

Cigarette Smoking, Desire to Quit, and Tobacco-Related Counseling Among Patients at Adult Health Centers

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Although overall smoking rates have dropped dramatically in the past few decades, less progress has been made among certain subpopulations, including those who have less education and lower incomes: 27% of adults with less than a high-school diploma, and 28% of adults living below the federal poverty level (FPL) are cigarette smokers.^{1,2}

In light of slowing declines in smoking rates, the US Department of Health and Human Services (HHS) has reaffirmed its commitment to ending the tobacco epidemic, with a particular focus on the nation's most vulnerable members.^{3,4} Within HHS, the Health Resources and Services Administration (HRSA) supports health centers throughout the United States to provide access to primary care services for medically underserved and vulnerable populations. In 2011, 1128 centers served more than 20 million patients throughout the nation, including 62% racial/ethnic minorities, 36% uninsured, 40% Medicaid-insured, and 93% below 200% of the FPL.⁵

Primary care settings are important intervention points for identifying tobacco use and providing appropriate counseling and treatment. As part of the primary care safety-net system, health centers are well-positioned to identify patients who smoke and ensure receipt of needed counseling and treatment.⁶ The US Preventive Services Task Force recommends that clinicians provide screening and tobacco cessation interventions for adults who use tobacco products.⁷ Smokers who see health care providers and receive advice to quit smoking are more likely to attempt to quit than patients who do not; however, only 2 out of 10 tobacco users nationally receive tobacco counseling during visits to their providers.^{8,9}

Health centers are a critical component of national efforts to address the disproportionate burden of tobacco use among vulnerable populations, and it is important to understand cigarette smoking patterns and treatment needs of patients who may have limited access to

Objectives. We determined cigarette smoking prevalence, desire to quit, and tobacco-related counseling among a national sample of patients at health centers.

Methods. Data came from the 2009 Health Center Patient Survey and the 2009 National Health Interview Survey. The analytic sample included 3949 adult patients at health centers and 27 731 US adults.

Results. Thirty-one percent of health center patients were current smokers, compared with 21% of US adults in general. Among currently smoking health center patients, 83% desired to quit and 68% received tobacco counseling. In multivariable models, patients had higher adjusted odds of wanting to quit if they had indications of severe mental illness (adjusted odds ratio [AOR] = 3.26; 95% confidence interval [CI] = 1.19, 8.97) and lower odds if they had health insurance (AOR = 0.43; 95% CI = 0.22, 0.86). Patients had higher odds of receiving counseling if they had 2 or more chronic conditions (AOR = 2.05; 95% CI = 1.11, 3.78) and lower odds if they were Hispanic (AOR = 0.57; 95% CI = 0.34, 0.96).

Conclusions. Cigarette smoking prevalence is substantially higher among patients at health centers than US adults in general. However, most smokers at health centers desire to quit. Continued efforts are warranted to reduce tobacco use in this vulnerable group. (*Am J Public Health*. Published online ahead of print March 13, 2014; e1–e9. doi:10.2105/AJPH.2013.301691)

care, to guide further enhancements to services in the primary care setting. Several studies have examined tobacco use within primary care safety-net settings; however, these have focused on assessing prevalence and evaluating pilot interventions in a limited number of health centers or free clinics.^{10–16} To date there have been no nationally representative studies of tobacco use and related counseling or treatment within health centers.

To address this gap in the literature, the purpose of this study was to determine the prevalence of cigarette smoking, desire to quit, and receipt of tobacco-related counseling among a national sample of patients at adult health centers, as well as to identify socio-demographic and health-related factors associated with these measures.

METHODS

Two data sources contributed to these analyses. First, data came from the 2009 Health Center Patient Survey, including a nationally

representative sample of 4562 patients served by HRSA-supported health centers. Respondents were selected through a 3-stage sampling process. First, health centers were randomly selected, then up to 3 eligible clinic sites within each selected health center, and finally eligible patients within each clinic site (with at least 1 visit in the past 12 months). Trained field interviewers conducted the computer-assisted personal interviews, which lasted about 50 minutes.

Interview questions were replicated based on items from other national surveys, including the National Health Interview Survey (NHIS), the National Ambulatory Medical Care Survey, the Medical Expenditure Panel Survey, and the National Health and Nutrition Examination Survey. Survey items focused on sociodemographic characteristics, health conditions, health behaviors, access to health care, and use of services. The survey included a module on substance use, which allowed an assessment of patients' current and past cigarette smoking patterns, desire to quit smoking,

TABLE 1—Sociodemographic and Health-Related Characteristics of Adult Health Center Patients and US Adults in General: 2009 Health Center Patient Survey and 2009 National Health Interview Survey

