Factors Associated With Treatment Initiation for Psychiatric and Substance Use Disorders Among Persons With HIV

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Abstract

Objective—Prior studies of individuals with HIV infection have found that accessing psychiatric and substance abuse treatment when needed can improve health and prolong life, yet little is known about factors associated with treatment initiation.

Methods—In a retrospective cohort design including individuals with HIV infection (14 years old) in an integrated health care system in Northern California, this study included 822 patients with a major psychiatric diagnosis and 1,624 with a substance use disorder diagnosis. Data were extracted from a regional HIV registry and computerized databases.

Results—Twenty-four percent (N=198) of study patients with psychiatric diagnoses and 15% (N=245) with substance abuse or dependence received one or more specialty care visits within 12 months of diagnosis. Among patients with a psychiatric diagnosis, significant predictors of visiting a psychiatry clinic included not having an AIDS diagnosis at baseline or before the study (p=.049), having a diagnosis of major depression (p=.013), having a diagnosis of bipolar disorder (p<.001), and receiving a psychiatric diagnosis in 1996 versus later years of the study (p<.01). Among patients with a substance use disorder, significant predictors of initiating substance abuse treatment included age <30 (p=.015) and being in the HIV transmission risk group of injection drug use (p<.001).

Conclusions—Clinical, diagnostic, and demographic factors were associated with specialty care treatment initiation in this sample of individuals with HIV infection and substance use or psychiatric disorders. Developing strategies to enhance treatment initiation has the potential to improve outcomes for individuals with HIV infection.

Studies of individuals with HIV have found high prevalence of psychiatric (1–3) and substance use (4,5) disorders. Substance use and psychiatric disorders are associated with numerous general medical co-morbidities (6,7) and inadequate anti-retroviral (ARV) adherence (8–11), and they place HIV patients at elevated risk for poor health outcomes,

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including early mortality (12–15). However, among HIV patients with these disorders, those who obtain substance abuse treatment (16) and psychiatric care (17,18) have higher rates of ARV utilization and better viral control (19,20), as well as lower risk of early mortality (5,21). Yet only a minority of HIV-positive patients receives these services (22–24). These studies highlight the urgency of investigations examining how HIV patients initiate behavioral health care, so that a greater number of patients may benefit.

The Andersen model (25) is a useful framework proposed to help understand factors that contribute to treatment initiation. The model has hypothesized that treatment initiation may be determined by predisposing factors, such as demographic characteristics; need factors, such as diagnosis and severity indicators (26); and enabling factors, such as insurance and social variables (27).

Although a number of studies have examined predictors of initiation of substance abuse treatment and psychiatric outpatient service by including components of the Andersen model (28–31), few have been conducted with HIV-positive samples. In a study of HIV patients in the Boston area, who were primarily heterosexual and unemployed (32), self-reported initiation of outpatient substance abuse treatment was associated with need factors of having hepatitis C, being homeless, and having a drug dependence diagnosis and with the enabling factor of not having members of the social support network encourage drug use. In a national probability sample (33), an analysis that controlled for need of psychiatric treatment found that initiating psychotropic medication was associated with predisposing factors of younger age, not being African American, and being disabled; with the need factor of having a greater number of HIV symptoms; and with the enabling factor of having Medicare. Initiating individual or family therapy was associated with higher education and being disabled (predisposing factors), and initiating outpatient substance abuse treatment was associated with being predisposing factors of being African American and having lower education and with the enabling factor of having Medicaid. In a multi-site study (34), initiating outpatient psychiatry services was associated with predisposing factors of not being African American and being disabled, with the need factor of current illicit drug use, and with the enabling factor of a greater number of recent primary care visits.

Although informative regarding treatment-seeking patterns, none of this work was conducted in insured samples. Our work builds on these prior studies by examining key demographic and clinical factors associated with outpatient treatment initiation in an insured sample in an integrated health plan, an important model of service delivery in which all patients have access to care.

