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HIV-Related Medical Service Use by Rural/Urban Residents: A Multi-state Perspective

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Abstract

Objective—Geographic location may be related to the receipt of quality HIV healthcare services. Clinical outcomes and healthcare utilization were evaluated in rural, urban and peri-urban patients seen at high-volume U.S. urban-based HIV care sites.

Methods—Zip codes for 8,773 HIV patients followed in 2005 at 7 HIV Research Network sites were categorized as rural (population<10K), peri-urban (10K – 100K) and urban (>100K). Clinical and demographic characteristics, inpatient and outpatient (OP) utilization, AIDS defining illness rates, receipt of highly active antiretroviral therapy (HAART), opportunistic infection (OI) prophylaxis usage and virologic suppression were compared among patients, using X² tests for categorical variables, t-tests for means, and logistic regression for HAART utilization.

Results—HIV-infected rural (n=170) and peri-urban (n=215) patients were less likely to be Black or Hispanic than urban HIV patients. Peri-urban subjects were more likely to report MSM as their HIV risk factor than rural or urban subjects. Age, gender, CD4 or HIV-RNA distribution, virologic suppression, HAART usage or OI prophylaxis did not differ by geographic location. In multivariate analysis, rural and peri-urban patients were less likely to have 4 annual outpatient visits than urban patients. Rural patients were less likely to receive HAART if they were Black. Overall, geographic location (as defined by home zip code) did not affect receipt of HAART or OI prophylaxis.

Conclusion—Although demographic and healthcare utilization differences were seen among rural, peri-urban, and urban HIV patients, most HIV outcomes and medication use were comparable across geographic areas. As with HIV care for urban-dwelling patients, areas for improvement for non-urban HIV patients include access to HAART among minorities and IDUs.

Keywords

rural; HIV/AIDS Care; HAART; Outcomes; Quality of care; highly active antiretroviral therapy; HIV Research Network

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Introduction

HIV/AIDS is an increasing problem in rural areas in the United States (Berry, 2000; CDC National Center for HIV, 2006; CDC, 2007; CDC, 2004; Karon et al., 2001; The Henry J Kaiser Family Foundation, 2007) and the epidemiology of HIV/AIDS in rural America, differs from that of other geographic areas (CDC, 2007, CDC, 2004; Karon et al., 2001; Wasser et al., 1993; Whyte & Carr, 1992; Young et al., 1992; Rural Center AIDS/STD Prevention, 6 A.D.; Ellerbrock et al., 1992). Small localized studies in rural areas have demonstrated higher proportions of women, fewer injection drug users (IDUs), and more heterosexual transmission of HIV than in urban areas. These populations may be less likely to receive quality of care and this may be associated with suboptimal HIV outcomes (Gebo et al., 2005; Gebo KA, et al., 2005; McNaghten et al., 2003; Asch et al., 2001; Solomon et al., 1998; Teshale et al., 2007; Shapiro et al., 1999; Stein et al., 1991; Lucas et al., 2001; Anderson & Mitchell, 2000).

Compared with persons living with HIV/AIDS in urban areas, rural residents are diagnosed in later stages of illness (Miller et al., 1995; Calonge et al., 1993), are less likely to have health insurance (Ricketts, 2000; Hu, Duncan et al., 2006) and frequently travel over 2 hours to receive care (Mainous, III & Matheny, 1996), especially to urban sites (Schur et al., 2002). Schur et al. (2002) found that over 25% of surveyed rural HIV patients delayed HIV care because they lacked reliable transportation to their provider. Other barriers to receiving HIV services in rural areas include stigma, physician shortages/inexperience, lack of community education and social support (Williams et al., 2005; Ricketts, 2000; Graham et al., 1995; Miller et al., 1995; McKinney, 2002; Mainous, III & Matheny, 1996; Schur et al., 2002; Centers for Disease Control and Prevention, 1998; Hall et al., 2005).

This study examines the impact of geographic categorization of home zip code on clinical HIV outcomes, using data from a multisite, multistate cohort in the HAART era.