Variable	Adult Health Center Patients, Weighted % (No.)	US Adult Population (NHIS), Weighted % (No.)
Total	100.0 (3949)	100.0 (27 731)
Age, y		
≥ 60	10.7 (517)	23.8 (7543)
50–59	16.1 (955)	17.8 (4823)
40–49	22.1 (1033)	19.2 (5088)
30–39	21.3 (640)	17.4 (4998)
18–29	29.9 (804)	21.9 (5279)
Gender		
Female	62.1 (2578)	51.7 (15 470)
Male	37.9 (1371)	48.3 (12 261)
Marital status		
Not married	70.4 (2852)	45.5 (15 164)
Married	29.6 (1093)	54.5 (12 506)
Race/ethnicity		
Hispanic	29.5 (1075)	13.8 (5165)
Non-Hispanic Black	21.1 (1017)	11.9 (4464)
Non-Hispanic Other	8.6 (301)	5.6 (1834)
Non-Hispanic White	40.8 (1075)	68.8 (16 268)
Education		
> high-school diploma	28.4 (957)	57.4 (15 364)
High-school diploma or GED	29.9 (1058)	27.8 (7463)
< high-school diploma	41.7 (1920)	14.8 (4759)
Current employment		
Not working for pay	63.6 (2798)	39.9 (11 767)
Working for pay	36.4 (1137)	60.1 (15 957)
Federal poverty level (FPL)		
Unknown	16.4 (737)	8.6 (2469)
≥ 200% FPL	14.0 (331)	64.4 (16 203)
100%–199% FPL	26.4 (800)	15.3 (4718)
< 100% FPL	43.2 (2081)	11.7 (4341)
Health insurance		
Yes	59.9 (2314)	82.3 (22 561)
No	40.1 (1626)	17.7 (5103)
General health status		
Fair or poor	36.5 (1761)	13.0 (4101)
Excellent, very good, or good	63.5 (2184)	87.0 (23 620)
Hypertension		
Yes	39.9 (1752)	29.0 (8660)
No	60.1 (2193)	71.1 (19 043)
Diabetes		
Yes	19.2 (928)	10.1 (3042)
No	80.8 (3016)	89.9 (24 670)

Continued

and receipt of tobacco-related counseling. We excluded children younger than 18 years from the analyses, leaving a sample size of 3949 adult patients. We dropped an additional 12 respondents because they were missing responses regarding current smoking status, for a final sample of 3937 adults.

Second, we also examined data from the 2009 NHIS, to compare the prevalence of current smoking between health center patients and US adults in general. The NHIS is an annual household survey of the civilian noninstitutionalized population in the United States, which collects information on a broad range of health-related topics. Respondents are selected through a multistage area probability design to obtain a representative sample of US households. First, geographically defined primary sampling units are sampled, second-stage segments are selected within primary sampling units, and households are selected within segments. Data are collected at the household, family, individual adult, and individual child level. We used data from the Sample Adult Core questionnaire collected in 2009, which included 27 731 adults. Of these, we dropped 128 respondents because of missing responses for current smoking status, leaving a final sample of 27 603 adults.

Measures

There were 3 main outcomes of interest: current smoking, desire to quit smoking, and receipt of tobacco-related counseling. Only current smoking was available in both the Health Center Patient Survey and NHIS data sets; the other 2 outcomes were available solely for health center patients. We assessed current smoking with 2 survey questions: “Have you smoked at least 100 cigarettes in your entire life?” and, among those who responded affirmatively, “Do you now smoke cigarettes every day, some days or not at all?” We coded respondents who reported now smoking every day or some days as current smokers; we coded all others as not currently smoking. Among those who were current smokers, we assessed desire to quit with the question “During the past 12 months, have you wanted to stop smoking?” We also assessed receipt of tobacco-related counseling

TABLE 1—Continued

Cancer		
Yes	5.7 (263)	8.2 (2304)
No	94.3 (3675)	91.8 (25 411)
Asthma		
Yes	20.6 (848)	13.1 (3594)
No	79.4 (3095)	86.9 (24 121)
Emphysema		
Yes	3.9 (156)	2.2 (629)
No	96.1 (3776)	97.8 (27 078)
Cardiovascular disease ^a		
Yes	11.8 (510)	13.3 (3876)
No	88.2 (3395)	86.7 (23 812)
Mental health status (K6)		
Severe mental illness	12.1 (655)	3.3 (965)
Mental distress	29.9 (1308)	12.6 (3578)
No mental distress	58.0 (1984)	84.1 (23 019)
Heavy drinking, past year ^b		
Yes	14.2 (588)	8.9 (2319)
No	85.8 (3361)	91.1 (25 412)

Note. GED = general equivalency diploma; K6 = Kessler scale; NHIS = National Health Interview Survey.

^aComprises congestive heart failure, heart condition, coronary heart disease, angina pectoris, myocardial infarction, and stroke.

^bOn average days of drinking, ≥ 5 drinks for men, ≥ 4 drinks for women.

among smokers with the question “In the past 12 months, did anyone at the [reference health center] talk to you about the health risks of smoking and ways to quit?”

We selected covariates a priori on the basis of scientific evidence about the demographic, socioeconomic, and health characteristics shown to be risk factors for smoking. Demographic factors included age, gender, race/ethnicity, and marital status. Socioeconomic characteristics included employment status, FPL, education level, and health insurance status. Health-related characteristics included general health status, chronic conditions (i.e., hypertension, diabetes, cancer, asthma, emphysema, cardiovascular disease), mental health status (assessed by the Kessler scale [K6]), and heavy drinking in the past year. The K6 captures severe mental illness ($K6 \geq 13$), as well as psychological distress in the past month ($6 \leq K6 < 13$). The K6 has been validated in numerous countries and is frequently used in other US health surveys.^{17–22} Heavy drinking was defined as at least 5 drinks on average for men, and at least 4 drinks on average for women per episode of drinking.

