Utilization of Health Care Services in Hard-to-Reach Marginalized HIV-Infected Individuals

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ABSTRACT

To benefit from HIV treatment advances individuals must utilize ambulatory primary care services. Few studies focus on marginalized populations, which tend to have poor health care utilization patterns. This study examined factors associated with health care utilization in hard-to-reach marginalized HIV-infected individuals. As part of a multisite initiative evaluating outreach programs that target underserved HIV-infected individuals, 610 participants were interviewed about their HIV disease, health services utilization, substance use, mental health, and case management. Primary outcomes included ambulatory, emergency department, and inpatient visits. Generalized estimating equations were used in logistic regression analyses. On regression analyses ambulatory visits were associated with having insurance (adjusted odds ratio [AOR] = 2.46), mental health medications (AOR = 7.46), and case management (AOR = 4.81). Emergency department visits were associated with having insurance (AOR = 1.74), homelessness (AOR = 2.23), poor health status (AOR = 2.02), length of HIV infection (AOR = 2.02), mental health care (AOR = 1.47), mental health medications (AOR = 1.59), and heavy alcohol intake (AOR = 1.46). Hospitalizations were associated with high school education (AOR = 1.57), having insurance (AOR = 10.45), homelessness (AOR = 2.18), poor health status (AOR = 2.64), length of HIV infection (AOR = 2.03), and mental health medications (AOR = 1.87). In hard-to-reach marginalized HIV-infected individuals, having insurance, case management and mental health care were associated with increased ambulatory visits. These findings support HIV multidisciplinary care with marginalized populations. Understanding factors associated with health care utilization is essential for outreach programs to facilitate engagement in HIV care.

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INTRODUCTION

Treatment with antiretroviral therapy (ART) has been shown to improve survival and slow progression of HIV disease.[1–3] To utilize ART effectively, individuals must be able to access HIV primary care services. However, several studies have shown that access to and utilization of health care services are not equal among all HIV-infected individuals. In particular, marginalized populations such as racial/ethnic minorities, substance users, the unstably housed, and the mentally ill have poor access to and utilization of health care services.[4–10] Without utilizing HIV primary care services on a regular basis, it is nearly impossible to reap the benefits that are now available for the treatment of HIV disease.

Although some large-scale studies have examined differences between those who access and utilize HIV care compared with those who do not, marginalized populations that tend to have poor utilization of ambulatory health care services are often not included in these studies for various reasons. Frequently these studies recruit from clinical sources, thereby including only those individuals who are receiving health care services. Studies that include patients already engaged in the health care system have shown that patients with less severe HIV disease, low education, substance use, young age, a history of incarceration, and racial/ethnic minorities are less likely to utilize ambulatory health care services.[8,11–18] Studies examining gender have reported conflicting results regarding utilization of ambulatory care services.[11,13,15]

While most studies that examine health care utilization recruit from clinical sites, a few have recruited marginalized populations from nonclinical sites. However, these few studies tend to include limited samples of patients or focus on only one geographic location. Such studies have demonstrated that predictors of lower utilization of ambulatory health care services include unstable housing, active cocaine injection, and less severe HIV disease.[4,7,19] Regarding utilization of acute care services, women, the unstably housed, substance users, the mentally ill, recently incarcerated individuals, and those with advanced HIV disease have been shown to have high rates of hospitalizations or emergency department visits.[4,7,20–22]

A conceptual model of utilization of care that has been widely used and accepted assumes that a need for HIV care exists, and that a suboptimal pattern of care is reflected by infrequent ambulatory visits among HIV-infected individuals.[8] In order to optimize or improve utilization of HIV ambulatory services, it is essential first to identify those who are and are not utilizing health services. These data can inform the development and modification of programs to facilitate appropriate utilization of care. In this study we describe characteristics of hard-to-reach marginalized HIV-infected individuals who are served by outreach organizations, and examine how utilization of health care services differs according to these characteristics.

