Alcohol Use and Adherence to Prescribed Therapy Among Under-Served Latino and African-American Patients Using Emergency Department Services

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Non-adherence to prescribed therapy is a factor that results in many patients attending emergency departments. However, increasingly, we recognize that patients who seek health care from inner-city emergency departments are among those experiencing health disparities. For these marginalized patients, emergency departments can play an important role in complementing the process of individualized care to achieve successful health outcomes. Research that examines socio-psychological characteristics and correlates of healthcare utilization of emergency department service users among under-served minority patients is needed for redirecting appropriate care among this segment of our population.

Objective: This study examines the prevalence and correlates of adherence to prescribed therapy among patients presenting to an inner-city emergency department for a medical emergency or trauma injury. Specific attention is paid to the role of alcohol.

Method: A cross-sectional face-to-face survey was conducted among a consecutive sample of 412 Hispanic and African Americans aged 18 years and older who sought care at an inner-city emergency department facility.

Results: Among patients who use medication (*N*=145), 32% reported low adherence. More than 24% scored positive for alcohol problems based on the Alcohol Use Disorders Identification Test (AUDIT). Results of multivariate regression analysis showed that those emergency department patients who: 1) identified themselves as Hispanic, 2) reported excessive use of alcohol, 3) reported a higher number of depressive symptoms, and 4) reported a higher number of alcohol related consequences were less likely to adhere to prescribed therapy.

Conclusion: Future investigation regarding factors related to adherence to prescribed medication among emergency department patients should take into consideration the role of alcohol and depression in this process. Further research is also needed to factor in patient's ethnicity in the context of treatment adherence. (*Ethn Dis*. 2005;15:267–275)

Key Words: Adherence, African Americans, Alcohol, Emergency Department, Latino

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Introduction

Medication regimens can be complex and may need close follow-up. Patient adherence to prescribed therapy is rarely more than 60%. This figure comes from studies on HIV, child and adult asthma, diabetes, hypertension, and post myocardial infarction care.[1] Lower socioeconomic and minority populations often have greater barriers to adherence, which may hinder efforts at improving care and outcomes. Non-adherence to drug regimens leads many of these patients to seek care from inner-city emergency departments (EDs).[2–6] Because lower socioeconomic and minority groups generally have greater burdens of chronic disease, less vigorous treatment, and poorer disease outcomes,[7–9] efforts to improve adherence should focus on such populations.[10] A review of the literature reveals that current methods of improving medication adherence are mostly complex, labor-intensive, and not predictably effective.[11] The full benefits of medications cannot be realized at currently achievable levels of adherence; therefore, more studies of innovative approaches to assist patients in following prescriptions for medications are needed.[11]

Diagnosing non-adherence to medication could be a challenging effort. Many theoretical models have been proposed to recognize the determinants of non-adherence, and numerous factors have been identified. Many of these studies targeted treatment adherence among patients with narrow or wide ranges of health disorders in order to identify methods to improve adherence. Substance abuse, including alcohol consumption as a risk factor for poor adherence, has been the subject of previous research including studies among patients with hypertension,[12–15] diabetes,[15–17] psychiatric disorders,[18–21] asthma,[18,22–24] and those with other conditions including HIV.[25–28]

To date, there have been limited studies examining the prevalence of medication/treatment adherence in an ED setting.[5,29–31] Specifically, examining the role of alcohol in medication or treatment adherence among inner-city hospital ED patients, who often lack a regular source of care and are frequent users of ED services is lacking.[32] Examining the role of excessive drinking and adherence to prescribed therapy among these patients is significant since EDs have reported high case rates of alcohol problems.[33–35] Several studies conducted in the United States. and abroad have estimated that 10% to 40% of patients who present to emergency rooms have detectable amounts of alcohol in their blood or on their breath.[36–38] Alcohol consumption plays a role in approximately 30% of motor vehicle accidents, between 40% and 56% of falls, and 56% of assaults. In addition, 50% of trauma patients were injured while under the influence of alcohol.[39–42] Therefore, a disproportionate amount of healthcare resources, especially in EDs, are used by patients who misuse alcohol.[43]

Identification of patients who abuse alcohol,who are more likely to seek access to care within an ED setting, as a risk factor for non-adherence could be

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Patient adherence to prescribed therapy is rarely more than 60%.

an initial step toward designing effective interventions. Furthermore, recognizing factors that can influence adherence to prescribed therapy among ED patients can guide and create a therapy regimen between ED doctors and patients that is compatible with the patient's goals and concerns.[44] The main objective of this study is to determine the prevalence and correlates of adherence to prescribed therapy, with special emphasis on the role of alcohol use on adherence to prescribed therapy among patients presenting to an inner-city ED for a medical emergency or trauma.