Analysis

We examined the distributions of various sociodemographic and health measures for the total sample of health center patients and US adults in general. We then compared prevalence of overall current cigarette smoking among health center patients and US adults, and examined unadjusted associations between the various demographic, socioeconomic, and health-related covariates and current smoking for both samples with the χ^2 test. Next, we performed multiple logistic regressions to examine the factors independently associated with current smoking in both samples, after we adjusted for covariates. We also calculated prevalence of desire to quit smoking and receipt of tobacco counseling among health center patients (NHIS data were unavailable for US adults in general); we examined distributions of demographic, socioeconomic, and health factors for those measures, and we conducted multiple logistic regressions to determine factors independently associated with these 2 measures.

We excluded respondents with missing data, who refused to answer, or who did not know

the answers to questions from multivariable analyses. Specifically, among health center patients, we excluded 41 respondents (1.0%) from the current smoking analysis because of missing data on the covariates of interest. Among US adults in general, we excluded 399 respondents (1.4%) because of missing covariate information. For the analysis on desire to quit, we excluded 14 health center respondents (1.1%) because of missing data on covariates of interest; similarly, for the analysis on receipt of tobacco counseling, we excluded 15 respondents (1.1%) because of missing covariates. We conducted all analyses with Stata version 12.0 (StataCorp LP, College Station, TX) and accounted for the complex sampling design. We considered 2-tailed *P* values less than or equal to .05 to be statistically significant.

RESULTS

Table 1 summarizes the sociodemographic and health-related characteristics of the sample of adult health center patients and general US adult population. Compared with the US population in general, health center patients were younger, more frequently female, unmarried, racial/ethnic minorities, less educated, unemployed, lower income, and uninsured. These sociodemographic differences are expected when one considers that health centers serve primarily vulnerable and medically underserved populations. Relative to US adults in general, health center patients also had worse health, with higher prevalence of fair or poor general health status, hypertension, diabetes, and asthma. Behavioral health problems were also more frequent among health center patients, with higher prevalence of mental distress or severe mental illness and heavy drinking.

About 31% of adult health center patients reported currently smoking, compared with 21% of US adults in general (Table 2). Among health center patients, the prevalence of current smoking varied by age, gender, marital status, race/ethnicity, employment status, poverty level, several chronic conditions (i.e., asthma, emphysema, cardiovascular disease), mental health status, and drinking behavior. We found similar patterns among US adults, except that there were no associations between current smoking and

TABLE 2—Prevalence of Current Cigarette Smoking Among Adult Health Center Patients and US Adults in General: 2009 Health Center Patient Survey and 2009 National Health Interview Survey

Variable	Adult Health Center Patients (n = 3937)		US Adults (NHIS; n = 27 603)	
	Weighted %	P	Weighted %	P
Overall	30.9		20.6	
Age, y		< .001		< .001
≥ 60	21.1		11.9	
50–59	30.6		22.1	
40–49	40.6		24.5	
30–39	30.4		22.9	
18–29	27.8		23.6	
Gender		.001		< .001
Female	26.7		17.9	
Male	37.9		23.5	
Marital status		< .001		< .001
Not married	35.2		26.5	
Married	20.8		15.7	
Race/ethnicity		< .001		< .001
Hispanic	13.6		14.5	
Non-Hispanic Black	24.5		21.3	
Non-Hispanic Other	39.0		14.5	
Non-Hispanic White	45.1		22.2	
Education		.93		< .001
> high-school diploma	30.5		15.4	
High-school diploma or GED	31.9		27.7	
< high-school diploma	30.7		27.4	
Current employment		.013		.058
Not working for pay	34.3		21.4	
Working for pay	25.2		20.1	
Federal poverty level (FPL)		.029		< .001
Unknown	23.3		17.3	
≥ 200% FPL	34.7		18.0	
100%–199% FPL	24.1		25.2	
< 100% FPL	36.8		31.1	
Health insurance		.592		< .001
Yes	30.1		17.9	
No	32.4		33.1	
General health status		.093		< .001
Fair or poor	34.6		28.5	
Excellent, very good, or good	28.8		19.4	
Hypertension		.674		.001
Yes	31.8		19.0	
No	30.3		21.3	
Diabetes		.154		.027
Yes	25.9		18.4	
No	32.2		20.8	

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employment status or cardiovascular disease. However, several additional factors were significantly associated with current smoking among US adults, which were not significant among health center patients, including education level, insurance status, general health status, and several chronic conditions (i.e., hypertension, diabetes, cancer).

