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Not all non-drinkers with HIV are equal: demographic and clinical comparisons among current non-drinkers with and without a history of prior alcohol use disorders

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Abstract

Studies of persons living with HIV (PLWH) have compared current non-drinkers to at-risk drinkers without differentiating whether current non-drinkers had a prior alcohol use disorder (AUD). The purpose of this study was to compare current non-drinkers with and without a prior AUD on demographic and clinical characteristics to understand the impact of combining them. We

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included data from 6 sites across the US from 1/2013–3/2015. Patients completed tablet-based clinical assessments at routine clinic appointments using the most recent assessment. Current non-drinkers were identified by AUDIT-C scores of 0. We identified a prior probable AUD by a prior AUD diagnosis in the electronic medical record (EMR) or a report of attendance at alcohol treatment in the clinical assessment. We used multivariate logistic regression to examine factors associated with prior AUD. Among 2235 PLWH who were current non-drinkers, 36% had a prior AUD with more patients with an AUD identified by the clinical assessment than the EMR. Higher proportions with a prior AUD were male, depressed, and reported current drug use compared to non-drinkers without a prior AUD. Former cocaine/crack (70% vs. 25%), methamphetamine/crystal (49% vs. 16%) and opioid/heroin use (35% vs. 7%) were more commonly reported by those with a prior AUD. In adjusted analyses, male sex, past methamphetamine/crystal use, past marijuana use, past opioid/heroin use, past and current cocaine/crack use and cigarette use were associated with a prior AUD. In conclusion, this study found that among non-drinking PLWH in routine clinical care, 36% had a prior AUD. We found key differences between those with and without prior AUD in demographic and clinical characteristics including drug use and depression. These results suggest non-drinkers are heterogeneous and need further differentiation in studies and that prior alcohol misuse including alcohol treatment should be included in behavioral health assessments as part of clinical care.

Keywords

HIV; alcohol use; substance use; alcohol use disorders; adherence

Introduction

General population studies suggest non-drinkers and heavy alcohol drinkers have worse outcomes compared with light-to-moderate drinkers (G. Corrao, Rubbiati, Bagnardi, Zambon, & Poikolainen, 2000; Ronksley, Brien, Turner, Mukamal, & Ghali, 2011), referred to as “abstainer effect” (Lucas, Windsor, Caldwell, & Rodgers, 2010) resulting in a J- or U-shaped outcome curve (Shaper, Wannamethee, & Walker, 1988). It has been argued that these findings are due in part to misclassification, particularly of former drinkers in the non-drinker category, mixing lifetime abstainers with those with prior alcohol use who may have quit because of poor health, aging, and other reasons (Sareen, McWilliams, Cox, & Stein, 2004; Shaper et al., 1988).

At-risk alcohol use including alcohol use disorders (AUD) among persons living with HIV (PLWH) has been associated with poor outcomes (Cook et al., 2001; Kim et al., 2014). Many studies among PLWH have compared health outcomes of non-drinkers to at-risk drinkers treating current nondrinkers as a homogeneous group. Thus, former drinkers are combined with lifelong nondrinkers regardless of whether former drinkers had a prior AUD. This potentially leads to increased risk in the nondrinker category for a variety of outcomes and an underestimate of the impact of alcohol.

This study evaluated the common practice of defining a non-drinker based on current alcohol use. We hypothesized that prior AUD would be common among current non-

drinkers and that those with and without a prior AUD would differ. Specifically, among PLWH who are current nondrinkers, we used two approaches to identify prior AUD and compared demographic and clinical characteristics among current non-drinkers with and without a prior AUD.

Methods

Centers for AIDS Research Network of Integrated Clinical Systems (CNICS)

CNICS is a longitudinal observational study of PLWH receiving care from 8 clinical sites across the United States from 1/1/1995 to the present (Kitahata et al., 2008) of whom 6 contributed data to these analyses (University of Washington, Seattle; University of Alabama, Birmingham; University of North Carolina, Chapel Hill; University of California, San Francisco; University of California, San Diego; Fenway Health, Boston).