METHOD

Study Design, Setting, and Population

A cross-sectional study was performed at the MLK/Drew Medical Center Emergency Department, a large inner-city teaching hospital with approximately 65,000 adult visits annually. The Medical Center is the primary safety net provider of health services for many of the surrounding 1.7 million predominately Hispanic (59%) and African-American (28%) residents, who are economically disadvantaged and medically under-served. Patients were considered eligible for the study if they were 18 years of age or older, and were in the ED to receive medical care. Patients were considered ineligible for the study if they showed any sign of cognitive impairment, if they spoke a language other than English or Spanish, or if they were in police custody. Patients who required immediate medical attention as determined by the attending doctor were approached to participate in the study following their treatment. Interviewers delayed their work with sampled patients who showed signs of intoxication. To assess comprehension of the study, all subjects, prior to signing the consent form, were asked to fill out an "Evaluation Form to Sign a Consent Form," which asked patients several questions about the nature of the study. Patients who could not provide correct answers were provided with more information and/or time to become more informed/alert about the study. Patients who gave written informed consent to participate were included. Hispanic respondents were given a choice of being interviewed in English or in Spanish. The Spanish version of the questionnaire underwent a process of translation and independent back-translation. Sampling of the patients took place in the triage area of the ED on a 24-hour basis for a five week period from March to April of 2001. Interviewers used ED computerized logs to select their sample. This log reflected consecutive patients who arrived and registered in the ED triage area. This list was continuously generated and updated. Every other consecutive patient was selected as a potential candidate to participate in this face-to-face interview. The ED in which this study was conducted is considered one the busiest in California. The selection of every other patient versus every patient prevented the research assistants from being overloaded with interviews. This study was approved by the Charles R. Drew University of Medicine and Science Institution Review Board (IRB).

Study Protocol

Six bilingual interviewers, trained extensively in interviewing techniques, administered the study interviews. Field supervisors conducted the following for field quality procedures: 1) checking the patient log to ensure precision and reliability of selection procedure; and 2) editing the completed interviews for rapid detection of missing data and unclear responses. Field supervisors and the study investigators conferred frequently to resolve disputes regarding incomplete interviews. Interviewers approached patients to participate in the study using a uniform script.

Measures

Adherence

Patient adherence to prescribed medication/treatment during the last three months was measured using six items on a Likert scale (1 strongly agree to 4 strongly disagree), with the response ranging from 6 to 24. Items include: 1) you had a hard time taking the medication(s) as often as prescribed; 2) you had a hard time taking the medication(s) for as long as it was prescribed; 3) you followed your healthcare provider's suggestions exactly; 4) you were able to follow your healthcare provider's recommendation for treatment; 5) you had a hard time following your providers' recommendation for follow-ups; and 6) you found it easy to do the things your healthcare provider suggested you to do. After adjusting for reverse items, each item was dichotomized. If a subject's response included either a 3 = disagree or 4 = strongly disagree, then the new variable was set to 1 = medication adherence, and 0 = medication non-adherence. The sum score of the recoded items was calculated from 0 to 6, with higher values representing more adherence to medications. The Cronbach alpha reliability of this composite indicator for our sample was 0.71 and considered acceptable. Cronbach's alpha coefficient is the proportion of a scale's total variance that is attributable to a latent variable underlying the items (eg, adherence to medications). Acceptable coefficient alpha is between 0.7 and 0.9: an alpha that is too low signifies low homogeneity among items, whereas a very high coefficient alpha reflects redundancy.[45]

