Available online at www.sciencedirect.com
ScienceDirect
Drug and Alcohol Dependence 95 (2008) 37–44
DRUG and ALCOHOL DEPENDENCE
www.elsevier.com/locate/drugalcdep

HIV-positive patients' discussion of alcohol use with their HIV primary care providers

Lisa R. Metsch[a,*], Margaret Pereyra[a], Grant Colfax[b], Carol Dawson-Rose[c], Gabriel Cardenas[a], David McKirnan[d], Dogan Eroglu[e]

[a] *Department of Epidemiology and Public Health, Miller School of Medicine, University of Miami, Miami, FL, United States*
[b] *HIV Epidemiology Section, San Francisco Department of Health, United States*
[c] *Center for AIDS Prevention, University of California at San Francisco, San Francisco, CA, United States*
[d] *University of Illinois at Chicago, IL, United States*
[e] *Division of HIV/AIDS Prevention, National Center for HIV, STD, and TB Prevention, Centers for Disease Control and Prevention, Atlanta, GA, United States*

Received 10 September 2007; received in revised form 29 November 2007; accepted 4 December 2007
Available online 19 February 2008

Abstract

Objectives: We investigated the prevalence of HIV-positive patients discussing alcohol use with their HIV primary care providers and factors associated with these discussions.
Methods: We recruited 1225 adult participants from 10 HIV care clinics in three large US cities from May 2004 to 2005. Multivariate logistic regression analysis was used to assess the associations between self-reported rates of discussion of alcohol use with HIV primary care providers in the past 12 months and the CAGE screening measure of problem drinking and sociodemographic variables.
Results: Thirty-five percent of participants reported discussion of alcohol use with their primary care providers. The odds of reporting discussion of alcohol were three times greater for problem drinkers than for non-drinkers, but only 52% of problem drinkers reported such a discussion in the prior 12 months. Sociodemographic factors associated with discussion of alcohol use (after controlling for problem drinking) were being younger than 40, male, being non-white Hispanic (compared with being Hispanic), being in poorer health, and having a better patient–provider relationship.
Conclusions: Efforts are needed to increase the focus on alcohol use in the HIV primary care setting, especially with problem drinkers. Interventions addressing provider training or brief interventions that address alcohol use by HIV-positive patients in the HIV primary care setting should be considered as possible approaches to address this issue.
© 2007 Elsevier Ireland Ltd. All rights reserved.

Keywords: HIV; HIV primary care; Providers; Alcohol use

1. Introduction

Alcohol consumption is common among persons living with HIV (Galvan et al., 2002) and raises several health concerns (Braithwaite et al., 2007; Conigliaro et al., 2006). Alcohol consumption by HIV-positive persons has been associated with lower utilization of antiretroviral treatment (Chander et al., 2006; Gordon et al., 2006), lower utilization of outpatient care (Cunningham et al., 2006) and poorer adherence to antiretroviral treatment (Braithwaite et al., 2005; Chander et al., 2006; Cook et al., 2001; Golin et al., 2002; Halkitis et al., 2003; Howard et al., 2002; Lucas et al., 2002; Rothlind et al., 2005; Samet et al., 2004; Tucker et al., 2003; Wagner et al., 2001). Alcohol also has a negative interactive effect with antiretroviral treatment (e.g., Kresina et al., 2002). Use of alcohol by persons infected with HIV is a risk factor for liver disease, especially for persons co-infected with HIV and hepatitis C (Cheng et al., 2007; Sackoff et al., 2006; Salmon-Ceron et al., 2005; Shen et al., 2005). It has been suggested that there may be no level of alcohol consumption that is "safe" for persons living with HIV and taking antiretroviral treatment (Bryant, 2006). Some physicians will not start an HIV-positive patient on antiretroviral treatment if the patient is known to abuse alcohol (Bogart et al., 2000; Loughlin et al., 2004). Additionally, from a prevention perspective, although the

* Corresponding author at: Department of Epidemiology and Public Health, Clinical Research Building, 1120 NW 14th Street, Room 917, Miami, FL 33136, United States. Tel.: +1 305 243 3471.
E-mail address: Lmetsch@med.miami.edu (L.R. Metsch).

0376-8716/$ – see front matter © 2007 Elsevier Ireland Ltd. All rights reserved.
doi:10.1016/j.drugalcdep.2007.12.006

evidence on the role of alcohol in HIV transmission behavior is mixed (Vanable et al., 2004), risky sexual behavior has been shown to be associated with heavy alcohol use (Chesson et al., 2003; Colfax et al., 2004; Cook et al., 2006; Ehrenstein et al., 2004; Kalichman et al., 2002; Parsons et al., 2004; Purcell et al., 2001; Theall et al., 2006). Based on the factors cited above, it is critical to promote strategies to reduce alcohol consumption among persons living with HIV.

Previous studies have shown that provider-based interventions addressing alcohol in primary care settings are efficacious in reducing alcohol use (Bertholet et al., 2005; Fink et al., 2005; Fleming et al., 1997, 2002; Saitz et al., 2003; Whitlock et al., 2004). The HIV primary care setting may similarly present a good opportunity to prevent and treat alcohol consumption among HIV-positive patients. Past studies have focused on discussions of sexual risk behavior, medication adherence, and injection drug use behavior by HIV primary care providers with their HIV-positive patients (Fisher et al., 2006; Gerbert et al., 2006; Metsch et al., 2004; Morin et al., 2004; Richardson et al., 2004; Wilkinson et al., 2006). To date, however, there have been no published studies of efficacious interventions that address the discussion of alcohol use in the HIV primary care setting, including provider-based interventions.