Table 3 summarizes the results of the multiple logistic regression models examining factors independently associated with current smoking in health center patients and in US adults. Because unadjusted analyses (Table 2) showed that each covariate was significantly associated with current smoking for at least 1 of the 2 populations of interest, we included all covariates in the adjusted models. Among health center patients, adjusted odds of currently smoking were higher among those aged 40 to 49 years (adjusted odds ratio [AOR] = 1.84; 95% confidence interval [CI] = 1.15, 2.95), unmarried patients (AOR = 1.95; 95% CI = 1.24, 3.07), patients with mental distress (AOR = 1.69; 95% CI = 1.20, 2.36) or severe mental illness (AOR = 2.70; 95% CI = 1.50, 4.89), and heavy drinkers (AOR = 4.25; 95% CI = 2.69, 6.72). Conversely, adjusted odds of currently smoking were lower among female patients (AOR = 0.63; 95% CI = 0.47, 0.86), Hispanic patients (AOR = 0.16; 95% CI = 0.08, 0.32) and non-Hispanic Black patients (AOR = 0.39; 95% CI = 0.23, 0.65), and patients between 100% and 200% FPL (AOR = 0.55; 95% CI = 0.35, 0.86). We found these same patterns among US adults; however, we also found additional factors to be independently associated with current smoking, including lower adjusted odds of current smoking among those with more than a high-school education, greater than 200% FPL, and health insurance, and higher odds of smoking among those in fair or poor health.

About 83% of patients at health centers who were current smokers reported a desire to quit smoking, and about 68% of current smokers reported receiving some form of tobacco counseling (Table 4). There were no differences in desire to quit according to demographic, socioeconomic, or health factors, with the exception that uninsured patients at health centers more frequently reported wanting to quit than did

TABLE 2—Continued

Cancer		.393		< .001
Yes	34.2		16.3	
No	30.7		21.0	
Asthma		.037		< .001
Yes	38.9		24.5	
No	28.9		20.0	
Emphysema		< .001		< .001
Yes	71.8		38.1	
No	29.2		20.2	
Cardiovascular disease ^a		.03		.532
Yes	41.3		20.1	
No	29.7		20.6	
Mental health status (K6)		< .001		< .001
Severe mental illness	55.7		47.2	
Mental distress	35.7		31.8	
No mental distress	23.4		17.9	
Heavy drinking, past year ^b		< .001		< .001
Yes	56.9		46.5	
No	26.6		18.1	

Note. GED = general equivalency diploma; K6 = Kessler scale; NHIS = National Health Interview Survey.

^aComprises congestive heart failure, heart condition, coronary heart disease, angina pectoris, myocardial infarction, and stroke.

^bOn average days of drinking, ≥ 5 drinks for men, ≥ 4 drinks for women.

insured patients. Similarly, there were no demographic, socioeconomic, or health-based differences in tobacco counseling.

Although there were few unadjusted associations between covariates of interest and desire to quit and receipt of tobacco counseling, we retained all covariates in adjusted models to obtain the independent associations between specific risk factors and outcomes of interest. The adjusted odds of wanting to quit smoking were lower among insured health center patients (AOR = 0.43; 95% CI = 0.22, 0.86) and higher among patients with severe mental illness (AOR = 3.26; 95% CI = 1.19, 8.97; Table 5). Adjusted odds of receiving tobacco counseling were lower among Hispanic patients (AOR = 0.57; 95% CI = 0.34, 0.96) and higher among patients with multiple chronic conditions (AOR = 2.05; 95% CI = 1.11, 3.78).

DISCUSSION

Based on self-reported data, findings showed disproportionately higher prevalence of cigarette smoking among patients at adult health

centers (31%), relative to the general US population (21%). This is consistent with other national data showing higher smoking rates among individuals with lower socioeconomic status, and expected as health centers serve predominantly low-income populations. A new finding showed that a very high proportion of health center patients who smoke want to quit. Although the burden of tobacco use was high in this sample, patients also indicated greater desire to quit smoking than US adults, about 83% of health center patients who smoked versus 69% of smokers in general (according to the 2010 NHIS).²³ Other research has found that smokers experiencing financial stress are more likely to want to quit, but less likely to actually make a quit attempt, and also less likely to succeed if they do attempt to quit.²⁴ Thus, it is especially important for health center providers to consider their patients' economic context and provide additional supportive counseling and resources to encourage tobacco cessation.

In addition, a large proportion of patients who smoked (68%) reported that someone at

their health center talked to them about the health risks of smoking and ways to quit in the past year. Depending on the data source, surveys of the overall US population indicate that anywhere between 30% and 65% of smokers in general receive advice to quit smoking.^{23,25,26} The finding that two thirds of patients at health centers who were smokers receive tobacco counseling is encouraging; however, this means that about 1 in 3 current smokers seen at health centers do not receive tobacco counseling, indicating further opportunities for improvement in these safety-net primary care settings.

Multivariable analyses identified few statistically significant covariates independently associated with desire to quit smoking, indicating that patients at health centers with different sociodemographic and health characteristics generally want to quit in equal proportions. However, patients with severe mental illness had 3 times higher odds of wanting to quit compared with patients with no mental illness, after we adjusted for all other covariates of interest. This finding challenges conventional wisdom that people with mental health problems do not prioritize quitting smoking; health centers should be mindful of this desire to quit, and address smoking cessation with patients suffering from mental illness. In addition, patients with health insurance had lower adjusted odds of wanting to quit smoking compared with uninsured patients. Additional analyses revealed that desire to quit was highest among uninsured patients (89%) and Medicare patients (88%), followed by Medicaid patients (77%), and finally privately insured patients (67%; detailed results not shown, available upon request).

