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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 included data from six sites across the US from 1/2013 to 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 that non-drinkers are heterogeneous and need further differentiation in studies and that prior alcohol misuse (including alcohol treatment) should be included in behavioural health assessments as part of clinical care.

Introduction

General population studies suggest non-drinkers and heavy alcohol drinkers have worse outcomes compared with light-to-moderate drinkers (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 non-drinkers as a homogeneous group. Thus, former drinkers are combined with lifelong non-drinkers regardless of whether former drinkers had a prior AUD. This potentially leads to increased risk in the non-drinker 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 non-drinkers, 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 eight clinical sites across the US from 1/1/1995 to the present (Kitahata et al., 2008) of whom six 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 behaviours and outcomes between 1/2013 and 3/2015 and reported that 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), as well as 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), 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). 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, and 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 adjusted 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 included 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%, $p < .001$), white (54% vs. 38%, $p < .001$), and depressed (29% vs. 22%, $p < .001$). Those with a prior AUD were more likely to be co-infected with HCV (29% vs. 13%, $p < .001$).

Table 1. Prior AUD 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 six CNICS sites across the US from 1/2013 to 3/2015 ($N = 2235$).

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

Note: Prior alcohol abuse/dependence diagnoses identified in the electronic medical record. AA meeting or other alcohol treatment identified as part of the clinical assessment.

Higher proportions with a prior AUD had injected drugs (41% vs. 12%, $p < .001$), and reported past (59% vs. 28%) and current (30% vs. 22%, $p < .001$) 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 rather 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%, $p = .4$) by the VAS. The self-rating adherence item measure also did not differ between the two groups ($p = .1$). 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%, $p < .001$).

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

Table 2. Clinical and demographic characteristics of current non-drinkers by prior AUD status among PLWH in clinical care at six CNICS sites across the US from 1/2013 to 3/2015 (N = 2235).

	Total N = 2235		No prior AUD N = 1436		Prior AUD N = 799		P-value
		100%		64%		36%	
Sex							<.001
Male	1753	78	1075	75	678	85	
Female	482	22	361	25	121	15	
Age (years)							.1
<30	115	5	85	6	30	4	
30–39	348	16	228	16	120	15	
40–49	748	33	469	33	279	35	
50–59	753	34	472	33	281	35	
≥60	271	12	182	13	89	11	
Race/ethnicity							<.001
White	972	43	542	38	430	54	
Black	787	35	567	39	220	28	
Hispanic	359	16	255	18	104	13	
Other	117	5	72	5	45	6	
HIV transmission risk factor							<.001
MSM	1131	51	740	52	391	49	
IDU[a]	399	18	147	10	252	32	
Heterosexual	634	28	493	34	141	18	
Other	71	3	56	4	15	2	
CD4+ cell count (nadir)							.03
<350	1564	70	1032	72	532	67	
350–499	319	14	186	13	133	17	
≥500	330	15	202	14	128	16	
Missing	22	1	16	1	6	1	
CD4+ cell count (current)							.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							.4
No	242	11	162	11	80	10	
Yes	1993	89	1274	89	719	90	
Current viral load							.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							<.001
No	1819	81	1246	87	573	71	
Yes	416	19	190	13	226	28	
Depression symptoms (PHQ-9)							<.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	

Notes: IDU: injection drug use; MSM: men who have sex with men; ART: antiretroviral therapy. Those with a prior AUD included those with a previous AUD in the EMR or those who reported on the clinical assessment that they had ever been in alcohol treatment or attended AA for an alcohol problem.
[a]IDU includes patients who report being both MSM and IDU.

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

Table 3. Substance use among current non-drinkers by prior AUD status among PLWH in clinical care at six CNICS sites across the US from 1/2013 to 3/2015.