Methods

Setting and Subjects

The HIV Research Network (HIVRN) is a consortium of 21 sites that provide primary and subspecialty care to HIV patients (Gebo et al., 2005; Fleishman JA et al., 2005; Gebo KA et al., 2005). To be included, a site must have a minimum data set available in electronic format or through paper abstraction. The minimum data required were: patients' age, sex, race, HIV transmission risk factor, AIDS-defining illnesses, CD4 level, HIV-1 RNA, and antiretroviral medication use. This analysis was limited to adult patients (> 18 years old) in HIV primary care, defined by at least one visit to an HIV primary care provider and one recorded CD4 test result during calendar year 2005.

Seven sites that collect zip code information and provide care to patients residing in rural areas were included in the analysis. The five academic sites and 2 community-based sites were located in the Northeastern (1), Western (2), Midwestern (2) and Southern (2) US. The median sample size per site was 665 patients (Range: 55 to 3456 patients). Zip codes from 8,824 HIV patients followed in 2005 at these 7 HIV Research Network sites were categorized via the University of Washington rural health categorization schema as rural (<10,000 population), peri-urban (10,000–100,000) and urban (>100,000) (Hart, Larson, & Lishner, 2005; WWAMI Rural Health Research Center, 2008). Of note, all the study sites in the analysis are located in urban areas. Although some patients in one site did receive care at rural locations by providers traveling from urban academic health centers, the majority received care at the urban study sites. While rural dwellers may receive care in the same urban clinic setting as their urban/peri-urban counterparts, they potentially may receive

different care in these clinics, due to less frequent care utilization. Reasons for less frequent care utilization may include transportation issues and distance-related factors such as decreased social services, lack of childcare services, financial constraints and fewer social networks. Thus, this study analyzes urban, peri-urban, and rural dwellers receiving HIV specialty care in predominantly urban clinics.

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 2005. The date of the encounter 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. The study was approved by the Institutional Review Board of the Johns Hopkins School of Medicine as well as by each of the participating sites.

Definitions of Variables

HAART was defined as use of: (1) three or more nucleosides; (2) 1 protease inhibitors [PI] or a non-nucleoside reverse transcriptase inhibitor [RTI]; or (3) use of a fusion inhibitor. Patients were considered to be on HAART if they received any of these combinations during the calendar year. The mean length of time on HAART for an adult patient in care in 2005 was 819.3 days (range 1 day to 7,304.0 days). The CD4 and HIV-1 RNA laboratory values used in this analysis were the first values recorded in 2005, which were similar to the overall median CD4 and HIV RNA measured in 2005 (median CD4= 350 cells/mm³ and HIV-1 RNA = 400 copies/ml). HIV transmission risk factors included injection drug use (IDU), men who had sex with men (MSM), and heterosexual transmission (HET), which was defined as either heterosexual activity with a partner at high risk for HIV or sex with an HIV-infected individual. Risk factor assignment was not mutually exclusive, as patients could have multiple HIV risk factors. For purposes of analysis, we classified patients as IDU or non-IDU; the IDU category included patients with other risk factors (i.e., MSM or HET) in addition to IDU. Adequate outpatient utilization was defined as 4 or more visits in a calendar year, consistent with the IAS-USA guidelines that recommend at least quarterly visits for HIV infected patients. Insurance was categorized into Private, Medicaid, Medicare, Self-Pay/Ryan White and other. A small number of patients with dual Medicare/Medicaid coverage were classified as Medicare, as Medicare is the primary payer for these patients. In the analysis, we classified patients as private vs. other, which included all public insurance as well as self-pay/Ryan White Care Act coverage.

