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Access to HAART and Utilization of Inpatient Medical Hospital Services among HIV-Infected Patients with Co-Occurring Serious Mental Illness and Injection Drug Use

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Abstract

Objective— Among HIV infected individuals we examined whether having a co-occurring serious mental illness (SMI) and injection drug use (IDU) impacts: (1) receipt of HAART and (2) utilization of inpatient HIV services, compared to those who have SMI only, IDU only, or neither.

Methods— Demographic, clinical, and resource utilization data were collected from medical records of 5,119 patients in HIV primary care at 4 U.S. HIV care sites in different geographic regions with on-site mental health services in 2001. We analyzed receipt of HAART using multivariate logistic regression and number of medical hospital admissions using multivariate logistic and Poisson regression analyses, which controlled for demographic factors, receipt of HAART, CD4 count and HIV-1 RNA.

Results— Those with a co-occurring SMI and IDU (AOR: 0.52 [0.41– 0.81]) and those with IDU alone (AOR: 0.64 [0.58– 0.85]) were significantly less likely to receive HAART than those with neither SMI nor IDU, controlling for demographic and clinical factors. Those with co-occurring SMI and IDU were more likely to use any inpatient medical services (AOR: 2.22 [1.64–3.01]) and significantly more likely to use them more frequently (IRR:1.33 [1.13–1.55]) compared to those with neither SMI nor IDU, SMI only or IDU only.

Conclusions—HIV-infected individuals with co-occurring SMI and IDU are significantly more likely to utilize HIV-related medical inpatient services than individuals with no or only one comorbidity. Individuals with both SMI and IDU did not differ from those with IDU only in receipt of HAART. Inpatient hospitalizations are expensive, and efforts should be targeted towards these populations to reduce potentially avoidable inpatient care.

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Background

Individuals with serious mental illness (SMI) are reported to be at high risk for HIV infection. [1] Estimates from samples during the 1990s suggest that the prevalence of HIV among individuals with SMI ranges from 3–23%.[2–10] Highly active antiretroviral therapy (HAART) has revolutionized the treatment of HIV leading to significant declines in HIV related morbidity and mortality as well as declines in hospitalization. [11–17]

Although previous studies suggest that individuals with SMI are less likely to receive potentially life saving interventions for non-HIV-related chronic conditions, [18;19] few studies have evaluated the degree to which HIV infected individuals with SMI receive HAART. One study using New Jersey Medicaid claims data from 1996–1998 found that patients with serious mental illness were more likely to have initiated new antiretroviral therapy, defined as receiving a protease inhibitor or a non-nucleoside reverse transcriptase inhibitor, compared to those without serious mental illness.[20] An important limitation of this study was its inability to adjust for CD4 count, suggesting the results may be confounded by severity of disease. Another study compared 154 HIV infected patients with SMI to a sample of 762 HIV infected patients without SMI and found no difference in the percentage of those treated with HAART. [21]An important limitation of this study was that the control group was drawn from a Western U.S. probability sample of HIV infected patients who were participants in a separate study that occurred several years earlier. The use of such a sample raises questions about the effect of secular trends with respect to the treatment HIV over time.

Poor access to HIV medical care, including access to HAART, can lead to increased morbidity and increased reliance on costly inpatient hospitalizations. [22] In the pre-HAART era, one study using hospital discharge claims data reported that HIV infected individuals with psychiatric illnesses had fewer inpatient medical admissions but had longer lengths of stay, compared to those without psychiatric illness. [23] Those HIV infected individuals diagnosed with SMI were reported to have among the longest hospital stays, even when compared to those with other non-SMI psychiatric illnesses. A more recent study in the HAART era found that individuals with AIDS and a history of SMI had similar length of inpatient medical hospital stays, compared to those with no mental illness history. [24] Although both studies noted that injection drug use (IDU) was associated with longer lengths of hospitalization, neither study investigated whether a co-occurring SMI diagnosis and a history of IDU was associated with increased utilization of inpatient medical admissions or longer lengths of stays.