MATERIALS AND METHODS

Study participants

Data for this study were collected as part of a Health and Resources Services Administration (HRSA) Special Project of National Significance (SPNS) multicenter initiative evaluating outreach targeted at hard-to-reach underserved HIV-infected individuals.[23] Briefly, from October 1, 2001 to September 31, 2003 sixteen sites from around the United States conducted face-to-face interviews with HIV-infected individuals who were part of their outreach program. This analysis draws on data from 7 of the 16 sites for the SPNS outreach initiative, located in Sacramento, California; Boston, Massachusetts; Detroit, Michigan;, St. Louis, Missouri;, Bronx, New York; Portland, Oregon; and Seattle, Washington. The 7 sites were chosen because they collected all domains of interest (during this phase of the initiative the collection of multicenter data elements were voluntary), and their recruitment occurred outside of the clinic setting (e.g., recruited from the community or community-based organizations).

The outreach study sites provided a range of services including HIV testing and counseling, case finding and linkage to HIV clinics,

case management, and direct medical care. Venues for outreach services included streets, churches, community-based organizations, bars, mobile vans, single-room occupancy hotels, and homeless shelters. The hard-to-reach populations served were defined locally by each program and included active substance users, the medically indigent, commercial sex workers, individuals with mental illness, recently incarcerated individuals, and the homeless. Previous studies guided the selection of these services, venues, and populations as likely ways to find hard-to-reach HIV-infected individuals.[24–30] Despite the range of services, venues, and populations, all of the programs provided supportive outreach services to link HIV-infected individuals who were not in any care, not in consistent care, or were at risk of dropping out of care. For more detailed information about the specific sites see www.bu.edu/hdwg/projects/coreph1.htm.

The total number of participants enrolled in the 7 sites was 610, with each site ranging from 31 to 150 individuals. Eligibility criteria across all sites included: (1) HIV infection, (2) 18 years of age or older, and (3) ability to complete the interview in English or Spanish. A purposive sample of eligible, hard-to-reach individuals was selected by each of the outreach service programs. All participants gave informed consent, and each study site obtained approval from their respective institutional review boards.

Interview

During the face-to-face interview the following information was collected: demographic information, severity of HIV disease, measures of utilization of health care services, substance use, mental health, and case management.

Health care utilization. Utilization of health care services was assessed within the previous 6 months focusing on (1) ambulatory primary care visits ("How many visits did you have with a primary care provider in the last 6 months?"); (2) emergency department visits ("How many times did you visit an emergency room in the last 6 months?"); and (3) hospitalizations ("How many times did you have to stay overnight in the hospital in the last 6 months?")

Health-related variables. Questions assessing severity of disease included an assessment of overall health ("Would you say your health is excellent, very good, good, fair, poor?"), and $CD4^+$ T-cell counts (by self report). Detailed information regarding type and frequency of alcohol and drug use, and route of administration were collected.

Mental health and substance abuse variables. The interview included questions about mental health including questions regarding visits with a mental health professional, mental health medications, and hospitalizations because of mental health or emotional problems. Substance abuse questions inquired about ever using and currently using (within 30 days) heroin, cocaine, injection drugs, and heavy alcohol (more than five drinks of alcohol in 1 day).

Demographic variables. Demographic information collected included race, ethnicity, age, gender, having a significant other, education, employment, income, insurance, incarceration history, and housing status.

Analysis

This study aimed to evaluate correlates of utilization of health care services over the previous 6 months, measured as having at least 1 ambulatory care visit, one emergency department visit, or one inpatient hospitalization in the 6-month period before the interview. Our decision to evaluate any ambulatory visit versus no visits in the 6-month period was based on the most recent national treatment guidelines that recommend that HIV-infected adults have their CD4 count checked every 3–6 months for their HIV infection.[31]