Linking the Andersen model to the literature on initiation of behavioral health services among HIV patients, we hypothesized that among those with a psychiatric disorder, accessing psychiatric services would be associated with older age and white race as predisposing factors and greater HIV illness severity as a need factor (33). We also hypothesized that among those with a substance use disorder, accessing substance abuse treatment would be associated with the predisposing factor of black race (33) and with the need factors of lower CD4 T-cell counts, not taking ARV medications (32), and using illicit

injection drugs (35). Understanding these factors has the potential to enhance efforts to engage HIV-infected individuals with important services.

We examined factors associated with initiation of psychiatric and substance abuse treatment among health plan members with a diagnosis of a psychiatric or substance use disorder noted in their medical records, which established treatment need and awareness of providers. Members were in a private, fully integrated health care plan where access to care and ability to pay for care are not significant barriers to treatment. Conducting the study in this setting allowed us to focus on key clinical and demographic predictors of treatment initiation that health systems can address to improve services.

Methods

Study setting

We conducted a retrospective observational cohort study for years 1996 to 2009 among 12,636 HIV-infected individuals who were members of Kaiser Permanente Northern California (KPNC). KPNC is an integrated health care delivery system with a membership of 3.2 million individuals, representing 34% of the insured population in Northern California. The membership is representative of the population with respect to race-ethnicity, gender, and socioeconomic status, except for some underrepresentation of both extremes of the economic spectrum (36). Members with HIV infection receive services at medical centers throughout the KPNC 17-county catchment region.

Psychiatric and substance abuse treatment services are available to all members. Psychiatric treatment includes assessment, individual and group psychotherapy, and medication management. Outpatient substance abuse treatment services include both day hospital and traditional outpatient programs (37), both of which include eight weeks of individual and group therapy, education, relapse prevention, and family therapy.

Study sample

We assembled two cohorts. In the first, patients had at least one psychiatric diagnosis in their medical record (N=2,704, representing 21% of HIV registry patients); in the second, patients had at least one diagnosed substance use disorder during the study follow-up period (N=2,487, representing 20% of HIV registry patients). The two cohorts were not mutually exclusive. We included only patients with active disorders (that is, not in remission) who had received their diagnoses outside specialty care and before specialty treatment initiation (to enable examination of treatment initiation predictors) and who had at least one month of KPNC health plan membership (to allow enough time for a diagnosis to be assigned).

In the psychiatric cohort of 2,704 potential patients, we excluded 45 individuals whose medical records showed only remission codes and 1,738 patients who had had their first psychiatric clinic visit on or before their first date of psychiatric diagnosis. Finally, 99 patients who did not have at least one month of health plan membership before their first psychiatric diagnosis were excluded. Thus 822 patients were included in the psychiatric cohort analyses.

In the substance use disorder cohort of 2,487 potential patients, we excluded 248 patients whose medical records showed only substance use disorder remission codes and 350 patients who had been seen at a substance use disorder treatment clinic on or before their first date of substance use disorder diagnosis. Finally, the study excluded 265 patients who did not have at least one month of health plan membership before their first diagnosis date of substance use disorder. Thus, 1,624 patients were included in the substance use cohort analyses.

This study was approved by the institutional review boards of KPNC and the University of California, San Francisco.

Data sources

Since 1988, the KPNC Division of Research has maintained a surveillance system of members who are HIV-1 seropositive, ascertained through monitoring electronic inpatient, outpatient, laboratory testing, and pharmacy dispensing databases for sentinel indicators of probable HIV infection and confirmed through review of medical records. Ascertainment of HIV-infected members by this registry has been shown to be at least 95% complete. The HIV registry contains information on demographic characteristics (including sex, birth date, and race-ethnicity), HIV transmission risk group (men who have sex with men, injection drug users, heterosexual sex, other, and unknown), dates of known HIV infection, AIDS diagnoses, CD4 T-cell counts, and HIV-1 RNA levels.