It is well known that co-occurring substance use disorders are common among those with SMI [25;26]. Those with SMI and co-occurring substance abuse disorders are known to have poorer psychiatric treatment compliance and greater use of crisis-oriented services that result in higher costs of care. [27] Although those with injection drug use are significantly less likely to be prescribed HAART, [20;28] it is largely unknown whether those with SMI and co-occurring injection drug use are at even greater risk of not being prescribed HAART. It is quite possible that having 3 stigmatizing diseases -- HIV, a serious mental illness and injection drug use -- may be associated with not only worse access to medical treatment, including access to HAART, but may also be associated with increased HIV-related morbidity as well as increased reliance on costly inpatient hospitalizations. [22]

The goal of this study is to determine, among a sample of HIV infected individuals receiving outpatient HIV primary medical care, whether SMI and a history of co-occurring IDU are associated with: (1) decreased receipt of HAART; (2) increased utilization of inpatient general medical hospitalizations and (3) increased median length of inpatient hospitalization as compared to those with SMI alone, IDU alone or those with neither SMI nor IDU. This study improves upon the results of previous studies because analyses adjust for severity of HIV

disease (e.g. CD4 count and HIV-1 RNA) and use a time concordant control group as well as an accepted definition of HAART.

Methods

Design

This is a cross-sectional study of a sample of HIV infected individuals who received at least 2 health care encounters at HIV outpatient treatment facilities during calendar year 2001.

Site Selection

The HIV Research Network (HIVRN) is a consortium of 21 sites that provide primary and subspecialty care to HIV patients. To participate, a site had to have a minimum data set available in electronic format or through paper abstraction, including the patients' age, sex, race, HIV transmission risk factor, AIDS-defining illnesses, CD4 level, HIV-1 RNA, and use of antiretroviral medication. Eleven sites also collected data on resource utilization, including hospital admissions, length of stay, and outpatient clinic and office visits. Four sites collected additional information regarding utilization of mental health and substance abuse services, including psychiatric diagnosis, mental health office visits and substance abuse office visits. Data from these 4 sites, located in coastal regions of the United States where HIV is most endemic, make up the final sample. These four sites represent nearly 40% of patients from the 15 adult sites. The median sample size per site is 1922 patients (range: 256 to 2136 patients). This analysis was limited to adult patients (≥18 years old) who were in longitudinal HIV primary care, as defined by at least two recorded visits to a primary care provider and one recorded CD4 test result during calendar year 2001. Calendar year 2001 was chosen as the baseline year of a larger longitudinal study.

Data Collection

The data elements described above were abstracted from electronic or paper records at each site. Abstracted data were sent in electronic format to a data-coordinating center after personal identifying information was removed. For this analysis, data collection encompassed calendar year 2001. The date of the encounter (not the date of billing or payment of claim) was used. Electronic data received by the coordinating center were reviewed to ensure that each data element was correctly formatted and that all elements were captured. Data elements with incorrect formatting, unknown or incomplete information, or other inaccuracies were reviewed with the site and corrected. After this verification process, the data were combined across sites to achieve a uniformly constructed multi-site database. A variable identifying the site was included in the database.

Definitions of Variables

HAART was defined as use of: (1) three or more nucleosides; (2) any use of one or more protease inhibitors [PI] or a non-nucleoside reverse transcriptase inhibitor[NNRTI] in combination with two or more nucleoside RTIs; or (3) a PI, NNRTI, nucleoside RTI combination. Patients were considered to be on HAART if they received any of these combinations during the calendar year. The CD4 and HIV-1 RNA laboratory values used in this analysis were the first values recorded in 2001.

