Antiretroviral Therapy Use Among HIV-Infected People Who Inject Drugs—20 Cities, United States, 2009–2015

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Abstract

Background—Approximately 16% of infections among those living with diagnosed HIV infection in the United States are attributable to injection drug use. Antiretrovirals (ARVs) are recommended for all infected persons to improve health and prevent transmission. Using data from National HIV Behavioral Surveillance, we evaluated changes in ARV use from 2009 to 2015 among HIV-positive people who inject drugs (PWID).

Methods—PWID were recruited by respondent-driven sampling in 20 cities. ARV use was defined as self-reported use at the time of interview. Prevalence ratios measuring change in ARV use per 3-year increase in year were estimated using log-linked Poisson regression models with generalized estimating equations.

Results—ARV use was 58% (319/548) in 2009, 67% (410/608) in 2012, and 71% (386/545) in 2015. In all 3 cycle years, a higher percentage of ARV treatment was observed among males, PWID of older age (50), and PWID with current health insurance. ARV use increased overall, with an adjusted relative increase of 8% per every 3-year increase in year (adjusted prevalence ratio 1.08, 95% confidence interval: 1.03 to 1.12). ARV use also increased among most subgroups.

Conclusions—These findings show progress in ARV treatment, although ARV coverage remains low compared with other populations at risk for HIV. Efforts to improve ARV coverage among PWIDs are needed.

Keywords

PWID; HIV; antiretroviral therapy; surveillance; United States

INTRODUCTION

Approximately 16% of infections among those diagnosed with HIV in the United States are attributable to injection drug use.[1] Although HIV infections due to injection drug use have declined since the late 1980s,[2] injecting drugs remains a significant risk for HIV, both directly through the sharing of injection equipment and indirectly through sexual transmission from people who inject drugs (PWID) to noninjecting sex partners.[3] In the United States, PWID experience disparities in HIV health care access and outcomes, including mortality, compared with other groups at risk for HIV.[4] PWID are more likely to be diagnosed at later stages of HIV infection and initiate antiretrovirals (ARVs) later and with lower adherence compared with individuals without a history of injection drug use.[5] The reasons for these disparities are complex and include both individual risk behaviors associated with addiction and social and structural factors such as socioeconomic disadvantage, stigmatization, and criminalization of injection drug use.[4,6]

ARVs dramatically improve health outcomes among people living with HIV or AIDS, lower HIV viral load, and reduce the likelihood of HIV transmission.[7] Recommendations for initiating ARVs in treatment-naive persons broadened in 2009 to include those with a CD4 count less than 500 cells/mm^3 (previously less than 350 cells/mm^3) and again in 2012 to include all HIV-infected individuals.[8] However, historically there has been a long-standing reluctance to treat PWID with ARVs out of fear that barriers experienced by PWID will result in lower adherence and may contribute to the development of drug-resistant HIV strains.[9] The National Institute on Drug Abuse and the International AIDS Society supports extension of the "seek, test, and treat" paradigm of ARV treatment to PWID.[10] The effectiveness of this approach has been substantiated in a longitudinal cohort of PWID.[11] The National HIV/AIDS Strategy, originally released in 2010 and updated in 2015, provides a comprehensive plan for prevention and care with measurable HIV targets.[12,13] The National HIV/AIDS Strategy does not set a specific target for percentage of persons with diagnosed HIV infection on ARVs but does call for 80% of PWID to be virally suppressed through ARV treatment. The strategy also includes a call to reduce HIV-related disparities by supporting engagement in care for groups with low levels of viral suppression, including PWID.

To monitor progress of the extension of the "seek, test, and treat" paradigm to PWID, we analyzed data from HIV-positive PWID from 3 cycles of National HIV Behavioral Surveillance (NHBS) (2009, 2012, and 2015) to determine whether there was a difference in prevalence of current ARV use between cycle years. We also examined differences in ARV use between cycle years among demographic subgroups.