Variables tested as possible correlates of utilization patterns were selected a priori based on previous research on predictors of HIV health service use. In bivariate analyses, we examined the distributions of covariates within categories of the health care utilization outcomes: ambulatory care visits, emergency department visits,

and hospitalizations. In addition to describing bivariate associations, we described multivariate associations between these predictors and health care utilization outcomes using multiple logistic regression analyses. We used generalized estimating equations in our regression analyses to account for correlation of observations within sites sampling patients for this study. Separate regression analyses were conducted for each outcome. Predictor variables were chosen for entry into the regression models if they were associated with outcomes in the bivariate analyses with p values <0.20.[32] To specify each multivariate model, we tested each predictor variable in a stepwise fashion, retaining only those that had an independent association (at $p < 0.20$) with the outcome variable after observing it with other predictor variables in the same model. Because of the large number of *a priori* identified predictor variables, we present only the final multivariate models which include only variables retained after this model specification process.

Multivariate analyses were conducted using two separate data sets. In the first dataset, cases with missing data points were dropped. In the second, missing data were imputed using a hot deck approach. The hot deck imputation method identifies cases that most closely match the case with one or more missing data points using reference variables and replaces missing data with the values from the matched cases. For this analysis the hot deck procedure was performed using site, gender, education (high school graduate or greater, less than high school graduate), and race/ethnicity (Latino, non-Latino white, non-Latino black, non-Latino other). Because there were a few missing data points on these variables, the final imputed dataset included a total of 579 subjects. Data were not imputed for the three main outcome variables. The results were essentially the same before and after applying the imputation procedure, thus only results for multivariate analyses that used the imputed dataset are presented here.

RESULTS

Overall, the majority of participants were male, black or Latino, older than 40 years of age, and heterosexual (Table 1). Most had graduated from high school, had annual incomes less than $10,000 per year, and were homeless in the previous 6 months. The majority reported having insurance, a history of incarceration, and a history of drug use. Most reported having at least one ambulatory visit and one mental health visit in the previous 6 months. Over one third reported at least one visit to the emergency department, and approximately one quarter reported at least one hospitalization in the previous 6 months (Table 2).

On bivariate analysis having at least one ambulatory visit in the previous 6 months was associated with male gender, having insurance, CD4 count greater than 200 cells/mm^3, mental

TABLE 1. CHARACTERISTICS OF HARD-TO-REACH MARGINALIZED HIV-INFECTED INDIVIDUALS ENROLLED IN OUTREACH PROGRAMS

Characteristic	Total n (%)
Age <40 years	253 (43.6)
Male	414 (67.9)
Race/ethnicity	
Latino	120 (19.8)
Non-Latino black	368 (60.6)
Non-Latino white/other	119 (19.6)
Primary language	
English	517 (89.8)
Spanish	50 (8.7)
Other	9 (1.6)
Heterosexual	349 (63.0)
Less than high school education	229 (39.3)
Employed	60 (10.0)
Annual income < $10,000	480 (85.0)
Insured	498 (92.6)
Ever incarcerated	372 (61.7)
Homeless in past 6 months	302 (53.5)
Health status	
Poor or fair	238 (40.9)
Good, very good, or excellent	344 (59.1)
HIV	
HIV infected ≥ 3 years	461 (82.2)
CD4 count ≤ 200 cells/mm^3	69 (28.2)
Mental health	
Had mental health visit in past 6 months	277 (58.8)
Taking mental health medications	180 (41.5)
Substance use	
Ever used cocaine or heroin	442 (82.6)
Currently use cocaine or heroin	435 (76.2)
Ever injected drugs	239 (44.2)
Currently injects drugs	47 (8.5)
Ever had heavy alcohol intake	275 (70.9)
Currently have heavy alcohol intake	118 (21.5)
In a methadone program	52 (8.9)
Have a case manager	296 (56.8)