KPNC maintains electronic databases on hospital admission, discharge, and transfer data and emergency department and outpatient visits. To control for the impact of health services utilization as an enabling factor (34,38)—for example, general medical visits may increase the likelihood of initiating specialty behavioral health care (39)—we measured the number of visits between the time of substance use or psychiatric diagnosis through the follow-up period (one year). Measures included inpatient hospitalization (yes or no), emergency department visits (yes or no) and out-patient visits (zero, one, or two or more visits). Inpatient and emergency department visits were dichotomized because these events were relatively infrequent.

ARV medication prescription data were obtained from KPNC pharmacy databases. Approximately 97% of HIV patients fill their prescriptions at KPNC pharmacies. ARV medication data included date of first fill, dosage, days of supply, and refills. Patients were classified as currently receiving or not receiving combination-ARV (or dual nonnucleoside reverse-transcriptase inhibitor–nucleoside reverse-transcriptase inhibitor ARV use for some who received treatment in 1996).

We used psychiatric and substance use diagnoses assigned by providers to identify participants. Diagnoses can be assigned in any clinical setting within the KPNC health plan, such as primary care or an emergency setting, but we excluded participants whose psychiatric diagnosis was initially made in a psychiatric department and participants whose substance use diagnosis was initially made in a substance abuse treatment clinic before they received a diagnosis in another setting. One or more diagnoses can be coded with *ICD-9* in the KPNC administrative databases (40,41). We studied the most common and serious

psychiatric disorders, including major depressive disorder, bipolar disorder, neurotic disorders (including panic), hysteria, phobic disorders, obsessive-compulsive disorder, anorexia nervosa and bulimia, and schizophrenic disorders (including schizoaffective type disorder). For the substance use disorder cohort, diagnostic categories included all alcoholic psychoses, drug psychoses, alcohol abuse or dependence, drug abuse or dependence (including opioid, barbiturate, sedative-tranquilizer, cocaine, cannabis, amphetamine, and hallucinogen abuse or dependence but excluding tobacco), as well as abuse of multiple or unspecified substances. Remission codes were excluded from the analyses.

Study outcomes

To determine whether patients in the study sample would likely meet a minimum criterion for receiving care (treatment initiation) (42,43), the primary outcomes examined in this study were initiation of psychiatric treatment (having one or more visits at KPNC) by HIV patients who had received a psychiatric diagnosis or initiation of substance abuse treatment (having one or more visits at KPNC) by those who had received a substance use disorder diagnosis, each occurring within one year of diagnosis. Follow-up for treatment initiation (first visit to psychiatry clinic) began at the date of first psychiatric diagnosis (baseline date for psychiatric cohort).

Statistical methods

Initial analyses focused on descriptive characteristics of patients with psychiatric or substance use disorders (Table 1). Cox proportional hazards regression was used to obtain point and interval estimates of risks relative to treatment initiation after diagnosis. These estimates were adjusted for an a priori chosen set of covariates based on the Andersen model, as follows: predisposing factors included age at psychiatric or substance use diagnosis, gender, race-ethnicity, and HIV transmission risk group; need factors included time-dependent covariates of CD4 T-cell counts, HIV-1 RNA levels, and ARV treatment (naïve or experienced) plus AIDS diagnosis before mental health diagnosis; and enabling factors included primary care visits, in-patient hospitalizations, and any emergency visits within the year before follow-up as well as the year of diagnosis of a psychiatric or substance use disorder (32). These variables were selected as key components of the Andersen model (44,45), in which demographic factors represent a biological imperative for service utilization and thus predispose individuals to access care, clinical measures and diagnoses represent professionally evaluated need for medical care, and health services utilization in the prior year represents contact with the health care system that can enable patients to obtain further services, in this case psychiatric and substance abuse treatment.

The regression model for the substance use disorder cohort included psychiatric diagnosis as a time-dependent covariate, and the model for the psychiatric diagnosis cohort included substance abuse or dependence diagnosis, major depression diagnosis, and bipolar disorder diagnosis as time-dependent covariates. Gender was included in but dropped from the final model because of lack of significance and because the sample was over 90% male. Data analyses were conducted with SAS software, version 9.1.