METHODS

Since 2003, the Centers for Disease Control and Prevention's NHBS has monitored HIV-associated behaviors and HIV prevalence in cities with high AIDS prevalence among 3 populations with high HIV risk behaviors: PWID, men who have sex with men (MSM), and heterosexuals at increased risk for HIV infection.[14] Cross-sectional data reported in this analysis are from PWID recruited for face-to-face interviews and HIV testing through

respondent-driven sampling (RDS) in NHBS surveys in 2009, 2012, and 2015. NHBS RDS procedures have been previously published[15] and are summarized briefly here. Persons were eligible to participate if they had injected drugs in the previous 12 months, resided in a participating city, were aged 18 years, and could complete the interview in English or Spanish. Drug injection in the last 12 months was confirmed by observing physical evidence of recent injection (eg, track marks) and by assessing knowledge of injection practices. Recruitment chains in each city began with initial participants identified during formative assessment by referral from persons who knew the local population of PWID or through outreach to areas with PWID. Participants who completed the interview were asked to recruit up to 5 other PWID. This recruitment process continued until the sample size had been reached or the sampling period ended. Incentives were given for participating in the survey and HIV test as well as for recruiting others. Interviews were conducted by trained interviewers using a standardized questionnaire covering demographics, HIV-associated behaviors, and use of HIV prevention and testing services. Activities for NHBS were approved by local institutional review boards for each of the 20 participating cities. The Centers for Disease Control and Prevention also reviewed and approved the protocol.

Current ARV treatment was defined as self-reported use at the time of NHBS interview. Analyses were restricted to PWID who self-reported being HIV positive during the interview. Although HIV testing was conducted as part of NHBS, test results were not known until after the interview, and thus data on ARV use were only collected on those who self-reported HIV-positive status during the interview. Data from the 20 cities that contributed NHBS data in 2009, 2012, and 2015 were used.

Unadjusted prevalence ratios (PRs) comparing prevalence of ARV use for a 3-year increase in cycle year (ie, 2009–2012 or 2012–2015) were calculated to explore differences over time overall and by demographic characteristics (sex, race, age, education, and insurance). Because the goal of this analysis was to describe how prevalence of ARV treatment may have changed over time among demographic groups, behavioral factors that may be associated with ARV treatment were not considered. PRs and 95% confidence intervals (CIs) were calculated from log-linked Poisson regression models with generalized estimating equations. Models were clustered on RDS recruitment chain. Year was included in the model as an ordinal variable. Models estimating the change in ARV treatment per 3-year increase in year by demographic group included the demographic covariate of interest and the interaction term between the covariate and year. We also adjusted for the differing sampling inclusion probabilities by including participants' personal network size and for the multisite nature of the study by including city in the models. Adjusted models included sex, race/ethnicity, current age, and current insurance.

RESULTS

Data on NHBS recruitment in 2009, 2012, and 2015 are presented elsewhere.[16,17] Of 9741 PWID who consented and had valid and complete interviews in 2009, 548 (5.6%) reported being HIV positive (Table 1). In 2012, 609 (6.0%) of 10,117, and in 2015, 546 (5.2%) of 10,431 were HIV positive. Most self-reported HIV-positive participants were male in all years (71% in 2009, 69% in 2012, and 72% in 2015). The 2009 and 2012 cycles had

comparable age and race distribution, with most participants being black (57% in 2009% and 58% in 2012) and older than 40 years (82% in 2009% and 85% in 2012). This was true in 2015 as well, but the proportion of black participants (46%) and the proportion of those older than 40 years (78%) were both lower in comparison with the other cycle years. In all 3 years, almost 3 quarters of participants had a high school education or less and over 3 quarters of participants had an annual household income of less than $20,000. Participants were more likely to have health insurance in the 2012 and 2015 samples (86% in both) compared with the 2009 sample (78%). Most participants were older than 30 years when they were diagnosed with HIV. About half of HIV-positive participants were recruited in cities in the South and territories (San Juan, PR).

For the current ARV treatment analysis, all self-reported HIV-positive PWIDs interviewed in 2009 (n = 548), 2012 (n = 609), and 2015 (n = 546) were eligible for inclusion. One participant in 2012 and 1 in 2015 were missing data on current ARV treatment, leaving 608 in 2012 and 545 in 2015 for analyses (Table 2). In all 3 cycle years, a higher percentage of ARV treatment was observed among black PWID, PWID of older age (50), PWID with current health insurance, and PWID recruited in the Northeast. The difference in current ARV use between black and white PWID was not statistically significant in 2015 and was driven by differences in age by race. Black PWID were more likely to be older than white PWID (data not shown, $P < 0.0001$ in 2015), and older age was associated with increased prevalence of ARV use. PWID recruited in the South and territories were significantly less likely to report current ARV use compared with those in other regions in 2015 and were significantly less likely to be currently insured (data not shown). Prevalence of current ARV use increased significantly overall from 58% in 2009 to 67% in 2012 and 71% in 2015, for an adjusted relative increase of 8% per every 3-year increase in year (aPR 1.08, 95% CI: 1.03 to 1.12). ARV use also increased among both males (aPR 1.06, 95% CI: 1.01 to 1.10) and females (aPR 1.15, 95% CI: 1.06 to 1.24), blacks (aPR 1.07, 95% CI: 1.02 to 1.13) and Hispanics (aPR 1.10, 95% CI: 1.02 to 1.18), those of all ages (aPR 1.09, 95% CI: 1.02 to 1.17 for those <50 years; aPR 1.07, 95% CI: 1.01 to 1.12 for those 50 years), those with less education (aPR 1.10, 95% CI: 1.05 to 1.15), and those with current insurance (aPR 1.07, 95% CI: 1.03 to 1.11). By region, ARV use increased among those recruited in the Northeast (aPR 1.09, 95% CI: 1.02 to 1.17) and those recruited in the South and territories (aPR 1.11, 95% CI: 1.04 to 1.19).

