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Factors associated with returning to HIV care after a gap in care in New York State

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Abstract

Background—Retention in HIV care has important implications. Few studies examining retention include comprehensive and heterogeneous populations, and few examine factors associated with returning to care after gaps in care. We identified reasons for gaps in care and factors associated with returning to care.

Methods—We extracted medical record and state-wide reporting data from 1865 patients with one HIV visit to a New York facility in 2008 and subsequent 6-month gap in care. Using mixed effect logistic regression, we examined sociodemographic, clinical, and facility characteristics associated with returning to care.

Results—Most patients were men (63.2%), black (51.4%), had Medicaid (53.9%). Many had CD4 counts >500 cells/mm³ (34.4%) and undetectable viral loads (45.0%). Most (55.9%) had unknown reasons for gaps in care; of those with known reasons, reasons varied considerably. After a gap, 54.6% returned to care. Patients who did (vs. did not) return to care were more likely to have stable housing, longer duration of HIV, high CD4 count, suppressed VL, antiretroviral medications, and had facilities attempt to contact them. Those who returned to care were less likely to be uninsured and have mental health problems or substance use histories.

Conclusion—Over half of our sample of patients in New York with one HIV visit and subsequent 6-month gap in care returned to care; no major reasons for gaps emerged. Nevertheless, our findings emphasize that stabilizing patients' psychosocial factors and contacting patients after a gap in care are key strategies to retain HIV-positive patients in care in New York.

Keywords

retention in care; HIV; health care utilization; New York

Introduction

Despite well-known benefits of regular HIV care, approximately 51% of Americans with known HIV infection are retained in HIV care¹⁻⁴. Although no uniform definition of retention in care exists, at least one visit to an HIV care provider every six months is a minimum bench mark recommended by several national organizations and used in prior studies²⁻⁸. Prolonged gaps in care that are often associated with interruptions in treatment are also considered in the definition of retention in care. Retention in care has important individual and public health implications, as retention in care is associated with HIV viral load (VL) suppression and survival^{2, 6, 9, 10}.

As people live longer with HIV infection, the challenge of ensuring that HIV-infected individuals are retained in care grows. Per the National HIV/AIDS Strategy and the HIV Care Continuum Initiative, retention in care has become a priority area^{11, 12}. In addition, the evidence-based literature focused on retention in care has grown. Several studies reveal that individuals who are young, male, racial/ethnic minorities, mentally ill, substance-using, without an AIDS diagnosis, and with insurance issues are at risk for poor retention in care^{2, 3, 7, 10, 13-19}. Studies have also identified reasons for dropping out of care, including feeling well, having other responsibilities, distrust of medical providers, effects of HIV medications, and depression²⁰⁻²². Additional studies found that ancillary services such as case management, outreach, support groups, and patient navigation are also associated with improved retention in care²³⁻³⁶. While these studies are important, most studies that examined reasons for poor retention and factors associated with improved retention are from a single setting or focus on a narrow group of HIV-infected individuals; few have included a comprehensive and heterogeneous HIV-infected population. In addition, few studies have explicitly examined factors associated with returning to care after gaps in care.

As part of a widespread quality improvement initiative at the New York (NY) State Department of Health's AIDS Institute, among HIV-infected patients receiving care in New York State medical facilities, we sought to identify: 1) reasons why patients had gaps in care, and 2) factors associated with returning to care after gaps in care.

Methods

We identified patients who had a single visit for HIV care in one of NY State's medical facilities in 2008 and a subsequent gap in care of at least 6 months. Patients' sociodemographic and clinical characteristics, along with facilities' characteristics were obtained via electronic extraction from a statewide reporting system and manual extraction of medical records. We report reasons for gaps in HIV care and compare patient and facility characteristics among those who did versus did not return to care after a gap in care. This study was determined to be exempt by affiliated institutional review boards.