Data Analysis

We conducted descriptive analyses of geographic variation in demographic and clinical characteristics, including age, gender, race/ethnicity (White, Black, Hispanic and Other), HIV risk factors, CD4 count (< 50, 51–200, 201–350 351–500, > 500 cells/mm³), HIV-1 RNA (<10,000, 10–100,000, >100,000 copies/ml), use of HAART, OI prophylaxis, development of an AIDS defining illness (ADI), insurance coverage, and inpatient and outpatient utilization. For multivariate analyses, race/ethnicity was collapsed into Black, Hispanic, and White. Asian, American Indian, and Other race categories were collapsed into the “White” category because of small sample sizes. The mean and standard deviation were used for describing normally distributed data, whereas the median and interquartile ranges were used for describing non-normally distributed data. Normally distributed continuous

variables were analyzed with Student's *t* test; the Wilcoxon rank-sum test was used for analysis of non-normal data. Categorical variables were analyzed with Fisher's exact test. ANOVA was used to test three-way measures. Statistical analyses were done with STATA 10.0 (College Station, TX).

In bivariate analyses, we examined geographic differences in the number of outpatient visits, development of an ADI, receipt of HAART (among those with CD4<350 cells/mm³), and receipt of OI prophylaxis (among those for whom it was clinically appropriate). For variables with (unadjusted) geographic differences in bivariate analyses, we used multivariate logistic regression to estimate geographic differences, adjusted for other significant variables. Transgendered persons (n= 51) were not included in the multivariate analysis. All reported p-values are two-sided.

Results

Demographic and Clinical Characteristics

Rural and peri-urban HIV-infected patients were significantly less likely to be Black (22% and 21% vs. 40%, $p < 0.001$) or Hispanic (11% and 14% vs. 20%, $p < 0.001$) and more likely to be White (65% and 62% vs. 37%, $p < 0.001$) than urban patients (Table 1). Rural and peri-urban patients did not differ from urban patients by age or gender. The median age was 42 years (range 18–95 years) in all geographic categories. Peri-urban patients were more likely to be MSM than rural or urban patients (63% vs. 51% rural and 56% urban, $p = 0.04$). No other differences in HIV risk factors were noted between the groups.

Median CD4 count and CD4 distribution did not differ by rural (360 cell/mm³), peri-urban (378 cells/mm³) or urban (368 cells/mm³) location (Table 2). Similarly, median HIV-1 RNA (rural = 440 copies/ml, peri-urban=400 copies/ml, urban = 490 copies/ml) and distribution of HIV-1 RNA were similar between the groups. Likewise, rates of HIV virologic suppression of patients receiving HAART did not differ between rural (58%), peri-urban (64%) and urban (60%) residence. Although rates of ADIs were lower among peri-urban than rural and urban patients (0.5/100 PY vs. 5.3/100 PY and 2.4/100 PY), these differences were not statistically significant ($p = 0.17$) (Table 2).

Health Care Utilization

Overall, rural and peri-urban patients had fewer outpatient visits than urban patients (3.95 visits per patient per year (PPPY) and 4.04 visits vs. 5.24 visits, $p < 0.001$) (Table 3). Of those on HAART, rural patients has fewer visits than peri-urban or urban patients (4.02 vs. 4.48 vs. 5.83 visits/PPPY, $p < 0.001$). The rate of inpatient admissions was higher among urban residents (26.8 per 100 person-years (PY)) than among rural and peri-urban residents (17.1 and 16.3 admissions per 100 PY, respectively). In patients with a clinical indication, pharmaceutical utilization rates of *Pneumocystis jiroveci* pneumonia (PCP) and mycobacterium avium (MAC) prophylaxis were uniformly high and did not differ by residential location.

In bivariate analysis (Table 3), geographic differences in HAART receipt fell short of statistical significance ($p = 0.07$), but some trends were revealed. Black patients (Odds Ratio (OR) =0.80, [95% CI 0.69, 0.93]) were less likely to receive HAART than White/other patients (Table 4), while older patients (OR=1.31, [1.15–1.48]) and men (OR=1.17, [1.02–1.34]) were more likely to receive HAART than younger patients or women. Likewise, those with 4 or more outpatient visits per year (OR=2.90, [2.54–3.31]) and those without private health insurance (i.e., Medicaid, Medicare, and uninsured) were more likely to receive HAART than their counterparts.