DISCUSSION

The prevalence of ARV use increased significantly among PWID overall and among most subgroups. This suggests that PWID are increasingly initiating ARVs, in accordance with more inclusive treatment guidelines and support of the "seek, test, and treat" paradigm in PWID. Higher prevalence of ARV use was associated with older age (50 years), current health insurance, and residing in the Northeast. Black PWID appeared to have a higher prevalence of ARV use compared with other races, including white PWID, in all 3 years. This was surprising considering the racial disparity in ARV use among MSM, with black MSM significantly less likely to report current ARV use compared with white MSM.[18] However, the racial difference observed in this analysis was attributable to differences in age by race and disappeared after adjusting for age (data not shown). Black PWID in NHBS

were older compared with white PWID, and older PWIDs were more likely to report current ARV use.

In 2012, 67% of HIV-positive PWID in our analysis reported currently using ARVs. This estimate is considerably higher than that found in an analysis of the continuum of care among PWID in the US for 2009, which estimated that 39% of PWID diagnosed with HIV were receiving ARVs.[19] This difference may be because NHBS samples from 20 urban areas and do not represent rural areas. It can also be explained by an overrepresentation of older PWID in NHBS compared with national estimates of PWID,[20] who are more likely to be linked to care and receiving ARVs. Young PWID may be less networked than older PWIDs and therefore less likely to be recruited through RDS sampling.[3] Our sample also has a high proportion of participants with health insurance, which affords more opportunities to access HIV care and receive ARVs. Another recent analysis of mostly older, black HIV-infected PWID enrolled in a prospective study in Baltimore between 1998 and 2011 found that 604 of 790 PWIDs (76%) received ARVs at some point during study observation.[4] This estimate is likely higher than those currently receiving ARVs but does indicate that most older urban PWID are being prescribed ARVs.

Although there was a 13 percentage point increase in prevalence of ARV use between 2009 and 2015 overall, the prevalence of current ARV use among PWID in 2015 (71%) was lower compared with estimates of current ARV use among MSM (79% in NHBS in 2011).[18] This finding is consistent with previous observations that PWID are more likely to discontinue ARVs and have less stability in their ARV regimens over time compared with other HIV-infected people who do not inject drugs,[21,22] leading some physicians to resist prescribing ARVs to PWID. A prospective study of 790 HIV-infected PWID followed from 1998 to 2011 found that although 94% were ever linked to care, only 31% were continuously retained with no 6-month lapses in HIV care.[4] Breaks in care were associated with active drug use and incarceration and likely contribute to poorer responses to treatment and lower life expectancy among PWID infected with HIV. Drug dependence undermines ARV adherence, and comorbidities such as hepatitis C can increase the side effects of ARVs and limit their tolerability and affect drug metabolism.[10,23] However, programs can encourage greater ARV adherence if they provide comprehensive harm-reduction services including substance use disorder treatment that enable persons who use drugs to stabilize their lives.[24,25] If PWID are engaged in care and adhere to treatment, they can have as successful a response to ARVs as other people living with HIV.[23] Harm-reduction services, including syringe services programs, social and psychological services, and medication-assisted therapy, provide important entry points for HIV testing and accessing HIV care.[23] Integrating HIV treatment with harm-reduction services has been shown to effectively reduce HIV morbidity and mortality as well as transmission risk.[26–28]

Ongoing changes in the US health care system offer opportunities to improve use of drug treatment programs and HIV services, including ARV treatment, by PWID. The Patient Protection and Affordable Care Act (ACA) of 2010 (as amended by the Healthcare and Education Reconciliation Act of 2010 and referred to collectively as the ACA) has expanded insurance coverage, consumer protections, and access to primary care and has emphasized prevention in addition to care and treatment (see http://aids.gov/federal-resources/policies/

health-care-reform/). Under the ACA, many HIV-infected PWID have become newly eligible for Medicaid coverage and others have become eligible to purchase private insurance through the marketplaces (websites where individuals can compare insurance plans and enroll in coverage).[29] The ACA also requires insurance companies to cover treatment of addiction as they would any other chronic disease.