Little is known about the frequency or extent of patient–provider discussions of alcohol use in the primary care setting, a necessary first step for planning interventions. There are no published studies on how frequently HIV-positive patients discuss alcohol use with their primary physicians. This dearth of information is surprising given the recent focus on prevention with positive persons and the federal recommendations for HIV providers to enhance their delivery of prevention counseling in the HIV primary care setting (Centers for Disease Control and Prevention (CDC), Health Resources and Services Administration, National Institutes of Health, & HIV Medicine Association of the Infectious Diseases Society of America, 2003). One study conducted in three Veteran's Affairs (VA) HIV clinics examined whether health care providers were aware of the excessive alcohol use of their HIV-infected patients and showed that health care providers often missed alcohol problems in patients with less severe HIV infection and those without liver disease (Conigliaro et al., 2006, 2003).

This study focuses on HIV-positive patients' discussion of alcohol use with their HIV primary care providers in three cities in the United States. First, we describe the extent of discussion regarding alcohol use between HIV primary care providers and their HIV-positive patients. Second, we examine what factors are associated with the occurrence of discussion. Third, we examine whether the factors that are associated with the occurrence of discussion vary by level of self-reported alcohol consumption of HIV-positive patients.

2. Methods

2.1. Sample

This cross-sectional analysis used baseline data collected from May 2004 through May 2005 from 1225 HIV-positive patients attending 10 HIV primary care clinics in Chicago, Miami, and San Francisco. Participants were recruited from HIV primary care clinics that served diverse patient populations, via referrals from clinic staff. Whereas HIV-positive men and women were recruited in Miami and San Francisco, only HIV-positive men were recruited in Chicago. All research activities were approved in advance by institutional review boards at the collaborating sites and the CDC.

Individuals were eligible for the study if they were at least 18 years old, confirmed to be HIV-positive via medical record reviews, and a patient at the HIV primary care clinic where they were recruited. Participants completed an audio-computer-assisted self-interview (A-CASI) in either English or Spanish to answer questions regarding sexual and alcohol and drug using behaviors, utilization of health care and other social services, mental health status, and questions about their relationship and discussions with their HIV care provider. Participants were reimbursed with a monetary incentive for their time and effort.

2.2. Measures

Measures were uniform across study sites. The dependent variable asked whether participants reported discussing alcohol use with their HIV primary care provider in the past year (yes/no). We also examined whether participants discussed alcohol use with any other provider in the HIV primary care setting in the past year.

Several factors were explored for their potential association with participants' reporting discussion of alcohol use with their HIV primary care provider. Correlates examined consisted of individual sociodemographic characteristics, drug and alcohol use history, depression, HIV-related health and management issues, and patient–provider relationship factors. Variables in these five domains were selected because previous research has shown that discussions between HIV providers and their patients on prevention and behavioral management issues is related to aspects of the specific patient–provider relationship and to psychosocial issues, such as depression, that may affect how the patient is perceived by their provider (Loughlin et al., 2004; Metsch et al., 2004).

Sociodemographic variables included age, gender (male/female), race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, other), education (high school graduate yes/no), total personal yearly income (less than $10,000, $10,001 to $20,000, more than $20,000), and currently employed (yes/no).

Depression: To assess levels of depression, nine items based on the CESD (Center for Epidemiological Studies Depression Scale (CES–D)) (Radloff, 1977) were administered and a mean score of these items was calculated ($n = 1191$, $\alpha = 0.895$). A dichotomous measure was developed to denote that three or more symptoms were experienced during three or more days in the past week versus fewer symptoms.

Self-reported drug use behavior in the past 6 months was defined as any use of each of the following drugs: crack cocaine, cocaine (powdered), methamphetamine/amphetamine, heroin, and marijuana. Binary indicators of any use (yes/no) of each drug were created. We also created a summary indicator for the use of any of these illicit drugs (yes/no). Participants were also asked about their lifetime use of injection drugs not prescribed by a physician.

Alcohol use was measured by the self-reported frequency of consumption in the past 6 months (never, less than 1 day per week, 1–2 days per week, 3–6 days per week, about everyday). The CAGE, an established and widely used alcohol-screening instrument (Ewing, 1984), was used to describe respondents who reported any alcohol use in the past 6 months. The CAGE consists of four questions: (1) Have you ever felt you should **C**ut down on your drinking? (2) Have people **A**nnoyed you by criticizing your drinking? (3) Have you ever felt bad or **G**uilty about your drinking? and (4) Have you ever had a drink first thing in the morning to steady your nerves or get rid of a hangover? (**E**ye opener). It has documented sensitivity in the range of 73–82% and specificity of approximately 90% (Buchsbaum et al., 1991). Samet et al. (2004) showed that the CAGE yielded a positive predictive value of 95% in showing lifetime diagnosis of alcohol problems in a cohort study of 141 HIV-infected participants. Respondents were categorized into three groups to describe their alcohol use: (1) *Non-drinkers*: no alcohol use in the past 6 months, (2) *non-problem drinkers*: answered "yes" to none or one question of the CAGE, or (3) *problem drinkers*: answered "yes" to two or more questions of the CAGE.

HIV-related health and management issues included diagnosed pre- or post-ART (1996) (yes/no), self-reported medication adherence, self-reported adherence to HIV clinic appointments, and self-reported general health. For

medication adherence, participants were categorized into three groups: adherent, non-adherent, and not taking medication, based on the participant's self-report. Non-adherence was defined as having missed more than one dose in the past 2 days (yes/no). Adherence to HIV primary care physician clinic appointments was measured by asking "Did you miss an appointment with your HIV primary care physician in the past year?" (yes/no). Self-reported general health was measured by the single item, "In general, how would you describe your health in the past 6 months?" Response options ranged from 1 (poor) to 5 (excellent).