Multivariable analyses also showed that health center providers consistently focused tobacco counseling efforts across population subgroups, with particular emphasis on the chronically ill. Patients with 2 or more chronic conditions had twice the adjusted odds of reporting counseling, compared with patients with no chronic conditions. This suggests that health center providers may be targeting their counseling toward patients with the greatest health needs. However, Hispanic patients had lower odds of receiving tobacco counseling, after adjustment for other covariates, which is consistent with national

TABLE 3—Results of Multivariate Analysis of Current Smoking Among Health Center Patients and US Adults in General: 2009 Health Center Patient Survey and 2009 National Health Interview Survey

Variable	Adult Health Center Patients (n = 3896), AOR (95% CI) ^a	US Adults (NHIS; n = 27 204), AOR (95% CI) ^a
Age, y (Ref: 18-29)		
≥ 60	0.63 (0.33, 1.18)	0.61 (0.51, 0.73)
50-59	0.87 (0.47, 1.64)	1.41 (1.20, 1.65)
40-49	1.84 (1.15, 2.95)	1.54 (1.34, 1.76)
30-39	1.24 (0.69, 2.22)	1.46 (1.28, 1.66)
Female (Ref: male)	0.63 (0.47, 0.86)	0.75 (0.69, 0.81)
Not married (Ref: married)	1.95 (1.24, 3.07)	1.70 (1.55, 1.86)
Race/ethnicity (Ref: non-Hispanic White)		
Hispanic	0.16 (0.08, 0.32)	0.32 (0.28, 0.36)
Non-Hispanic Black	0.39 (0.23, 0.65)	0.69 (0.61, 0.79)
Non-Hispanic Other	0.69 (0.36, 1.33)	0.63 (0.53, 0.76)
Education (Ref: high school diploma)		
> high-school diploma	0.66 (0.43, 1.02)	0.47 (0.41, 0.53)
High-school diploma or GED	0.75 (0.47, 1.19)	0.93 (0.82, 1.05)
Not working for pay (Ref: working for pay)	1.36 (0.92, 2.01)	1.05 (0.95, 1.16)
FPL (Ref: < 100%)		
Unknown	0.70 (0.45, 1.09)	0.66 (0.55, 0.80)
≥ 200%	1.05 (0.53, 2.05)	0.75 (0.66, 0.86)
100%-199%	0.55 (0.35, 0.86)	0.87 (0.76, 1.004)
Health insurance (Ref: no health insurance)	0.86 (0.61, 1.22)	0.60 (0.53, 0.67)
Fair or poor health status (Ref: excellent, very good, or good)	1.05 (0.67, 1.65)	1.31 (1.16, 1.47)
No. of chronic conditions ^b (Ref: 0)		
≥ 2	1.38 (0.88, 2.14)	0.91 (0.79, 1.05)
1	0.96 (0.59, 1.56)	1.09 (0.99, 1.20)
Mental health status (K6; Ref: no mental distress)		
Severe mental illness	2.70 (1.50, 4.89)	2.52 (2.06, 3.07)
Mental distress	1.69 (1.20, 2.36)	1.71 (1.53, 1.92)
Heavy drinking in past year ^c (Ref: no heavy drinking)	4.25 (2.69, 6.72)	3.10 (2.71, 3.55)

Note. AOR = adjusted odds ratio; CI = confidence interval; FPL = federal poverty level; GED = general equivalency diploma; K6 = Kessler scale; NHIS = National Health Interview Survey.

^aOdds ratio for each covariate adjusted for all other covariates in the model.

^bNumber of chronic conditions based on count of hypertension, diabetes, cancer, asthma, emphysema, and cardiovascular disease.

^cOn average days of drinking, ≥ 5 drinks for men, ≥ 4 drinks for women.

findings.²⁵ Lower rates of counseling among Hispanic patients may reflect providers' awareness of lower smoking prevalence in this racial/ethnic group (14% among Hispanic vs 25% among Black and 45% among White patients at health centers); thus, providers may perceive less of a need for counseling among Hispanic patients. Although only 61% of Hispanic patients seen at health centers who were smokers received tobacco

counseling (compared with 73% of non-Hispanic White patients), these rates are still much higher than those among a national sample of primary care visits (21% for Hispanics and 29% for non-Hispanic Whites).²⁵ Nonetheless, the ultimate goal is for health centers to provide tobacco counseling equally across all groups of smokers, regardless of sociodemographic background or health status.

This study had several limitations. This was a cross-sectional analysis so findings can only infer association between patient-level characteristics and tobacco-related outcomes, rather than causation. In addition, the data were based on patients' self-reports of tobacco use and desire to quit, and thus may be subject to social desirability bias. The prevalence of cigarette smoking reported in the findings may be an underestimate of the true prevalence among the population of health center patients. In addition, the tobacco-related measures included in the 2009 Health Center Patient Survey were somewhat limited, and this study was not able to assess actual quit attempts among smokers. More detailed information was also not available regarding the type or extent of tobacco counseling or other cessation support. Additional data and studies are needed to determine whether providers are following the US Public Health Service Clinical Practice Guidelines' 5 A's model to (1) ask about tobacco use, (2) advise patients to quit smoking, (3) assess willingness to make a quit attempt, (4) assist in quit attempts and develop quit plans with their patients, and (5) arrange for referrals and follow-up.²⁷ Finally, we compared the prevalence of cigarette smoking among health center patients with those among US adults in general, but health center patients are also sicker than the general adult population, which includes individuals who do not seek health care. Another possible comparison group would have been US adults who received health care in the past year; however, we were unable to identify national data sources with this comparison group that assessed current smoking by using the same survey questions as the Health Center Patient Survey.