Serious mental illness was defined using the following ICD-9 codes for schizophrenia or other psychoses, bipolar disorder, and depressive disorders (295.0–9; 296.0–8; 311; 297.0–3, 297.8–9; 298.0–9). For the 4 sites in the analyses, these codes were generated by evaluations performed by psychiatrists. Injection drug use was defined as a history of injection drug use as an HIV transmission factor. Although this may not capture active injection drug use,

previous research suggests that the vast majority of those with a history of injection drug use continue to use. [29] Based on these definitions, 4 mutually exclusive SMI/IDU categories were created: (1) those with serious mental illness and a history of injection drug use (SMI and IDU); (2) those with a history of injection drug use only (IDU); (3) those with serious mental illness only (SMI) and (4) those with neither serious mental illness nor a history of injection drug use (neither SMI nor IDU).

For each patient, the number of non-psychiatric, medical hospital admissions and the length of stay for each admission were determined for the 12-month time period from January 1 – December 31, 2001. Length of stay (LOS) for each admission was calculated by subtracting the admission date from the discharge date and adding 1; same day admissions and discharges thus count as one day. We calculated the mean and median length of stay for each hospital admission for all patients hospitalized.

The study was approved by the institutional review boards of the University of Maryland School of Medicine and the Johns Hopkins School of Medicine as well as each of the participating sites.

Data Analysis

We first conducted descriptive analyses of demographic and clinical characteristics, including age, gender, race/ethnicity (White, Black and Other), use of HAART, CD4 count (≤50, 51–200, 201–500, > 500 cells/mm^3), HIV-1 RNA (≤400 or > 400 copies/ml) and SMI/IDU category. A total of 208 patients (3.9%) were removed from the analyses due to missing data for gender, race/ethnicity, or HIV-1 RNA.

In bivariate analyses, we examined the relationships between SMI/IDU category and demographic and clinical factors, prescription of HAART and utilization of inpatient admissions. To determine whether those with SMI and IDU, those with IDU only, or those with SMI only were differentially likely to receive a prescription for HAART, as compared to those with neither SMI nor IDU, we used multivariate logistic regression to determine the adjusted odds-ratios and 95% confidence intervals associated with the dependent variable of being prescribed HAART. This analysis adjusted for potential confounding factors including: age, gender, race, and CD4 count. Tests of equivalence of estimated odds-ratios were conducted to determine whether there were differences in likelihood of HAART receipt among those with SMI and IDU, those with IDU only, or those with SMI only.

Next we investigated whether SMI/IDU category was associated with inpatient medical admissions. Since 77% of patients did not have an inpatient admission in 2001, we used a two-part approach to model inpatient medical admissions.[30] The first part of the model used multivariate logistic regression to determine the adjusted odds-ratios and 95% confidence intervals of ever being hospitalized in calendar 2001. The second model used a multivariate Poisson regression that accounted for over-dispersion to analyze the number of inpatient medical hospitalizations among those who were hospitalized during calendar year 2001. These analyses adjusted for potential confounding factors, including: age, gender, race, CD4 count, HIV-1 RNA, receipt of HAART, and site. Tests of equivalence of estimated odds-ratios were conducted to determine whether there were differences in likelihood of HAART receipt among those with SMI and IDU, those with IDU only, or those with SMI only. Among hospitalized patients, we also compared median and mean length of inpatient stay across SMI/IDU categories.

To gauge the significance of an interaction between SMI and IDU, in additional multivariate analyses we respecified the model to include a main effect of IDU, a main effect of SMI, and a term representing the interaction between SMI variable and IDU. All reported p-values are

two-sided. In all analyses, we adjusted for site of care to capture site-specific variation in HAART prescription or utilization patterns.

Analyses using more detailed psychiatric diagnostic categories (i.e., diagnoses of schizophrenia or bipolar disorder versus diagnosis of depression) did not reveal significant differences across diagnostic categories with respect to HAART or inpatient hospitalization. We therefore report analyses that use a dichotomous SMI – no SMI variable.