TABLE 2. CHARACTERISTICS ASSOCIATED WITH HEALTH CARE UTILIZATION IN HARD-TO-REACH MARGINALIZED HIV-INFECTED INDIVIDUALS

Characteristic	≥1 Ambulatory visit		≥1 ER visit		≥1 Hospitalization	
	n (%)	OR (CI)	n (%)	OR (CI)	n (%)	OR (CI)
Total	493 (90.1)		226 (41.7)		138 (25.6)	
Age						
<40 years	281 (90.9)	1.00	137 (45.2)	1.00	86 (28.5)	1.00
>40 years	212 (89.1)	0.81 (0.46–1.43)	89 (37.2)	0.72 (0.51–1.02)	52 (21.9)	0.71 (0.48–1.05)
Gender						
Female	133 (85.8)	1.00	70 (45.8)	1.00	46 (30.1)	1.00
Male	360 (91.8)[a]	1.86 (1.04–3.32)[a]	156 (40.1)	0.80 (0.54–1.16)	92 (23.8)	0.73 (0.48–1.11)
Race/ethnicity						
Non-Latino white/other	108 (93.1)	1.00	49 (42.6)	1.00	34 (30.1)	1.00
Non-Latino black	281 (90.4)	0.69 (0.31–1.56)	123 (40.1)	0.64 (0.58–1.39)	72 (23.5)	0.72 (0.44–1.16)
Latino	102 (87.2)	0.50 (0.21–1.24)	54 (46.2)	1.16 (0.69–1.94)	30 (25.6)	0.80 (0.45–1.43)
Primary language						
English	439 (90.3)	1.00	203 (42.1)	1.00	127 (26.6)	1.00
Non-English	51 (87.9)	0.78 (0.34–1.82)	19 (33.9)	0.71 (0.39–1.26)	9 (15.8)	0.52 (0.25–1.09)
Sexual orientation						
Heterosexual	284 (90.7)	1.00	127 (40.3)	1.00	87 (27.7)	1.00
Homosexual/bisexual	179 (90.9)	1.02 (0.55–1.89)	87 (44.4)	1.18 (0.82–1.70)	44 (22.6)	0.76 (0.50–1.15)
Married or have a partner						
No	292 (89.3)	1.00	134 (41.5)	1.00	81 (25.2)	1.00
Yes	195 (91.1)	1.23 (0.68–2.21)	89 (41.8)	1.01 (0.71–1.44)	55 (26.1)	1.05 (0.71–1.56)
Education						
< High school	178 (88.6)	1.00	88 (44.2)	1.00	47 (23.5)	1.00
≥ High school graduate	294 (91.0)	1.31 (0.73–2.33)	129 (40.2)	0.85 (0.59–1.21)	87 (27.4)	1.23 (0.82–1.86)
Employment						
Unemployed	436 (90.3)	1.00	205 (42.9)	1.00	124 (26.1)	1.00
Employed	50 (87.7)	0.77 (0.33–1.80)	17 (29.8)	0.57 (0.31–1.03)	12 (21.4)	0.77 (0.40–1.51)
Annual income						
≥ $10,000	80 (95.2)	1.00	32 (38.1)	1.00	18 (21.7)	1.00
≤ $10,000	404 (89.2)	0.41 (0.15–1.18)	189 (42.2)	1.19 (0.74–1.91)	118 (26.5)	1.30 (0.74–2.28)
Insurance status						
No insurance	29 (74.4)	1.00	9 (24.3)	1.00	1 (2.7)	1.00
Any Insurance	464 (91.3)[a]	3.64 (1.66–7.94)[a]	217 (43.0)[a]	2.34 (1.08–5.08)[a]	137 (27.3)[a]	13.5 (1.83–100.00)[a]
Ever incarcerated						
No	184 (90.6)	1.00	79 (38.9)	1.00	49 (24.1)	1.00
Yes	308 (90.3)	0.96 (0.53–1.74)	145 (43.0)	1.19 (0.83–1.70)	88 (26.3)	1.12 (0.75–1.68)
Homeless in the last 6 months						
No	220 (89.1)	1.00	76 (31.1)	1.00	41 (16.9)	1.00
Yes	267 (91.1)	1.26 (0.72–2.22)	148 (50.7)[a]	2.27 (1.59–3.24)[a]	96 (33.1)[a]	2.43 (1.60–3.68)[a]
Health status						
Good, very good, or excellent	288 (90.9)	1.00	111 (34.8)	1.00	58 (18.2)	1.00
Poor or fair	191 (89.7)	0.87 (0.49–1.57)	112 (52.8)[a]	2.10 (1.47–2.99)[a]	77 (36.5)[a]	2.58 (1.73–3.84)[a]