Patient-provider relationship measures included time spent with provider and provider engagement. The self-reported time spent with the primary care provider during the last appointment was measured on a 5-point scale (less than 5, 5–15, 16–30, 31–60 min, and more than 60 min). Perceived provider engagement was treated as a continuous variable and measured by 13 items (Bakken et al., 2000) using a 4-point scale ranging from 1 (never) to 4 (always) and included such questions as "Your HIV care provider listens to you" and "Your HIV care provider engages you in your care" ($n = 1191$, $\alpha = 0.940$).

2.3. Statistical analysis

The aim of the analysis was to describe the associations between a set of variables, which have shown significance in previous behavior research with HIV-infected groups, and their association between participants' discussion of alcohol use with their HIV primary care provider. Associations were assessed using chi-square tests of independence for nominal-level independent variables and *t*-tests for continuous and interval-level independent variables. In multivariate logistic regression modeling, independent variables with *p*-values ≤ 0.25 in bivariate associations were included in the initial model. A parsimonious model was developed by retaining a set of demographic variables (age, gender, race/ethnicity, and education) and study site and excluding variables that exceeded $p = 0.05$ in a stepwise fashion by backward elimination. At each step, goodness of fit was assessed and coefficients and standard errors were examined for any indications of confounding by the removed variable. There were no multicollinearity problems (all variance inflation factors were less than 1.2). No important interactions were identified after examining statistical significance and contribution to model fit for all pairwise interactions.

3. Results

Of the 1225 participants, the median age was 42.6 years, 77.8% were males, 46.3% were African American, 26.2% were white, 22.5% were Hispanic, and 4.9% were of other race/ethnicity. Three quarters of the sample (74.0%) had at least a high school education, 30.5% reported being employed at the time of the interview and 54.6% had an annual income of less than $10,000. Most respondents (71.8%) reported their general health as good to excellent. Provider engagement was high with 40.2% of respondents reporting "always" to all of the 13 items assessing provider engagement. The majority of participants (73.1%) reported spending between 16 and 60 min with their HIV provider at their last primary care visit. Respondents discussed alcohol use most frequently with their primary care provider (35.3%), followed by other professionals (18.4%) and support groups (17.8%).

Over half (57.5%) of the respondents reported use of alcohol in the past 6 months with 25.3% reporting using alcohol less than 1 day per week, 18% reported 1–2 days per week, 10% reported 3–6 days per week, and 4.3% reported using alcohol about everyday in the past 6 months (data on frequency of use not shown in table). Approximately one-third of respondents (35.5%) were categorized as non-problem drinkers and 22.0% as problem drinkers according to the CAGE.

Both non-problem and problem drinkers were significantly more likely to self-report engaging in sexual risk behaviors in the 6 months preceding the study interview (data not shown in tables). Specifically, both problem and non-problem drinkers were more likely to self-report having more than two sex partners in the past 6 months (60.1% of problem drinkers vs. 54.5% of non-problems drinkers and 39.9% of non-drinkers; $p < .001$). Furthermore, problem and non-problem drinking was associated with higher reports of unprotected sex with HIV-negative and unknown status partners in the past 6 months (31.2% of problems drinkers vs. 25.7% of non-problem drinkers and 18.2% of non-drinkers; $p < .001$). Problem drinkers were also more likely to self-report having missed a primary care appointment in the past 12 months (24.9% of problem drinkers reported missing an appointment vs. 17.2% of non-problem drinkers and 15.8% of non-drinkers; $p < .01$).

Bivariate results (Table 1) show that men, those with poorer self-reported health, those who missed more than one primary care appointment in the past 12 months, and those who reported use of any illicit drug were more likely to discuss alcohol use with their provider. Rates of alcohol discussion increased from non-drinkers, to non-problem drinkers, to problem drinkers, with 52% of the latter group reporting discussion. Hispanics were the least likely to report discussion, followed by African Americans and non-Hispanic whites.

In the multivariate logistic regression model (Table 2), both non-problem and problem drinkers were more likely to discuss alcohol use with their primary care provider than non-drinkers (respective odds ratios of 2.0 and 3.3). Taking account of drinking behaviors, demographic differences were found with men and participants younger than 40 being more likely to report discussing alcohol use with their HIV providers; Hispanics (compared with non-Hispanic whites) were less likely to report discussions of alcohol use. Participants who reported better perception of engagement with their HIV provider were more likely to discuss alcohol use than those who reported less engagement. Self-reported general health was inversely related to discussion of alcohol with the primary care provider; respondents reporting better health status were less likely to discuss alcohol (the odds decrease by 0.828 for each unit on a 5-point scale). Finally, respondents in Chicago were less likely to discuss alcohol with their primary care provider than those in San Francisco (OR = 0.656) while respondents in Miami did not differ from those in San Francisco.