Alcohol Use

Alcohol Use Disorders Identification Test (AUDIT) was developed by the

World Health Organization and has been widely used nationally and internationally.[46] It is a 10-item questionnaire (see Appendix A) that includes assessments of frequency and intensity of drinking (first 3 items), alcohol dependence (items 4–6), harmful alcohol consumption (items 7–10), as well as overall consumption (with the score range 0–40). AUDIT was developed with the aim of early identification of hazardous/at-risk drinkers rather than of diagnosed alcoholics, and has the following psychometric properties (sensitivity 92% and specificity 93%).[46–48] Although studies have often used an AUDIT score ≥8[46] as the threshold for hazardous/at-risk drinking, lower thresholds increase the sensitivity of the screen.[49–50] A lower threshold is appropriate for this study given that the aim was to identify uncomplicated cases of at-risk drinking, and sensitivity is a more central concern than specificity.[51,52] Therefore, a score of ≥7 out of a possible 40 was considered at-risk drinking in this study.

Drinking Consequences

Those who report alcohol problems often experience a variety of negative consequences related to their drinking behaviors. Adverse drinking consequences were measured using the Short Index of Problem (SIP), which is a shorter version of the 50-item Drinker Inventory of Consequences (DrInC).[53] The SIP, which is a 21-item binary scale, was used to measure negative consequences of problem drinking in five areas related to interpersonal, physical, social, impulsive, and intrapersonal behaviors. Respondents were asked to check all the consequences they experienced during the last 12 months. For this study, higher scores on the scale represent higher levels of negative drinking consequences. The alpha reliability of this composite indicator for our sample was .94.

Current Tobacco Use

Current tobacco use was derived from the following question: "From the list of tobacco products (ie, cigarettes, bidis, cigars, blunts, chewing tobacco, clove cigarettes, snuff, other) which one have you used during the last seven days and during the last 30 days." We computed the sum score variables of all the items to which the patient responded "Yes" and developed a binary variable. Those who stated no tobacco use received a score of 0, and those who used one or more tobacco products in the last 30 or 7 days scored 1.

Depression

This was measured using the Center for Epidemiologic Studies Depression Scale (CES-D).[54] This scale measures the current (last seven days) level of depressive symptomatology and its reliability and validity has been tested in the general population (coefficient alpha=.80). The final score was constructed from a list of 20 items referring to the ways respondents might have felt or behaved during the past week. Response to each item was scored from 0 to 3 based on frequency of occurrence of the symptom ("rarely"=0; "most of the time"=3) with the possible range of 3 to 60. A response for each item was summed and a mean value calculated. Respondents with the overall sum less than the mean ≤16 were set as the reference group and being at low-risk of depression=0, and respondents whose overall sum values were more than the mean ≥16 were set to represent the high-risk group for depression=1.

Socio-demographics

This included age, gender, education, and ethnicity. Gender was dichotomized with 0 assigned to female and 1 to male. Ethnicity was assessed by asking the respondents to self-identify their own ethnicity in a number of categories, including Black or African American, and Latino, Mexican, Mexican-American, Chicano, or of other Spanish heritage. Using a dummy code, 0 was assigned to African Americans and 1 to Latino subjects.

Data Analysis

In addition to the descriptive analysis of data at the bivariate level (depending on the measurement of independent variables), a chi-square test, Pearson correlation coefficient, Student *t* test, and a one-way analysis of variance (ANOVA) were performed. At the multivariate level, multiple-regression was used to document the independent impact of each of the predictors in the equation. A diagnostic test was performed to assess for multicollinearity among the independent variables. In addition, diagnostic tests were performed to evaluate goodness of fit and normality of the dependent variable as required in linear regression. All analyses were performed using a standard statistical software program (SPSS, Version 11, SPSS, Inc., Chicago, Ill).