(continued)

TABLE 2. CHARACTERISTICS ASSOCIATED WITH HEALTH CARE UTILIZATION IN HARD-TO-REACH MARGINALIZED HIV-INFECTED INDIVIDUALS (CONTINUED)

Characteristic	≥1 Ambulatory visit		≥1 ER visit		≥1 Hospitalization	
	n (%)	OR (CI)	n (%)	OR (CI)	n (%)	OR (CI)
Duration of HIV infection						
< 3 years	83 (88.3)	1.00	27 (29.3)	1.00	15 (16.7)	1.00
≥ 3 years	404 (90.6)	1.28 (0.63–2.58)	197 (44.5)[a]	1.93 (1.19–3.14)[a]	123 (27.8)[a]	1.92 (1.06–3.47)[a]
CD4 count						
> 200 cells/mm^3	154 (92.2)	1.00	65 (40.1)	1.00	38 (23.5)	1.00
≤ 200 cells/mm^3	55 (80.9)[a]	0.36 (0.16–0.82)[a]	27 (40.3)	1.01 (0.56–1.80)	20 (30.8)	1.45 (0.77–2.75)
Mental health visit in last 6 months						
No	148 (84.1)	1.00	55 (31.8)	1.00	27 (16.0)	1.00
Yes	259 (94.5)[a]	3.27 (1.69–6.31)[a]	131 (48.2)[a]	1.99 (1.34–2.97)[a]	87 (32.0)[a]	2.47 (1.52–4.01)[a]
Taking mental health medications						
No	200 (85.1)	1.00	78 (33.8)	1.00	41 (18.1)	1.00
Yes	159 (98.1)[a]	9.28 (2.80–30.71)[a]	82 (50.6)[a]	2.01 (1.33–3.03)[a]	53 (32.7)[a]	2.21 (1.38–3.53)[a]
Ever used cocaine or heroin						
No	76 (89.4)	1.00	19 (22.9)	1.00	14 (16.9)	1.00
Yes	370 (90.7)	1.15 (0.54–2.48)	183 (45.2)[a]	2.78 (1.61–4.80)[a]	114 (28.4)[a]	1.95 (1.06–3.61)[a]
Currently use cocaine or heroin						
No	362 (90.3)	1.00	158 (39.6)	1.00	99 (24.9)	1.00
Yes	109 (92.4)	1.31 (0.61–2.78)	57 (48.3)	1.43 (0.94–2.15)	31 (26.5)	1.09 (0.68–1.74)
Ever injected drugs						
No	248 (89.5)	1.00	108 (38.8)	1.00	66 (23.8)	1.00
Yes	203 (91.0)	1.19 (0.65–2.16)	102 (46.8)	1.38 (0.97–1.98)	67 (31.0)	1.44 (0.96–2.14)
Currently injects drugs						
No	436 (90.6)	1.00	197 (41.0)	1.00	124 (25.9)	1.00
Yes	43 (91.5)	1.11 (0.38–3.23)	24 (51.1)	1.50 (0.83–2.74)	12 (25.5)	0.98 (0.49–1.95)
Ever had heavy alcohol intake						
No	101 (91.0)	1.00	34 (30.9)	1.00	24 (22.0)	1.00
Yes	235 (90.0)	0.90 (0.42–1.92)	116 (44.6)[a]	1.80 (1.12–2.89)[a]	66 (25.7)	1.22 (0.72–2.08)
Currently heavy alcohol intake						
No	376 (90.4)	1.00	166 (40.0)	1.00	107 (26.0)	1.00
Yes	98 (90.7)	1.04 (0.50–2.16)	51 (46.8)	1.32 (0.86–2.02)	27 (24.8)	0.94 (0.58–1.53)
In a methadone program						
No	440 (90.0)	1.00	198 (40.7)	1.00	118 (24.4)	1.00
Yes	42 (93.3)	1.56 (0.47–5.22)	25 (58.1)[a]	2.03 (1.08–3.82)[a]	18 (40.9)[a]	2.14 (1.13–4.04)[a]
Have a case manager						
No	177 (81.9)	1.00	84 (39.1)	1.00	56 (26.4)	1.00
Yes	265 (96.0)[a]	5.31 (2.65–10.64)[a]	122 (44.9)	1.27 (0.88–1.82)	72 (26.5)	1.00 (0.67–1.51)