Study Subjects

All PLWH 18 years of age who completed a clinical assessment of patient reported behaviors and outcomes between 1/2013–3/2015 and reported they were currently not drinking were eligible. Individuals not receiving antiretroviral therapy (ART) were excluded from adherence analyses. The clinical assessment is completed every ~4–6 months during routine clinical visits. For those who completed multiple assessments during the study period, the most recent assessment was used. PLWH who are medically unstable, appear intoxicated, have a cognitive impairment, or do not speak English, Spanish or Amharic are not asked to complete the assessment at that visit. CNICS was approved by each site's Institutional Review Board.

Data Sources

The CNICS data repository integrates longitudinal data including comprehensive clinical data from outpatient and inpatient encounters such as standardized HIV-related information collected at enrollment (initial clinic visit), demographic, clinical, medication, laboratory, and socioeconomic data obtained from each site's electronic medical record (EMR) and other institutional data sources.

Patients used touch-screen tablets to complete the ~10–12 minute clinical assessment including measures of alcohol use (Alcohol Use Disorders Identification Test, AUDIT-C) (Bradley et al., 2003) and alcohol treatment or attending Alcohol Anonymous for an alcohol problem (Bradley et al., 2004), substance use (modified Alcohol, Smoking, and Substance Involvement Screening Test [ASSIST]) (Newcombe, Humeniuk, & Ali, 2005, 2002), and depressive symptoms (Patient Health Questionnaire [PHQ-9]) (Spitzer, Kroenke, & Williams, 1999). ART adherence is measured by a 30-day visual analog scale item (VAS) (Amico et al., 2006), a 30-day self-rating item (Feldman et al., 2012; Lu et al., 2008), and by items from the Adult AIDS Clinical Trial Group (AACTG) adherence measure including an item on time since last missed dose (Chesney et al., 2000).

Instrument Scoring

AUDIT-C measures current alcohol use over the prior year. PLWH who were current non-drinkers were identified by AUDIT-C scores of 0. The ASSIST categorizes drug use as current (past 3 months), prior, or never (Newcombe et al., 2005, 2002). We examined drug use defined by 1) type of drug (marijuana, crack/cocaine, methamphetamines/crystal, or illicit opioid/heroin); 2) any drug use; and 3) any drug use excluding marijuana. Cigarette use was categorized as current, prior, or never. Depressive symptom scores from the PHQ-9 range from 0–27 and were categorized as: none (0–4), mild (5–9), moderate (10–19), or severe (≥ 20 points) or as a binary outcome: not depressed (0–9), depressed (≥ 10) (Kroenke, Spitzer, & Williams, 2001). Approximately 2% had incomplete data for substance use or depression and these individuals were categorized based on whatever portion of items they had completed. The VAS adherence measure provides a percentage of doses taken.

Prior at-risk drinkers

We used two strategies to identify those with a probable prior AUD. First, from the EMR, we identified individuals who were previously diagnosed with an AUD. Second, we identified individuals who reported on the clinical assessment that they had been in alcohol treatment or attended Alcoholics Anonymous (AA) for an alcohol problem (Bradley et al., 2004). Either strategy was sufficient to meet criteria for a prior AUD.

Statistical Analyses

We performed chi-squared tests to compare those with and without a prior AUD. We examined demographic characteristics including age, race/ethnicity, sex, risk factor for HIV transmission; and clinical characteristics including CD4⁺ cell count nadir, current CD4⁺ cell count, current HIV-1 RNA viral load level (detectable vs. undetectable), current ART use, hepatitis C virus (HCV) infection indicated by the presence of HCV antibody or HCV RNA, depression category, and substance use (both overall and by individual drug class). We examined the percentage of current non-drinking PLWH by demographic and clinical categories with and without prior AUD.