Because residential differences in HAART receipt were close to being statistically significant, we further explored the data via multivariate logistic regression analyses. Adjusting for other variables did not substantially alter the magnitude or statistical significance of geographic differences in the odds of receiving HAART. (Table 4) We found that Blacks (adjusted odds ratio (AOR) = 0.79 [0.65–0.95]), and injection drug users (IDUs) (0.81 [0.65–0.99]) were less likely to receive HAART, while older patients (1.30 [1.10–1.52]) and Hispanics (1.31 [1.03–1.67]) were more likely to receive HAART than their counterparts. Also, those with at least 4 outpatient visits per year were more likely to receive HAART (2.62, [2.23–3.09]). Those without private health insurance (i.e., Medicaid, Medicare and uninsured) were more likely to receive HAART than those with private insurance.

Demographic and clinical factors significantly associated with adequate outpatient utilization (at least 4 visits per year) are shown in Table 5. Patients with age greater than 40 years (AOR=1.10, [1.06–1.13]), IDU (1.07, [1.03–1.12]), Hispanic patients (1.14, [1.10–1.19]), those with Medicaid (1.17, [1.12–1.22]) and Medicare (1.16, [1.11–1.22]) were more likely to have adequate outpatient visits than younger patients, White patients and those with private health insurance. Rural patients (OR 0.73, [0.66–0.82]) (but not peri-urban patients (0.91, [0.83–1.00])) and men (0.96, [0.93–1.00]) were less likely to have had at least 4 outpatient visits per year than their counterparts.

Discussion

In this study, persons living with HIV/AIDS in rural and peri-urban areas who received care in urban areas experienced high levels of appropriate OI prophylaxis and favorable HIV outcomes (i.e., virologic suppression, incidence of ADIs), comparable to those living in urban areas. Unexpectedly, the unadjusted proportion of eligible patients receiving HAART was actually somewhat higher for non-urban patients than for urban patients. Also, outpatient utilization was lower among HIV-infected rural patients, compared to urban patients. Finally, HIV-infected patients from non-urban areas followed in this observational cohort are less likely to be Black or Hispanic than HIV-infected urban patients, but were otherwise demographically similar.

Rural and peri-urban patients in this study had high rates of HAART utilization and opportunistic illness prophylaxis that were consistent with national guidelines (Yeni et al., 2004). Most rural and peri-urban patients in this population traveled to urban tertiary centers to receive care. In addition, previous work has demonstrated that when providers from urban centers travel to deliver care in rural areas, high quality HIV care can also be achieved (Wilson L et al., 2006). Thus, elimination of access barriers may contribute to an improvement in quality of care for rural HIV residents. In contrast, studies from the pre-HAART era that reported sub-standard HIV care for rural patients (Calonge et al., 1993; Miller et al., 1995; Whyte & Carr, 1992) primarily dealt with HIV patients who received care in rural areas. Future studies will need to examine whether patients who receive their care at local, rural or peri-urban settings have different outcomes than those who travel to urban high volume HIV care centers.

Rural and peri-urban patients had less frequent outpatient utilization than urban patients overall, as well as among those on HAART therapy. This raises concern about quality of HIV monitoring in non-urban patients on HAART. However, rural and peri-urban patients on HAART still met International AIDS Society HIV-USA Panel treatment guidelines (Yeni et al., 2002) by having at least quarterly visits with their providers and were as likely to achieve virologic suppression. Interestingly, rural and peri-urban patients also had lower inpatient utilization rates than urban patients, although these rates were not different if

patients were taking HAART. While observed geographic differences may be due to patients' seeking care outside of the HIV Research Network, all sites make an effort to comprehensively record inpatient utilization by patients at both their sites and outside medical facilities.

Consistent with previous literature demonstrating that patients affected by HIV in rural areas differ from those in urban areas (Cohn et al., 2001; Wasser et al., 1993; Young et al., 1992; Rural Center of AIDS/STD Prevention, 6 A.D.; Ellerbrock et al., 1992), we found that non-urban patients were more likely to be White than urban patients; however, unlike previous studies, we found no differences in the prevalence of IDU by geographic distribution. Otherwise, in this multisite, multistate cohort, there were few demographic differences between rural and urban patients, other than increased MSM HIV risk factor among peri-urban patients.