RESULTS

Six bilingual research associates contacted 579 eligible patients. Of these, 412 agreed to participate representing a 71% completion rate which approximates those of previous ED alcohol studies. Non-response was mainly due to refusal (23%), and some of the reasons for refusal included patients complaining of discomfort, hearing problems, and situational conditions interfering with the patient's ability to talk. No difference was found in gender, ethnicity, or age between the interviewed and non-interviewed. The study sample consisted of 191 African Americans and 204 Hispanics. African Americans and Hispanics had similar response rates of 68%, and 72%, respectively. Among participants, 41% were female and the mean age of the sample was 38 years. Participants were almost equally divided between having less than a high school diploma (50.2%), and having a high school diploma or more years of education (49.7%). Most participants (61%) were single, separated, divorced, or widowed.

Table 1. Frequency of drinking in the overall sample (*N*=412)

Alcohol Consumption	*N*	%
Non-drinker (at all)	48	11.7
Drank previously	364	88.3
Drank in the last 12 months	188	51.6
Drank in the last 3 months	163	44.7
Drank within the 6 hrs before the ER admission	42	11.5
AUDIT score		
6 and higher	121	33.24
7 and higher	108	29.67
8 and higher	96	26.37

Table 2. Characteristics of the sample who reported taking prescribed medication (*N*=145)

Variables	*N* (%)	Adherence (0–6) *N* (%)
Age	Mean=45 (SD=14.3)	
18–29	29 (20.1)	21 (72.4)
30–39	19 (13.2)	13 (68.4)
40–49	38 (26.4)	27 (71.1)
50–59	35 (24.3)	20 (57.1)
65 and older	23 (16.0)	17 (73.9)
Gender		
Female	68 (46.9)	44 (65.7)
Male	77 (53.1)	54 (70.1)
Ethnicity		
Latino	66 (45.5)	39 (60.0)*
African American	79 (54.5)	59 (74.7)
Education		
<High school	73 (50.3)	44 (61.1)
≥High school	72 (49.7)	54 (75.0)
Smoking		
Not a current tobacco user	85 (58.6)	66 (74.2)*
Current tobacco user	60 (41.4)	32 (58.2)
Medical condition	Mean=3.11 (SD=2.8)	
0–1	47 (32.6)	35 (74.5)
2–3	54 (37.5)	36 (66.7)
4 or more	44 (29.9)	27 (62.8)
AUDIT		
<8=not at-risk and non-drinkers	112 (77.8)	81 (72.3)*
≥8=at-risk	32 (22.2)	17 (53.1)
Depression score (CES-D)	16.0 (SD=13.6)	
<16=low	68 (46.9)	53 (79.1)†
≥16=high	77 (53.1)	45 (58.4)
Perception of drinking consequences (#)	Mean=2.8 (SD=5.4)	
0–3	116 (80.6)	75 (75.0)†
4 or more	28 (19.4)	13 (46.4)
Medication adherence score	Mean=3.82 (SD=1.31)	
0–3 (low)	47 (32.3)	NA
4 (average)	42 (28.9)	
5–6 (high)	56 (38.5)	

* $P<.05$.
† $P<.01$.
SD=standard deviation.

Table 1 shows that of the overall sample population (N=412), 88% (n=364), had previously drunk alcohol. Of those, one out of two (51.6%, n=188) reported drinking in the last 12 months, four out of 10 (44.7%, n=163) reported drinking during the last three months, and one out of 10 (11.5%, n=42) reported drinking within six hours of the event that led to the ED visit. Approximately 12% (n=48) of the sample reported that they abstain from drinking. Of 364 participants who had previously drunk alcohol, more than 26% scored positive for being potentially hazardous/at-risk drinkers (≥8) based on the Alcohol Use Disorders Identification Test (AUDIT).

Because we were interested in knowing the relationship between alcohol misuse and adherence to prescribed therapy, we excluded subjects who reported not taking any medications during the three months before the interview. Among medication users, (145/412=35.2%), >32% reported low adherence (scores of 3 or less out of the possible 6) as shown in Table 2. Table 2 also presents the relevant characteristics of subjects. The mean age of this sample was 44.9 years, with men (53.1%), African American (54.5%), and those with less than high school diploma (50.3%) making up slightly more than half of the respondents. This table is illustrative of a sample in which >40% used one or more tobacco products. One out of four patients who reported drinking scored positive for hazardous/at-risk drinking based on the AUDIT screening tool (≥8) This sample of ED patients reported experiencing nearly three (2.8) negative consequences as a result of drinking/alcohol problems.