Identification of patients

We identified patients who had only one HIV visit to a single medical facility in NY State between January 2008 and December 2008 with a subsequent gap in care of at least 6 months. Patients were identified via a report from Island Peer Review Organization, a

federally-designated Quality Improvement Organization. This report was compiled from case lists that are submitted annually by facilities to the NY State Department of Health. This report included 60,732 patients who had at least one HIV visit to a physician, nurse practitioner, or physician assistant in 2008 to at least one of 195 medical facilities in New York that provide HIV care under the NY State Medicaid program and have signed agreements with the state to provide comprehensive HIV care services in exchange for enhanced reimbursement rates. These 195 medical facilities include hospital-based clinics, community clinics, and private practices that accept Medicaid. Care provided in medical facilities located in jails or prisons and within the Veterans Health Administration are not included in this report. From this report, we identified 3,928 patients from 167 medical facilities who were reported to have a single visit at one medical facility, no visit at other facilities, and no visit in 2009 that was within 6 months of the visit in 2008. (e.g., Patients who had a single visit in December 2008 were included only if they did not have subsequent visits through May 2009—6 months later). Using these criteria, we identified patients who had one visit in 2008 with a subsequent gap in care of at least 6 months. Of these 167 facilities, 137 (82.0%) participated in a medical record extraction process investigating 3,433 patients. Based on this record review, patients were excluded for the following reasons: 445 had more than one visit in 2008, 482 had a return visit within 6 months of their single visit in 2008 (e.g. no gap in care of at least 6 months), 420 had no HIV primary care visit (e.g., they had emergency department visits or hospitalizations only), 111 were HIV-negative, 76 had missing medical records, and 34 were less than 18 years old. Seventeen facilities had no patients with a single visit in 2008 and subsequent gap in care. Thus, from 120 facilities, we identified 1865 adult HIV-infected patients with a single HIV primary care visit in 2008 and a subsequent gap in care of at least 6 months. This sample was included in the analysis.

Data extraction

We extracted patients' sociodemographic and clinical characteristics, facility characteristics, factors associated with retention in care from previous studies, and other factors thought to be clinically relevant according to HIV medical directors from the NY State HIV Quality of Care Advisory Committee. Two types of data extraction occurred—electronic extraction from the NY State Department of Health AIDS Institute Data Application (AIDA) and manual extraction from patients' medical records.

Electronic extraction from the NY State AIDA—The NY State AIDA is a state-wide database repository used to measure health care utilization to which medical facilities receiving support from NY State or the Ryan White Program are required to submit data. We electronically extracted data from the AIDA that included demographic, social, and clinical characteristics. Demographic characteristics included: age, gender (male, female, transgender), race/ethnicity (Hispanic, black, white, other [for the latter three categories, patients had either a non-Hispanic ethnicity or unknown-Hispanic ethnicity with the corresponding race]), and primary language (English, Spanish, other). Social characteristics included housing status (stable [permanent owned housing, permanent rental housing], unstable [homeless in shelter, homeless in streets, transitional housing, domestic violence situation], institutionalized [skilled nursing facility or hospice, residential drug treatment

program, residential group home, residential psychiatric facility, correctional facility], with relations or friends) and primary insurance (Medicaid, Medicare, AIDS Drug Assistant Program Plus [provision of free primary care services at select clinics and laboratories], private, self-pay, other). Clinical characteristics included: HIV risk category, duration of HIV infection, antiretroviral medication utilization in 2008, and CD4 count and HIV VL reported closest to the time of their visit in 2008. If data elements were missing in the AIDA, they were then manually extracted from medical records.

Manual extraction from medical records—Manual medical record extraction occurred by staff employed at each medical facility. Data were entered into a central secure internet-based portal. All staff who extracted medical record data participated in a training seminar on medical record extraction.

