

Tobacco, Alcohol, and Drug Use Among Hospital Patients: Concurrent Use and Willingness to Change

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BACKGROUND: Data are limited on concurrent smoking and substance use among hospital patients. To better inform hospital-based intervention strategies, we evaluated the prevalence and concurrent use of these behaviors. This study evaluated the association between tobacco, alcohol, and other drug use, compared willingness to quit smoking among patients with and without substance use, and evaluated the relationship between willingness to quit smoking and readiness to change substance use.

METHODS: This study was a cross-sectional survey of non-Intensive Care Unit hospital patients at 2 public hospitals (a 464-bed tertiary-care hospital and a 100-bed community hospital) by bedside interview. Severity of use and willingness to change behavior was determined. We evaluated the association between smoking and substance use by multivariable methods.

RESULTS: Of 7,391 patients with known smoking status, 2,684 (36%) were current smokers. Among them, 1,376 hospitalized smokers (51%) had concurrent substance use. Among the 1,972 patients with at-risk alcohol or drug use, the prevalence of smoking was 70% compared to 24% for non-substance users ($P < .01$). Compared to other patients who smoked, substance-dependent patients were more likely (Prevalence Rate Ratio = 1.4, 95% Confidence Interval = 1.1-1.9) to be moderate to heavy smokers. Regardless of substance use pattern, most patients (60%) expressed a desire to immediately quit smoking.

CONCLUSION: Hospital patients who describe at-risk substance use are likely to smoke and express willingness to quit smoking. Given the prevalence of concurrent smoking and substance use and patients' desire to change both behaviors, there is a need for coordination of substance use and smoking cessation interventions. *Journal of Hospital Medicine* 2008;3:369-375. © 2008 Society of Hospital Medicine.

Population-based surveys of the adult US population estimate a prevalence of smoking of 25% and a prevalence of hazardous alcohol or illegal drug use of 23% and 8% respectively,¹ with frequent concurrent use of these substances.² The mortality associated with smoking and substance use is extremely high with tobacco first, alcohol third, and illicit drug use ninth as the leading causes of death in the US.³ Worldwide, the burden of disease from tobacco, alcohol, and illicit drugs accounts for almost 10% of all disability-adjusted life years.⁴ Despite the availability of effective treatments,⁵⁻⁷ many patients do not receive professional intervention and few are offered comprehensive programs that address all of their harmful substance use.

Interventions have been successfully implemented for hospitalized smokers. Earlier work by Emmons⁸ and Orleans⁹ suggests that many smokers seek assistance to quit smoking during

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hospitalization. Over the past 15 years, hospital-based smoking cessation interventions have been successfully implemented.¹⁰ Although mute on hospital-based settings, the United States Preventive Service Task Force recommends screening and counseling interventions to reduce alcohol misuse among adults seen in primary care settings (B recommendation).⁶ Referral to specialized care is the accepted standard for most patients with substance dependence disorders⁷ regardless of the medical setting in which the diagnosis is made. Hospitalization provides a unique opportunity to initiate change in harmful substance use and smoking;¹¹ however, interventions rarely are coordinated.

A high prevalence of smoking among substance users has been reported from population-based surveys^{12–15} and among patients in substance use treatment facilities.^{16–18} Rates of concurrent smoking and substance use range from 35%–44% in population-based studies and may reach 80% in populations seeking substance use treatment.¹⁹ A recent hospital-based study found at-risk alcohol users were 3 times more likely to smoke.²⁰ There are limited data describing concurrent smoking and substance use in the hospital population,¹⁵ and no reports describing the association between patients' willingness to quit smoking and readiness to change substance use behavior.

To better inform hospital-based smoking and substance use intervention strategies, the epidemiology of smoking and substance use in the hospital population needs to be better described. Furthermore, there may be opportunities for synergy between these programs. In this study, we screened inpatients from multiple services at 2 hospitals for tobacco, alcohol, and illicit substance use. We report the prevalence and co-occurrence of these behaviors and willingness to quit smoking among patients with and without at-risk substance use.