At the bivariate level, six independent variables were related to the adherence variable. Specifically, those: 1) reported a lower level of education, 2) currently smoked, 3) identified themselves as Latino (compared with African Americans), 4) had a higher level of de-

Table 3. Linear multiple regression analysis for adherence with drug regimens among ER patients

Independent Variable	Model 1		Model 2	
	β	t	β	T
Gender (male)	−0.03	−0.37	−0.03	−0.03
Age	−0.01	−0.07	−0.01	−0.05
Ethnicity (Latino)	−0.17	−2.00*	−0.18	−2.01*
Education	0.07	0.54	0.06	0.56
Number of medical conditions	−0.08	−0.89	−0.09	−1.09
Depression	−0.22	−2.10*	−0.26	−2.60*
Current smoking behavior (yes)	−0.13	−1.43	−0.10	−1.06
Alcohol consumption (AUDIT)	N/A	N/A	0.20	2.60*
Perception of drinking consequences	−0.23	−2.81*	N/A	N/A
Adjusted R^2	18%		17%	
	F=3.9; *df* (8; 135)		F=3.7; *df* (8; 135)	

Notes: Model 1 excludes AUDIT from analysis, whereas, model 2 excludes drinking consequences to avoid multicollinearity. Code one were assigned to male, Latino, current smokers, and AUDIT >7, whereas, zero were assigned to female, African Americans, non-smokers, and non-drinkers/AUDIT score less than 8. Beta are standardized coefficients.

N/A=not applicable.

* $P<.05$.

pression, 5) reported a higher number of negative consequences of drinking, and 6) scored positive on the AUDIT, demonstrated a higher rate of non-adherence with prescribed therapy. The result of the multivariate analysis of our data is shown in Table 3. A diagnostic test assessed multicollinearity among two of the independent variables (alcohol consumption and perception of consequences of alcohol use, $r=0.79$). Therefore, two models were formed. Both models are identical, except that one model excludes the AUDIT score from the lists of independent variables and the second one excludes the perception of drinking consequences. The results of the multiple regression analysis, presented in Table 3, show that the level of depression, perception of drinking consequences, alcohol problem (AUDIT score), and ethnicity are independently related to adherence to prescribed therapy among our sample of ED patients who reported consuming any prescription medications. Those who were diagnosed with a higher level of alcohol problem (as indicated by AUDIT scores), those who identified with a higher level of depression (as indicated by CES-D scores), those who scored higher on the harmful consequences of drinking scale (as measured with SIP), as well as Latino participants (compared with African Americans) were less likely to report a higher level of adherence to prescribed therapy (Table 3). The results of the multivariate analysis indicate that two of the independent variables, current smoking status and level of education, that showed a significant association with the level of adherence at the bi-variate analysis, lost their significance when other independent variables were included in the multivariate analysis (Table 3). Further analysis of this data shows that depression subsumed the variance shared by education and adherence, whereas the smoking status lost its significance due to variance shared with the AUDIT score and drinking consequences. The beneficial impact of the higher level of education on adherence with prescribed therapy disappears when a person suffers from depression. Similarly, the detrimental negative impact of smoking is taken over with harmful impact of excessive alcohol consumption. The association between ethnicity and level of adherence with medical regimens is weakened in multivariate analysis with the introduction of other variables, particularly with education. A higher rate of non-adherence is found among less-educated patients; however, Latinos are more likely to report a lower level of education than their African-American counterparts.

DISCUSSION

Increasingly, patients who present to inner-city EDs to receive health care are recognized to be among those experiencing disproportionately adverse health outcome.[32,55] Yet, with new data for these marginalized patients, EDs can play an important role to complement the process of individualized care for achieving successful health outcomes. The present study sought to assess the prevalence of prescribed therapy and provide an examination of the variables that might predict adherence behavior of ED patients in an inner-city ED. We investigated the relationship of adherence to prescribed therapy and at-risk alcohol use while considering the impact of psychosocial and demographic factors. Our findings detected a high level of non-adherence among this sample of patients with slightly >32% of the sample reporting a low score on adherence scale, nearly 29% reporting an average score, and 38.5% reporting a high score. Furthermore, our findings reveal that factors in an ED patient's life that could influence adherence to pre-

Our findings detected a high level of non-adherence among this sample of patients with slightly >32% of the sample reporting a low score on adherence scale

scribed therapy include cultural background and co-morbidities such as depression and alcohol use. If we assume patients using the ED are more likely to visit the ED based on a nondiscretionary basis, one expects higher levels of adherence among these patients. On the other hand, if ED services are used by these patients because of a lack of regular care, reasons for low adherence need to be further investigated.