Pre-populated data forms incorporating data extracted from the AIDA were given to staff at facilities to complete the remaining data elements. In addition to data elements that were missing from the AIDA, other information extracted from medical records included: support services received in 2008 (yes/no), type of support services received (case management or social work services, treatment adherence services, harm reduction services, nutritional services, patient navigation services, other), mental health problems during or before 2008 (yes/no), type of mental health problem (depression, anxiety, other), mental health services received during or before 2008 (yes/no), history of substance use (yes/no), type of substances use history (alcohol, crack/cocaine, heroin, prescription opioids, marijuana, methamphetamine, other), medical comorbidities during or before 2008 (yes/no), and type of medical comorbidity (cancer, chronic hepatitis B virus, chronic hepatitis C virus, chronic medical conditions, opportunistic infections, other). To understand the circumstances of patients' gaps in care, medical record extraction also included: documented reasons for patients' gaps in care (open text), efforts to contact them after their gap in care (yes/no), type of effort to contact patients (contact patient by phone, mail/email, in-person, or by other means; contact patient's provider), and whether patients eventually returned to care (yes/no).

For many medical record variables, an "other" option was available in which staff could enter free text. Three authors (CC, JB, FS) independently examined these "other" free text responses and created themes to categorize them. The final categories were those in which authors reached consensus.

Facility characteristics—Facility characteristics were designated according to categories defined by the New York State Department of Health AIDS Institute. These characteristics included: type of facility (Designated AIDS Center hospital-based clinic [DAC; state-certified HIV Center of Excellence³⁷], community health center, non-DAC hospital-based clinic, and drug treatment program with integrated HIV clinical services³⁸), and location of facility (urban, suburban, rural).

Analyses

To identify reasons for gaps in care, we performed simple frequency analysis. To identify factors associated with returning to care after a gap in care, we first excluded patients who died, relocated, or transferred care. We then categorized patients by whether they did or did

not return to care after their gap in care. Next, to examine which sociodemographic and clinical factors were associated with returning to care, we conducted bivariate analyses using mixed effect logistic regression models to account for clustering effects of patients within medical facilities. Factors that were significant at $p < 0.10$ were then included in a multivariate mixed effect logistic regression model. Because prior studies have demonstrated differences in retention in care by gender and age, both gender and age were forced into the final multivariate model regardless of the p value on bivariate analyses.

To account for missing data, we imputed data five times applying the fully conditional specification approach using SAS v9.3 PROC MI³⁹. We applied mixed-effects logistic regression models to each imputed data set. The final parameter estimates (odds ratios) of each variable were computed by applying Rubin's pooling method for multiple imputation data analysis using PROC MIANALYZE⁴⁰. We conducted sensitivity analyses by repeating the steps outlined above with the original data without imputation. The final model using the imputed dataset was similar to the final model using the original dataset without imputation. Therefore, we report the findings from the imputed dataset.

We constructed additional multivariate models to explore how types of mental health problems, types of substance use histories, and type of support services were associated with returning to care, as prior studies have shown these factors to be associated with retention in care^{10, 17, 23-36}. To further explore how mental health problems were associated with returning to care, we created two different models in which all variables were the same as the base multivariate model described above except for the variable representing mental health problems. For example, in these two models, instead of including a variable that represented any mental health problem, one model included a variable representing depression (depression, no depression but other mental health problem, no mental health problem), and one model included a variable representing anxiety (anxiety, no anxiety but other mental health problem, no mental health problem). We repeated this process creating four different models for substance use history (exploring a history of alcohol, heroin, crack/cocaine, and marijuana use) and one different model for support services received (exploring the receipt of case management).

Results

Of 1865 patients who had a single HIV primary care visit at one medical facility in New York, no visit at other New York facilities, and a subsequent gap in care of at least 6 months, the mean age was 43 years, and most were men (63.2%), black (51.4%), lived in stable housing (65.0%), and had Medicaid (53.9%) (Table 1). Most (61.2%) were diagnosed with HIV infection more than 5 years prior to their visit in 2008. Many patients had CD4 counts greater than 500 cells/mm³ (34.4%) and undetectable VL (45.0%). The majority of patients (62.8%) had been prescribed antiretroviral medications at some time during 2008. Nearly one third (29.2%) had a mental health problem, with depression most common. Nearly half (41.7%) had a history of substance use, with alcohol or crack/cocaine histories most common. Almost half (43.7%) had a medical comorbidity. Over half (55.1%) received supportive services, with case management as the most commonly received service. The

majority of patients had a single visit in 2008 in a New York State Designated AIDS Center, and at a facility located in an urban area.