Like previous studies, our results demonstrate that IDU's were less likely to receive HAART than non-IDUs, and those engaged in longitudinal care (≥ 4 visits per year) were more likely to receive HAART than those who were not in care. Of note, those with private insurance were less likely to receive HAART than those with governmental assistance or no insurance. This may reflect the utilization of AIDS Drug Assistance Programs (ADAP) which provide access to medications for HIV infected patients. Rules for eligibility for these programs and drugs covered vary state to state. Future studies will need to evaluate changes in HAART utilization with changes in our health care delivery system.

There are several potential study limitations. Our study population is not nationally representative and may not generalize to all HIV-infected Americans. However, sites from which patients were sampled do encompass a broad geographic distribution, and multi-site studies afford greater generalizability than single-site studies. In addition, providers at these sites are highly experienced in HIV care with high rates of HAART usage (Gebo et al., 2005) and OI prophylaxis (Gebo et al., 2005) among their patients. Therefore, our results may not generalize to patients receiving care from providers with less HIV experience, as may be typical in a rural/peri-urban clinic with lower HIV patient volume. As the data collected were on patients actively engaged in primary care, we were unable to capture individuals not engaged in primary HIV care, incarcerated, or unaware of their HIV diagnosis. HIV-infected patients who are not in primary care may be significantly different than those who engage in HIV care. Also, it must be acknowledged that "rural" and "peri-urban" do not depict uniform demographic or geographic entities, but rather many unique regions within the United States with lower population density. Additionally, we were unable to analyze the distance traveled by each patient to determine whether quality of HIV care was related to distance traveled, as de-identified data made it impossible to match geographic location with HIV care site. HIV patients who reside in non-urban areas but receive care in urban areas may not be representative of the full population of non-urban patients with HIV infection. They may have more economic or social resources, or they may have more motivation to seek high-quality care than other non-urban dwellers. Such factors might explain why non-urban residents in this study had higher odds of receiving HAART than urban dwellers. As we did not have access to a large number of rural HIV patients accessing HIV care in rural locations, future studies will need to assess this topic further.

In summary, this study demonstrates that, despite demographic and geographic differences between urban, rural and peri-urban HIV patients followed in the HIV Research Network, it is possible to provide high quality HIV care to non-urban residents. With care from providers with extensive HIV clinical expertise, these patients had high rates of opportunistic illness prophylaxis and HAART usage. Given the increasing prevalence of

HIV in non-urban areas in the United States, future studies will need to examine care provided by providers located in non-urban settings to confirm the results of this study.

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APPENDIX

Participating Sites

Alameda County Medical Center, Oakland, California (Howard Edelstein, M.D., Children's Hospital of Philadelphia, Philadelphia, Pennsylvania (Richard Rutstein, M.D.)

Community Health Network, Rochester, New York (Roberto Corales, D.O.)

Community Medical Alliance, Boston, Massachusetts (James Hellinger, M.D.)

Drexel University, Philadelphia, Pennsylvania (Sara Allen, C.R.N.P.)

Johns Hopkins University, Baltimore, Maryland (Kelly Gebo, M.D., Richard Moore, M.D., Allison Agwu M.D.)

Montefiore Medical Group, Bronx, New York (Robert Beil, M.D.)

Montefiore Medical Center, Bronx, New York (Lawrence Hanau, M.D.)

Nemechek Health Renewal, Kansas City, Missouri (Patrick Nemechek, M.D.)

Oregon Health and Science University, Portland, Oregon (P. Todd Korthuis, M.D.)

Parkland Health and Hospital System, Dallas, Texas (Laura Armas-Kolostroubis, M.D.)

St. Jude's Children's Hospital and University of Tennessee, Memphis, Tennessee (Aditya Gaur, M.D.)

St. Luke's Roosevelt Hospital Center, New York, New York (Victoria Sharp, M.D.)

