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Alcohol and substance use diagnoses among HIV-positive patients receiving care in NYC clinic settings

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Abstract

Background—Substance use among HIV-positive persons exacerbates health problems. This study sought to estimate the prevalence of alcohol and drug-use diagnoses and examined hypothesized predictors associated with alcohol and drug-use diagnoses among HIV-positive patients in New York City (NYC).

Methods—This cohort study reviewed electronic medical records (EMRs) of 4,965 HIV-positive patients based on diagnostic codes. These patients attended a comprehensive care clinic in NYC in 2012. Multinomial logistic regression was used to predict the odds of classification into substance use diagnosis grouping.

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Author Disclosures

Contributors

Sitaji Gurung and Demetria Cain were primarily responsible for drafting text, reviewing content, and approving the final manuscript. Ana Ventuneac, Chloe Mirzayi and H. Jonathon Rendina were primarily responsible for designing and executing analyses, reviewing content, and approving the final manuscript. Martha A. Sparks and Christopher Ferraris were primarily responsible for confirming issues with the data, reviewing content, and approving the final manuscript. Jeffrey T. Parsons was the principal investigator on the grant, and primarily responsible for project conceptualization, reviewing content, and approving the final manuscript.

Conflict of Interest

The authors declare that they have no conflict of interest.

Results—Of the full sample, only 12.7% of patients had an alcohol use diagnosis documented in their EMR compared with more than one-quarter (26.4%) of patients having a recorded drug use diagnosis ($p < 0.001$). Compared with the *No Alcohol or Drugs* group, the regression model showed that older age and having a recent inpatient hospital stay independently predicted being in the *Alcohol Only* group; years living with HIV, having an unsuppressed viral load, and having a recent inpatient hospital stay were associated with higher odds of being in the *Drugs Only* and *Alcohol and Drugs* groups; and being women and men who have sex with men (MSM) were associated with decreased odds of being in the *Drugs Only* and *Alcohol and Drugs* groups.

Conclusions—Substance use diagnosis was associated with viremia and low CD4 counts and hospital stays. This implies that providers should screen for substance use in HIV-positive patients with poor health. Further examination of the extent of such comorbidity is instrumental for intervention efforts.

Keywords

alcohol use; drug use; HIV

1. Introduction

Alcohol (Chander et al., 2008; Cook et al., 2009; Galvan et al., 2002) and drug use (Korthuis et al., 2008) is prevalent among HIV-positive individuals with reported rates exceeding United States (U.S.) national averages by as much as two-fold (Justice et al., 2006; Petry, 1999). Reported rates among HIV-positive individuals have varied, with 32%– 66% currently consuming alcohol (Galvan et al., 2002; Petry, 1999; Samet et al., 2004) and 9–29% meeting criteria for hazardous drinking or an alcohol use diagnosis (Cook et al., 2009; Pence et al., 2008; Petry, 1999; Samet et al., 2004). For illicit drug use, rates have been found to be 25–40% among HIV-positive individuals (Chander et al., 2006; Korthuis et al., 2008; Sohler et al., 2007). Across studies, cocaine and marijuana were the most common drug types (Pence et al., 2008; Sohler et al., 2007; Turner et al., 2001) and poly drug use was often prevalent (Proeschold-Bell et al., 2010; Sohler et al., 2007; Turner et al., 2001).

Substance use exacerbates health problems and has implications for HIV transmission. Heavy alcohol use (Baum et al., 2010; Kader et al., 2015) and drug use (Baum et al., 2009; Chander et al., 2009; Lucas et al., 2006; Murray et al., 2012) accelerate HIV disease progression (Hahn and Samet, 2010) by hindering viral suppression (Chander et al., 2009; Conigliaro et al., 2003; Conigliaro et al., 2006) and decreasing immunologic functioning (Bagasra et al., 1996; Bagasra et al., 1993), resulting in clinical indicators of higher viral load (VL) and lower CD4 counts. A meta-analysis examining 40 studies found that drinkers were half as likely to take antiretroviral (ARV) medication as prescribed compared to those who were abstinent or who consumed alcohol infrequently (Hendershot et al., 2009). Adherence was particularly problematic among those who drank heavily or met criteria for an alcohol use diagnosis (Hendershot et al., 2009). Disease progression associated with substance use has also been found to be independent of medication non-adherence, pointing to additional clinical challenges for these patients (Baum et al., 2009, 2010; Carrico, 2011; Malbergier et al., 2015). In addition to the elevated risk of HIV transmission among injection drug users (Kaplan and Heimer, 1992), the sexual transmission of HIV is also of