Although new HIV infections attributed to drug injection have been declining in the United States since the 1980s,[2] recent increases in substance use disorders related to prescription drug abuse could lead to increased transmission of HIV among PWID. During 2015, Scott County, Indiana, an area without comprehensive harm-reduction services, had an outbreak of HIV infection attributable to prescription drug injection.[30] This outbreak and the prescription opioid epidemic demonstrate the need for sustained access to both HIV and substance use prevention and treatment services so as not to erode successes in reducing HIV among PWID.[13]

Our analyses are subject to several limitations. First, NHBS is not a nationally representative sample, so results may not be generalizable to all cities or to all PWID in participating cities. Because RDS relies on recruitment through social networks, those who inject alone or rarely interact with other PWID may not be sampled. RDS sampling weights were not used in our analysis and point estimates may be biased by overrepresented or underrepresented subgroups of the sample. Therefore, the point estimates should be interpreted with caution, especially those for the total sample. Second, our data are collected through face-to-face interviews and our measures of early linkage to care and ARV treatment are based on self-reported data and might be subject to social desirability and recall bias. Social desirability would lead to overestimation of prevalence estimates, whereas the direction of bias because of recall error is unknown. However, our results are based on differences between cycle years and are less likely to be affected by these biases than the point estimates themselves, provided the biases remained consistent over time. The analysis is limited to 3 time points and cannot be interpreted as a trend nor as resulting from changes to practices that occurred between these time points. Our analysis also did not include data on early linkage to care, engagement in care, ARV adherence, or viral load suppression, so we cannot say whether PWID linked to care early were retained in care or if those currently on ARVs are at reduced risk of HIV transmission.

Our data show that PWID are increasingly initiating ARVs, in accordance with the more inclusive treatment guidelines introduced in 2009. Although the measurable increases in antiretroviral therapy use are encouraging, strengthened intervention efforts among PWID are needed to improve coverage of ARVs in this population to reduce disparities compared with other groups at risk for HIV. Efforts to improve ARV coverage should be linked to other harm-reduction strategies to ensure sustained treatment and reduction in HIV transmission risk.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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TABLE 1

Characteristics of Self-Reported HIV-Positive People Who Inject Drugs—NHBS, 2009–2015

Characteristic	2009, n (%)	2012, n (%)	2015, n (%)
Total	548	609	546
Sex			
Female	161 (29)	191 (31)	155 (28)
Male	387 (71)	418 (69)	391 (72)
Race/ethnicity			
Black	309 (57)	350 (58)	252 (46)
Hispanic/Latino [*]	103 (19)	106 (17)	129 (24)
White	110 (20)	111 (18)	127 (23)
Other [†]	25 (5)	41 (7)	36 (7)
Current age, yrs			
18–29	22 (4)	16 (3)	37 (7)
30–39	77 (14)	76 (13)	87 (16)
40–49	213 (39)	218 (36)	167 (31)
50	236 (43)	299 (49)	255 (47)
Education			
Less than high school	208 (38)	252 (41)	194 (36)
High school diploma or equivalent	191 (35)	209 (34)	195 (36)
Some college	118 (22)	128 (21)	129 (24)
College or higher	31 (6)	20 (3)	28 (5)
Annual household income			
0–$19,999	480 (88)	544 (90)	458 (85)
$20,000–$39,999	44 (8)	43 (7)	54 (10)
$40,000–$74,999	15 (3)	9 (2)	23 (4)
$75,000 or more	6 (1)	8 (1)	6 (1)
Current health insurance			
No	123 (22)	88 (15)	77 (14)
Yes	425 (78)	520 (86)	469 (86)
Age at HIV diagnosis, yrs			
24	57 (11)	81 (14)	98 (18)
25–29	90 (17)	86 (15)	109 (20)
30–39	195 (37)	218 (37)	200 (37)
40	192 (36)	204 (35)	127 (24)
Region[‡]			
Midwest and West	137 (25)	153 (25)	150 (27)
Northeast	137 (25)	123 (20)	110 (20)
South and Territories	274 (50)	333 (55)	286 (52)

Numbers may not add to total because of missing values.