Results

Study patients with a psychiatric diagnosis had distributions of demographic and HIV-related clinical and behavioral characteristics similar to patients with a substance use disorder (Table 1). Most patients were white, male, and 30–49 years of age at baseline and belonged to the HIV transmission risk group of men who have sex with men. CD4 T-cell counts measured at or near time of study entry were comparable in both groups. Similar results in the two groups were observed for HIV RNA levels, although rates of ARV therapy were slightly higher in the psychiatric group.

Of the 822 patients with a psychiatric diagnosis, 24% had one or more psychiatry department visits postdiagnosis. The mean±SD time to first psychiatric clinic visit after diagnosis was 76.1±98.5 days. Of the 1,624 patients with a substance use disorder, 15% had one or more substance abuse treatment visits postdiagnosis. Time to first substance abuse treatment visit after diagnosis was 78.8± 95.5 days.

The relative hazards (relative risk) for predictors of substance abuse and psychiatric treatment initiation were estimated via Cox proportional hazards regression (Table 2). Among patients with a substance use disorder, significant predictors of having one or more visits to a KPNC substance abuse treatment program included younger age (under 30 versus 60 or older [p=.015] or 50–59 years old [p=.048]) as predisposing factors; being in the HIV transmission group of injection drug users who are not men who have sex with men (p<.001), a need factor; and not having CD4 cell counts measured during study follow-up (p=.015). Not having HIV RNA levels measured during study follow-up (p=.005) also was associated with not seeking care at a KPNC substance abuse treatment program.

Among patients with a psychiatric diagnosis, significant predictors of having one or more visits to a KPNC psychiatry clinic included the predisposing factor of older age—specifically, being in the 40- to 49-year-old group versus the under-30 group (p=.041). Having a diagnosis of major depression (p=.013) and having a diagnosis of bipolar disorder (p<.001) were significant need-related predictors of seeking psychiatric treatment, whereas having an AIDS diagnosis at or prior to entry into study was predictive of not seeking treatment (p=.049). Of patients receiving their psychiatric diagnosis between 1997 and 2009, those diagnosed later in the range were significantly less likely to seek psychiatric treatment compared with those diagnosed in 1996 (p<.01) (Table 2).

Discussion

As in prior HIV studies, in this study the results indicated substantial prevalence of both substance use and psychiatric disorders. The overall prevalence rates we observed (21% with a psychiatric disorder and 20% with a substance use disorder) were significantly elevated compared with rates of non–HIV-positive individuals in the general population (1). As in previous general population (29,30) and HIV (23) studies, in this study major depression was the most prevalent diagnosis. Overall rates and prevalence of specific psychiatric and substance use disorders were somewhat lower than those observed in other large HIV samples, perhaps because we used provider-assigned diagnosis in our sample

selection rather than structured interviews (3,4,23). Although the prevalence reported thus may be conservative, our approach identified rates of these disorders as recorded by health care providers, which serves as a baseline for examining to what extent these patients received subsequent specialty care services.

Direct comparison of rates of treatment initiation with results of other studies is difficult because of variability in time frame and treatment measurement. However, rates were similar to those found in prior general population studies, in which a minority of patients (approximately 15%–30%) of patients with substance use disorders (46–48) or psychiatric disorders (30,49–51) received specialty care treatment. These rates are also similar to those in prior studies of HIV-positive individuals (24,32,34), highlighting the significant gaps between service need and receipt of specialty care.

To inform ways to improve substance use and psychiatric care among HIV-infected patients, we used the Andersen model to examine demographic and clinical factors associated with initiating specialty services (25). Among indicators of treatment need, we found that two of the most frequent diagnoses (major depression and bipolar disorder) predicted psychiatric service initiation. One prior study found that among HIV-infected individuals with depression, shorter time to psychiatric treatment was associated with greater depression severity (52). Two prior studies found that having a substance use disorder was associated with accessing both substance abuse treatment and psychiatric services (33,34); however, these study samples included HIV-infected participants in general population samples rather than psychiatric samples. Although we did not measure illness severity, more acute and unstable psychiatric problems, such as bipolar disorder and severe depression, generally are managed in specialty psychiatry clinics within the KPNC health plan. Our findings are consistent with this practice.