Tampa General Health Care, Tampa, Florida (Chararut Somboonwit, M.D.)

University of California, San Diego, La Jolla, California (Stephen Spector, M.D.)

University of California, San Diego, California (W. Christopher Mathews, M.D.)

Wayne State University, Detroit, Michigan (Jonathan Cohn, M.D.)

Sponsoring Agencies

Agency for Healthcare Research and Quality, Rockville, Maryland (Fred Hellinger, Ph.D., John Fleishman, Ph.D., Irene Fraser, Ph.D.)

Health Resources and Services Administration, Rockville, Maryland (Robert Mills, Ph.D.)

Data Coordinating Center

Johns Hopkins University (Richard Moore, M.D., Jeanne Keruly, C.R.N.P., Kelly Gebo, M.D., Perrin Lawrence, M.P.H., Michelande Ridore, B.S., Cindy Voss, M.A., Bonnie Cameron, M.S.)

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Table 1

Demographic Characteristics of Multisite HIV Infected Sample by Geographic Location of Residence

	Rural N = 170	Peri-urban N=215	Urban N = 8,439	p value
Median Age (range) years	42 (20–68)	42 (19–67)	42(18–95)	ns
Race				
White	110 (64.7%)	134 (62.3%)	3,088 (36.6%)	<.001
Black	37 (21.5%)	46 (21.4%)	3,351 (39.7%)	
Hispanic	18 (10.6%)	30 (14.0%)	1,652 (19.6%)	
Other	5 (2.9%)	5 (2.3%)	348 (4.1%)	
Gender				
Female	49 (28.8%)	44 (20%)	1,918 (22.7%)	ns
Male	121 (71.2%)	171 (80%)	6,470 (76.7%)	
Transgendered	0	0	51 (0.6%)	
HIV Risk Factor [*]				
MSM	86 (50.6%)	136 (63.3%)	4,713 (55.9%)	0.04
IDU	31 (18.2%)	28 (13.0%)	1,400 (16.6%)	ns
HET	53 (31.2%)	60 (27.9%)	2,313 (27.8%)	ns
Other/Unknown	14 (8.5%)	9 (1.2%)	729 (8.8%)	ns

* Columns add up to >100% because categories are not mutually exclusive.

Table 2

Clinical Characteristics of Multisite HIV Infected Sample by Geographic Location of Residence

	Rural N = 170	Peri-urban N=215	Urban N = 8,439	p value
CD4 Count (cells/mm ³)				
Median	360	378	368	
<50	20 (11.8%)	13 (6.1%)	806 (9.6%)	0.479
50–200	31 (18.2%)	31 (14.4%)	1,344 (15.9%)	
201–350	30 (17.7%)	51 (23.7%)	1,855 (22.0%)	
351–500	41 (24.1%)	49 (22.8%)	1,826 (21.6%)	
>500	48 (28.2%)	71 (33.0%)	2,608 (30.9%)	
HIV-1 RNA Distribution(copies/ml)				
Median *	440	400	490	
<10,000	107(62.9%)	134 (62.3%)	5,275 (62.5%)	0.777
10–100,000	38 (22.3%)	48 (22.3%)	1,836 (21.8%)	
>100,000	23 (13.5%)	32 (14.9%)	990 (11.7%)	
Missing	2 (1.2%)	1 (0.5%)	338 (4%)	
HIV-1 RNA <400 copies/ml if on HAART	N=131 76 (58.0%)	N=155 99 (63.9%)	N=5,408 3,255 (60.1%)	0.561
AIDS Defining Illnesses/100PY	5.3	0.5	2.4	0.17

Table 3

Medical and Pharmacy Utilization of Multisite HIV Infected Sample by Geographic Location of Residence