We compared adherence among the subset on ART. We hypothesized that among current non-drinkers, those with a prior AUD would have lower adherence than those without a prior AUD.

We used multivariate logistic regression to examine factors associated with prior AUD. Inclusion in models was based on bivariate results, potential confounders, and hypotheses such as those with prior AUD would have more severe HIV disease measured by CD4 and viral load values. Final models including age, race, sex, HIV transmission risk factor, CD4⁺ cell count nadir, viral load, HCV, depression, methamphetamine/crystal use, cocaine/crack use, illicit opioid/heroin use, marijuana use, and cigarette use.

Results

We included 2235 PLWH who reported that they currently did not drink. Mean age was 48 years (standard deviation [SD] 10), 22% were women, and mean CD4⁺ count nadir was 263

(SD 228) cells/mm³. Among PLWH who did not currently drink, 36% had a prior probable AUD by the two approaches, specifically 12% had prior AUD diagnoses in the EMR, 31% reported having attended alcohol treatment or AA meetings, (7% had a prior AUD by both definitions)(Table 1).

Those with a prior AUD differed on demographic and clinical characteristics from those without a prior AUD (Table 2). Higher proportions with a prior AUD were male (85% vs. 75%, $p<0.001$), white (54% vs. 38%, $p<0.001$), and depressed (29% vs. 22%, $p<0.001$). Those with a prior AUD were more likely to be co-infected with HCV (29% vs. 13%, $p<0.001$).

Higher proportions with a prior AUD had injected drugs (41% vs. 12%, $p<0.001$), and reported past (59% vs. 28%) and current (30% vs. 22%, $p<0.001$) drug use compared with those without a prior AUD (Table 3). Former methamphetamine/crystal use (49% vs. 16%), cocaine/crack (70% vs. 25%), opioid/heroin use (35% vs. 7%), and marijuana use (60% vs. 29%) were more commonly reported by those with than those without a prior AUD (Table 3).

Among 1993 PLWH on ART, adherence was not significantly lower in those with a prior AUD compared with those without (92% vs. 93%, $p=0.4$) by the VAS. The self-rating adherence item measure also did not differ between the two groups ($p=0.1$). Adherence measured by an item asking about last missed dose of medications did differ: those without a prior AUD were more likely to report that they “never skip medications” (51% vs. 36%, <0.001).

Furthermore, the percentage with an undetectable viral load was high in both groups (87% vs. 83% among those with and without a prior AUD). Current CD4+ counts and currently receiving ART were not statistically different between those with and without a prior AUD (Table 2).

Factors associated with a prior AUD

In adjusted logistic regression analyses, former methamphetamine/crystal use, former marijuana use, and former opioid/heroin use were all associated with a prior AUD. Both former and current cocaine/crack use and former and current cigarette use were also associated with a prior AUD (Table 4).

Discussion

Among 2235 PLWH in clinical care across the US who were currently not drinking, a third had a prior probable AUD. Self-reported alcohol treatment history captured more prior AUD than AUD diagnoses suggesting the importance of collecting this information from patients and not just relying on EMR diagnosis data. Non-drinkers with a prior AUD differed in demographic and clinical characteristics from those without a prior AUD. In particular, they were much more likely to report former and current cocaine/crack and cigarette use and former methamphetamine/crystal, opioid/heroin, and marijuana use. The proportion with prior drug use was more than twice as high for 4 drug classes among those with a prior

AUD. These results have important implications for studies of PLWH that compare current non-drinkers to at-risk drinkers without differentiating whether non-drinkers had a previous AUD or not.