Results

Demographic and Clinical Characteristics

Our sample consisted of 5,119 HIV infected patients in primary HIV care. The majority of the sample was male (69.6%), non-white (68.4%) with a median age of 41.6 years (SD=8.6). Sixty-six percent had a CD4 count greater than 200 cells/mm^3 and 40.7% of the sample had a HIV-1 RNA of less than 400 copies/ml. Of this sample, 5.2% were defined as SMI and IDU, 25.3% were defined as IDU only, 9.8% were defined as SMI only, and 59.6% were defined as neither SMI nor IDU. Among those with SMI, 3.5% were diagnosed with schizophrenia or other psychoses, 8.6% were diagnosed with bipolar affective disorder and 87.8% were diagnosed with depressive disorders. Approximately 73% of those diagnosed with schizophrenia or other psychoses received HAART; 72.7% of those diagnosed with bipolar disorder received HAART; and 80.2% of those diagnosed with depression received HAART. The differences in receipt of HAART by SMI diagnosis were not statistically significant (P=0.22).

Comparing demographic and clinical characteristics across SMI/IDU categories revealed that those with SMI and IDU were more likely to be female, have lower CD4 counts and higher HIV-1 RNA‘s than those with neither SMI nor IDU. They were also least likely to be prescribed HAART (Table 1).

Adjusted Odds of Being Prescribed HAART

After adjusting for age, sex, race, CD4 count, and site, those with SMI and IDU had a 48% reduction in the odds (AOR [95% CI]: 0.52 [0.41– 0.81]) of being prescribed HAART, compared with those with neither SMI nor IDU. Those with IDU had 36% reduction in the odds (AOR 0.64 [0.58– 0.85]) of being prescribed HAART compared with those with neither SMI nor IDU. Those with SMI only were as likely (AOR 0.85 [0.71– 1.23]) to be prescribed HAART as those with neither SMI nor IDU. (Table 2) Further testing for equality of regression coefficients did not find a statistically significant difference in the odds of receiving HAART comparing SMI and IDU to those with IDU only (X^2=1.82, p=0.18). However, the odds of receiving HAART comparing SMI and IDU to those with SMI only were statistically significant (X^2=6.57, p=0.01). The interaction between SMI and IDU was not statistically significant (P=0.22).

Significantly greater odds of receiving a prescription of HAART were observed for men compared to women (AOR: 1.41 [1.10–1.57]), and older patients (AOR: 1.02 [1.01–1.03]). The odds of receiving HAAART increased among those with lower CD4 cell counts. (Table 2)

Utilization of Any Non-Psychiatric Inpatient Medical Hospitalization

Thirty six percent of those with SMI and IDU had an inpatient medical hospitalization during 2001, compared with IDU only (29%), SMI only (26%) and neither SMI nor IDU (18%). Those with both SMI and IDU were significantly more likely to use inpatient medical services (X^2=102.5, p<0.001) compared to those who had SMI only, IDU only, or neither. Among those who had at least one hospitalization, those with SMI and IDU had a mean of 2.46

hospitalizations with a median of 2 hospitalizations; those with IDU only had a mean of 1.8 hospitalizations with a median of 1 hospitalization; those with SMI only had a mean of 1.7 hospitalizations with a median of 1 hospitalization and those with neither SMI nor IDU had a mean of 1.8 hospitalizations with a median of 1 hospitalization.

After adjusting for age, sex, race CD4 count, HIV-1 RNA, prescription of HAART and site, those with SMI and IDU had over two times the odds (AOR: 2.22 [1.64–3.01]) of utilizing inpatient medical hospitalization as compared to those with neither SMI nor IDU. Those with IDU had a 65% greater odds (AOR: 1.65 [1.39–1.96]) and those with SMI nearly a 70% greater odds (AOR: 1.70 [1.34–2.15]) of utilizing any inpatient medical hospitalization, compared with those with neither SMI nor IDU (Table 3). Further testing for equality of odds-ratios did not find a statistically significant difference in the odds of hospitalization comparing SMI and IDU to those with IDU only (X^2=3.43, p=0.06), or compared to those with SMI only (X^2=2.19, p=0.13). The interaction between IDU and SMI was not statistically significant (P=0.53).