METHODS

Data for this study were obtained for a 5-year Substance Abuse and Mental Health Services Administration (SAMHSA) grant to the Illinois Office of the Governor. The grant was awarded to implement screening, brief intervention, brief treatment, and referral to treatment programs for patients of the Cook County Bureau of Health Services who had alcohol or other drug use disorders. We analyzed data collected from non-Intensive

Care Unit patients who had been hospitalized on the internal medicine, family practice, HIV, or surgery services at John H. Stroger Jr Hospital of Cook County (formerly Cook County Hospital, a 464-bed public, tertiary-care hospital) or Provident Hospital of Cook County (a 100-bed public community hospital), in Chicago, Illinois. Because internal medicine and family practice patients were similar in demographic characteristics and interview responses, we considered these as a single service. There is an HIV service at Stroger Hospital; all HIV-infected patients are admitted or transferred to this service. For each patient, we used data collected from their initial hospitalization during a 9-month study period (April 1, 2006 through December 31, 2006). Using hospital admission data, we estimated that 65% of patients were interviewed by a counselor; only 5% of patients could not be interviewed due to patient refusal or mental status changes.

Patients were screened for alcohol use, drug use, and smoking history by bedside interview. We defined at-risk substance use as any illicit drug use within the previous 3 months or alcohol use that exceeded the National Institute for Alcohol Abuse and Alcoholism (NIAAA) guidelines for low-risk drinking (no more than 5 drinks per day or 14 drinks per week for men up to age 65; no more than 3 drinks per day or 7 drinks per week for men over 65 and women). Based on their responses to questions about smoking history, patients were categorized into the following 4 groups: current smokers (ie, smoked within the previous 7 days), recent quitters (ie, quit within 8 days and 6 months), ex-smokers (quit more than 6 months ago), or never smokers. Current smokers were also asked about their heaviness of smoking and willingness to quit. All smokers received a counseling session during hospitalization. All smokers who indicated a desire to quit were encouraged to call the Illinois Quitline after hospital discharge. Individuals who smoked between 10-14 cigarettes per day and smoked their first cigarette within 30 minutes of waking or who smoked 15 or more cigarettes per day were classified as moderate or heavy smokers; all other smokers were classified as light smokers. We established these cut-points by modifying the Public Health Service guideline and Heaviness of Smoking Index.^{5,21,22} The heaviness of smoking classification was used to guide recommendations to the primary service regarding the appropriateness of nicotine patch

therapy during and after hospitalization. For moderate to heavy smokers who were willing to quit, the recommendation was to continue nicotine replacement after hospitalization.⁵

Patients were considered low health risk if their alcohol use did not exceed NIAAA guidelines and they reported no recent drug use. For all patients who reported alcohol use that exceeded the NIAAA guidelines or recent drug use, we administered the Texas Christian University Drug Screen II (TCU)²³ to further characterize the severity of their use. Patients who had a TCU score of ≥ 3 were considered at-risk substance users with substance dependence disorder; patients with scores of 2 or less were considered at-risk substance users without dependence. Among all at-risk substance users, we used a 10-point visual analog scale to assess their readiness to change substance use. After evaluating the distribution and clustering of scores, we prespecified that a score ≥ 8 was indicative of a patient being ready to change their substance use behavior. This ruler has been successfully implemented as part of the Brief Negotiated Interview and Active Referral to Treatment Institute toolbox.²⁴

Analysis

To facilitate comparison with other data sources, we used the same age categories as the National Survey on Drug Use and Health.¹ Differences between proportions were evaluated by the chi-squared test. We analyzed the trend in smoking behavior across the strata of substance use (ie, number of substances used and severity of use) using the Cochran-Armitage test for trend. To evaluate the association between substance use and smoking, multivariable models were constructed that included terms to adjust for age, race, gender, and hospital service; potential confounders (eg, age, race, gender, and service) were included in the final model if they significantly contributed to the outcome variable ($P < 0.1$). From these multivariable models, prevalence ratios were estimated using the binary log transformation in PROC GENMOD.^{25,26} All data were analyzed using SAS version 9.0 (SAS Institute Inc., Cary, NC).