4. Discussion

Our study findings suggest that slightly more than one-third of HIV-positive patients in this ten clinic study conducted in three U.S. cities reported any discussion of alcohol use with their HIV primary care providers in the past year. This finding raises concern because of the documented health consequences associated with alcohol consumption and the sizeable number of persons who may have alcohol disorders. In our study, over one-fifth of the study sample was identified as problem drinkers according to the CAGE (Ewing, 1984; Samet et al., 2004). Notably and of concern from a prevention perspective, problem drinkers were

Table 1
Description of sample and discussion of alcohol with provider in the past year by selected respondent characteristics, the positive and providers in prevention (PPIP) project, Chicago, Miami, and San Francisco, 2004–2005

	Group % $N = 1225$	Provider discussed alcohol (% within group)	*n*	*p*-Value
Discussed alcohol				
Provider	35.3		1180	
Other professional	18.4		1180	
Support group	17.8		1180	
Site				
Miami	42.3	31.0	504	0.019
Chicago	26.1	37.1	307	
San Francisco	31.6	39.8	369	
Age[a]				
<40 years old	33.7	37.1	400	0.372
40 years old or older	66.3	34.5	780	
Gender[b]				
Male	77.8	36.8	901	0.017
Female	22.2	28.8	257	
Ethnicity[c]				
Hispanic	22.5	29.5	264	0.052
African American	46.3	34.9	541	
Non-Hispanic white	26.2	39.4	312	
Other	4.9	43.1	58	
Formal education[d]				
Less than high school	26.0	33.7	306	0.482
High school or more	74.0	35.9	872	
Currently employed				
Yes	30.5	36.0	364	0.755
No	69.5	36.0	816	
Total personal income[e]				
Less than $10,000	54.6	35.8	634	0.792
$10,001 to $20,000	24.3	33.9	286	
More than $20,000	21.1	36.6	246	
Self-reported general health				
Poor	5.5	50.8	63	0.008
Fair	22.7	37.7	265	
Good	33.2	36.1	393	
Very good	24.2	34.1	287	
Excellent	14.4	26.2	172	
Provider engagement				
Always responsive	40.2	36.7	480	0.440
Not always responsive	59.8	34.4	699	
Alcohol use				
Non-drinker	42.5	23.7	507	<0.001
Non-problem drinker	35.5	39.1	419	
Problem drinker	22.0	52.4	254	
Missed more than one primary care appointment in past 12 months				
No	81.7	34.0	969	0.033
Yes	18.3	41.7	211	
HIV diagnosis post-HAART (1996)				
No	49.6	32.9	584	0.080
Yes	50.4	37.8	596	
Time spent with provider in last visit[f]				
Less than 5 min	1.2	14.3	14	0.295
Between 5 and 15	17.3	31.9	204	
Between 16 and 30	47.2	35.9	555	
Between 31 and 60	25.9	36.4	310	
More than 60 min	8.3	40.0	95	

Table 1 (*Continued*)

	Group % $N = 1225$	Provider discussed alcohol (% within group)	n	p-Value
HIV medication adherence[g]				
Adherent	57.5	33.3	679	0.311
Non-adherent	13.8	37.1	159	
Not taking medicine	28.7	37.8	336	
Depression				
0–2 symptoms in past week	61.1	33.2	723	0.053
3 or more symptoms in past week	38.9	38.7	457	
Drug use in past 6 months				
Any drug use[h]				
No	47.4	29.7	555	<0.001
Yes	52.6	40.3	625	
Marijuana[f]				
No	66.1	30.1	777	<0.001
Yes	33.9	45.4	401	
Cocaine (powdered)[a]				
No	86.3	34.4	1015	0.096
Yes	13.7	41.1	163	
Crack[i]				
No	82.9	33.1	975	0.001
Yes	17.1	45.8	201	
Methamphetamine/Amphetamine[a]				
No	86.1	34.4	1014	0.097
Yes	13.9	41.1	163	
Heroin[a]				
No	95.7	35.4	1126	0.994
Yes	4.3	35.3	51	
Lifetime use of injection drugs[d]				
No	82.8	34.6	976	0.570
Yes	17.2	38.9	203	

Group % N: [a] $n = 1221$, [b] $n = 1158$, [c] $n = 1220$, [d] $n = 1223$, [e] $n = 1210$, [f] $n = 1222$, [g] $n = 1218$, [h] $n = 1224$, [i] $n = 1219$.

significantly more likely to self-report having unprotected sex with HIV-negative and unknown status partners.

It is promising to observe that the odds of reporting discussion of alcohol with their provider were 3.3 times greater for problem drinkers than for non-drinkers. However, it is disconcerting that only half (52.4%) of participants who were identified as problem drinkers by the CAGE reported discussing alcohol use with their provider. A previous study (Conigliaro et al., 2003) of HIV-positive patients recruited from three VA HIV clinics indicated that HIV providers did not recognize the alcohol problems of many of their patients with excessive alcohol use.

Demographic variables including gender, age, and race/ethnicity of the participant were shown to be associated with discussions of alcohol use between participants and their HIV providers, even after adjusting for drinking behavior. The finding that men (compared with women) were more likely to report discussing alcohol use with their HIV care provider is probably because providers may be more likely to identify men as being at risk for alcohol use and initiate the conversation. Previous research has shown that men, in general, are more likely to use alcohol than women (Naimi et al., 2003; Nolen-Hoeksema, 2004; Nolen-Hoeksema and Hilt, 2006) and are more likely to be alcohol dependent than their female counterparts (Grant et al., 2004; Harford et al., 2005). Other research has shown that women often communicate more with their providers, ask more questions than their male counterparts, and are more likely to discuss sensitive issues such as sexual risk and drug use (Metsch et al., 2004; Wilson and Kaplan, 2000). However, it may be that providers might initiate conversation around alcohol use with men but not with women and therefore this observed gender difference may not be a function of patients communicating to providers, but rather, how providers are communicating to patients.