Over half (55.9%) of the patients had an unknown reason for their gap in care (Table 2). Of those with known reasons, reasons varied considerably with no clear predominant reason for gaps in care. Medical facilities made efforts to contact 67.7% of patients who had a gap in care, with the most common effort via phone calls (70.4%) or mail or email (63.0%). After a gap in care, excluding those who transferred care, relocated, or expired, over half (54.6%) returned to care. Of those who returned to care, the median duration of their gap was 336 days (IQR=264-420, range=184-932 days).

In bivariate analysis, those who did (versus did not) return to care significantly differed by race/ethnicity, language, housing status, insurance, HIV risk category, duration of HIV infection, CD4 count, HIV VL, use of antiretroviral medications, mental health problems, substance use histories, and receipt of supportive services (Table 3). In addition, significant differences in the location and type of medical facility existed between those who did versus did not return to care. In the multivariate analysis, those who did (versus did not) return to care were more likely to have stable housing, longer duration of HIV infection, high CD4 count, suppressed VL, have been prescribed antiretroviral medications, have received care in a Designated AIDS Center and a medical facility located in a non-urban area, and had a facility make efforts to contact them. Those who returned to care were also less likely to be uninsured and have mental health problems or substance use histories.

In exploratory models, specific types of mental health problems and types of substance use histories were also significantly associated with returning to care. Compared to those with no mental health problem, patients with depression were less likely to return to care (AOR=0.68, 95% CI=0.50-0.93), while those with anxiety were not (AOR=0.92, 95% CI=0.59-1.44). Compared to those with no substance use history, patients with a history of heroin use (AOR=0.53, 95% CI=0.32-0.86), crack/cocaine use (AOR=0.60, 95% CI=0.41-0.87), and alcohol use (AOR=0.67, 95% CI=0.47-0.94) were less likely to return to care, while patients with a history of marijuana use were not (AOR=0.80, 95% CI=0.53-1.21). Finally, compared to those who did not receive supportive services, there were no differences in whether patients returned to care by receipt of case management (AOR=0.95, 95% CI=0.72-1.24).

Discussion

Of 1865 HIV-positive adult New Yorkers who had a single visit to an HIV primary care provider in 2008 followed by a subsequent gap in care of at least 6 months, most had indicators of well-controlled HIV infection (high CD4 count and suppressed VL), and nearly half had a substance use history or medical comorbidity. Over half received supportive services. Most had unknown reasons for gaps in care, and in those with known reasons, no clear predominant reasons for gaps in care emerged. For the majority of patients, medical facilities attempted to contact them, and over half of the patients returned to care.

With our study sample drawn from New York State, which includes a heterogeneous patient population from a spectrum of geographic locations (urban, suburban, and rural), our findings extend those of prior studies. We found similar sociodemographic and clinical characteristics among patients not retained in care as those reported in previous studies^{2, 3, 7, 10, 13-18}. For example, a high proportion of patients who were black, had high CD4 counts, and had substance use histories or mental health problems had gaps in care.

Few US studies have explicitly examined reasons for gaps in care, and to our knowledge, all these studies interviewed patients to determine reasons. Reasons included feeling well, having other responsibilities or competing priorities, distrust of or negative experiences with medical providers, effects of HIV medications, depression, lack of insurance, and not wanting to think about HIV²⁰⁻²². We used different methods to determine reasons for gaps in care—we extracted this information from medical records. While our methods undoubtedly contributed to our finding that approximately half of the patients had unknown reasons for gaps in care, examining gaps in care from medical records can contribute meaningful findings. For example, studies that derive data from patient interviews are likely to under-report certain reasons for gaps in care, such as incarceration, relocating residence, and transferring care, because patients who have these reasons may be least likely to be included in samples of those interviewed. In contrast, from medical record extraction, this type of information is available; however, other more nuanced reasons for gaps in care may be under-reported in medical records. Given these differences based on methods used in studies, it is important that studies report on reasons for gaps in care using a variety of methods, including both patient interviews and medical record reviews.