RESULTS

Patient Characteristics

Of the 7,714 unique patients interviewed at the 2 hospitals, we had data on smoking status for 7,391

TABLE 1
Characteristics of Inpatients Interviewed for Tobacco, Alcohol, and Drug Use (N = 7,391)

Characteristic	N	(%)	Smoking prevalence* (%)	Prevalence ratio (95% CI)
<i>Age category†</i>				
18-25	479	(6)	35	2.6 (2.1 to 3.1)
26-34	664	(9)	38	2.8 (2.4 to 3.4)
35-44	1306	(18)	46	3.4 (2.9 to 4.0)
45-54	2182	(30)	46	3.4 (2.9 to 4.0)
55-64	1563	(21)	31	2.3 (2.0 to 2.7)
65 and older	1185	(16)	13	ref -
<i>Race/Ethnicity</i>				
Non Hispanic Black	4990	(68)	45	3.0 (2.2 to 4.0)
Non Hispanic White	850	(12)	40	2.7 (2.0 to 3.6)
Hispanic	1222	(17)	19	1.3 (0.9 to 1.7)
Asian	253	(3)	15	ref -
Other	27	(<1)		
<i>Gender</i>				
Male	4279	(58)	42	1.5 (1.4 to 1.6)
Female	3099	(42)	29	ref -
<i>Service</i>				
HIV	227	(3)	52	1.7 (1.5 to 2.0)
Internal medicine or family practice	6278	(85)	36	1.2 (1.1 to 1.3)
Surgery	886	(12)	31	ref -

Data were missing for age (n = 12), race (n = 49), and gender (n = 13).

Abbreviations: ref, referent group

*4707 (64%) of all patients reported ex or never smoking, 2684 (36%) were current smokers. Among current smokers, 35% were moderate or heavy smokers.

†Mean age = 50 years, standard deviation = 15.

(96%) (Table 1). The mean age was 50 years, most were male, cared for by the internal medicine or family practice service, and the most common racial/ethnic category was non-Hispanic Black, followed by Hispanic, non-Hispanic White, and Asian (Table 1). More than one-quarter of patients reported at-risk substance use other than tobacco; the most common substance used was alcohol followed by cocaine, marijuana, and then heroin (Table 1). Most patients who were at-risk substance users (52%) met criteria for substance dependence disorder.²³

Tobacco Use

Many hospitalized patients were current smokers (36%) and 35% of current smokers were moderate to heavy smokers. The prevalence of smoking varied significantly by age category, race, gender, and service. By age category, the prevalence of smoking peaked at 35–54 years with lower rates of smoking at either extreme of age (Table 1).

TABLE 2
Concurrent Tobacco and Substance Use (n = 7,391)

	N	(%)	Smoking prevalence (%)	Adjusted prevalence ratio (95% CI)*	
<i>Risk Index[†]</i>					
Low Health Risk	5419	(73)	24	ref	–
At-Risk, not dependent	945	(13)	64	2.2	(2.0 to 2.3)
At-Risk, dependent	1027	(14)	75	2.5	(2.3 to 2.6)
<i>Specific substance use</i>					
Low Health Risk	5419	(73)	24	ref	–
At-Risk Alcohol Use	1171	(16)	68	2.2	(2.1 to 2.4)
At-Risk Marijuana Use	688	(9)	70	2.1	(2.0 to 2.3)
At-Risk Cocaine Use	503	(7)	79	2.4	(2.2 to 2.6)
At-Risk Heroin Use	448	(6)	82	2.4	(2.2 to 2.6)
<i>Number of drugs[†]</i>					
None	5419	(73)	24	ref	–
One	1284	(17)	64	2.2	(2.0 to 2.3)
Two or more	688	(9)	81	2.6	(2.5 to 2.8)

*Adjusted for age, race, gender, and service by multivariable analysis.

[†] $P < .001$ for Cochran-Armitage Test for trend across the 3 strata.

Non-Hispanic Blacks and Whites had a prevalence of smoking 3-fold higher than Asians; Hispanics were less likely to smoke than non-Hispanic Whites or Blacks. Men were more likely to smoke than women, and patients on the HIV or internal medicine/family practice services had a higher prevalence of smoking compared to patients on the surgery service (Table 1).

The proportion of current smokers who were moderate to heavy smokers was similar between patients with no-risk or low-risk substance use and those who had at-risk substance use without dependence (32% versus 34%, respectively); however, current smokers who were substance-dependent were 40% more likely to be moderate to heavy smokers (48%) (prevalence ratio [PR]: 1.4, 95% confidence interval [CI]: 1.1 to 1.9).