Hispanic and older participants were less likely to have discussed alcohol use with their HIV providers. These differences might reflect that providers are aware that alcohol abuse is more common among whites (compared with Hispanics and African Americans) and younger persons (Grant et al., 2004). In a study of 881 HIV-positive veterans, Conigliaro et al. (2003) reported that Hispanics (compared with whites and African Americans) were the least likely to have a diagnosis of alcohol abuse or dependence in the past 5 years. It is possible that there were issues of patient–provider communication related to language difficulties and further research is needed to further explore these findings.

Participants who reported a better patient–provider relationship through the provider engagement scale were more likely to report discussion of alcohol use with their providers in the past 12 months. This is consistent with a previous four-city study (Wilkinson et al., 2006) that showed that higher provider engage-

Table 2
Multiple logistic regression model of participant's report of discussing alcohol use with HIV care provider in the past year: adjusted odds ratios and 95% confidence intervals ($n = 1152$), the positive and providers in prevention (PPIP) project, Chicago, Miami, and San Francisco, 2004–2005

	Adjusted OR	(95% CI)
Age (median split; <40 years)[a]	1.331	(1.029, 1.722)[b]
Site[a]		
San Francisco	1.000	
Chicago	0.664	(0.467, 0.946)[b]
Miami	0.815	(0.592, 1.123)
Ethnicity[a]		
Non-Hispanic white	1.000	
African American	0.969	(0.694, 1.353)
Hispanic	0.671	(0.456, 0.987)[b]
Other	1.129	(0.613, 2.081)
Gender (male)[a]	1.513	(1.073, 2.134)[b]
Self-reported general health (continuous)	0.828	(0.734, 0.935)[b]
Provider engagement (continuous)	1.040	(1.006, 1.075)[b]
Alcohol use		
Non-drinker	1.000	
Non-problem drinker	2.041	(1.509, 2.759)[b]
Problem drinker	3.319	(2.365, 4.657)[b]

Global likelihood ratio test for $\beta = 0$: $\chi^2 = 89.80$, $p < 0.0001$.
[a] Forced into model.
[b] Statistically significant.

ment was related to discussion of prevention issues between HIV primary care providers and HIV-positive injection drug users. In another study conducted in Baltimore, Beach et al. (2006) showed that patients who reported that their provider knew them "as a person" had higher odds of receiving HAART, adhering to HAART, and having undetectable serum HIV RNA. Participants reporting poorer health were also more likely to report discussing alcohol use with their providers. This finding may reflect a greater propensity for providers to discuss or probe for alcohol use among patients with co-morbid conditions. For example, Conigliaro et al. (2003) reported that HIV providers are more likely to screen HIV patients with more severe HIV infection and evidence of liver disease.

Several study limitations should be recognized. First, these data are from a convenience sample of HIV-positive patients recruited from HIV primary care clinics in three large urban areas. Thus, generalizations to other HIV-positive individuals in rural areas or other countries should be made with caution. However, using a multi-site sample with different types of HIV clinics strengthens potential generalizability. Second, these data are based on self-reports. Thus, the reporting of stigmatized behaviors such as alcohol use and other drug use may have been underreported. To diminish this concern, we used computerized data collection methods, which have been shown to enhance reporting of sensitive risk behaviors (Des Jarlais et al., 1999). Additionally, it should be noted that any underreporting bias would suggest that the estimates of risk behavior reported in this study are low. Third, a limitation to the study is that it depends upon the CAGE for identifying problematic alcohol use and it is important to recognize that the CAGE is a screening instrument and it is not intended to be used to diagnose alcohol disorders. Another limitation concerns the initiation of the discussion of alcohol; the discussion of alcohol could have been initiated by the provider or the patient and the available data do not allow for this distinction. Finally, as the analysis was cross-sectional, time order could not be established.

Our study reinforces the need to increase the focus on alcohol use in the HIV primary care setting. There are no primary care interventions that have been shown to be efficacious in reducing alcohol use among HIV-positive persons. Although there are many demands placed on HIV primary care providers who are addressing multiple needs of their HIV-positive patients, HIV primary care clinicians should be encouraged to increase rates of screening and counseling their patients on alcohol use. Provider training is needed to educate clinicians about the importance of screening for alcohol use and intervening with patients that are identified from such screening as problem drinkers. In addition, training could focus on how providers could become more engaged with their patients so that they can elicit discussion about sensitive topics such as alcohol use.

Further research is needed to provide information on the strategies to use and what the intervention message should be.

Conflict of interest

None.

Acknowledgements

The authors would like to thank the Positives and Providers in Prevention (PPIP) Study Group for their hard work and dedication, the HIV-positive individuals who participated in the research studies, and the clinicians and staff of the participating medical clinics for their support.

Role of funding source: Funding for this study was provided by Centers for Disease Control and Prevention (CDC) Grant CDC CA #R18/CCR420971-04; this was a funded cooperative agreement and the CDC contributed to the study design. The

findings and conclusions in this report are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

Contributors: Each author warrants that he or she has participated sufficiently in the intellectual content, the analysis of data, and the writing of the work to take public responsibility for it. Each has reviewed the final version of the work, believes it represents valid work, and approves it for publication.

Authors Dr. Lisa Metsch, Grant Colfax, Carol Dawson-Rose, David McKirnan, and Dogan Eroglu designed the study and wrote the protocol. Author Dr. Lisa Metsch managed the literature searches and summaries of previous related work. Authors Dr. Margaret Pereyra and Gabriel Cardenas undertook the statistical analysis, and author Dr. Lisa Metsch wrote the first draft of the manuscript. All authors contributed to and have approved the final manuscript.