[*] Hispanic/Latinos can be of any race.

†Includes those reporting American Indian or Alaska Native, Asian, Native Hawaiian or Pacific Islander, other race, or multiple races.

‡Midwest and West: Chicago, Denver, Detroit, Los Angeles, San Diego, San Francisco, Seattle; Northeast: Boston, Nassau-Suffolk, Newark, NY, Philadelphia; South and Territories: Atlanta, Baltimore, Dallas, Houston, Miami, New Orleans, San Juan, D.C.

TABLE 2

Prevalence of Current ARV Use and Prevalence Ratios Comparing ARV Use per 3-Year Increase in Year Among Self-Reported HIV-Positive People Who Inject Drugs by Selected Characteristics—NHBS, 2009–2015

Characteristic	2009		2012		2015		Unadjusted PR (95% CI)*	Adjusted PR (95% CI)†
	No. in Sample	n (%)	No. in Sample	n (%)	No. in Sample	n (%)		
Overall	548	319 (58)	608	410 (67)	545	386 (71)	1.10 (1.06 to 1.15)	1.08 (1.03 to 1.12)
Sex								
Female	161	80 (50)	191	119 (62)	155	106 (68)	1.17 (1.08 to 1.26)	1.15 (1.06 to 1.24)
Male	387	239 (62)	417	291 (70)	390	280 (72)	1.08 (1.03 to 1.13)	1.06 (1.01 to 1.10)
Race/ethnicity								
Black	309	190 (62)	350	246 (70)	252	189 (75)	1.10 (1.04 to 1.16)	1.07 (1.02 to 1.13)
Hispanic‡	103	55 (53)	106	73 (69)	129	88 (68)	1.15 (1.06 to 1.24)	1.10 (1.02 to 1.18)
White	110	61 (56)	111	64 (58)	126	84 (67)	1.11 (0.99 to 1.23)	1.08 (0.98 to 1.19)
Other§	25	12 (48)	40	26 (65)	36	23 (64)	1.12 (0.91 to 1.38)	1.07 (0.87 to 1.32)
Current age								
<50 yrs	312	166 (53)	310	188 (61)	290	187 (64)	1.11 (1.03 to 1.19)	1.09 (1.02 to 1.17)
50 yrs	236	153 (65)	298	222 (75)	255	199 (78)	1.09 (1.03 to 1.15)	1.07 (1.01 to 1.12)
Education								
HS or less	399	228 (57)	460	312 (68)	389	280 (72)	1.12 (1.07 to 1.17)	1.10 (1.05 to 1.15)
More than HS	149	91 (61)	148	98 (66)	156	106 (68)	1.06 (0.97 to 1.17)	1.04 (0.95 to 1.14)
Current insurance								
No	123	36 (29)	88	39 (44)	77	29 (38)	1.15 (0.96 to 1.36)	1.16 (0.97 to 1.38)
Yes	425	283 (67)	519	370 (71)	468	357 (76)	1.08 (1.04 to 1.12)	1.07 (1.03 to 1.11)
Region‖								
Midwest and West	137	86 (63)	152	102 (67)	150	108 (72)	1.07 (0.97 to 1.19)	1.04 (0.95 to 1.15)
Northeast	137	91 (66)	123	88 (72)	109	88 (81)	1.11 (1.04 to 1.18)	1.09 (1.02 to 1.17)
South and Territories	274	142 (52)	333	220 (66)	286	190 (66)	1.13 (1.05 to 1.21)	1.11 (1.04 to 1.19)

*
PR corresponds to the increase in ARV use for each 3-year increase in interview year (ie, 2009–2012 or 2012–2015); models include participant's personal network size, region, year, the covariate, and the interaction between the covariate and year.

†
Adjusted models are adjusted for sex, race/ethnicity, current age, and current insurance in addition to the variables included in the unadjusted models.

†Hispanics/Latinos can be of any race.

§Includes those reporting American Indian or Alaska Native, Asian, Native Hawaiian or Pacific Islander, other race, or multiple races.

‖Midwest and West: Chicago, Denver, Detroit, Los Angeles, San Diego, San Francisco, Seattle; Northeast: Boston, Nassau-Suffolk, Newark, NY, Philadelphia; South and Territories: Atlanta, Baltimore, Dallas, Houston, Miami, New Orleans, San Juan, D.C.

HS, high school.