The HHS has set a goal of reducing the prevalence of adult cigarette smoking to 12% by 2020.²⁸ The HRSA is engaged in several efforts to further address tobacco use among vulnerable populations served by health centers. Beginning in 2011, all health centers are now required to annually report tobacco-related data to the agency. Specifically, they report data on 2 measures: (1) proportion of adults aged 18 years and older who are queried about tobacco use, and (2) proportion of adults who smoke with documented receipt of tobacco cessation counseling or

TABLE 4—Prevalence of Desire to Quit Smoking and Tobacco-Related Counseling Among Currently Smoking US Health Center Patients: 2009 Health Center Patient Survey

Variable	Wanted to Quit (n = 1329)		Received Tobacco Counseling (n = 1330)	
	Weighted %	P	Weighted %	P
Overall	82.9		68.3	
Age, y		.27		.813
≥ 60	69.4		62.9	
50–59	85.4		70.2	
40–49	88.3		69.5	
30–39	81.6		63.5	
18–29	80.2		78.9	
Gender		.82		.822
Female	82.3		68.8	
Male	83.6		67.6	
Marital status		.856		.392
Not married	82.7		69.2	
Married	83.7		64.6	
Race/ethnicity		.786		.173
Hispanic	79.7		60.5	
Non-Hispanic Black	86.3		63.2	
Non-Hispanic Other	84.2		62.2	
Non-Hispanic White	82.4		72.5	
Education		.432		.988
> high-school diploma	86.5		67.8	
High-school diploma or GED	80.1		68.8	
< high-school diploma	82.5		68.0	
Current employment		.922		.428
Not working for pay	82.8		66.8	
Working for pay	83.2		71.8	
Federal poverty level (FPL)		.981		.569
Unknown	82.6		70.8	
≥ 200% FPL	81.7		70.7	
100%–199% FPL	84.1		73.6	
< 100% FPL	82.9		64.8	
Health insurance		.028		.92
Yes	78.6		68.5	
No	88.9		67.9	
General health status		.504		.102
Fair or poor	85.1		63.4	
Excellent, very good, or good	81.4		71.6	
Hypertension		.717		.734
Yes	81.9		67.1	
No	83.6		69.0	
Diabetes		.249		.43
Yes	77.2		72.4	
No	84.1		67.4	
Cancer		.784		.651
Yes	85.2		64.6	
No	82.7		68.4	

Continued

pharmacological intervention. Currently, 80% of patients are screened for tobacco use, which exceeds the Healthy People 2020 goal of 68.6% for tobacco screening in office-based ambulatory care settings.^{5,28} In addition, 53% of smokers receive documented cessation advice or medication in health centers, also higher than the 21.1% goal for Healthy People 2020.^{5,28} By tracking these measures over time, health centers will be encouraged to improve tobacco-related counseling and treatment of all their patients.

Electronic health records (EHRs) provide another opportunity to address tobacco use among medically underserved communities, through the consistent collection of patient information, computerized chart prompts, and tracking of patients over time. Systematic prompts have been shown to increase assessment of smoking status and provision of (or referral to) counseling or treatment.^{16,29–32} The HRSA has been supporting health centers to adopt EHRs for more than a decade. As of 2011, 80% of health centers were using EHRs; among these, 96% have EHRs that record patients' smoking status, and 70% have EHRs that prompt for and record tobacco cessation interventions.³³ In addition, HRSA oversees the 340b Prime Vendor Program, which provides access to medications, including prescription and over-the-counter tobacco cessation drugs, at discounted prices to health centers.

In light of the disproportionately high prevalence of cigarette smoking among patients at health centers, as well as the high proportions of patients who desire to quit, continued efforts are warranted to address screening, counseling, and treatment of tobacco use in this vulnerable segment of the US population. ■

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TABLE 4—Continued

Asthma		.982		.643
Yes	83.0		70.2	
No	82.9		67.6	
Emphysema		.521		.08
Yes	87.7		84.9	
No	82.3		66.5	
Cardiovascular disease ^a		.448		.052
Yes	77.5		81.2	
No	83.9		65.8	
Mental health status (K6)		.054		.318
Severe mental illness	89.9		66.6	
Mental distress	86.5		64.0	
No mental distress	76.6		72.4	
Heavy drinking, past year ^b		.77		.659
Yes	81.9		70.5	
No	83.2		67.5	

Note. GED = general equivalency diploma; K6 = Kessler scale.

^aComprises congestive heart failure, heart condition, coronary heart disease, angina pectoris, myocardial infarction, and stroke.

^bOn average day of drinking, ≥ 5 drinks for men, ≥ 4 drinks for women.

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Contributors

Q. Ngo-Metzger originated and supervised the study. M. C. Fiore and N. Tomoyasu provided guidance during study conceptualization and design. L. A. Lebrun-Harris completed the analyses. L. A. Lebrun-Harris led the writing of the article, and N. Tomoyasu, M. C. Fiore, and Q. Ngo-Metzger contributed data interpretation and critical revisions.