concern given that drug use and heavy alcohol consumption is associated with condomless sex (Cohen and Gay, 2010; Parsons et al., 2012; Parsons et al., 2003a; Parsons et al., 2003b; Parsons et al., 2008; Parsons et al., 2004; Ramirez-Valles et al., 2008; Velasquez et al., 2009).

Since much of the effects of alcohol and drugs on the health outcomes of HIV-positive individuals are closely related to medication adherence and have implications for medical care, continued assessment of substance use prevalence in HIV medical care clinics remains critical to provide substance use treatment within medical care. Clinic settings present an opportunity to understand the health needs of HIV-positive patients in the general population (Chander et al., 2009; Chander et al., 2006; Cofrancesco et al., 2008; Masson et al., 2004; Weaver et al., 2008), including women (Justice et al., 2006), and those who may not have sought substance use treatment. Additionally, the cumulative effect of alcohol and drug use among HIV-positive patients could present additional barriers to HIV medical care, but few studies have examined the prevalence of co-morbid alcohol and drug-use diagnoses. Cook et al. (2009) found rates of 30% cocaine use, 39.5% crack use, 42% marijuana use, and 21.5% heroin use among hazardous drinkers and Chander et al. (2008) found hazardous alcohol use 2.67 times more likely among illicit drug users. Co-occurring alcohol and drug use present unique challenges for HIV disease progression and has implications for the utilization of substance use treatment services (Weaver et al., 2008).

As part of a larger study to conduct a comparative effectiveness trial to test the effectiveness of an intervention, Positive Living through Understanding and Support (PLUS), on treatment adherence and substance use, this study sought to examine alcohol and drug-use diagnoses among HIV-positive patients receiving care in New York City (NYC). Utilizing electronic medical records (EMRs) from HIV-positive patients at the Spencer Cox Center for Health (SCCH) in NYC, we conducted retrospective analyses. Our goals were to estimate the prevalence of alcohol and drug-use diagnoses and to examine hypothesized predictors associated with alcohol and drug-use diagnoses.

2. Methods

2.1. Participants and Procedures

The Spencer Cox Center for Health (now part of the Mount Sinai Institute for Advanced Medicine) comprised three clinics at St. Luke’s-Roosevelt Hospital in NYC providing HIV primary care to over 5000 active HIV-positive patients. All three SCCH clinics utilized a unified EMR, the Clinical Information Management of Ambulatory Care Services (CLIMACS) system, since 1996 which facilitates the analysis of data for research and clinical purposes. CLIMACS documents insurance information, clinic visit information (scheduled, kept and missed visits), International Classification of Diseases (ICD) diagnoses, laboratory results, clinical notes, and patient-reported medication adherence and substance use, in terms of onset, last use, quantity and frequency. A computer in each exam room allows providers to document services and clinical notes at point of care, review diagnostic information, monitor treatment, prescribe medication, and schedule appointments. Providers track and document all patient activity in CLIMACS for each patient visit.

Analyses were conducted on patient records that contained complete data for age, race/ethnicity, gender, risk category, CD4 count, HIV-1 RNA (i.e., viral load), and years since HIV diagnosis. Based on these criteria, EMR data from 4,965 HIV-positive patients who attended the SCCH in 2012 were extracted for these analyses. Only those with VL tests indicated in EMR were included for analyses. A sample of 619 cases were not extracted due to a missing viral load lab result in 2012, which was one of the variables we used in our models. The data elements described below were extracted into a useable SPSS format from the EMR database. The electronic data were securely transferred in an Access database to our research site after identifying information was removed. The Institutional Review Boards of both collaborating groups approved the use of these data.