“Sick quitter” hypothesis

In the general population, studies have examined associations between alcohol use and health outcomes and found lower risks among light-to-moderate drinkers compared to nondrinkers or heavy drinkers(Giovanni Corrao, Bagnardi, Zambon, & La Vecchia, 2004; Poikolainen, 1995) as has a recent study in PLWH(Wandeler et al., 2015). While few studies have separated former drinkers from nondrinkers or focused on lifetime use(Gmel, Gutjahr, & Rehm, 2003; Sareen et al., 2004), many have combined former drinkers with lifetime abstainers(K. Fillmore, Kerr, Stockwell, Chikritzhs, & Bostrom, 2006; K. M. Fillmore, Stockwell, Chikritzhs, Bostrom, & Kerr, 2007). A meta-analysis suggested that it is preferable to distinguish former drinkers from lifetime abstainers, although failing to do so caused minimal bias in the setting of myocardial infarction(Maclure, 1993). Other studies have suggested that former drinkers differ from lifetime abstainers(K. M. Fillmore et al., 1998), and that the impact of conflating abstainers with former drinkers may be responsible for spurious associations of poorer health outcomes among nondrinkers(K. Fillmore et al., 2006). Explanations have often focused on the “sick quitter hypothesis” in which findings are potentially being driven in part by previously heavy drinkers who became current non-drinkers(Liang & Chikritzhs, 2013; Shaper, 1995). Some may quit drinking due to health reasons such as disability, frailty, and medication use(K. Fillmore et al., 2006). Thus, reference groups that combine lifetime non-drinkers with prior heavy drinkers who no longer drink may result in a reference group that distorts the health consequences associated with alcohol use(Dawson, Goldstein, & Grant, 2013). Those with prior heavy alcohol use who are currently non-drinkers have been shown to have worse outcomes than long-term non-drinkers(Gmel et al., 2003), however excluding current non-drinkers with heavy drinking histories from analyses has not always yielded consistent results(Lucas et al., 2010) with some studies showing that separating these patients from nondrinkers has substantial impact(K. Fillmore et al., 2006; Sareen et al., 2004) and others demonstrating an effect persisted even after excluding non-drinkers with prior heavy drinking(Alati et al., 2005; Power, Rodgers, & Hope, 1998).

The best approach to dealing with former drinkers is not clear and might vary based on outcomes although the common approach of combining them with other current non-drinkers seems problematic. It has been argued that they cannot be combined with lifelong abstainers(K. M. Fillmore et al., 2007), and maybe even should be assigned to a drinking category based on prior alcohol consumption(Liang & Chikritzhs, 2013). We examined non-drinking PLWH and found higher rates of former drinkers than seen in the general population(Dawson, 2000; Klatsky, Armstrong, & Friedman, 1990; Lucas et al., 2010). This high prevalence suggests that the impact of these former drinkers will persist if not be a bigger problem in studies of PLWH versus general population studies.

Prior AUD

This study focused on prior AUD based on alcohol treatment or AUD diagnoses among current non-drinkers which may be capturing patients with histories of more severe alcohol misuse. This may be a “tip of the iceberg” effect identifying the most extreme prior drinkers and yet this was still a third of non-drinking PLWH.

We used two approaches to identify prior AUD among PLWH. More PLWH with prior AUD were identified using patient reports of alcohol treatment from the clinical assessment than were identified by AUD diagnoses from the EMR, although there was overlap. While additional studies are needed to better understand the strengths and limitations of these approaches, using them both resulted in identifying more prior AUD among current non-drinkers. Furthermore, those with prior AUD were a very distinct population from other non-drinking PLWH, raising concerns about combining the two groups. For example, PLWH who were non-drinkers with prior AUD had on average a much more extensive substance use history than those without a prior AUD. Additional research is needed to examine the extent that separating non-drinking individuals with prior AUD from others who do not drink will impact studies of clinical outcomes such as myocardial infarction, liver disease and other outcomes of increasing importance for individuals aging with HIV. Furthermore, these findings highlight the need for careful review of prior alcohol use among current non-drinkers including diagnoses and treatment history.