References

Bakken, S., Holzemer, W.L., Brown, M.A., Powell-Cope, G.M., Turner, J.G., Inouye, J., Nokes, K.M., Corless, I.B., 2000. Relationships between perception of engagement with health care provider and demographic characteristics, health status, and adherence to therapeutic regimen in persons with HIV/AIDS. AIDS Patient Care STDS 14, 189–197.

Beach, M.C., Keruly, J., Moore, R.D., 2006. Is the quality of the patient–provider relationship associated with better adherence and health outcomes for patients with HIV? J. Gen. Int. Med. 21, 661–665.

Bertholet, N., Daeppen, J.B., Wietlisbach, V., Fleming, M., Burnand, B., 2005. Reduction of alcohol consumption by brief alcohol intervention in primary care: systematic review and meta-analysis. Arch. Int. Med. 165, 986–995.

Bogart, L.M., Kelly, J.A., Catz, S.L., Sosman, J.M., 2000. Impact of medical and nonmedical factors on physician decision making for HIV/AIDS antiretroviral treatment. J. AIDS 23, 396–404.

Braithwaite, R.S., McGinnis, K.A., Conigliaro, J., Maisto, S.A., Crystal, S., Day, N., Cook, R.L., Gordon, A., Bridges, M.W., Seiler, J.F., Justice, A.C., 2005. A temporal and dose-response association between alcohol consumption and medication adherence among veterans in care. Alcohol. Clin. Exp. Res. 29, 1190–1197.

Braithwaite, R.S., Conigliaro, J., Roberts, M.S., Shechter, S., Schaefer, A., McGinnis, K., Rodriguez, M.C., Rabeneck, L., Bryant, K., Justice, A.C., 2007. Estimating the impact of alcohol consumption on survival for HIV+ individuals. AIDS Care 19, 459–466.

Bryant, K.J., 2006. Expanding research on the role of alcohol consumption and related risks in the prevention and treatment of HIV/AIDS. Subst. Use Misuse 41, 1465–1507.

Buchsbaum, D.G., Buchanan, R.G., Centor, R.M., Schnoll, S.H., Lawton, M.J., 1991. Screening for alcohol abuse using CAGE scores and likelihood ratios. Ann. Intern. Med. 115, 774–777.

Centers for Disease Control and Prevention (CDC) Health Resources and Services Administration, National Institutes of Health, & HIV Medicine Association of the Infectious Diseases Society of America, 2003. Incorporating HIV prevention into the medical care of persons living with HIV. Recommendations of CDC, the Health Resources and Services administration, the National Institutes of Health, and the HIV Medicine Association of the Infectious Diseases Society of America. MMWR Recomm. Rep. 52, 1–24.

Chander, G., Lau, B., Moore, R.D., 2006. Hazardous alcohol use: a risk factor for non-adherence and lack of suppression in HIV infection. J. AIDS 43, 411–417.

Cheng, D.M., Nunes, D., Libman, H., Vidaver, J., Alperen, J.K., Saitz, R., Samet, J.H., 2007. Impact of Hepatitis C on HIV Progression in Adults with Alcohol Problems. Alcohol. Clin. Exp. Res. 31, 829–836.

Chesson, H.W., Harrison, P., Stall, R., 2003. Changes in alcohol consumption and in sexually transmitted disease incidence rates in the United States: 1983–1998. J. Stud. Alcohol 64, 623–630.

Colfax, G., Vittinghoff, E., Husnik, M.J., McKirnan, D., Buchbinder, S., Koblin, B., Celum, C., Chesney, M., Huang, Y., Mayer, K., Bozeman, S., Judson, F.N., Bryant, K.J., Coates, T.J., EXPLORE Study Team, 2004. Substance use and sexual risk: a participant- and episode-level analysis among a cohort of men who have sex with men. Am. J. Epidemiol. 159, 1002–1012.

Conigliaro, J., Gordon, A.J., McGinnis, K.A., Rabeneck, L., Justice, A.C., Veterans Aging Cohort 3-Site Study, 2003. How harmful is hazardous alcohol use and abuse in HIV infection: do health care providers know who is at risk? J. AIDS 33 (4), 521–525.

Conigliaro, J., Justice, A.C., Gordon, A.J., Bryant, K., VACS Alcohol, Behavior Change Research Group, 2006. Role of alcohol in determining human immunodeficiency virus (HIV)-relevant outcomes: A conceptual model to guide the implementation of evidence-based interventions into practice. Med. Care 44, S1–S6.

Cook, R.L., Sereika, S.M., Hunt, S.C., Woodward, W.C., Erlen, J.A., Conigliaro, J., 2001. Problem drinking and medication adherence among persons with HIV infection. J. Gen. Int. Med. 16, 83–88.

Cook, R.L., McGinnis, K.A., Kraemer, K.L., Gordon, A.J., Conigliaro, J., Maisto, S.A., Samet, J.H., Crystal, S., Rimland, D., Bryant, K.J., Braithwaite, R.S., Justice, A.C., 2006. Intoxication before intercourse and risky sexual behavior in male veterans with and without human immunodeficiency virus infection. Med. Care 44, S31–S36.

Cunningham, W.E., Sohler, N.L., Tobias, C., Drainoni, M.L., Bradford, J., Davis, C., Cabral, H.J., Cunningham, C.O., Eldred, L., Wong, M.D., 2006. Health services utilization for people with HIV infection: comparison of a population targeted for outreach with the U.S. population in care. Med. Care 44, 1038–1047.