2.2. Measures

EMR data included diagnoses of alcohol and/or drug use using the International Statistical Classification of Disease and Related Health Problems, Ninth and Tenth Revisions (ICD-9/10) system. Using ICD-9/10 codes, we developed algorithms to search records of both outpatient and inpatient diagnoses for substance use.

We analyzed both demographic and clinical covariates hypothesized to be associated with alcohol and drug-use diagnoses and relevant to an HIV-positive population. Age was calculated using year of birth. Race/ethnicity was categorized as Black, Latino, White, and other. EMR data indicated men who have sex with men (MSM) as the primary HIV risk behavior. Whether the patient was a MSM or not, combined with the data on gender, we created four mutually exclusive HIV risk category groups – MSM, men who have sex with women (MSW), women, and transgender. Years since HIV diagnosis were calculated using the HIV diagnosed year. Most recent viral load values were recoded into virally suppressed (VL ≤ 200) or not virally suppressed (VL > 200) and most recent CD4 cell count was recoded into not immunocompromised (CD4 > 200) or immunocompromised (CD4 ≤ 200) based on current guidelines (Agins et al., 2013; Panel on Antiretroviral Guidelines for Adults and Adolescents, 2016; Vajpayee et al., 2005). Finally, a dichotomous indicator was created for whether or not there was any record of an inpatient hospital visit over the 12-month period.

2.3. Data Analysis

We first conducted chi-square tests to examine bivariate associations between individual demographic and clinical variables and substance use diagnosis. To examine the prevalence of substance use diagnosis among HIV-positive patients in NYC, we divided the study sample into four groups based on diagnoses documented in the EMR system: 1) patients who had not been diagnosed with any alcohol or drug use; 2) patients who had an alcohol use diagnosis only; 3) patients who had a drug use diagnosis only; and 4) patients who had both alcohol and drug-use diagnoses. Following significant chi-squared tests, post-hoc tests were examined with Bonferroni adjustment as well as standardized residuals greater than or equal to ±2 to find groups where the proportion differed from what was expected by chance (i.e., areas in which we observed the greatest sources of non-independence).

We next ran a multinomial logistic regression model, with age, years since HIV diagnosis, race/ethnicity, HIV risk category, virally unsuppressed, immunocompromised, and inpatient hospitalization predicting substance use diagnosis grouping. Adjusted odds ratios (AOR) from the model are presented for the odds of classification with an alcohol-only, drug-only, or both alcohol and drug-use diagnosis relative to no substance use diagnosis as the reference group.

3. Results

Table 1 shows the demographic and clinical characteristics of the sample in each group of substance use diagnosis. The sample was predominantly male (78.1%) and of minority race/ethnicity − 78.1% identified as Black or Latino. More than half of the sample was MSM. The mean age was 46 (range: 19– 80 years) and the mean time since HIV diagnosis was 12.5 years (range: 0–32 years). Across all four groups, nearly one-quarter (23.8%) of the sample was not virally suppressed, approximately 10% was immunocompromised, and roughly 9% had an inpatient hospital stay during the course of the year.

Of the full sample, only 12.7% of patients had an alcohol use diagnosis documented in their EMR compared with more than one-quarter (26.4%) of patients having a record of drug use diagnosis. An alcohol use diagnosis was significantly associated with having a drug use diagnosis. The odds of having an alcohol use diagnosis with a drug use diagnosis was 8.6 times the odds relative to those without a drug use diagnosis. In fact, 8.7% of all patients had co-morbid alcohol and drug-use diagnoses – this was 68.5% of patients with a documented alcohol use diagnosis and 33.0% of patients with a drug use diagnosis. The two substance use diagnoses are highly interrelated in this sample and, as a result, all later analyses utilize a four-group classification of the two diagnoses.