Concurrent Tobacco and Substance Use

Compared to patients who reported low-risk substance use, patients with at-risk substance use had a dramatically higher prevalence of smoking (Table 2). In addition, there was a significant increase in the likelihood of smoking across the 3 levels of substance use and the number of substances used (Table 2).

Willingness to Quit

Most patients (61%) who smoked were willing to immediately quit smoking. After adjusting for

other demographic confounders, non-Hispanic Blacks and the elderly (age > 65) were more willing to quit ($P < 0.05$, data not shown). The substance use risk categories of low risk, at-risk, and dependence were not associated with willingness to quit tobacco (Fig. 1, left panel).

Regardless of substance use category, most patients were ready to change their substance use behavior (Fig. 1). Those patients who were ready to change their substance use behavior, regardless of whether they were substance-dependent, were significantly more likely to report a willingness to quit smoking than those who were not ready to change (Fig. 1, right panel). In fact, at-risk substance users without dependence who were ready to change their substance use were more willing to quit smoking than patients without at-risk substance use (72% versus 64%; $P < 0.05$).

DISCUSSION

Among hospital patients, we found a 46% absolute increase in the prevalence of smoking among those who used illicit substances or alcohol above NIAAA guidelines compared to those who did not report such use. The prevalence of smoking increased across the spectrum of substance use, being highest for patients who met criteria for dependence. Also, patients who were substance dependent were more likely to be moderate to heavy smokers, suggesting an association between alcohol or other drug dependence disorders and nicotine dependence. Regardless of their patterns of substance use, most patients expressed a desire to immediately quit smoking and there was a strong association between willingness to quit smoking and readiness to reduce substance use.

In our hospital population, the prevalence of smoking among patients who use illicit drugs or at-risk quantities of alcohol far exceeds estimates obtained from population-based surveys. In addition to the relatively high prevalence of smoking, focusing attention on hospital patients who use substances is important for several other reasons. Individuals who use substances are less likely to receive health care from a primary care physician.²⁸ Also, most patients who have substance use disorders do not enter treatment programs,¹ even after hospitalization.²⁹ Further, hospitals provide a setting that facilitates change; patients are temporarily required to stop smoking, and often they are available for relatively long counseling