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Human Participant Protection

This study was exempt from institutional review board review because it consisted of secondary analysis of existing publicly available and de-identified data.

References

1. Schiller J, Lucas J, Ward B, Peregoy J. *Summary Health Statistics for US Adults: National Health Interview Survey, 2010*. Atlanta, GA: Centers for Disease Control

and Prevention, National Center for Health Statistics; 2012.

2. King BA, Dube SR, Tynan MA. Current tobacco use among adults in the United States: findings from the National Adult Tobacco Survey. *Am J Public Health*. 2012;102(11):e93–e100.

3. Koh HK, Sebelius KG. Ending the tobacco epidemic. *JAMA*. 2012;308(8):767–768.

4. US Department of Health and Human Services. *Ending the Tobacco Epidemic: A Tobacco Control Strategic Action Plan for the US Department of Health and Human Services*. Washington, DC: Office of the Assistant Secretary for Health; 2010.

5. Bureau of Primary Health Care. UDS Summary Report - 2011. Rockville, MD: Department of Health and Human Services, Health Resources and Services Administration; 2012.

6. Center for Substance Abuse Treatment. *A Guide to Substance Abuse Services for Primary Care Clinicians*. Rockville, MD: Substance Abuse and Mental Health Services Administration; 1997.

7. US Preventive Services Task Force. *Counseling and Interventions to Prevent Tobacco Use and Tobacco-Caused Disease in Adults and Pregnant Women*. Rockville, MD: Agency for Healthcare Research and Quality; 2009.

8. Jamal A, Dube SR, Malarcher AM, Shaw L, Engstrom MC. Tobacco use screening and counseling during physician office visits among adults—National Ambulatory Medical Care Survey and National Health Interview Survey, United States, 2005–2009. *MMWR Morbid Mortal Wkly Rep*. 2012;61(suppl):38–45.

9. Institute of Medicine. *Reducing Tobacco-Related Cancer Incidence and Mortality: Workshop Summary*. Washington, DC: The National Academies Press; 2012.

10. Shelley D, Cantrell J. The effect of linking community health centers to a state-level smoker's quitline on rates of cessation assistance. *BMC Health Serv Res*. 2010;10:25.

11. Maizlish NA, Ruland J, Rosinski ME, Hendry K. A systems-based intervention to promote smoking as a vital sign in patients served by community health centers. *Am J Med Qual*. 2006;21(3):169–177.

12. Fisher E, Musick J, Scott C, et al. Improving clinic- and neighborhood-based smoking cessation services within federally qualified health centers serving low-income, minority neighborhoods. *Nicotine Tob Res*. 2005;7(suppl 1):S45–S56.

13. Doescher MP, Winston MA, Goo A, Cummings D, Huntington J, Saver BG. Pilot study of enhanced tobacco-cessation services coverage for low-income smokers. *Nicotine Tob Res*. 2002;4(suppl 1):S19–S24.

14. Foley KL, Pockey JR, Helme DW, et al. Integrating evidence-based tobacco cessation interventions in free medical clinics: opportunities and challenges. *Health Promot Pract*. 2012;13(5):687–695.

15. Foley KL, Sutfin EL. Availability of tobacco cessation services in free clinics. *N C Med J*. 2008;69(4):270–274.

16. Kruse GR, Kelley JH, Linder JA, Park ER, Rigotti NA. Implementation of an electronic health record-based care management system to improve tobacco treatment. *J Gen Intern Med*. 2012;27(12):1690–1696.

17. Kessler RC, Andrews G, Colpe LJ, et al. Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychol Med*. 2002;32(6):959–976.

18. Kessler RC, Barker PR, Colpe LJ, et al. Screening for serious mental illness in the general population. *Arch Gen Psychiatry*. 2003;60(2):184–189.

19. Furukawa TA, Kessler RC, Slade T, Andrews G. The performance of the K6 and K10 screening scales for psychological distress in the Australian National Survey of Mental Health and Well-Being. *Psychol Med*. 2003;33(2):357–362.

20. Strine TW, Kobau R, Chapman DP, Thurman DJ, Price P, Balluz LS. Psychological distress, comorbidities, and health behaviors among U.S. adults with seizures: results from the 2002 National Health Interview Survey. *Epilepsia*. 2005;46(7):1133–1139.

21. Sorkin DH, Nguyen H, Ngo-Metzger Q. Assessing the mental health needs and barriers to care among a diverse sample of Asian American older adults. *J Gen Intern Med*. 2011;26(6):595–602.

22. Kessler RC, Green JG, Gruber MJ, et al. Screening for serious mental illness in the general population with the K6 screening scale: results from the WHO World Mental Health (WMH) survey initiative. *Int J Methods Psychiatr Res*. 2010;19(suppl 1):4–22.

23. Centers for Disease Control and Prevention. Quitting smoking among adults—United States, 2001–2010. *MMWR Morb Mortal Wkly Rep*. 2011;60(44):1513–1519.