We found that all demographic and clinical indicators examined were significantly associated with substance use diagnosis groupings ($p < 0.001$). Examining the standardized residuals (not presented) and post-hoc results displayed in Table 1, several general trends emerged. A higher proportion of Black and lower proportion of Hispanic patients were in the *Alcohol and Drugs* group and a higher proportion of White and a lower proportion of other race patients were in the *Drugs Only* group than expected by chance. A lower proportion of MSM and a higher proportion of MSW were in the *Drugs Only* and *Alcohol and Drugs* groups than expected by chance, while a lower proportion of transgender were in the *Alcohol and Drugs* groups than expected. Among those not virally suppressed, a greater proportion were observed in the *Alcohol and Drugs* group than expected, while the opposite was true among those virally suppressed. Among those who were immunocompromised, we observed a lower proportion in the *No Alcohol or Drugs* group and a higher proportion in the *Alcohol and Drugs* group than expected. Finally, among those who did not have an inpatient hospital stay, we observed a lower proportion in the *Alcohol and Drugs* group than expected while among those who had an inpatient stay we observed a substantially lower proportion in the *No Alcohol or Drugs group* and a substantially higher proportion in all three other groups than expected. Based on the results of the ANOVA, we found that age and years living with HIV were significantly associated with substance use groups. Overall, the *No Alcohol or Drugs* group was significantly younger than the other three groups and the

No Alcohol or Drugs and *Alcohol Only* groups had been living with HIV for significantly less time than the other two groups.

Table 2 presents two views of the same multinomial logistic regression model of 4,965 patients examining alcohol and drug-use diagnoses. Model 1A uses no alcohol or drug-use diagnosis as the reference group while model 1B uses both alcohol and drug-use diagnosis as the reference group. In model 1A, older age ($p < 0.01$) and having a recent inpatient hospital stay ($p < 0.001$) significantly increased the odds of being in the *Alcohol Only* group compared with the *No Alcohol or Drugs* group. No other variables independently predicted being in the *Alcohol Only* group versus the *No Alcohol or Drugs* group. Years living with HIV ($p < 0.001$), having an unsuppressed viral load ($p < 0.05$), and having a recent inpatient hospital stay ($p < 0.001$) significantly increased the odds of being in the *Drugs Only* group compared with the *No Alcohol or Drugs* group. Conversely, being Black ($p < 0.001$), Latino ($p < 0.001$), and other race ($p < 0.01$) compared to White race were associated with a significant decrease in the odds of being in the *Drugs Only* group compared with the *No Alcohol or Drugs* group. Similarly, being MSM ($p < 0.001$) and female ($p < 0.05$) compared with MSW were associated with decreased odds of being in the *Drugs Only* group compared with the *No Alcohol or Drugs* group. Finally, the results comparing the *Alcohol and Drug* group with the *No Alcohol or* Drugs group were generally consistent with those for the *Drug Only* analyses with the exception of race. Specifically, years living with HIV ($p < 0.001$), having an unsuppressed viral load ($p < 0.001$), and having a recent inpatient hospital stay ($p < 0.001$) significantly increased the odds of being in the *Alcohol and Drugs* group compared with the *No Alcohol or Drugs* group. Conversely, being Latino ($p < 0.01$) compared with White was associated with decreased odds of being in the *Alcohol and Drugs* group rather than the *No Alcohol or Drugs* group. Similarly, being MSM ($p < 0.01$) and female ($p < 0.01$) compared with MSW were associated with decreased odds of being in the *Alcohol and Drugs* group compared with the *No Alcohol or Drugs* group.

4. Discussion

In a clinical sample of 4,965 urban HIV-positive patients, one-third had alcohol and/or drug use diagnoses. In contrast, the World Health Organization (WHO) surveillance data estimates prevalence of drug use diagnoses at 1.83% of the U.S. adult population and alcohol use diagnoses at 5.48% (WHO, 2004). Rates are substantially higher in this clinic sample and that the magnitude is reversed, with higher prevalence of drug use diagnoses.

Alcohol and drug diagnoses were associated with poorer clinical outcomes including higher viral loads, lower CD4 counts and more inpatient stays. Among virally unsuppressed patients, a greater proportion was observed in the *Alcohol and Drugs* group. Among those who were immunocompromised, we observed a lower proportion in the *No Alcohol or Drugs* group and a higher proportion in the *Alcohol and Drugs* group than expected. Diagnosis of an alcohol use was significantly associated with having a diagnosis of a drug use. Finally, among those who had an inpatient stay we observed a substantially lower proportion in the *No Alcohol or Drugs* group and a substantially higher proportion in all three other groups than expected. This is also an important finding, essentially that inpatient admissions are correlated with alcohol/drug use groups.