	Total N = 2235		No prior AUD N = 1436		Prior AUD N = 799		P-value
		100%		64%		36%	
Drug use (including marijuana)							<.001
None	810	36	719	50	91	11	
Past	879	39	408	28	471	59	
Current	546	24	309	22	237	30	
Drug use (excluding marijuana)							<.001
None	1104	49	959	67	145	18	
Past	879	39	352	25	527	66	
Current	252	11	125	9	127	16	
Methamphetamine/crystal use							<.001
None	1426	64	1105	77	321	40	
Past	624	28	232	16	392	49	
Current	185	8	99	7	86	11	
Cocaine/crack use							<.001
None	1246	56	1046	73	200	25	
Past	925	41	363	25	562	70	
Current	64	3	27	2	37	5	
Opioid/heroin use							<.001
None	1807	81	1315	92	492	62	
Past	382	17	102	7	280	35	
Current	46	2	19	1	27	3	
Marijuana use							<.001
None	947	42	799	56	148	19	
Past	868	39	386	29	482	60	
Current	420	19	251	17	169	21	
Cigarette use							<.001
Never	912	41	743	52	169	21	
Past	590	26	328	23	262	33	
Current	733	33	365	25	368	46	

Note: Those with a prior AUD included those with a previous AUD in the electronic medical record or those who reported on the clinical assessment that they had ever been in alcohol treatment or attended AA for an alcohol problem.

former methamphetamine/crystal, opioid/heroin, and marijuana use. The proportion with prior drug use was more than twice as high for four 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 non-drinkers or heavy drinkers (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 non-drinkers or focused on lifetime use (Gmel, Gutjahr, & Rehm, 2003; Sareen et al., 2004), many have combined former drinkers with lifetime abstainers (Fillmore, Kerr, Stockwell, Chikritzhs, & Bostrom, 2006; Fillmore, Stockwell, Chikritzhs, Bostrom, & Kerr, 2007). A meta-analysis suggested that it is preferable to

Table 4. Factors associated with prior AUD in adjusted analyses among current non-drinking PLWH in clinical care at six CNICS sites across the US in 1/2013 to 3/2015.

	OR: 95% CI, *p*-value
Sex	
Female	Ref
Male	**1.53: 1.08–2.17, .02**
Age (per year)	1.00: 0.99–1.01, .6
Race/ethnicity	
White	Ref
Black	0.95: 0.73–1.25, .7
Hispanic	1.16: 0.82–1.62,.4
Other	1.38: 0.88–2.17, .2
HIV transmission risk factor	
MSM	Ref
IDU[a]	**1.54; 1.11–2.13, .01**
Heterosexual	1.07: 0.77–1.49, .7
Other	0.82: 0.42–1.60, .6
Nadir CD4 cell count (per 100 cells/mm^3)	1.02: 0.98–1.07,.3
Viral load (per log change)	0.98: 0.94–1.02, .3
Hepatitis C virus	
No	Ref
Yes	1.30: 0.96–1.77, .09
Depression	
None	Ref
Mild	1.18: 0.91–1.54, .2
Moderate	1.11: 0.84–1.47, .5
Severe	0.97: 0.58–1.62,.9
Methamphetamine/crystal use	
None	Ref
Past	**1.53: 1.13–2.09, .01**
Current	1.09: 0.71–1.67,.7
Cocaine/crack use	
None	Ref
Past	**3.00: 2.28–3.94, <.001**
Current	**3.74: 2.04–6.83, <.001**
Opioid/heroin use	
None	Ref
Past	**2.09: 1.53–2.86, <.001**
Current	1.59: 0.77–3.30, .2
Marijuana use	
None	Ref
Past	**1.91: 1.43–2.56, <.001**
Current	1.02: 0.72–1.45, .9
Cigarette use	
Never	Ref
Past	**1.47: 1.10–1.97, .01**
Current	**2.00: 1.53–2.62, <.001**

Note: Those with a prior AUD included those with a previous AUD in the EMR or those who reported on the clinical assessment that they had ever been in alcohol treatment or attended AA for an alcohol problem. Bold values are represents *p* < .05.
[a]IDU includes patients who report being both MSM and IDU.

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 (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 non-drinkers (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 (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 non-drinkers has substantial impact (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 (Fillmore et al., 2007), and 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 will become 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 that 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 suggest 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 behaviours 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 disulfuram 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 problematic alcohol use should be included in behavioural health assessments as part of clinical care and research.

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