	Rural N = 170	Peri-urban N=215	Urban N = 8,439	p value
On HAART (if CD4<350)	N=81 67 (82.7%)	N=95 77 (81.1%)	N=3,975 2,942 (74.0%)	0.07
Receiving PCP prophylaxis (if CD4<200)	N=51 40 (78.4%)	N= 44 36 (81.8%)	N=2,136 1,718 (80.4%)	0.91
Receiving MAC prophylaxis (if CD4<50)	N=20 15 (75.0%)	N=13 10(76.9%)	N=799 606 (75.8%)	0.99
IP admissions/100PY	17.1	16.3	26.8	0.05
IP admissions/100PY if on HAART	16.5	16.7	26.1	0.14
OP visits/yr	3.95	4.04	5.24	<0.001
4 or more OP visits/yr	85 (50%)	103 (47.9%)	4,895 (58%)	0.002
OP visits/yr if on HAART	4.02	4.48	5.83	<0.001

Table 4

Clinical and Demographic Factors associated with Receipt of HAART (Univariate and Multivariate Analyses)

	Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI) (N=4129)
Age	N=7667	
40	1.00 (Ref)	1.00 (Ref)
>40	1.31 (1.15 – 1.48)	1.30 (1.10 – 1.52)
Gender	N=7618	
Female	1.00 (Ref)	1.00 (Ref)
Male	1.17 (1.02 – 1.34)	1.12 (0.93– 1.35)
Race/Ethnicity	N=7667	
White/Other	1.00 (Ref)	1.00 (Ref)
Black	0.80 (0.69 – 0.93)	0.79 (0.65 – 0.95)
Hispanic	1.17 (0.96 – 1.41)	1.31 (1.03 – 1.67)
HIV Risk Factor	N=7667	
Non-IDU	1.00 (Ref)	1.00 (Ref)
IDU	1.03 (0.88–1.20)	0.81 (0.65– 0.99)
Geographic Location	N=4151	
Rural	1.00 (Ref)	1.00 (Ref)
Urban	0.73 (0.39–1.34)	0.72 (0.39 – 1.35)
Peri-urban	1.00 (0.45–2.24)	0.99 (0.43 – 2.26)
Outpatient Visits	N=7667	
< 4 visits per year	1.00 (Ref)	1.00 (Ref)
4 visits per year	2.90 (2.54 – 3.31)	2.62 (2.23 – 3.09)
Health Insurance	N=7667	
Private	1.00 (Ref)	1.00 (Ref)
Medicaid	1.35 (1.12 – 1.62)	1.40 (1.09 – 1.79)
Medicare	2.19 (1.77 – 2.72)	1.90 (1.45 – 2.49)
Uninsured	1.34 (1.10–1.62)	1.60 (1.26 – 2.03)

Table 5

Clinical and Demographic Factors associated with at least 4 outpatient visits per year (Univariate and Multivariate Analyses)

	Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI) (N=8773)
Age	N=16825	
40	1.00 (Ref)	1.00 (Ref)
>40	1.14 (1.12 – 1.17)	1.10 (1.06 – 1.13)
Gender	N=16727	
Female	1.00 (Ref)	1.00 (Ref)
Male	0.97 (0.95 – 1.00)	0.96 (0.93– 1.00)
Race/Ethnicity	N=16825	
White/Other	1.00 (Ref)	1.00 (Ref)
Black	0.99 (0.97 – 1.02)	0.99 (0.96 – 1.03)
Hispanic	1.07 (1.04 – 1.11)	1.14 (1.10 – 1.19)
HIV Risk Factor	N=16825	
Non-IDU	1.00 (Ref)	1.00 (Ref)
IDU	1.13 (1.10–1.16)	1.07 (1.03 – 1.12)
Geographic Location	N=8824	
Urban	1.00 (Ref)	1.00 (Ref)
Rural	0.74 (0.66–0.83)	0.73 (0.66 – 0.82)
Peri-urban	0.89 (0.81–0.98)	0.91 (0.83 – 1.00)
Health Insurance	N=16825	
Private	1.00 (Ref)	1.00 (Ref)
Medicaid	1.21 (1.17 – 1.24)	1.17(1.12 – 1.22)
Medicare	1.21 (1.17 – 1.25)	1.16 (1.11 – 1.22)
Uninsured	0.97 (0.94–1.00)	0.98 (0.94 – 1.02)