The most common substance use diagnosis was *Drugs Only* irrespective of HIV risk category. Contrary to previous studies showing higher rates of substance use among HIV-positive MSM (Parsons et al., 2014; Parsons and Starks, 2014; Rendina et al., 2015) and transgender populations (Mayer et al., 2016), our results found these two groups had lower percentages of substance use overall (27.4% and 26.1%, respectively) compared to men who have sex with women (37.4%) and female (30.5%). It is worth noting that the information on sexual orientation being an essential element of self-identification was not recorded in the EMRs used for analyzing this study. The importance of routine collection of sexual orientation and gender identity information and its inclusion in EMRs as noted in a 2011 Institute of Medicine report is supported by studies focusing on identifying the unique health needs and health disparities of lesbian, gay, bisexual and transgender (LGBT) patients (Cahill et al., 2015; Cahill and Makadon, 2014; Callahan et al., 2014). The *No Alcohol or Drugs* group was significantly younger than the other three groups. This may not reflect a difference in prevalence but differences in screening practices.

Our results showed that alcohol and drug-use diagnoses are highly intercorrelated in this sample. Though fewer patients with a drug use diagnosis had a co-morbid alcohol use diagnosis, this outcome could be a result of the ways in which they are reported and documented in the EMR databases. This suggests that medical providers are more likely to document drug than alcohol use diagnoses – and highlights the need for more routine screening.

Although our study is based on large, comprehensive clinic-based data analyses and uses a sophisticated analytical model to predict the relationships between the independent variables and outcomes, it has potential limitations. First, we are unable to make any causal inferences based on a cross-sectional study design looking at one point in time retrospectively. While we are able to see associations between individual demographic and clinical indicators examined and substance use diagnosis groupings, observational studies are not intended to prove causation, and causal inferences should be interpreted with causation (Aschengrau and Seage, 2014). Our findings do, however, suggest changes in organizational level practices that may enhance screening for substance use for those who are not virally suppressed in prospective studies.

Second, the results of our study are not generalizable to all HIV-positive patients because the sample is not designed to provide nationally representative estimates of the prevalence of alcohol and drug-use diagnoses. However, our design of a multisite component affords greater generalizability than single-site studies, and the use of EMRs in a large urban, diverse cohort of three related clinics does encompass a broad geographic distribution. Third, although we consider it strength to use electronic diagnoses, there is documented variation in the way substance use questions and response options are administered in the EMR databases. Our use of diagnostic codes as a proxy for substance use diagnoses likely underestimates the prevalence of alcohol and drug-use diagnoses. To document a diagnosis, providers must first ask about substance use, then determine whether a patient's use meets criteria for a diagnosis, and finally hand-enter the diagnostic code in the ICD tab of the medical record. In the context of a 20-minute primary care visit, one or more of these steps may be skipped, especially given the sensitive nature of substance use diagnoses.

Furthermore, medical providers may not feel equipped to inquire or respond to patients in a way that opens up a longer conversation about treatment for substance use diagnoses.

Fourth, the electronic records did not specify the drug types used among the sample. They were mostly coded as drug use diagnosis. Different drugs and methods of use would likely have differential effects on patients' disease progression, level of clinic engagement, and possibly the levels of viral suppression. Therefore, understanding which drugs are associated with disengagement and viremia would be incredibly valuable. Future research could look at subsamples of which drugs and methods of use were most correlated with poorer outcomes. Finally, our data are limited to older individuals with HIV, impacting the generalizability of our results. The average age of our sample was 45. Future research should investigate if younger adults would present differently on the prevalence and interacting effects of comorbid alcohol and drug-use diagnoses.