Adherence and other HIV Outcomes

We compared likelihood of being on ART, ART adherence, and having an undetectable viral load among current non-drinkers with and without a prior AUD. While current alcohol use is associated with poorer adherence (Chander, Lau, & Moore, 2006), this analysis looked at prior AUD among PLWH who currently did not drink and were on ART. Using three approaches to measuring self-reported adherence, two found no difference and one only differed among those at the extreme end of excellent adherence. This suggests there is not a substantial impact of prior AUD on adherence among current non-drinking PLWH, mirroring an extensive literature reporting on comparable adherence outcomes for patients with past or treated substance use disorder. In fact, adherence levels were high in both groups. While this raises a concern of over-reporting as adherence is a self-report measure, this concern is minimized by the corresponding high levels of undetectable viral loads. Similarly there were not large differences in the likelihood of receiving ART between those with and without a prior AUD.

This data suggests that there are a large proportion of PLWH currently in recovery with a third of current non-drinkers having a prior AUD many of whom are also in recovery from drugs. Furthermore, it demonstrates that these individuals have good HIV-related outcomes including ART access, adherence, and viral suppression providing more evidence of the benefits of getting individuals into recovery as another mechanism to improve HIV outcomes. This study does not address the impact of a prior AUD on other HIV-related outcomes including liver disease, cancer, cognitive decline, and frailty suggesting that there remain many unanswered questions.

Strengths

A strength of this study is that it was conducted in a large, diverse cohort with substantial numbers of women, racial/ethnic diversity, and a population increasing in mean age. This cohort exemplifies the changing epidemiology of HIV across the US. The clinical assessment integrated into routine care facilitated an assessment of current alcohol use as well as a prior AUD requiring alcohol treatment. Patients completed the clinical assessment as part of routine visits rather than as part of a specific study with study specific exclusion criteria enhancing generalizability to PLWH in care across the US. The comprehensive clinical data allowed AUD diagnoses in the EMR to be examined as an indicator of prior AUD. Another strength is that by focusing on 2013 and after, this study examines relationships in the current treatment era. Finally, the comprehensive measurement of not just alcohol but other drug use allows assessment of the role of individual drugs among PLWH who often do not limit their substance use to alcohol.

Limitations

This study has limitations. We evaluated associations with prior AUD, but associations do not necessarily indicate causation. Current alcohol use was collected via the clinical assessment which could lead to overestimates of PLWH who are current non-drinkers. However, electronic collection reduces patient burden and decreases underreporting of risk behaviors due to social desirability bias (Fairley, Sze, Vodstrcil, & Chen, 2010). Rather than formally assessing lifetime AUD diagnoses, we relied on patient report of prior treatment and provider generated AUD EMR diagnoses. Both methods could under- or over-estimate actual lifetime AUD. EMR diagnoses likely miss cases and it is possible that there are people who attended AA meetings for reasons other than AUD. We did not include use of alcohol pharmacotherapy such as disulfiram or acamprosate to identify prior AUD. We have found that these medications are used rarely among PLWH although hopefully this will improve in the future. While the clinical assessment has expanded to include Amharic, this study included only English and Spanish-speaking PLWH which may reduce generalizability to PLWH who do not speak English or Spanish and/or are not in care.

Conclusions

This study demonstrated that among current non-drinking PLWH in clinical care across the US, over a third had a prior AUD. This substantial number could have significant impacts on conclusions about health outcomes. We found key differences between non-drinking PLWH with and without a prior AUD with striking differences in former drug use with rates at least twice as high among those with vs. without a prior AUD. Despite these differences, many of those with a prior AUD who became current non-drinkers had excellent adherence and viral suppression and thus this serves as yet one more reason to encourage decreased alcohol use among those with an AUD and not withholding ART among those with a prior AUD. These results suggest that non-drinking PLWH are a heterogeneous group that needs further differentiation in studies and that prior AUD and other problem alcohol use should be included in behavioral health assessments as part of clinical care and research.