Including year of diagnosis (enabling factor) as a covariate in the model showed that patients diagnosed as having a psychiatric disorder in later years were less likely to have initiated specialty care. Although the specific reasons for this cannot be determined, the finding is consistent with the trend in the United States for mental health conditions to be increasingly treated in primary care (53). Substance use disorders, which continue to be treated primarily in specialty care, showed no comparable result.

It is difficult to draw conclusions regarding the effect of having missing CD4 and HIV RNA measurements on initiation of substance abuse treatment. Measurements could be missing if a patient neglects routine monitoring, either because viral control is stable or because active substance use problems interfere with regular care. These reasons may explain why lack of HIV RNA measurement was associated with not initiating substance abuse treatment. CD4 tests are sometimes administered less frequently, and it is not clear whether the same possible explanations would apply, given the opposite direction of the effects observed. Not having an AIDS diagnosis was also significantly related to initiating specialty care in psychiatry, and reasons for this are similarly speculative: given the illness severity that an AIDS diagnosis indicates, it may be that illness prevented patients from accessing specialty psychiatric care or that psychiatric treatment was managed in primary care.

Implications for patient care

Improving specialty care service linkages or enhancing primary care–based services could help HIV patients obtain needed substance abuse treatment. For example, one KPNC study found that patients with a substance use disorder and comorbid chronic general medical conditions had better alcohol and drug use outcomes when medical services were integrated (37). In this approach, general medical care was colocated with substance abuse treatment. Alternative forms of implementation of the screening, brief intervention, and referral to treatment (SBIRT) model are being studied, as is training for primary care providers on motivational interviewing to enhance willingness to change and procedures for linking patients with substance abuse treatment (54). Using motivational interviewing as well as secure electronic messaging to implement SBIRT strategies for HIV patients is also being investigated within the health plan (55). Such approaches could help enhance treatment initiation for substance use disorders, including in systems such as KPNC, which are already designed to deliver integrated care but would benefit from more active linkages.

Similarly, enhancing psychiatric specialty care linkages as well as services in primary care also should be explored. Strategies such as those used in the Improving Mood: Promoting Access to Collaborative Treatment trial have explored how to improve depression treatment within primary care settings (56). Depression treatment initiatives implemented in KPNC also have encouraged electronic communication between patients and specialty care providers (57). Given the need for HIV patients to closely track their medications and other aspects of care, these strategies seem especially appropriate in this population.

In addition, analysis of factors associated with treatment initiation helps reveal which patients may be least likely to access care (such as older adults with a substance use disorder). Building on prior studies of utilization of substance use and psychiatric treatment (31,33,58), this study indicates that targeting subgroups of HIV patients in primary care services who underutilize care and addressing issues such as the stigma associated with going to a psychiatry or substance use clinic may help to increase treatment initiation. For patients without significant financial barriers but unwilling to access specialty services within an integrated system, primary care integration strategies are likely to be especially important.

Study strengths and limitations

Strengths of this study include its large sample size and use of administrative data. We used a conservative method in which study patients' specialty care visits had to occur subsequent to diagnosis to ensure appropriate measurement of predictors of treatment initiation (rather than coincident treatment and diagnosis). Thus we selected patients given a diagnosis in clinics other than chemical dependency or psychiatry, such as within primary care, and focused on treatment initiation rather than on extent of services received.

The study also had limitations. The selection criteria necessitated by our study design resulted in a subsample of the HIV patients treated in KPNC: for example, patients who did not receive a substance use or psychiatric diagnosis before initiating specialty care services were excluded. This could affect the representativeness of the sample. Some patients may

have met the criteria for a psychiatric or substance use disorder without receiving a diagnosis, which would also affect representativeness. When participants received diagnoses of psychiatric or substance use disorders, it is not known whether providers discussed these diagnoses with the participants or whether providers specifically referred participants to specialty care. A further limitation of the study is missing data on some measures, such as CD4 cell counts and HIV RNA levels at baseline, reducing our ability to examine the impact of these factors.