Despite these limitations, our study has several clinical implications for substance use diagnosis among HIV-positive patients receiving care. Alcohol and drugs contribute to worse outcomes so providers should be highly aware of an increased likelihood of substance use diagnoses in viremic patients. Enhanced, routine screening for substance use is indicated for all HIV-positive patients. Our findings also suggest promoting up-to-date knowledge of referral processes to appropriate alcohol/other drug services for patients with alcohol and/or substance use diagnoses among clinicians. Alcohol and drug use varies over time so screening should take place on a regular basis especially if a previously stable patient presents with an unsuppressed viral load. Enhanced screening for immunocompromised patients-with CD4's lower than 200–400 may be an effective strategy for improving substance use diagnosis and retaining patients in substance use treatment. Finally, given the relationship between inpatient hospitalizations and alcohol and drug use diagnoses, the inpatient hospital is an optimal setting for screening and engagement in substance use treatment.

In conclusion, the aim of this retrospective cohort analysis was to estimate the prevalence of alcohol and drug-use diagnoses based on ICD-9/10 codes of substance use and examine interacting effects of comorbid alcohol and drug use among HIV-positive people. The results indicate that nearly three-quarters of patients with a documented alcohol use diagnosis also had a co-morbid drug use diagnosis and compared with patients with no alcohol use diagnosis, had nearly 9 times the odds of having a drug use diagnosis. In particular, when comparing the three groups with the *No Alcohol or Drugs* group, we found that older age and having a recent inpatient hospital stay independently predicted being in the *Alcohol Only* group; years living with HIV, having an unsuppressed viral load, and having a recent inpatient hospital stay significantly increased the odds of being in the *Drugs Only* and *Alcohol and Drugs* groups; and being a MSM and female were associated with decreased odds of being in the *Drugs Only* and *Alcohol and Drugs* groups. Future research should distinguish the data between severity of alcohol and drug-use diagnoses as indicated by the Alcohol Use Disorders Identification Test (AUDIT) and Drug Abuse Screening Test (DAST) scores.

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Highlights

- Immunocompromised patients were found to be lower in the reference group.
- The reference group was significantly younger than the three comparison groups.
- Diagnosis of alcohol and drug use was significantly associated.
- Higher proportion of patients in all three comparison groups had an inpatient stay.
- HIV treatment providers should routinely screen for alcohol and substances.

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Table 1

Demographic and Clinical Characteristics of Sample by Alcohol and Drug-Use Diagnoses (N = 4,965)

	Total Sample *N* = 4,965		**No Alcohol or Drugs *n* = 3,456**		**Alcohol Only *n* = 199**		**Drugs Only *n* = 877**		**Alcohol and Drugs *n* = 433**		
	n	**%**	***n***	**%**	***n***	**%**	***n***	**%**	***n***	**%**	**Test Statistic**
Race/Ethnicity											
Black	2063	41.6	1434	69.5	74	3.6	349	16.9	206	10.0	$\chi^2(9) = 28.300^{***}$
Latino	1811	36.5	1279	70.6	85	4.7	321	17.7	126	7.0	
White	911	18.3	603	66.2	35	3.8	188	20.6	85	9.3	
Other	180	3.6	140	77.8	5	2.8	19	10.6	16	8.9	
HIV Risk Category											
MSW	1176	23.7	736	62.6	45	3.8	250	21.3	145	12.3	$\chi^2(9) = 64.733^{***}$
MSM	2701	54.4	1961	72.6	124	4.6	421	15.6	195	7.2	
Female	1019	20.5	708	69.5	29	2.8	190	18.6	92	9.0	
Transgender	69	1.4	51	73.9	1	1.4	16	23.2	1	1.4	
Viral Load											
Not Virally Suppressed (VL > 200)	1183	23.8	770	65.1	47	4.0	228	19.3	138	11.7	$\chi^2(3) = 22.274^{***}$
Virally Suppressed (VL ≤ 200)	3782	76.2	2686	71.0	152	4.0	649	17.2	295	7.8	
CD4 Count											
Immunocompromised (CD4 ≤ 200)	528	10.6	321	60.8	23	4.4	103	19.5	81	15.3	$\chi^2(3) = 37.595^{***}$
Not Immunocompromised (CD4 > 200)	4437	89.4	3135	70.7	176	4.0	774	17.4	352	7.9	
Hospital Stay											
Yes	441	8.9	200	45.4	30	6.8	119	27.0	92	20.9	$\chi^2(3) = 155.942^{***}$
No	4524	91.1	3256	72.0	169	3.7	758	16.8	341	7.5	
	M	SD	M	SD	M	SD	M	SD	M	SD	
Age (range 19–80)	45.6	11.6	44.7^{a}	12.1	$47.2^{b,c}$	11.2	47.1^{b}	10.3	48.9^{c}	8.8	$F(3, 4961) = 25.033^{***}$
Years Living with HIV (range 0–32)	12.5	7.8	11.6^{a}	7.8	12.3^{a}	7.7	14.5^{b}	7.4	15.6^{c}	7.0	$F(3, 4961) = 59.586^{***}$