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Table 1

Prior alcohol use disorder as identified by two approaches: prior alcohol abuse/dependence diagnoses or reporting previously attending alcohol anonymous or other alcohol treatment among current non-drinkers with HIV in clinical care at 6 CNICS sites across the U.S. from 1/2013 to 3/2015 (N=2235)

Alcohol abuse/dependence diagnoses	AA meeting or other alcohol treatment		Total
	No	Yes	
No	1436, 64%	524, 23%	88%
Yes	111, 5%	164, 7%	12%
Total	69%	31%	2235

-Prior alcohol abuse/dependence diagnoses identified in the electronic medical record

-AA meeting or other alcohol treatment identified as part of the clinical assessment.

Clinical and demographic characteristics of current non-drinkers by prior alcohol use disorder status among persons living with HIV in clinical care at 6 CNICS sites across the U.S. from 1/2013 to 3/2015

Table 2

	Total N=2235		No prior alcohol use disorder N=1436		Prior alcohol use disorder N=799		P value
	100%	64	%	36	%		
Sex							<0.001
Male	1753	1075	78%	678	75%	85%	
Female	482	361	22%	121	25%	15%	
Age (years)							0.1
<30	115	85	5%	30	6%	4%	
30-39	348	228	16%	120	16%	15%	
40-49	748	469	33%	279	33%	35%	
50-59	753	472	34%	281	33%	35%	
60	271	182	12%	89	13%	11%	
Race/ethnicity							<0.001
White	972	542	43%	430	38%	54%	
Black	787	567	35%	220	39%	28%	
Hispanic	359	255	16%	104	18%	13%	
Other	117	72	5%	45	5%	6%	
HIV transmission risk factor							<0.001
MSM	1131	740	51%	391	52%	49%	
IDU**	399	147	18%	252	10%	32%	
Heterosexual	634	493	28%	141	34%	18%	
Other	71	56	3%	15	4%	2%	
CD4+ cell count (nadir)							0.03
<350	1564	1032	70%	532	72%	67%	
350-499	319	186	14%	133	13%	17%	
500	330	202	15%	128	14%	16%	

	Total N=2235		No prior alcohol use disorder N=1436		Prior alcohol use disorder N=799		P value
	100%	64	%	36	%		
Missing	22	1%	16	1%	6	1%	
CD4+ cell count (current)							0.5
<350	548	25%	363	25%	185	23%	
350-499	418	19%	268	19%	150	19%	
500	1247	56%	789	55%	458	57%	
Missing	22	1%	16	1%	6	1%	
Currently receiving ART							0.4
No	242	11%	162	11%	80	10%	
Yes	1993	89%	1274	89%	719	90%	
Current viral load							0.03
Detectable	310	14%	216	15%	94	12%	
Undetectable	1895	85%	1197	83%	698	87%	
Missing	30	1%	23	2%	7	1%	
Hepatitis C virus							<0.001
No	1819	81%	1246	87%	573	71%	
Yes	416	19%	190	13%	226	28%	
Depression symptoms (PHQ-9)							<0.001
None	1189	53%	814	57%	375	47%	
Mild	485	22%	292	20%	193	24%	
Moderate	460	21%	270	19%	190	24%	
Severe	101	5%	60	4%	41	5%	

IDU: injection drug use; MSM: men who have sex with men; ART: antiretroviral therapy

* IDU includes patients who report being both MSM and IDU

Those with a prior alcohol use disorder including those with a previous alcohol use disorder in the electronic medical record or those who reported on the clinical assessment that they had ever been in alcohol treatment or attended Alcoholics Anonymous for an alcohol problem

Substance use among current non-drinkers by prior alcohol use disorder status among persons living with HIV in clinical care at 6 CNICS sites across the U.S. from 1/2013 to 3/2015