The study did not examine services received apart from KPNC specialty care. Additional sources for treatment may have been accessed by HIV-infected members, including discussion of behavioral health problems with a primary care physician (33) and Alcoholics Anonymous or other self-help groups. We note that the characteristics of HIV patients seeking formal substance abuse treatment services and self-help may be similar (33). Because accessing specialty care can reduce mortality (5,21), and referral to specialty care for those with more severe disorders is a widely used approach, exploring potential barriers to treatment initiation is an important area of investigation.

Conclusions

This study examined predictors of substance abuse treatment and psychiatric specialty care treatment initiation among members of an HIV/ AIDS registry in an integrated health plan. As in prior studies, a minority of patients with substance use or psychiatric disorders initiated treatment. Demographic and clinical factors were associated with treatment initiation, which varied between the two types of diagnosis. Developing strategies to enhance specialty care treatment initiation has the potential to improve health outcomes for those with HIV infection.

Acknowledgments

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Table 1

Demographic and clinical baseline characteristics of Kaiser Permanente Northern California HIV/AIDS Registry participants with a substance use disorder or psychiatric diagnosis

Characteristic	Substance use disorder (N=1,624)		Psychiatric disorder (N=822)	
	N	%	N	%
Age				
<30	109	7	44	5
30–39	556	34	240	29
40–49	621	38	298	36
50–59	268	17	174	21
60	70	4	66	8
Gender				
Female	133	8	78	9
Male	1,491	92	744	91
Race-ethnicity				
White	1,012	62	452	55
African American	283	17	134	16
Hispanic	181	11	130	16
Other	72	4	52	6
Unknown	76	5	54	7
HIV risk transmission				
Heterosexual sex	181	11	100	12
Injection drug use				
Not among men who have sex with men	116	71	32	4
Including men who have sex with men	123	8	50	6
Men who have sex with men	1,020	63	530	64
Coagulation disorder or transfusion	13	1	6	1
Unknown	171	11	104	13
AIDS diagnosis				
No	823	51	352	43
Yes	801	49	470	57
CD4 cell count (per μl)				
Missing	292	18	169	21
<100	156	10	71	9
100–200	192	12	84	10
201–349	303	19	162	20
350–499	392	24	169	21
500	289	18	167	20
HIV RNA level at baseline				
Missing	464	29	290	35
$10^{4.7}$	269	17	111	14
$10^{3.3}$–$<10^{4.7}$	392	24	139	17

Characteristic	Substance use disorder (N=1,624)		Psychiatric disorder (N=822)	
	N	%	N	%
$10^{2.7}$–$<10^{3.3}$	128	8	54	7
$<10^{2.7}$	372	23	228	28
Antiretroviral treatment				
No	735	45	270	33
Yes	889	55	552	67
Any visit to emergency department				
No	1,162	72	598	73
Yes	462	28	224	27
Any inpatient stays				
No	1,388	85	680	83
Yes	236	15	142	17
Any psychiatric disorder				
No	1,151	71		
Yes	473	29		
Specific psychiatric diagnosis				
Major depression			526	64
Anorexia or bulimia			132	16
Panic disorder			99	12
Bipolar disorder			41	5
Other			25	3
Any substance use disorder				
No			634	77
Yes			188	23
Specific substance use diagnosis				
Alcohol dependence or abuse	585	36		
Cannabis abuse or dependence	195	12		
Dependence or abuse of multiple substances	195	12		
Amphetamine abuse or dependence	114	7		
Alcohol or drug psychoses	65	4		
Cocaine abuse or dependence	49	3		
Opioid abuse or dependence	16	1		
Unspecified	358	22		
Initiated outpatient psychiatric services				
No			624	76
Yes			198	24
Initiated outpatient substance abuse treatment				
No	1,379	85		
Yes	245	15		

Table 2

Factors predicting initiation of substance abuse and psychiatric specialty care among HIV patients with substance use and psychiatric disorder diagnoses[a]