Des Jarlais, D.C., Paone, D., Milliken, J., Turner, C.F., Miller, H., Gribble, J., Shi, Q., Hagan, H., Friedman, S.R., 1999. Audio-computer interviewing to measure risk behaviour for HIV among injecting drug users: a quasi-randomised trial. Lancet 353, 1657–1661.

Ehrenstein, V., Horton, N.J., Samet, J.H., 2004. Inconsistent condom use among HIV-infected patients with alcohol problems. Drug Alcohol Depend. 73, 159–166.

Ewing, J.A., 1984. Detecting alcoholism. The CAGE questionnaire. JAMA 252, 1905–1907.

Fink, A., Elliott, M.N., Tsai, M., Beck, J.C., 2005. An evaluation of an intervention to assist primary care physicians in screening and educating older patients who use alcohol. J. Am. Geriatr. Soc. 53, 1937–1943.

Fisher, J.D., Fisher, W.A., Cornman, D.H., Amico, R.K., Bryan, A., Friedland, G.H., 2006. Clinician-delivered intervention during routine clinical care reduces unprotected sexual behavior among HIV-infected patients. J. AIDS 41, 44–52.

Fleming, M.F., Barry, K.L., Manwell, L.B., Johnson, K., London, R., 1997. Brief physician advice for problem alcohol drinkers. A randomized controlled trial in community-based primary care practices. JAMA 277, 1039–1045.

Fleming, M.F., Mundt, M.P., French, M.T., Manwell, L.B., Stauffacher, E.A., Barry, K.L., 2002. Brief physician advice for problem drinkers: Long-term efficacy and benefit-cost analysis. Alcohol. Clin. Exp. Res. 26, 36–43.

Galvan, F.H., Bing, E.G., Fleishman, J.A., London, A.S., Caetano, R., Burnam, M.A., Longshore, D., Morton, S.C., Orlando, M., Shapiro, M., 2002. The prevalence of alcohol consumption and heavy drinking among people with HIV in the United States: results from the HIV cost and services utilization study. J. Stud. Alcohol 63, 179–186.

Gerbert, B., Danley, D.W., Herzig, K., Clanon, K., Ciccarone, D., Gilbert, P., Allerton, M., 2006. Reframing "prevention with positives": incorporating counseling techniques that improve the health of HIV-positive patients. AIDS Patient Care STDS 20, 19–29.

Golin, C.E., Liu, H., Hays, R.D., Miller, L.G., Beck, C.K., Ickovics, J., Kaplan, A.H., Wenger, N.S., 2002. A prospective study of predictors of adherence to combination antiretroviral medication. J. Gen. Intern. Med. 17, 756–765.

Gordon, A.J., McGinnis, K.A., Conigliaro, J., Rodriguez-Barradas, M.C., Rabeneck, L., Justice, A.C., VACS-3 Project Team, 2006. Associations between alcohol use and homelessness with healthcare utilization among

human immunodeficiency virus-infected veterans. Med. Care 44, S37–S43.

Grant, B.F., Dawson, D.A., Stinson, F.S., Chou, S.P., Dufour, M.C., Pickering, R.P., 2004. The 12-month prevalence and trends in DSM-IV alcohol abuse and dependence: United States, 1991–1992 and 2001–2002. Drug Alcohol Depend. 74, 223–234.

Halkitis, P.N., Parsons, J.T., Wolitski, R.J., Remien, R.H., 2003. Characteristics of HIV antiretroviral treatments, access and adherence in an ethnically diverse sample of men who have sex with men. AIDS Care 15, 89–102.

Harford, T.C., Grant, B.F., Yi, H.Y., Chen, C.M., 2005. Patterns of DSM-IV alcohol abuse and dependence criteria among adolescents and adults: results from the 2001 national household survey on drug abuse. Alcohol. Clin. Exp. Res. 29, 810–828.

Howard, A.A., Arnsten, J.H., Lo, Y., Vlahov, D., Rich, J.D., Schuman, P., Stone, V.E., Smith, D.K., Schoenbaum, E.E., HER Study Group, 2002. A prospective study of adherence and viral load in a large multi-center cohort of HIV-infected women. AIDS 16, 2175–2182.

Kalichman, S.C., Weinhardt, L., DiFonzo, K., Austin, J., Luke, W., 2002. Sensation seeking and alcohol use as markers of sexual transmission risk behavior in HIV-positive men. Ann. Behav. Med. 24, 229–235.

Kresina, T.F., Flexner, C.W., Sinclair, J., Correia, M.A., Stapleton, J.T., Adeniyi-Jones, S., Cargill, V., Cheever, L.W., 2002. Alcohol use and HIV pharmacotherapy. AIDS Res. Hum. Retroviruses 18, 757–770.

Loughlin, A., Metsch, L., Gardner, L., Anderson-Mahoney, P., Barrigan, M., Strathdee, S., 2004. Provider barriers to prescribing HAART to medically-eligible HIV-infected drug users. AIDS Care 16, 485–500.

Lucas, G.M., Gebo, K.A., Chaisson, R.E., Moore, R.D., 2002. Longitudinal assessment of the effects of drug and alcohol abuse on HIV-1 treatment outcomes in an urban clinic. AIDS 16, 767–774.

Metsch, L.R., Pereyra, M., del Rio, C., Gardner, L., Duffus, W.A., Dickinson, G., Kerndt, P., Anderson-Mahoney, P., Strathdee, S.A., Greenberg, A.E., Antiretroviral Treatment, Access Study Group, 2004. Delivery of HIV prevention counseling by physicians at HIV medical care settings in 4 US cities. Am. J. Public Health 94, 1186–1192.