The likelihood of inpatient hospitalization was greater among women, older patients, non-Caucasians, and those with lower CD4 cell counts or detectable HIV-1 RNA. Receiving HAART, however, was not significantly associated with any inpatient hospitalization.

Incidence Rate Ratios of a Non-Psychiatric Inpatient Medical Hospitalization among those Hospitalized at Least Once

In multivariate Poisson regression analysis among the 1,102 patients with at least one inpatient admission, those with SMI and IDU had an inpatient medical hospitalization incidence rate ratio of 1.33 [1.13–1.55] compared to those with neither SMI nor IDU. The inpatient non-psychiatric medical hospitalization incidence rate ratios for those with IDU alone or SMI alone were not significantly different than those with neither SMI nor IDU. (Table 4) The inpatient non-psychiatric medical hospitalization incidence rate ratios for those with SMI and IDU were significantly different from those with IDU alone (X^2=8.89, p=0.002) as well as for those with SMI alone (X^2=10.2, p=0.001). The interaction between SMI and IDU was found to be statistically significant (P=0.01). CD4 count was the only other significant predictor of number of inpatient hospitalizations.

Mean and Median Length of Non-psychiatric Inpatient Hospital Stays

Those with SMI and IDU had a mean length of stay of 6.8 days (95% CI: [5.8–7.7 days] with a median length of stay of 5 days (95% CI: [4–7 days]; those with IDU only had a mean length of stay 7.6 days (95% CI: [6.5–8.7 days] with a median length of stay 4.5 days (95% CI: [4–5 days]; those with SMI only had a mean length of stay 5.2 days (95% CI: [4.2–6.1 days]with a median length of stay 3.3 days (95% CI: [3–4 days] and those with neither SMI nor IDU had a mean length of stay 6.5 days (95% CI: [5.8–7.2 days] with a median length of stay of 4.5 days (95% CI: [4–5 days].

Discussion

Our findings highlight the difficulties in treating HIV-infected patients with co-occurring SMI and IDU. First, among a sample of HIV infected individuals receiving outpatient medical treatment, individuals with IDU and those with both SMI and IDU were least likely to be prescribed HAART. Compared to those with neither SMI nor IDU and after adjusting for HIV disease severity, the odds of receiving HAART were 48% lower for those with both SMI and IDU, and 36% lower for those with IDU only. Clinical concerns about adherence [31–33;33], and the perceived public health risk of the spread of resistant strains of HIV [31–35] may limit the prescription of these potentially lifesaving antiretroviral medications. [36] For example, one study reported that HIV infected individuals with a history of injection drug use were

significantly more likely to have a delay in initiation of protease inhibitor therapy as compared to those without injection drug use. [32] This finding may reflect HIV providers' concerns regarding how substance use may affect adherence to HAART. Although access to care may also be an important factor, we believe that that this would not completely explain the current results, as all the patients in this study had at least 2 outpatient visits per year, and the odds of receiving HAART remained lower for those with both SMI and IDU even after controlling for CD4 count and HIV-1 RNA.

Although those with SMI and IDU and those with IDU only were significantly less likely to receive HART than those with neither SMI nor IDU, it is noteworthy that nearly 74% of those with SMI and IDU and nearly 80% of those with IDU were reported to be receiving HAART. Bogart et al. reported that approximately 51% of SMI patients were receiving HAART. Our findings may reflect the study selection of high-volume HIV specialty providers who have on-site mental health consultants that advocate and have experience with this population. [37]

Although individuals with SMI have been reported to receive poor quality medical care,[18; 38;39] we found that HIV infected individuals with SMI only were as likely to be prescribed antiretroviral medication as those with without SMI. Prior research has also found that HIV-infected persons with SMI were not less likely than those without SMI to receive HAART. [20;40] Taken together, these findings suggest that individuals with SMI in the absence of injection drug use may be receiving care that is on par with HIV infected individuals without SMI.