[a] $p < 0.05$.
OR, odds ratio; CI, confidence interval; ED, emergency department.

health visits, mental health medications, and case management. Utilization of acute care services (emergency department visits and hospitalizations) was associated with having insurance, homelessness, poor health status, longer duration of HIV infection, taking mental health medications, a history of heroin or cocaine use, and treatment in a methadone program. Additionally, emergency department visits were associated with mental health visits in the previous 6 months, current cocaine or heroin use, and a history of heavy alcohol use.

On multivariate analysis, ambulatory visits were significantly associated with having insurance (adjusted odds ratio [AOR] = 2.46, 95% confidence interval [CI] = 1.02–5.90), mental health medications (AOR = 7.46, 95% CI = 2.81–19.81), and case management (AOR = 4.81, 95% CI = 3.75–6.18) (Table 3). Emergency department visits were significantly associated with having insurance, homelessness, poor or fair health status, longer duration of HIV infection, mental health visits, mental health medications, and a history of heavy alcohol use. Hospitalizations were associated with at least a high school education, having insurance, homelessness, poor or fair health status, longer duration of HIV infection, and mental health medications.

DISCUSSION

In this study of an HIV-infected hard-to-reach marginalized population enrolled in out-

reach programs in seven cities across the United States, case management, utilization of mental health services, and having insurance were significantly associated with increased utilization of ambulatory health care services. Insurance, education, homelessness, poor health status, longer duration of HIV infection, utilization of mental health services, and a history of heavy alcohol intake were associated with increased acute care services (emergency department visits and/or hospitalizations).

Case management has been associated with access to and utilization of health care services in previous studies.[7,33–37] Gardner and colleagues[33] revealed that in individuals who were recently found to be HIV-infected, those assigned to case management were more likely to utilize ambulatory care services. In addition, the AIDS Linked to Intravenous Experiences (ALIVE) study, which included a sample of substance users from the community rather than the health care system, found similar results, with case management associated with increased ambulatory care services.[7] However, in the HIV Cost and Services Utilization Study (HCSUS), a nationally representative sample of HIV-infected individuals selected from regular provider sites, case management was not associated with utilization of ambulatory care services, but was associated with utilization of antiretroviral therapy, and less unmet needs.[38] Rich and colleagues[39] revealed that case management in recently released HIV-infected prisoners was associated with high retention rates in HIV primary care. Our findings, across mul-

TABLE 3. CHARACTERISTICS ASSOCIATED WITH HEALTH CARE UTILIZATION IN A LOGISTIC REGRESSION MODEL IN HARD-TO-REACH MARGINALIZED HIV-INFECTED INDIVIDUALS

