligible would lead to a smaller denominator and thus a larger response rate. Survey response rates in general have been declining even in state-based telephone studies on tobacco use, but there is no evidence to date that this has affected smoking prevalence estimates (Biener, Garrett, Gilpin, Roman, & Currivan, 2004). Third, the targeted approach for providing monetary incentives to only physicians, dentists, and registered nurses who initially refused the interview may have introduced a selection bias into the findings. Fourth, some findings of marginal statistical significance may be affected by the sample size, for example, if there were a larger sample of current smokers, it is possible that current smoking status might be significantly associated with "ask" or "arrange." Finally, pharmacists were excluded from the multivariate analyses and may warrant further study about differences in attitudes and behavior between retail and clinical settings.

As more health professionals realize the significance and feasibility of addressing tobacco use, it is hoped that cessation rates and interventions will increase and more smoker lives will be saved. No other intervention has such a high health potential benefit.

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Declaration of Interests

None declared.

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