In our study, of those with known reasons for gaps in care, no predominant reason emerged. The most common reasons for gaps in care included transferring care, relocating residence, and death. However, it is not known if those who transferred care or relocated actually established care in another facility outside of New York. Other common reasons for gaps in care included incarceration, “life stressors” (e.g., work, school, housing issues, caring for others), and that the HIV provider was not the patient’s primary care physician. It is no surprise that life stressors may be barriers to achieving optimal HIV care utilization, as HIV-positive individuals tend to be marginalized in many ways, which can lead to an additional level of burden that may take priority over seeking medical care. This theme is consistent with other studies^{21,41, 42}. Taken together, the lack of consistent emerging themes in our and others’ studies to explain patients’ gaps in care leaves medical providers and policy makers uncertain on how to mitigate or prevent gaps in care. Because of the variety of reasons for gaps in care, individualized problem solving or case management to address specific challenges of remaining in care appear to be necessary. Further exploration into reasons for or causes of gaps in care, and ultimately how to prevent these gaps in care is warranted.

Our study adds to the literature by shedding light on factors associated with returning to care after a gap in care. Although a few studies have examined returning to care after the employment of a public health case worker or retention specialist^{21, 43}, we are not aware of studies that have examined a variety of factors associated with returning to care. We found that those who did (versus did not) return to care were more likely to have indicators of psychosocial and medical stability. Many of our findings are consistent with other studies’

findings in terms of factors associated with retention in care. These findings are particularly problematic, as it is likely that patients who are less likely to return to care—those with unstable social and medical characteristics (mental health problems, substance use, and poorly controlled HIV)—are likely to be at highest risk of transmitting HIV to others. Similar to other studies, our findings point to the importance of addressing comprehensive psychosocial care of HIV-infected patients, including addressing social issues (e.g., housing, insurance), integration of care (e.g., mental health and substance abuse treatment services integrated into HIV care), joint planning, problem-solving, and shared decision-making among providers and patients. In particular, studies demonstrating the benefits of strength-based case management and managed problem solving provide support for an individualized approach that is tailored to patients' needs and situations^{30, 44}.

Although we found that supportive services were not associated with returning to care, efforts to contact patients were associated with returning to care. A substantial body of literature consisting mostly of observational studies, with a few randomized trials, provides evidence that support services such as case management, outreach, support groups, and patient navigation are associated with improved retention in care²³⁻³⁶. Our findings differ from these studies. However, in our study, except for case management which was received by the vast majority of patients and may be variably defined by different facilities, other support services were not commonly received, possibly limiting our ability to detect differences between those who did and did not receive these services. In addition, our study specifically examined patients with gaps in care, while many other studies examined patients “at risk” for poor retention in care. Possibly, supportive services help keep patients who are at risk of dropping out of care in care, but support services alone may not be sufficient to bring patients who have had a gap in care back into care. Despite these findings, after a gap in care, efforts made to contact patients were associated with returning to care. These data suggest that developing strategies to identify and contact patients who have a gap in care can lead to successful return to care. Further examination of the types of efforts (phone calls, letters, home visits) to contact patients is warranted to best utilize services and resources.

Our study has limitations. The medical facilities and their HIV-infected patients that we included in our study do not represent all medical facilities or all HIV-infected patients receiving care in New York State. In addition, upon medical record review, we found errors in the initial report of patients who were reported to have a single visit in 2008, and removed them from our sample. It is possible that the opposite error may have occurred (in which patients may have had a single visit in 2008, but were reported to have more than one visit). We relied on data extracted from the New York State AIDS Institute Data Application—an electronic database designed to measure health services utilization—and from manual medical record extraction. As mentioned above, because we did not survey patients directly, it is no surprise that our data regarding reasons for gaps in care differed from prior studies that interviewed patients. Using medical records to determine reasons for gaps in care may lead to “unknown” reasons for gaps in care for a substantial number of patients. In addition, medical record data are likely unable to capture nuanced information about reasons for gaps in care or returning to care. Because of our study design, causality cannot be determined. For example, one cannot determine if case management was ineffective in facilitating returning to care, or if those who received case management did so because they were the

most likely to not return to care. To address missing data, we relied on imputed data for our final models. However, when we conducted analyses with and without imputed data, we found similar results. Although our study focuses on care received in 2008-2009, the issue of poor retention in care remains important today. Unfortunately, few new policies or interventions have been implemented that substantially improve retention in care at the population level. Therefore, we are confident that our findings still contribute to the field. Finally, because our data capture HIV care in New York, our findings may not be generalizable to other states.