Table 3

	Total N=2235		No prior alcohol use disorder N=1436		Prior alcohol use disorder N=799		P value
	100	%	64	%	36	%	
Drug use (including marijuana)							
None	810	36%	719	50%	91	11%	<0.001
Past	879	39%	408	28%	471	59%	
Current	546	24%	309	22%	237	30%	
Drug use* (excluding marijuana)							
None	1104	49%	959	67%	145	18%	<0.001
Past	879	39%	352	25%	527	66%	
Current	252	11%	125	9%	127	16%	
Methamphetamine/crystal use							
None	1426	64%	1105	77%	321	40%	<0.001
Past	624	28%	232	16%	392	49%	
Current	185	8%	99	7%	86	11%	
Cocaine/crack use							
None	1246	56%	1046	73%	200	25%	<0.001
Past	925	41%	363	25%	562	70%	
Current	64	3%	27	2%	37	5%	
Opioid/heroin use							
None	1807	81%	1315	92%	492	62%	<0.001
Past	382	17%	102	7%	280	35%	
Current	46	2%	19	1%	27	3%	
Marijuana use							
None	947	42%	799	56%	148	19%	<0.001
Past	868	39%	386	29%	482	60%	

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	Total N=2235	No prior alcohol use disorder N=1436	Prior alcohol use disorder N=799	P value
	100 %	64 %	36 %	
Current	420 19%	251 17%	169 21%	
Cigarette use				
Never	912 41%	743 52%	169 21%	<0.001
Past	590 26%	328 23%	262 33%	
Current	733 33%	365 25%	368 46%	

Those with a prior alcohol use disorder including those with a previous alcohol use disorder in the electronic medical record or those who reported on the clinical assessment that they had ever been in alcohol treatment or attended Alcoholics Anonymous for an alcohol problem

Table 4

Factors associated with prior alcohol use disorder in multivariate analyses among current non-drinking persons living with HIV in clinical care at 6 CNICS sites across the U.S. in 1/2013 to 3/2015

	OR: 95% CI, p value
Sex	
Female	Ref
Male	1.53: 1.08–2.17, 0.02
Age (per year)	
	1.00: 0.99–1.01, 0.6
Race/ethnicity	
White	Ref
Black	0.95: 0.73–1.25, 0.7
Hispanic	1.16: 0.82–1.62, 0.4
Other	1.38: 0.88–2.17, 0.2
HIV transmission risk factor	
MSM	Ref
IDU*	1.54; 1.11–2.13, 0.01
Heterosexual	1.07: 0.77–1.49, 0.7
Other	0.82: 0.42–1.60, 0.6
Nadir CD4 cell count (per 100 cells/mm³)	
	1.02: 0.98–1.07, 0.3
Viral load (per log change)	
	0.98: 0.94–1.02, 0.3
Hepatitis C virus	
No	Ref
Yes	1.30: 0.96–1.77, 0.09
Depression	
None	Ref
Mild	1.18: 0.91–1.54, 0.2
Moderate	1.11: 0.84–1.47, 0.5
Severe	0.97: 0.58–1.62, 0.9
Methamphetamine/crystal use	
None	Ref
Past	1.53: 1.13–2.09, 0.01
Current	1.09: 0.71–1.67, 0.7
Cocaine/crack use	
None	Ref
Past	3.00: 2.28–3.94, <0.001
Current	3.74: 2.04–6.83, <0.001
Opioid/heroin use	

	OR: 95% CI, p value
None	Ref
Past	2.09: 1.53–2.86, <0.001
Current	1.59: 0.77–3.30, 0.2
Marijuana use	
None	Ref
Past	1.91: 1.43–2.56, <0.001
Current	1.02: 0.72–1.45, 0.9
Cigarette use	
Never	Ref
Past	1.47: 1.10–1.97, 0.01
Current	2.00: 1.53–2.62, <0.001

Those with a prior alcohol use disorder including those with a previous alcohol use disorder in the electronic medical record or those who reported on the clinical assessment that they had ever been in alcohol treatment or attended Alcoholics Anonymous for an alcohol problem