Published in final edited form as:

AIDS Behav. 2016 January ; 20(1): 204–214. doi:10.1007/s10461-015-1074-2.

Self-reported HIV and HCV Screening Rates and Sero-Status among Substance Abuse Treatment Patients

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Abstract

Substance users are at increased risk for HIV and HCV infection. Still, many substance use treatment programs (SUTP) fail to offer HIV/HCV testing. The present secondary analysis of screening data from a multi-site randomized trial of rapid HIV testing examines self-reported HIV/HCV testing patterns and serostatus of 2,473 SUTP patients in 12 community-based sites that had not previously offered on-site testing. Results indicate that most respondents screened for the randomized trial tested more than a year prior to intake for HIV (52%) and HCV (38%).

Prevalence rates were 3.6% and 30% for HIV and HCV, respectively. The majority of participants that were HIV (52.2%) and HCV-positive (40.5%) reported having been diagnosed within the last one to five years. Multivariable logistic regression showed that members of high-risk groups were more likely to have tested. Bundled HIV/HCV testing and linkage to care issues are recommended for expanding testing in community-based SUTP settings.

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Human Participant Protection

This study was approved by the Western Institutional Review Board. In addition, the following institutional review boards provided local approval or oversight for their respective study sites: Oregon Health and Science University, University of Cincinnati, Johns Hopkins University School of Medicine, University of New Mexico Health Sciences Center, and the University of Pittsburgh.

INTRODUCTION

Injection and non-injection drug users remain at elevated risk for both Human Immunodeficiency (HIV) and Hepatitis C (HCV) viral infections even as advances in testing and treatment have developed over time [1–9]. The Centers for Disease Control and Prevention (CDC) estimates that over one million people in the U.S. are living with HIV, and of those infected, greater than 200,000 (18%) do not know of their seropositive status [10–13]. Injection drug users account for nearly 15 percent of new HIV infections [14]. Similarly, of the approximately 3.9 million individuals living with HCV in the US [15], the majority (60%) are unaware of their status [16–17]. Injection drug use is the most prevalent risk behavior attributed to HCV infection, with an estimated 60% of HCV positive individuals reporting a history of injection drug use in the US [15]. The identification of hard to reach HIV and/or HCV-positive substance users presents a significant challenge for disease prevention and treatment [18–19]. This has critical implications for reducing disease transmission and improving the survival, health, and quality of life of infected persons through linkage to care [20–25].

Several recent policy initiatives recommend coupling HIV and/or HCV screening with other health services as a way of increasing testing, particularly among at-risk populations such as substance users [26–29]. Furthermore, the CDC, along with state and local governments, has strongly encouraged or mandated (in the case of New York State) the offer of routine HIV testing in healthcare settings particularly in circumstances of increased risk, as is the case among substance users [30–31]. Technological innovations such as rapid tests as well as increased awareness of the benefits of testing and treatment have enabled providers in a wider variety of settings to identify and seek care for infected individuals. Community-based substance use treatment programs constitute an important setting to offer testing and referral services for a segment of the population at increased risk for HIV and HCV.

Ironically, HIV testing in opioid treatment facilities has declined from 93% in 2005 to 64% in 2011, particularly in states that require pretest counseling and lack an opt-out approach to the informed consent procedures [32]. HCV testing during the same time period increased but largely due to off-site referrals [33]. Earlier findings estimated that fewer than half of U.S. substance use treatment programs offer on-site HIV testing services and about 29 percent provide HCV testing to their patients [32–38]. Limited HIV and HCV testing options in community based settings represents a missed opportunity to reach high-risk and otherwise hard-to-reach populations such as substance users [4] [36] [39–41]. Nevertheless, prior studies have overwhelmingly relied on program administrators to provide data on the availability of on-site HIV testing rather than asking patients directly about their HIV and HCV screening behavior [32] [34] [42–44]. This introduces a potential reporting bias as these sources do not reflect testing penetration among the patient population.

Several authors have provided explanations for why HIV and HCV testing is not more widespread. They cite lack of time, lack of training, lack of funding for testing, and lack of capacity to treat or knowledge of where to refer for treatment [32] [43]. Others suggest that off-site referrals and a decline in funding for opioid treatment are key determinants that limit opportunities for identifying cases and linking patients to care [33]. Still, the notion of

expanding HIV and HCV testing within substance use treatment settings has been contested and even considered by some to be a suboptimal use of resources because testing is offered in other venues seemingly accessible to substance users [45]. These debates and gaps in the literature raise an important question: what are the testing patterns and infection prevalence rates of substance use treatment patients in programs that do not offer onsite HIV and/or HCV testing?