Consistent with past literature, we also found that those with IDU only were significantly less likely to be prescribed HAART than those without SMI and IDU.[20;28] We also found that men were significantly more likely to be prescribed HAART than women and decreasing CD4 cell count were associated with increased prescription of HAART.[41]

After adjusting for severity of HIV disease and treatment with HAART, those with both SMI and IDU were as likely to be hospitalized in an inpatient medical facility at least once in 2001 as those with SMI only or IDU only; all three groups had a higher likelihood of hospitalization than those with neither SMI nor IDU. However, among those hospitalized at least once, those with both SMI and IDU had an adjusted inpatient medical hospitalization incidence rate ratio of 1.33, significantly higher than HIV infected individuals with neither SMI nor IDU. This is in contrast to the pattern found for both those with SMI alone as well as those with IDU alone. Although those with SMI alone and those with IDU alone were significantly more likely to be hospitalized once during 2001, as compared to those with neither SMI nor IDU, the number of hospitalizations among those with at least one admission was not significantly different compared to those with neither SMI nor IDU. It is interesting to note that HAART itself was not a significant predictor of utilization of inpatient hospitalizations. This may suggest that inpatient hospitalization may not be uniquely due to HIV related illness but rather may be the result of other chronic medical conditions, the result of injuries or the result of illnesses linked to injection drug use.

There are several potential reasons individuals with both SMI and IDU may be at the highest risk for multiple medical hospitalizations. Limited access to as well as inconsistent adherence to HAART may lead to increased HIV related morbidity and increased medical hospitalizations. For example, patients with schizophrenia and co-occurring substance use disorders tend to have poorer psychiatric treatment compliance, and greater use of crisis-oriented services that result in higher costs of care. [27] Furthermore, symptoms associated with both substance use and mental illness such as paranoia, distractibility or impulsivity may limit consistent use medical services and poorer access to HAART. This may then be compounded by short hospitalizations that do not adequately address the complicated nature

of co-occurring substance abuse, medical and psychiatric illnesses these patients have. [24] Finally, without proper outpatient post-hospital aftercare that evaluates and treats these illnesses in the outpatient realm, it is quite possible that these problems will inevitably require additional hospitalizations.[42]. Future analyses will need to be done to further evaluate these hypotheses.

Although Udall et al. [23] previously reported median length of inpatient hospitalization as 8 days using data from 1990–1992, it is not surprising that the median length of hospital stays has decreased given both the medical advances in HIV treatment (e.g. HAART)[11] and structural and financial changes associated with inpatient hospitalizations (e.g. emphasis on shorter hospital stays) that have occurred over the last decade.[43;44]

Our study has limitations. First, as this is a cross-sectional study, we cannot make strong claims as to the direction of causation. Although HIV may cause people to have depressive and psychotic symptoms,[45] research suggests that in the majority of cases psychotic disorders precede HIV infection.[46] Second, the sample is not nationally representative and does not generalize to all HIV care sites. The sites in the sample do encompass a geographic distribution that is in keeping with the HIV epidemic, and multi-site studies afford greater generalizeability than single-site studies. Moreover, the sites in the HIVRN were all highly experienced in the treatment of HIV with high rates of HAART [47] and opportunistic infection prophylaxis rates; [48]results may differ at sites with less provider experience with HIV or a smaller caseload of patients with HIV. Also, only 4 of the 15 adult sites in the Network collect comprehensive mental health and utilization data. However, these 4 sites represent nearly 40% of the total patients captured by the HIVRN. As these sites have the capacity to provide mental health data, they may be more likely to provide a higher level of care for individuals with co-occurring mental health and substance abuse disorders. It is possible that our findings from these sites may overestimate receipt of HAART and may underestimate the rate of inpatient hospitalization use compared to clinics that do not provide on-site mental health and substance abuse care. Third, as our definition of serious mental illness was based on ICD-9 codes and not based on patient clinical interviews, we were unable to confirm the validity of the diagnoses. Furthermore, the ICD-9 codes reflect use of psychiatric services provided within the clinic and do not capture use of mental health services provided outside of the clinic. As all the clinics have on-site psychiatric services, it is unlikely that many patients seek mental health care outside the clinic. However, because our data do not capture use of mental health services provided outside of the clinic the results may underestimate inpatient service use. Finally, in identifying patients who were not receiving HAART, we were unable to assess whether they refused it or whether other complex medical decision-making by them and their providers resulted in their not being on HAART.