In summary, HIV-infected patients who had a single HIV primary care visit to a New York facility in 2008 with a subsequent gap in care had similar sociodemographic and clinical characteristics to patients not retained in care in previous studies. Just over half of the patients with a gap in their HIV care returned to care, and no major theme emerged regarding reasons for gaps in care. Compared to those who did not return to care, those who did return to care were more likely to have indicators of medical and psychosocial stability. Additionally, efforts to contact patients after their gap in care, and not supportive services, were associated with returning to care. Our findings emphasize that stabilizing patients' psychosocial factors and contacting patients after a gap in care are key strategies to retain HIV-infected New Yorkers in care.

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Table 1

Characteristics of 1865 HIV-infected patients in New York who had a single HIV visit in 2008 and subsequent 6-month gap in care

Characteristic	n (%)
Sociodemographic characteristics	
Age	
<25	95 (5.1)
25-39	577 (30.9)
40-49	707 (37.9)
50-59	382 (20.5)
60	104 (5.6)
Gender	
Male	1179 (63.2)
Female	683 (36.6)
Transgender	3 (0.2)
Race/ethnicity	
Hispanic	463 (24.8)
Black	958 (51.4)
White	319 (17.1)
Other	89 (4.8)
Unknown	36 (1.9)
Primary language	
English	1602 (85.9)
Spanish	179 (9.6)
Other	64 (3.5)
Unknown	20 (1.1)
Housing	
Stable	1213 (65.0)
Unstable	140 (7.5)
Institutionalized	247 (13.2)
With relations	64 (3.4)
Unknown	201 (10.8)
Primary insurance	
Medicaid	1005 (53.9)
Medicare	110 (5.9)
AIDS Drug Assistance Program Plus ^a	298 (16.0)
Private Insurance	258 (13.8)
Self pay	82 (4.4)
Other	37 (2.0)

Characteristic	n (%)
Unknown	75 (4.0)
Clinical characteristics	
HIV risk factor	
Men who have sex with men	394 (21.1)
Men who have sex with men and injection drug use	18 (1.0)
Injection drug use	202 (10.8)
Heterosexual	892 (47.8)
Other	138 (7.4)
Unknown	221 (11.9)
Duration of HIV infection	
6 months before 2008 visit	112 (6.0)
> 6 months -12 months before 2008 visit	55 (3.0)
> 1 year - 5 years before 2008 visit	406 (21.8)
>5 years before 2008 visit	1142 (61.2)
Unknown	150 (8.0)
CD4 count (cells/mm ³)	
50	127 (6.8)
51-200	235 (12.6)
201-350	344 (18.5)
351-500	363 (19.5)
>500	642 (34.4)
Unknown	154 (8.3)
VL (copies/mL)	
400	840 (45.0)
401-1000	83 (4.5)
1001-10,000	276 (14.8)
10,001-99,999	361 (19.4)
100,000	116 (6.2)
Unknown	189 (10.1)
Prescribed antiretroviral medications in 2008	
Yes	1171 (62.8)
No	607 (32.5)
Unknown	87 (4.7)
Supportive services received in 2008	
Yes	1027 (55.1)
No	612 (32.8)
Unknown	226 (12.1)
Type of supportive services received (N=1027)	