Morin, S.F., Koester, K.A., Steward, W.T., Maiorana, A., McLaughlin, M., Myers, J.J., Vernon, K., Chesney, M.A., 2004. Missed opportunities: prevention with HIV-infected patients in clinical care settings. J. AIDS 36, 960–966.

Naimi, T.S., Brewer, R.D., Mokdad, A., Denny, C., Serdula, M.K., Marks, J.S., 2003. Binge drinking among US adults. JAMA 289, 70–75.

Nolen-Hoeksema, S., 2004. Gender differences in risk factors and consequences for alcohol use and problems. Clin. Psychol. Review 24, 981–1010.

Nolen-Hoeksema, S., Hilt, L., 2006. Possible contributors to the gender differences in alcohol use and problems. J. Gen. Psychol. 133, 357–374.

Parsons, J.T., Vicioso, K.J., Punzalan, J.C., Halkitis, P.N., Kutnick, A., Velasquez, M.M., 2004. The impact of alcohol use on the sexual scripts of HIV-positive men who have sex with men. J. Sex Res. 41, 160–172.

Purcell, D.W., Parsons, J.T., Halkitis, P.N., Mizuno, Y., Woods, W.J., 2001. Substance use and sexual transmission risk behavior of HIV-positive men who have sex with men. J. Subst. Abuse 13, 185–200.

Radloff, L.S., 1977. The CES-D scale: a self-report depression scale for research in the general population. Appl. Psych. Meas. 1, 385–401.

Richardson, J.L., Milam, J., McCutchan, A., Stoyanoff, S., Bolan, R., Weiss, J., Kemper, C., Larsen, R.A., Hollander, H., Weismuller, P., Chou, C.P., Marks, G., 2004. Effect of brief safer-sex counseling by medical providers to HIV-1 seropositive patients: a multi-clinic assessment. AIDS 18, 1179–1186.

Rothlind, J.C., Greenfield, T.M., Bruce, A.V., Meyerhoff, D.J., Flenniken, D.L., Lindgren, J.A., Weiner, M.W., 2005. Heavy alcohol consumption in individuals with HIV infection: effects on neuropsychological performance. J. Int. Neuropsychol Soc. 11, 70–83.

Sackoff, J.E., Hanna, D.B., Pfeiffer, M.R., Torian, L.V., 2006. Causes of death among persons with AIDS in the era of highly active antiretroviral therapy: New York City. Ann. Intern. Med. 145, 397–406.

Saitz, R., Horton, N.J., Sullivan, L.M., Moskowitz, M.A., Samet, J.H., 2003. Addressing alcohol problems in primary care: a cluster randomized, controlled trial of a systems intervention. The screening and intervention in primary care (SIP) study. Ann. Intern. Med. 138, 372–382.

Salmon-Ceron, D., Lewden, C., Morlat, P., Bevilacqua, S., Jougla, E., Bonnet, F., Heripret, L., Costagliola, D., May, T., Chene, G., The Mortality 2000 Study Group, 2005. Liver disease as a major cause of death among HIV infected patients: role of hepatitis C and B viruses and alcohol. J. Hepatol. 42, 799–805.

Samet, J.H., Phillips, S.J., Horton, N.J., Traphagen, E.T., Freedberg, K.A., 2004. Detecting alcohol problems in HIV-infected patients: use of the CAGE questionnaire. AIDS Res. Hum. Retroviruses 20, 151–155.

Shen, J.M., Blank, A., Selwyn, P.A., 2005. Predictors of mortality for patients with advanced disease in an HIV palliative care program. J. AIDS 40, 445–447.

Theall, K.P., Clark, R.A., Powell, A., Smith, H., Kissinger, P., 2006. Alcohol consumption, art usage and high-risk sex among women infected with HIV. AIDS Behav. 11, 205–215.

Tucker, J.S., Burnam, M.A., Sherbourne, C.D., Kung, F.Y., Gifford, A.L., 2003. Substance use and mental health correlates of nonadherence to antiretroviral medications in a sample of patients with human immunodeficiency virus infection. Am. J. Med. 114, 573–580.

Vanable, P.A., McKirnan, D.J., Buchbinder, S.P., Bartholow, B.N., Douglas Jr., J.M., Judson, F.N., MacQueen, K.M., 2004. Alcohol use and high-risk sexual behavior among men who have sex with men: the effects of consumption level and partner type. Health Psychol. 23, 525–532.

Wagner, J.H., Justice, A.C., Chesney, M., Sinclair, G., Weissman, S., Rodriguez-Barradas, M., VACS 3 Project Team, 2001. Patient- and provider-reported adherence: toward a clinically useful approach to measuring antiretroviral adherence. J. Clin. Epidemiol. 54 (Suppl. 1), S91–S98.

Whitlock, E.P., Polen, M.R., Green, C.A., Orleans, T., Klein, J., U.S. Preventive Services Task Force, 2004. Behavioral counseling interventions in primary care to reduce risky/harmful alcohol use by adults: a summary of the evidence for the U.S. preventive services task force. Ann. Intern. Med. 140, 557–568.

Wilkinson, J.D., Zhao, W., Santibanez, S., Arnsten, J., Knowlton, A., Gomez, C.A., Metsch, L.R., INSPIRE Study Group, 2006. Providers' HIV prevention discussions with HIV-seropositive injection drug users. AIDS Behav. 10, 699–705.

Wilson, I.B., Kaplan, S., 2000. Physician-patient communication in HIV disease: the importance of patient, physician, and visit characteristics. J. AIDS 25, 417–425.