About 45% of this sample was Latino, and we detected a significant association between ethnicity and adherence even after all other related variables were held constant. Latino participants, (compared with African Americans) in this sample of ED patients, were less likely to report optimal adherence. Demographics such as race and ethnicity, as part of patient-based factors, often have been included in every analysis of adherence. However, we could not find any ED studies with which to compare our findings, but other studies exist where investigators examined the impact of ethnicity on adherence among other patients. In one study, African Americans were more likely to report worse adherence to taking antiretroviral medication.[56] Consistent with our findings, another recent study comparing Latino and African-American diabetic patients in an inner-city under-served area reported worse adherence to diabetes regimens among Latino patients compared with African Americans.[17] However, studies have reported a lack of association between ethnicity and adherence to medication among HIV positive patients.[57–59]

Patient-based factors, such as ethnicity, imply cultural aspects of the patients' health beliefs, values, and behaviors and must be considered an influential factor in the context of treatment adherence for ED patients, which may imply that standardized care protocol may not be justified for all ethnic groups. Intervention programs that target adherence should consider ethnicity an identifier of certain populations that may have specific needs and barriers, and not necessarily as a predictor of adherence. For example, the impact of access to healthcare services by patients who encounter language barriers is another factor that needs special attention among Latino and other non-English speaking patients.[60,61] Sarver and Baker conducted a cohort study among patients of a public hospital emergency department that reported that language barriers may decrease the likelihood that a patient is given a follow-up appointment after an emergency department visit.[62] Clearly, efforts to foster culturally sensitive and appropriate care are especially critical in monolingual minority populations. As articulated by Anderson and Funnell,[63] the goal should be to help educate, motivate, and empower patients to improve their self-care skills and take control of their disease, rather than simply foster adherence to prescribed medications.

When we examined the relationship between the AUDIT and adherence in both bivariate and multivariate analyses, a significant relationship was detected. Studies that have examined the role of alcohol in medication/treatment adherence among ED patients are limited. Our findings regarding the role of alcohol at this level support the findings of Dobscha and others[29] who examined the adherence behaviors of a sample of Veterans Affairs psychiatric emergency room patients and reported that at 12 weeks, the diagnosis of substance abuse was associated with lower adherence. As previously described, determining the role of alcohol in medication/treatment adherence among county/inner-city EDs is lacking. The role of alcohol in medication and treatment adherence has been studied in other settings targeting HIV and AIDS patients,[21,25,27,28] patients with psychiatric ailments,[64] minority under-served diabetic patients[17] and elderly patients,[65] just to mention a few.

One recent cross-sectional sampling of 392 consecutive African-American and Hispanic diabetic subjects who were screened for alcohol consumption during routine visits to their primary care physicians in seven inner-city out-patient clinics, documented that drinking is associated with poorer adherence to prescribed dietary recommendations for the consumption of fiber, fat, and sweets and adherence with oral medications.[17] Tucker and colleagues conducted a national survey of HIV-positive adults, which reported that compared with patients who did not drink, those who were moderate, heavy, or frequent heavy drinkers were more likely to be non-adherent.[21] In addressing the challenges of adherence, Bartlett reported that depression and substance use is often detected as a barrier to successful treatment of HIV infection and disease.[28] Alcohol was also detected to cause drug interaction in an elderly sample.[65]