This paper addresses this gap in knowledge by reporting findings regarding HIV and HCV testing history and seroprevalence rates among patients at community-based substance use treatment programs. The present study is a secondary analysis of participants' screening data gathered for the HIV Rapid Testing and Counseling in Drug Abuse Treatment study (CTN 0032) sponsored by the National Drug Abuse Treatment Clinical Trials Network (NIDA CTN) [46]. The CTN 0032 clinical trial examined the effectiveness and cost-effectiveness of on-site rapid testing with and without risk reduction counseling as a strategy to increase HIV testing acceptance and receipt of results, as well as to reduce sexual risk behavior among substance use treatment patients. In that study, participants who were referred off-site to testing were significantly less likely to obtain their test results compared to participants who received on-site rapid testing and there was no significant difference in HIV sexual risk behavior between those who did and did not receive HIV risk behavior counseling [46]. A prior secondary analysis found that onsite HIV testing was effective across treatment modalities for achieving high rates of HIV testing and results feedback compared to offsite referral [47]. Most recently an evaluation of rapid HCV and HCV/HIV antibody testing in substance use treatment programs was shown to be cost-effective [48]. The aim of the present article is to identify what factors (demographic, substance use, treatment modality) impacted patient HIV and HCV test history and seropositivity.

METHODS

The parent study, described in detail elsewhere [46] was a randomized clinical trial (RCT) conducted in 12 US community-based substance use treatment programs (CTPs) that, within 6 months prior to participating in the study, did not offer on-site HIV testing. Participant eligibility criteria for the RCT included being at least 18 years old, being HIV-negative or unaware of one's HIV status, and not having received result of an HIV test conducted in the past 12 months. Participant eligibility for the screening assessment was solely to be physically present at the CTP, therefore not all participants in the screening sample meet the RCT eligibility criteria. Screening was conducted over a five month period (January – May, 2009) where all substance use treatment patients and individuals presenting at intake assessments at the CTPs were screened, with consent, by research staff for study eligibility. Participants were recruited by research assistants at study sites by approaching patients in waiting rooms and treatment groups, and by self-referral.

The brief screen assessed for HIV and HCV testing patterns in the past 5 years, knowledge of HIV and HCV status, demographics (gender, racial/ethnic background, age) and lifetime/past 12 months use of injected drug use. All individuals screened for the study were provided \$5 for completing the screening questionnaire. Analyses for the present study were

conducted using all screening data, regardless of whether individuals qualified for study participation (i.e. HIV testing in the past year).

Recruitment Sites

Recruitment occurred in 12 CTPs located in Tucson, AZ; Plainville and Danbury, CT; Baltimore, MD; Cape Girardeau, MO; Salisbury, NC; Santa Fe, NM; Portland, OR; Pittsburgh, PA; Columbia and West Columbia, SC; and Chesterfield, VA. Participating programs offered different modalities of treatment, including outpatient and intensive outpatient psychosocial (n=6), opioid treatment (n=3), and residential programs (n=3). One of the residential sites also recruited a small number of participants from their on-site outpatient program. The parent study was approved by all study sites' local IRBs or the Western IRB.

CTP Demographics

All sites tracked the demographics including gender, race/ethnicity and age group of their patient populations within the units from which recruitment was completed using clinic records. These data were used to compare the study sample to the CTP population.

Statistical Analysis—Chi-square analyses were performed to examine whether the self-reported history of the timing of prior HIV and HCV testing and of their HIV and HCV status differed across gender, race/ethnicity, age, IDU status and modality of treatment program. Multiple logistic regression analyses were conducted to test the independent impacts of these factors (i.e. controlling for all other impacts) and explore interactions related to gender, race/ethnicity and age. The dependent measures for the logistic regressions were *Ever HIV tested* and *Ever HCV tested*. For multiple category predictors, contrasts based on the model were estimated to provide odds ratio estimates comparing all categories.

RESULTS

Of the 2,473 patients screened for the parent study, over half were males (58.8%), most were White (55.6%), followed by Black (27.1%), and 10.4% were Hispanic/Latino. As shown in Table 1, these proportions are quite close to the demographics of the treatment population of the 12 sites from which we recruited, with our screening sample having greater proportion of both Black and Hispanic participants than represented in the demographics of the treatment population. A sizable portion of the sample also had a history of injection drug use (43.3%) and nearly a fifth had injected drugs in the previous 12 months (19.4%). Most were screened at outpatient treatment centers (49.9%), with the remainder of the sample screened at either opioid treatment programs (27.6%), or at residential treatment facilities (22.5%).

Self-reported HIV Testing History and Serostatus

Twenty-one (0.8%) of the 2,473 individuals screened were excluded in the analysis of HIV testing history for the following reasons: 6 (0.2%) did not provide answers to the HIV testing question and 15 (0.6%) responded "Don't Know" to the question of having ever been tested. This resulted in a sample of 2,452 for the assessment of HIV testing history. HIV

status was only examined within the subgroup of participants that knew their HIV status. Six hundred twenty-one (25.1%) of the individuals screened were excluded from the HIV-positive rate calculation for the following reasons: 497 (20.1%) reported never having been tested, 43 (1.7%) participants did not answer, and 60 (2.4%) responded “Don’t Know” to their HIV status, possibly because they did not pick up their results (though this was not directly queried). The resulting sample size for HIV status was 1,852.