24. Siahpush M, Yong HH, Borland R, Reid JL, Hammond D. Smokers with financial stress are more likely to want to quit but less likely to try or succeed: findings from the International Tobacco Control (ITC) Four Country Survey. *Addiction (Abingdon, England)*. 2009;104(8):1382–1390.

25. Sonnenfeld N, Schappert SM, Lin SX. Racial and ethnic differences in delivery of tobacco-cessation services. *Am J Prev Med*. 2009;36(1):21–28.

TABLE 5—Results of Multivariate Analysis of Desire to Quit and Receipt of Counseling Among Currently Smoking US Health Center Patients: 2009 Health Center Patient Survey

Variable	Wanted to Quit Smoking (n = 1315), AOR (95% CI) ^a	Received Tobacco Counseling (n = 1315), AOR (95% CI) ^a
Age, y (Ref: 18-29)		
≥ 60	0.62 (0.21, 1.84)	0.57 (0.19, 1.71)
50-59	1.31 (0.45, 3.86)	0.88 (0.38, 2.01)
40-49	1.72 (0.65, 4.55)	1.09 (0.57, 2.08)
30-39	0.89 (0.37, 2.18)	0.76 (0.37, 1.56)
Female (Ref: male)	0.84 (0.40, 1.78)	1.02 (0.66, 1.57)
Not married (Ref: married)	0.86 (0.41, 1.81)	1.36 (0.86, 2.16)
Race/ethnicity (Ref: non-Hispanic White)		
Hispanic	0.78 (0.33, 1.83)	0.57 (0.34, 0.96)
Non-Hispanic Black	1.64 (0.77, 3.50)	0.59 (0.31, 1.14)
Non-Hispanic Other	1.28 (0.49, 3.39)	0.63 (0.33, 1.19)
Education (Ref: high school diploma)		
> high-school diploma	1.49 (0.83, 2.69)	0.91 (0.51, 1.64)
High-school diploma or GED	0.89 (0.46, 1.70)	0.90 (0.53, 1.53)
< high-school diploma (Ref)	1.00	1.00
Not working for pay (Ref: working for pay)	0.91 (0.51, 1.63)	0.87 (0.49, 1.53)
FPL (Ref: < 100%)		
Unknown	1.10 (0.46, 2.60)	1.56 (0.82, 2.98)
≥ 200%	0.98 (0.35, 2.76)	1.36 (0.52, 3.58)
100%-199%	1.19 (0.54, 2.62)	1.50 (0.78, 2.89)
Health insurance (Ref: no health insurance)	0.43 (0.22, 0.86)	1.15 (0.69, 1.89)
Fair or poor health status (Ref: excellent, very good, or good)	1.15 (0.49, 2.71)	0.75 (0.50, 1.12)
No. of chronic conditions ^b (Ref: 0)		
≥ 2	0.62 (0.23, 1.63)	2.05 (1.11, 3.78)
1	0.82 (0.41, 1.64)	0.78 (0.40, 1.50)
Mental health status (K6; Ref: no mental distress)		
Severe mental illness	3.26 (1.19, 8.97)	0.65 (0.38, 1.13)
Mental distress	2.02 (0.83, 4.97)	0.74 (0.43, 1.26)
Heavy drinking in past year ^c (Ref: no heavy drinking)	0.96 (0.52, 1.78)	1.15 (0.62, 2.12)

Note. AOR = adjusted odds ratio; CI = confidence interval; FPL = federal poverty level; GED = general equivalency diploma; K6 = Kessler scale.

^aOdds ratio for each covariate adjusted for all other covariates in the model.

^bNumber of chronic conditions based on count of hypertension, diabetes, cancer, asthma, emphysema, and cardiovascular disease.

^cOn average day of drinking, ≥ 5 drinks for men, ≥ 4 drinks for women.

26. Agency for Healthcare Research and Quality. *National Healthcare Quality Report 2011*. Rockville, MD: US Department of Health and Human Services; 2012.
27. Fiore M, Jaen C, Baker T. *Treating Tobacco Use and Dependence: 2008 Update. Clinical Practice Guidelines*. Rockville, MD: US Department of Health and Human Services, Public Health Service; 2008.
28. *Healthy People 2020: Topics & Objectives—Tobacco Use*. Rockville, MD: US Department of Health and Human Services; 2012.
29. Bentz CJ, Bayley KB, Bonin KE, et al. Provider feedback to improve 5 A's tobacco cessation in primary care: a cluster randomized clinical trial. *Nicotine Tob Res*. 2007;9(3):341-349.

30. Boyle R, Solberg L, Fiore M. Use of electronic health records to support smoking cessation. *Cochrane Database Syst Rev*. 2011(12):CD008743.
31. Greenwood DA, Parise CA, MacAller TA, et al. Utilizing clinical support staff and electronic health records to increase tobacco use documentation and referrals to a state quitline. *J Vasc Nurs*. 2012;30(4):107-111.
32. Lindholm C, Adsit R, Bain P, et al. A demonstration project for using the electronic health record to identify and treat tobacco users. *WJM*. 2010;109(6):335-340.
33. Wittie MA, Ngo-Metzger Q, Lebrun-Harris LA, Shi L, Ngai H, Nair S. Enabling quality: electronic health record adoption and meaningful use readiness in federally funded health centers. *J Healthc Qual*. In press.