Characteristic	≥1 Ambulatory visit AOR (95% CI)	≥1 ER visit AOR (95% CI)	≥1 Hospitalization AOR (95% CI)
≥ High school education (vs. not)	—	—	1.57 (1.02-2.40)
Insured (vs. not)	2.46 (1.02–5.90)	1.74 (1.10–2.77)	10.45 (1.04–104.70)
Homeless (vs. not)	—	2.23 (1.36–3.67)	2.18 (1.58–3.01)
Fair/poor health status (vs. good/very good/excellent)	—	2.02 (1.53–2.67)	2.64 (1.91–3.64)
HIV infected ≥ 3 years (vs. < 3 years)	—	2.02 (1.11–3.67)	2.03 (1.13–3.64)
≥ 1 mental health visit/6 months (vs. not)	—	1.47 (1.18–1.84)	—
Taking mental health meds (vs. not)	7.46 (2.81–19.81)	1.59 (1.05–2.38)	1.87 (1.21–2.91)
Have a case manager (vs. not)	4.81 (3.75–6.18)	—	—
Ever had heavy alcohol intake	—	1.46 (1.02–2.09)	—

AOR, adjusted odds ratio; ED, emergency department; CI, confidence interval.

tiple cities and types of outreach programs, show that case management plays an essential role in maintaining access to needed HIV health care, and that this role is particularly important for marginalized and vulnerable populations.

Mental illness is prominent among vulnerable populations and HIV-infected individuals,[40–46] and therefore is an important factor in the management of their health care. In this study, the utilization of mental health services was strongly associated with increased ambulatory visits, as well as acute care visits. It is likely that these patterns reflect the increased health care needs of this population. Other studies have revealed that mental health care was associated with the receipt of ambulatory HIV care.[36,37,47]

Most of the aforementioned studies that have previously shown associations between supportive services and HIV-related health care utilization have recruited patients from a single site who are already in care. This study is unique not only because study recruitment specifically targeted hard-to-reach marginalized individuals outside of the health care system, but also because the multisite sample was from seven different cities in the United States. The various models of case management and mental health care, and their linkage with HIV care, are different among the seven sites, yet receipt of these supportive services remained significantly associated with HIV care. Additionally, in marginalized populations the need for case management and mental health care is likely higher than in populations already in the health care system. This study's findings support the potential importance of providing such supportive services to the disenfranchised. In this study, factors associated with utilization of acute care services were insurance, homelessness, and indicators of more severe HIV infection. Our findings confirm that these factors have a similar impact among marginalized patients compared to populations already in the health care system, as reported in previous studies.[4,7,8,11,18,20,21]

There are limitations to this study, including the study does not allow us to make inferences about the direction of the association between case management and mental health care with utilization of ambulatory health care services. It is possible that case management and mental health care led to increased utilization of ambulatory care visits, or that increased ambulatory care utilization led to more case management and mental health care. There are no clear means to identify and recruit hard-to-reach populations who are not in care, or are intermittently in care. To identify potentially underserved HIV-infected individuals, we recruited from outreach programs that provide services to hard-to-reach individuals who were not in any care, not in consistent care, or were at risk of dropping out of care across a range of geographic regions in the United States. While this study allowed us to include individuals often not included in other studies, the extent to which the study results can be generalized to marginalized populations in the United States is uncertain. In addition, missing data points occurred in cases because in phase 1 of this initiative multicenter data collection was voluntary. However, because the results were similar when missing data points were dropped and when they were imputed, we are confident that the analysis is valid. Despite this issue, the sample size of 610 is substantially larger than most studies involving HIV-infected marginalized populations. Although study participants were recruited from communities rather than health care settings, the percentage of individuals utilizing ambulatory health care services was surprising. Because all data were from self-report, it is possible that the recall of participants did not accurately represent utilization of health care services. Studies have shown conflicting results regarding accuracy of self-report specifically concerning utilization of health care resources in marginalized individuals.[48–50]

In this study of 610 hard-to-reach marginalized HIV-infected individuals involved in seven different outreach programs from around the United States, having insurance, case management and utilization of mental health services were associated with increased ambulatory visits. These findings support the need to include multidisciplinary care in the delivery of HIV health care services to marginalized populations. Understanding which demographic and clinical characteristics are as-

sociated with access to and utilization of HIV care is essential to develop effective outreach programs that will facilitate entry and engagement in care, and subsequently reduce current disparities in HIV care.

ACKNOWLEDGMENTS

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