Characteristic	n (%)
Case management or social work services	874 (85.1)
Treatment adherence support	119 (11.6)
Harm reduction	119 (11.6)
Harm reduction	115 (11.2)
Patient navigation	43 (4.2)
Other	117 (11.4)
Mental Health problem during or before 2008	
Yes	544 (29.2)
No	1100 (59.0)
Unknown	221 (11.9)
Type of mental health problem (N=544)	
Depression	404 (74.3)
Anxiety	166 (30.5)
Other	181 (33.3)
Received mental health services during or before 2008 (N=544)	
Yes	320 (58.8)
No	135 (24.8)
Unknown	89 (16.4)
History of substance use	
Yes	777 (41.7)
No	838 (44.9)
Unknown	250 (13.4)
Type of substance use history (N=777)	
Alcohol	408 (52.5)
Crack/cocaine	381 (49.0)
Heroin	223 (28.7)
Prescription opioids	35 (4.5)
Marijuana	217 (27.9)
Methamphetamine	20 (2.6)
Other	40 (2.1)
Medical comorbidities during or before 2008	
Yes	814 (43.7)
No	961 (51.5)
Unknown	90 (4.8)
Type of medical comorbidity (N=814)	
Cancer	59 (7.3)
Chronic hepatitis B virus infection	66 (8.1)
Chronic hepatitis C virus infection	292 (35.9)
Chronic medical conditions ^b	460 (56.5)

Characteristic	n (%)
Opportunistic infection	42 (5.2)
Other	27 (3.3)
Medical facility characteristics	
Type of facility	
Designated AIDS center (DAC) hospital-based clinic	1394 (74.8)
Community health center	383 (20.5)
Non-DAC hospital-based clinic	56 (3.0)
Drug treatment program	32 (1.7)
Location of facility	
Urban	1411 (75.7)
Suburban	199 (10.7)
Rural	255 (13.7)

^aIncludes the provision of free primary care services at select clinics and laboratories.

^bIncludes chronic liver, renal, heart, peripheral vascular, pulmonary, gastrointestinal disease; hypertension; diabetes mellitus; hyperlipidemia; seizure disorder.

Table 2

Characteristics related to a gap in care among 1865 HIV-infected patients in New York who had a single HIV visit in 2008 and subsequent 6-month gap in care

Characteristics	n (%)
Medical facility made an effort to contact patient after gap in care	
Yes	1225 (65.7)
No	495 (26.5)
Unknown	145 (7.8)
Type of effort to contact patient (N=1225)	
Contact patient by phone	862 (70.4)
Contact patient by mail or email	772 (63.0)
Contact patient in-person	98 (8.0)
Contact patients' providers	29 (2.4)
Contact patient by other means	25 (2.0)
Reason for gap in care	
Unknown	1043 (55.9)
Transferred care	145 (7.8)
Relocated	138 (7.4)
Expired	101 (5.4)
Incarcerated	71 (3.8)
Life stressors	69 (3.7)
Not the primary HIV care provider	57 (3.1)
Drug treatment	49 (2.6)
Distance/lives elsewhere	48 (2.6)
Insurance issues	25 (1.3)
Institutionalized/Long-term care	24 (1.3)
Medical issues	23 (1.2)
Stable HIV, not on meds	22 (1.2)
Denial of disease	14 (0.8)
Mental illness/psych inpt treatment	12 (0.6)
Switches doctors, uses other providers	11 (0.6)
Refuses treatment	5 (0.3)
Other	8 (0.4)
Returned to medical facility after a gap in care? ^a (N=1481)	
Yes	808 (54.6)
No	665 (44.9)
Unknown	8 (0.5)

^aExcluding patients who transferred care, relocated and expired (n=384)

Table 3

Unadjusted and adjusted odds of HIV-infected patients in New York returning to care after a single HIV visit in 2008 and subsequent 6-month gap in care.*