Conclusions

HIV-infected individuals with co-occurring SMI and IDU have higher rates of medical inpatient admission than those with one or none of these comorbidities. As inpatient hospitalizations are expensive, efforts should be targeted towards tailoring interventions for these populations to increase their use of essential outpatient medical services and reduce their utilization of potentially avoidable inpatient care. Assertive community case management treatment interventions have been previously found to be successful in reducing inpatient psychiatric hospitalizations among those with SMI, [49] the majority of whom also have co-occurring substance use disorders. [25;26] As those with co-occurring SMI and IDU had the highest rate of costly inpatient medical hospitalization, interventions that use principles of assertive community case management treatment to coordinate medical, psychiatric and substance abuse care may be an important and potentially beneficial intervention for this group of HIV-infected individuals. Further longitudinal studies that address issues of adherence to

medical, psychiatric and substance abuse treatments are necessary to explain why these individuals are at higher risk of utilizing inpatient medical care.

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Table 1

Demographic characteristics, HIV Severity and Treatment with HAART stratified by presence or absence of SMI and History of Injection Drug Use

Characteristic	SMI and IDU (N=267)	IDU Only (N=1298)	SMI Only (N=504)	Neither SMI nor IDU (N=3050)
Age (Mean±SD)*	41.9±6.7	43.7±7.0	41.7±8.3	40.8±9.4
Female (%)*	42.7	29.9	35.9	28.6
Race (%)*	30.7	23.0	38.3	34.3
Caucasian	45.3	57.5	33.1	37.8
Black/AA	24.0	19.5	28.6	27.9
Other				
CD4 count (cells/mm^3) (%)*	29.8	22.8	31.2	27.5
>500	34.7	42.6	41.2	41.7
201–500	24.6	22.8	19.0	19.8
50–200	11.3	11.9	8.6	11.0
<50				
HIV1-RNA (copies/ml) (%)*	33.3	36.1	38.8	43.7
≤400	66.7	63.8	61.2	56.2
>400				
HAART (%)*	73.8	78.5	83.1	84.1

*P<0.05

Table 2

Crude and Adjusted Odds Ratios of Receipt of HAART among HIV-infected Individuals receiving HIV Medical Care*

Characteristic	Crude Odds Ratio [95% Confidence Interval] For Receiving HAART	Adjusted Odds Ratio [95% Confidence Interval] For Receiving HAART
Category#	0.53 (0.40–0.71)	0.52 (0.41–0.81)
SMI & IDU	0.68 (0.58–0.81)	0.64 (0.58–0.85)
IDU	0.93 (0.72–1.20)	0.85 (0.71–1.23)
SMI	1.00 (referent)	1.00 (referent)
Neither SMI nor IDU		
Age	1.02 (1.01–1.03)	1.02 (1.01–1.03)
Gender	1.48 (1.28–1.71)	1.41 (1.10–1.57)
Male	1.00 (referent)	1.00 (referent)
Female		
Race	1.00 (referent)	1.00 (referent)
Caucasian	0.79 (0.68–0.93)	0.87 (0.75–1.16)
Black/AA	1.41 (1.15–1.73)	1.28 (0.93–1.61)
Other		
CD4 count (cells/mm^3)	1.00 (referent)	1.00 (referent)
>500<	1.58 (1.34–1.87)	1.54 (1.82–2.68)
201–500	2.46 (1.97–3.09)	2.52 (3.54–5.87)
50–200	2.37 (1.78–3.14)	2.43 (3.93–7.27)
<50		