On average, respondents in this study reported experiencing nearly three negative consequences related to their drinking, and the SIP score maintained its predictive power in both bivariate and multivariate analyses. The ED patients who reported a higher number of negative consequences due to their drinking were more likely to be among the low adherence group. Negative consequences of drinking have predominately been more prevalent among men.[66] Assuming non-adherence as a proxy measure for negative drinking consequences, male respondents in our sample of ED patients were more likely to be non-adherent. Subsequent data analysis (not shown here) revealed a sta-

tistically significant relationship at a bivariate level ($P=<.023$) between gender and drinking consequences. Male respondents were more likely to report a higher number of negative consequences of drinking. Further analysis also revealed a statistically significant relationship between gender and each item in the SIP. Male respondents were more likely to experience negative consequences of drinking along all 21 items in the SIP (data not shown). Our findings support the gap that has persisted between men's and women's alcohol-related consequences among ED patients. Further studies are needed to examine gender roles, drinking consequences, and adherence in order to understand the extent of men's alcohol-related problems. In this process, the role of psychoactive substances and the number of medications that could facilitate or magnify the hazards of drinking should be considered.[66]

Depressive disorders are prevalent, and due to their disabling, chronic nature can manifest in ways that affect adherence to medication and can pose a significant public health issue.[67] In this sample of ED patients, 53% of respondents scored higher than 16 on the depression scale (Table 2). Our findings also revealed that in bivariate, as well as multivariate analyses, depressed ED patients were less likely to score high on adherence. Indeed, our data revealed a statistically significant bivariate relationship ($P=.05$) between measures of alcohol problems and depression, and 68% of the patients who reported a higher number of depression symptoms (scored 16 and above on the CES-D) reported visiting the ED more than once in the past 12 months. Several other studies that had been conducted in settings other than the ED also suggest that depression might have a ubiquitous effect.[21,59,67–71]

Several limitations to the study should be considered. First, interpretation of the findings is limited by the cross-sectional nature of the study. The findings are useful, however, as an approximation of prevalence, determinants of non-adherence, and the inner-city ED population experience. Second, a number of other variables could have impacted the results of this study, but they were not specifically measured. Such variables include the number of medications taken by the patient and the possession of a regular primary care provider. However, this study includes the number of medical conditions as a proxy variable for the number of medications used. Another limitation is the self-report nature of the study, which mostly relies on recall of the respondents and is therefore subject to error. However, to minimize the error of recall, we asked participants to report their adherence behavior within a three-month period prior to the interviews.

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Appendix A. List of AUDIT items

1) How often do you have a drink containing alcohol?

Never	Monthly	2 to 4 times/month	2 to 3 times/wk	≥4 times/wk
(0)	(1)	(2)	(3)	(4)

2) How many drinks containing alcohol do you have on a typical day when you are drinking?

0, 1 or 2	3 or 4	5 or 6	7 or 8	10 or more
(0)	(1)	(2)	(3)	(4)

3) How often do you have 6 (for men)/4 (for women) or more drinks on one occasion?

Never	Less than monthly	Monthly	Weekly	Daily or almost daily
(0)	(1)	(2)	(3)	(4)

4) How often during the last three months have you found that you were not able to stop drinking once you started?

Never	Less than monthly	Monthly	Weekly	Daily or almost daily
(0)	(1)	(2)	(3)	(4)

5) How often during the last three months have you failed to do what was normally expected from you because of drinking?

Never	Less than monthly	Monthly	Weekly	Daily or almost daily
(0)	(1)	(2)	(3)	(4)

6) How often during the last three months have you needed a first drink in the morning to get yourself going after a heavy drinking session?

Never	Less than monthly	Monthly	Weekly	Daily or almost daily
(0)	(1)	(2)	(3)	(4)

7) How often during the last three months have you had a feeling of guilt or remorse after drinking?

Never	Less than monthly	Monthly	Weekly	Daily or almost daily
(0)	(1)	(2)	(3)	(4)

8) How often during the last three months have you been unable to remember what happened the night before because you have been drinking?

Never	Less than monthly	Monthly	Weekly	Daily or almost daily
(0)	(1)	(2)	(3)	(4)

9) Have you or someone else been injured as a result of your drinking?

No	Yes
(0)	(4)

10) Has a relative or a friend or a doctor or other health worker been concerned about your drinking or suggested you cut down?

No	Yes
(0)	(4)