Characteristics	Unadjusted bivariate analyses		Adjusted multivariate analysis	
	OR	95% CI	OR	95% CI
Sociodemographic characteristics				
Age (continuous, year)	1.01	1.00-1.02	0.99	0.98-1.01
Gender				
Male	Ref	--	Ref	--
Female	1.06	0.86-1.31	0.92	0.70-1.22
Race/ethnicity				
Black	Ref	--	Ref	--
Hispanic	1.13	0.88-1.45	1.19	0.86-1.66
White	1.88	1.79-2.54	1.30	0.89-1.92
Other	0.92	0.57-1.48	0.79	0.46-1.38
Primary language				
English	Ref	--	Ref	--
Spanish	1.06	0.73-1.52	1.15	0.72-1.86
Other	2.43	1.30-4.56	1.99	0.97-4.09
Housing				
Stable	Ref	--	Ref	--
Unstable	0.32	0.21-0.50	0.53	0.33-0.86
Institutionalized	0.21	0.11-0.40	0.25	0.12-0.51
With relations	0.91	0.66-1.25	0.99	0.70-1.39
Primary Insurance				
Public insurance	Ref	--	Ref	--
Private insurance	2.87	2.00-3.94	1.39	0.90-2.13
Uninsured	0.49	0.30-0.80	0.56	0.32-0.99
Other insurance	0.45	0.22-0.94	0.56	0.24-1.30
Clinical characteristics				
HIV risk factor				
Heterosexual	Ref	--	Ref	--
Men who have sex with men	1.06	0.80-1.40	0.98	0.67-1.42
Men who have sex with men and injection drug use	0.96	0.31-2.95	0.85	0.25-2.88
Injection drug use	0.63	0.43-0.93	0.82	0.53-1.29
Other	0.56	0.37-0.85	0.69	0.42-1.13
Duration of HIV infection				

Characteristics	Unadjusted bivariate analyses		Adjusted multivariate analysis	
	OR	95% CI	OR	95% CI
>5 years before 2008 visit	Ref	--	Ref	--
> 1 year - 5 years before 2008 visit	0.84	0.65-1.08	0.84	0.63-1.13
> 6 months -12 months before 2008 visit	0.35	0.19-0.68	0.39	0.19-0.80
6 months before 2008 visit	0.25	0.16-0.40	0.29	0.17-0.50
CD4 count (cells/mm ³)				
>500	Ref	--	Ref	--
351-500	0.73	0.55-0.98	0.83	0.59-1.17
201-350	0.58	0.41-0.84	0.72	0.47-1.12
51-200	0.55	0.39-0.79	0.74	0.46-1.22
50	0.31	0.19-0.50	0.52	0.29-0.94
VL (copies/mL)				
400	Ref	--	Ref	--
401-1000	0.55	0.35-0.87	0.81	0.48-1.36
1001-10,000	0.55	0.40-0.74	0.89	0.59-1.34
10,001-99,999	0.49	0.37-0.66	1.02	0.69-1.51
100,000	0.20	0.12-0.34	0.44	0.25-0.77
Prescribed antiretroviral medications in 2008				
No	Ref	--	Ref	--
Yes	1.97	1.56-2.49	1.46	1.07-1.98
Supportive services received				
No	Ref	--	Ref	--
Yes	0.64	0.51-0.79	0.85	0.66-1.11
Mental Health problem				
No	Ref	--	Ref	--
Yes	0.57	0.45-0.72	0.69	0.52-0.93
History of substance use				
No	Ref	--	Ref	--
Yes	0.45	0.36-0.56	0.62	0.47-0.82
Medical comorbidities				
No	Ref	--	Ref	--
Yes	0.83	0.68-1.03	1.05	0.80-1.37
Medical facility characteristics				
Type of facility				
Designated AIDS center (DAC) hospital-based clinic	Ref	--	Ref	--
Community health center	0.53	0.41-0.69	0.54	0.40-0.72
Non-DAC hospital-based clinic	0.90	0.49-1.67	0.66	0.32-1.35

Characteristics	<u>Unadjusted bivariate analyses</u>		<u>Adjusted multivariate analysis</u>	
	OR	95% CI	OR	95% CI
Drug treatment program	0.39	0.15-0.97	0.64	0.22-1.90
Location of facility				
Urban	Ref	--	Ref	--
Suburban	2.80	1.95-4.02	1.71	1.09-2.68
Rural	2.11	1.50-2.97	1.97	1.30-2.99
Facility made an effort to contact patient				
No	Ref	--	Ref	--
Yes	1.20	0.94-1.53	1.46	1.09-1.96

* N=1481. Patients who died (n=101), self-reported to relocate (n=138), and self reported to transfer care (n=145) were not included in analyses.