Characteristic	Substance abuse treatment		Psychiatric treatment	
	Hazard ratio	95% CI	Hazard ratio	95% CI
Age (reference: <30)				
30–39	.99	.61–1.62	1.77	.79–3.96
40–49	.67	.40–1.11	2.30[*]	1.04–5.09
50–59	.55[*]	.31–1.00	1.69	.73–3.95
60	.26[*]	.09–.78	.70	.22–2.16
Race-ethnicity (reference: white)				
African American	.85	.58–1.25	1.45	.97–2.18
Hispanic	.79	.51–1.23	.85	.54–1.36
Other	1.03	.57–1.89	1.16	.62–2.17
Unknown	1.22	.68–2.19	.98	.50–1.95
HIV transmission risk (reference: heterosexual sex)				
Injection drug use				
Not among men who have sex with men	3.49[***]	1.89–6.45	1.15	.52–2.53
Including men who have sex with men	1.85	.95–3.59	.94	.45–1.96
Men who have sex with men	1.57	.93–2.64	.91	.57–1.46
Coagulation disorder or transfusion	.00	.00–.00	1.84	.39–8.68
Unknown or not measured	1.42	.74–2.71	.73	.38–1.41
CD4 cell count at baseline (reference: 500 cells/μl)				
350–499	1.07	.76–1.52	.98	.68–1.43
201–349	1.12	.77–1.64	.75	.49–1.14
100–200	1.12	.68–1.86	.53	.27–1.02
<100	.72	.38–1.35	.41[*]	.19–.87
Unknown or not measured	2.98[*]	1.13–7.87	1.54	.43–5.51
HIV RNA level at baseline (reference: $<10^{2.7}$)				
$10^{2.7}–<10^{3.3}$	1.13	.68–1.86	.64	.29–1.42
$10^{3.3}–<10^{4.7}$	.89	.61–1.28	.83	.51–1.35
$10^{4.7}$	1.27	.82–1.95	1.72[*]	1.00–2.97
Unknown	.26[**]	.10–.67	.67	.22–2.09
Antiretroviral therapy during follow-up (reference: no)	1.19	.86–1.63	1.21	.81–1.80
AIDS diagnosis at baseline (reference: no)	.90	.65–1.24	.71[*]	.50–1.00
Visit to outpatient clinics (reference: 0)				
1	.74	.37–1.47	.79	.32–1.97
2	.87	.52–1.47	1.10	.54–2.24
Visit to emergency department (reference: no)	.99	.73–1.34	.82	.56–1.21
Inpatient stay (reference: no)	.92	.60–1.40	1.39	.88–2.19

Characteristic	Substance abuse treatment		Psychiatric treatment	
	Hazard ratio	95% CI	Hazard ratio	95% CI
Psychiatric diagnosis (reference: no)	1.09	.82–1.45		
Substance use disorder (reference: no)			.69	.48–1.01
Major depression diagnosis (reference: no)			1.63*	1.11–2.39
Bipolar diagnosis (reference: no)			3.41***	1.90–6.11
Year of psychiatric diagnosis (reference: 1996)				
1997			.48	.12–1.93
1998			.21*	.05–.89
1999			.44	.09–2.11
2000			.18*	.05–.69
2001			.22*	.06–.81
2002			.22*	.06–.76
2003			.16**	.05–.53
2004			.17**	.05–.54
2005			.26*	.08–.80
2006			.15**	.05–.50
2007			.20**	.06–.63
2008			.15**	.05–.46
2009			.15**	.05–.49
Year of substance use disorder diagnosis (reference: 1996)				
1997	1.36	.63–2.91		
1998	1.75	.81–3.78		
1999	.95	.43–2.13		
2000	1.48	.70–3.14		
2001	.91	.41–2.03		
2002	1.74	.83–3.66		
2003	1.06	.47–2.03		
2004	1.64	.76–3.51		
2005	1.15	.53–2.52		
2006	1.35	.62–2.94		
2007	1.43	.66–3.10		
2008	1.93	.87–4.26		
2009	.75	.28–2.00		

[a]N=1,624 participants with a substance use disorder and 822 participants with a psychiatric diagnosis

* p<.05,

** p<.01,

*** p<.001