Note: $^{*}p < 0.05$.

$^{**}p < 0.01$.

$^{***}p < 0.001$.

Means with differing superscripts within rows differed significantly ($p < 0.05$) in LSD-adjusted post hoc analyses. Within row means that share a common superscript did not differ significantly.

Table 2

Multinomial Logistic Regression Predicting Alcohol and Drug-Use Diagnoses[†]

	Model 1A (Ref. Group: No Alcohol or Drugs)									*Model 1B (Ref. Group: Alcohol and Drugs)*[a]					
	Alcohol Only			**Drugs Only**			**Alcohol and Drugs**			**Alcohol Only**			**Drugs Only**		
	B	**SE**	**AOR**	**B**	**SE**	**AOR**	**B**	**SE**	**AOR**	**B**	**SE**	**AOR**	**B**	**SE**	**AOR**
Age	0.02	0.01	1.02**	0.00	0.00	1.00	0.01	0.01	1.01	0.02	0.01	1.02	−0.01	0.01	0.99
HIV Diagnosed Years	0.00	0.01	1.00	0.05	0.01	1.05***	0.06	0.01	1.06***	−0.06	0.01	0.94***	−0.01	0.01	0.99
Race/Ethnicity (Ref: White)															
Black	0.01	0.22	1.00	−0.42	0.11	0.66***	−0.20	0.15	0.82	0.21	0.26	1.23	−0.22	0.17	0.80
Latino	0.26	0.21	1.30	−0.34	0.11	0.71***	−0.47	0.16	0.63**	0.73	0.25	2.07**	0.12	0.17	1.13
Other	−0.37	0.49	0.70	−0.73	0.26	0.48**	0.00	0.30	1.00	−0.37	0.56	0.69	−0.73	0.37	0.48*
HIV Risk Category (Ref: MSW)															
MSM	0.28	0.19	1.32	−0.38	0.10	0.69***	−0.41	0.13	0.67**	1.05	1.43	2.86	2.02	1.04	7.53
Female	−0.36	0.25	0.70	−0.23	0.11	0.79*	−0.38	0.15	0.69**	0.02	0.28	1.02	0.14	0.17	1.15
Transgender	−0.91	1.03	0.40	0.06	0.30	1.06	−1.96	1.02	0.14	0.68	0.22	1.98**	0.03	0.15	1.03
Viral Load (Ref: Virally Suppressed)															
Not Virally Suppressed	0.13	0.19	1.14	0.23	0.10	1.26*	0.42	0.13	1.52***	−0.29	0.21	0.75	−0.19	0.14	0.83
CD4 Count (Ref: Not Immunocompromised)															
Immunocompro mised	0.07	0.25	1.08	−0.06	0.13	0.94	0.28	0.15	1.32	−0.20	0.28	0.82	−0.34	0.18	0.71
Hospital Stay (Ref: No)															
Yes	1.01	0.22	2.75***	0.84	0.13	2.31***	1.21	0.15	3.35***	−0.20	0.24	0.82	−0.37	0.16	0.69*

Note: [a]Betas and AORs for the No Alcohol or Drugs category are excluded from the results for Model 1B as they are the inverse of the Alcohol and Drugs category from Model 1a.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.