*Analysis also adjusted for site

#Interaction between IDU and SMI not significant (P=0.22)

Table 3

Crude and Adjusted Odds Ratios of Utilizing Any Inpatient Medical Hospitalization *

Characteristic	Crude Odds Ratio [95% Confidence Interval] For Inpatient Hospitalization	Adjusted Odds Ratio [95% Confidence Interval] For Inpatient Hospitalization
Category#	2.38 (1.84–3.08)	2.22 (1.64–3.01)
SMI & IDU	1.77 (1.53–2.05)	1.65 (1.39–1.96)
IDU	1.52 (1.23–1.88)	1.70 (1.34–2.15)
SMI	1.00 (referent)	1.00 (referent)
Neither SMI nor IDU		
Age (per year)	1.01 (1.00–1.02)	1.02 (1.01–1.03)
Gender	0.66 (.058–0.75)	0.63 (0.53–0.74)
Male	1.00 (referent)	1.00 (referent)
Female		
Race	1.00 (referent)	1.00 (referent)
Caucasian	1.62 (1.40–1.89)	1.35 (1.11–167)
Black/AA	1.42 (1.20–1.69)	1.19 (0.95–1.51)
Other		
CD4 count (cell/mm^3)	1.00 (referent)	1.00 (referent)
>500	1.38 (1.40–1.89)	1.26 (1.03–1.56)
201–500	3.19 (2.62–3.88)	2.78 (2.22–3.48)
50–200	8.74 (7.01–10.91)	7.86 (6.07–10.2)
<50		
HIV1-RNA (copies/ml)	0.66 (0.58–0.75)	0.83 (0.70–0.98)
≤	1.00 (referent)	1.00 (referent)
>400		
HAART	0.99 (0.84–1.17)	0.94 (0.77–1.15)

* Analysis also adjusted for site

Interaction between IDU and SMI not significant (P=0.53)

Table 4

Crude and Adjusted Incidence Rate Ratios of Utilizing Inpatient Medical Hospitalization for those with One or More Hospitalizations (N=1102)*

Characteristic	Crude Incidence Rate Ratios [95% Confidence Interval] For Inpatient Hospitalization	Adjusted Incidence Rate Ratios [95% Confidence Interval] For Inpatient Hospitalization
Category#	1.27 (1.11–1.47)	1.33 (1.13–1.55)
SMI & IDU	0.99 (0.90–1.09)	1.03 (0.93–1.15)
IDU	0.89 (0.77–1.02)	0.96 (0.83–1.12)
SMI	1.00 (referent)	1.00 (referent)
Neither SMI nor IDU		
Age (per year)	1.00 (0.99–1.00)	1.00 (0.99–1.00)
Gender	0.98 (0.90–1.06)	0.95 (0.86–1.04)
Male	1.00 (referent)	1.00 (referent)
Female		
Race	1.00 (referent)	1.00 (referent)
Caucasian	0.92 (0.83–1.01)	0.90 (0.79–1.02)
Black/AA	1.00 (0.90–1.12)	0.94 (0.82–1.08)
Other		
CD4 count (cell/mm^3)	1.00 (referent)	1.00 (referent)
>500	1.17 (1.02–1.35)	1.17 (1.01–1.37)
201–500	1.29 (1.13–1.49)	1.31 (1.12–1.53)
50–200	1.51 (1.32–1.74)	1.59 (1.35–1.86)
<50		
HIV1-RNA	0.89 (0.81–0.98)	1.01 (0.90–1.12)
≤400	1.00 (referent)	1.00 (referent)
>400		
HAART	1.01 (0.91–1.13)	0.97 (0.86–1.09)

*Analysis also adjusted for site

#Interaction between IDU and SMI is significant (P=0.01)