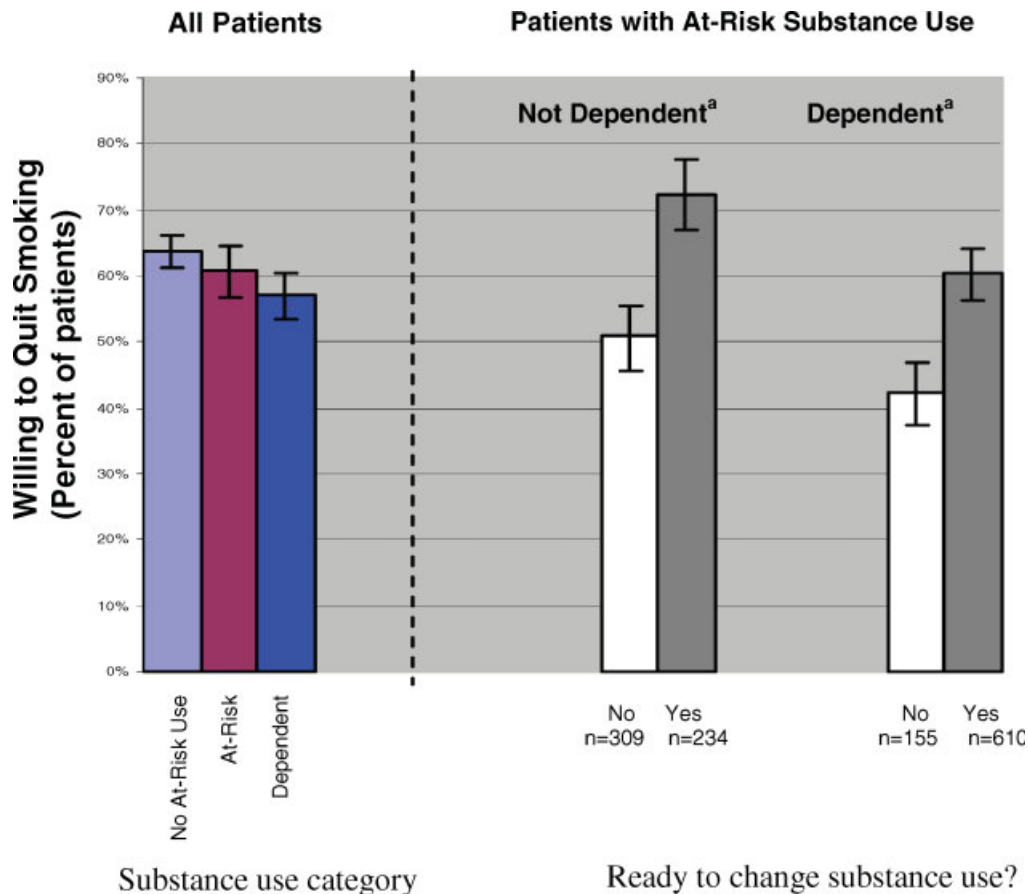


FIGURE 1. Willingness to quit smoking by patients' substance use history. Error bars indicate 95% CI. *Result of statistical tests comparing willingness to quit smoking among patients who expressed a readiness to change substance use versus those who were not, $P < 0.001$ for patients with and without substance dependence.

sessions. Finally, for patients without substance use disorders, hospital-based smoking cessation intervention programs have been proven to be successful in several randomized controlled trials.^{10,30}

Because alcohol and drug use are so common among hospitalized smokers, it is unfortunate that there is little evidence from clinical trials to inform intervention strategies for patients with concurrent use. The clinical trials that form the evidence base for intervention among hospitalized smokers¹⁰ either have explicitly excluded patients who reported substance use,^{10,15,31–33} did not assess baseline substance use,^{34,35} or were underpowered to perform subgroup analyses on this population.³⁶ Awaiting better evidence, we have chosen to routinely screen hospital patients for tobacco, alcohol, and drug use. For treatment strategies,

we extrapolate the findings from successful interventions in the ambulatory setting³⁷ or among hospital patients who do not use substances to our population. We offer smoking cessation interventions to patients regardless of other substance use.

Understanding the similarities and differences between smokers who use substances and those who do not is important in implementing successful strategies for smoking cessation. Rather than a step-wise increase in heaviness of smoking across substance use categories (ie, no-risk or low-risk use, at-risk use without dependence, and substance dependence), we found an increased heaviness of smoking only among substance-dependent smokers; there was no difference in heaviness of smoking between those with at-risk use without dependence and those with no-risk or low-risk

use. Because interventions for patients who have nicotine dependence are more likely to succeed when pharmacotherapy is offered as an adjunct to behavior therapy,³⁸ smokers who also are substance-dependent likely will benefit from the addition of pharmacotherapy. One similarity is that all patients, regardless of substance use category, were willing to quit smoking. In fact, hospitalized smokers who were ready to change at-risk substance use were more willing to quit smoking than patients who had no-risk or low-risk substance use. Previous investigators have found that smokers who use substances have fewer quit attempts,³⁹ higher nicotine dependence,^{37,39} and lower enrollment in smoking cessation interventions.³⁸

Our study only includes data from patients at 2 public hospitals; therefore, our findings may not generalize to populations of higher socioeconomic status. Also, our smoking screening tool had relatively low sensitivity for categorizing current smokers as moderate to heavy smokers; therefore, we may have underestimated the number of moderate to heavy smokers.^{5,22} Further, given our cross-sectional study design, we were unable to evaluate whether patients who have at-risk substance use remain willing to quit smoking after hospital discharge or to the effectiveness of our smoking cessation program. Finally, socially desirable responses may have caused patients to overstate their willingness to quit tobacco and readiness to change substance use. Additional research is needed to determine whether post-hospitalization quit rates are similar between smokers with and without at-risk substance use, and the optimal timing for smoking cessation interventions in relation to substance dependence treatment.⁴⁰

Hospital patients who have substance use disorders are also highly likely to smoke, and these patients express a willingness to quit smoking. Given the frequency of concurrent smoking and other substance misuse and patients' desire to change both behaviors, there is a role for coordination of substance use and smoking cessation intervention programs.

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