Self-reported HIV Testing History—Most participants had their last HIV test more than a year prior to their interview (52.1%, 1278/2,452) and 27.6% (677/2,452) were tested in the past year. There were 497/2452 (20.3%) participants who had never been HIV tested. Table 2 provides HIV testing history of the participants by various demographic characteristics. Broadly speaking, women ($\chi^2(1)=75.79$, $p < .001$), Blacks ($\chi^2(6)=111.87$, $p < .001$), individuals 30 or older ($\chi^2(6)=84.98$, $p < .001$), and those who injected drugs ($\chi^2(4)=71.41$, $p < .001$) were all more likely to have been tested. There were significant differences in HIV testing by treatment modality ($\chi^2(4)=153.14$, $p < .001$); participants from the opioid treatment programs were more likely, and those from residential treatment were less likely, to have been HIV tested prior to study screening.

The logistic regression examining HIV testing history indicated that the simple relationships by participant characteristics were maintained when adjusted for other demographic characteristics. In addition there was a statistically significant interaction of gender and race/ethnicity ($\chi^2(3)=12.81$, $p = .005$, see second and third columns of Table 3 for odds ratios and confidence intervals), but neither between gender and age ($\chi^2(3)=3.78$, $p = .286$) nor race/ethnicity and age ($\chi^2(9)=9.61$, $p = .383$). The odds of those participants with an injection history were nearly twice that of those with no injection history ($\chi^2(1) = 27.25$, $p < .001$) to have ever been tested for HIV. Individuals under 30 were less likely to have been HIV tested than all older age categories (30–39: $\chi^2(1) = 34.46$, $p < .001$, 40–49: $\chi^2(1) = 6.25$, $p = .012$, 50 plus: $\chi^2(1) = 6.00$, $p = .014$). Individuals 30 to 39 years of age were more likely to have been tested than those in the older two age categories (40–49: $\chi^2(1) = 12.67$, $p < .001$, 50 plus: $\chi^2(1) = 7.73$, $p = .006$) and there was no real difference between those 40 to 49 years of age and those over 50 ($\chi^2(1) = 5.29$, $p = .022$). Participants from opioid ($\chi^2(1) = 56.25$, $p < .001$) and outpatient ($\chi^2(1) = 0.14$, $p = .715$) programs were more likely to have been HIV tested than those in residential treatment and those in opioid treatment were more likely to have been HIV tested than those in outpatient treatment ($\chi^2(1) = 26.83$, $p < .001$). There were significant main effects for race/ethnicity ($\chi^2(2) = 34.73$, $p < .001$) and a significant interaction between gender and race/ethnicity ($\chi^2(3) = 12.81$, $p = .005$). The specific odds ratios are in columns 2 and 3 of Table 3. Men were less likely to have been tested than women for both the Black ($\chi^2(1) = 13.47$, $p < .001$) and White ($\chi^2(1) = 35.76$, $p < .001$) racial groups. Both Hispanic ($\chi^2(1) = 4.28$, $p = .038$) and Black ($\chi^2(1) = 23.43$, $p < .001$) men were more likely to have been HIV tested than were White men. Black women were more likely to have ever been tested for HIV than White women ($\chi^2(1) = 11.70$, $p < .001$). Hispanic women were less likely to have ever been tested than White women ($\chi^2(1) = 6.76$, $p = .009$).

Self-reported HIV Serostatus—The overall self-report of HIV-positive status in the sample was 3.6%. Most HIV-positive participants (52.2%) were last tested within a year of study screening; 47.8% were tested more than a year ago. The second and third columns of Table 4 show the HIV status by demographic characteristics. There were no differences in HIV status by gender ($\chi^2(2) = 0.63$, $p = .428$). Black participants ($\chi^2(3) = 27.90$, $p < .001$), older participants ($\chi^2(3) = 14.93$, $p = .002$), injection drug users ($\chi^2(2) = 6.53$, $p = .039$) and those recruited from opioid treatment ($\chi^2(2) = 19.48$, $p < .001$) each had higher reported HIV-positive rates.

Self-reported HCV Testing History and Serostatus

Seven participants (0.3%) did not provide answers to the HCV testing history question and an additional 469 responded (19.0%) “Don’t Know,” resulting in a sample of 1,997 for analyses of HCV testing history. There were 739 (29.9%) who reported having never been tested for HCV, 86 (3.5%) who reported having been tested but did not provide any information on their HCV status, and 163 (6.6%) participants who responded that they did not know their HCV status, resulting in a sample of 1,485 for analysis of HCV status.

Self-reported HCV Testing—As with HIV testing history, there were significant differences in the distribution of HCV testing by demographic characteristics (see Table 5). Similar to the pattern for HIV testing, women were more likely to have been HCV tested and more likely to have been tested recently ($\chi^2(1) = 12.80$, $p = .002$). Hispanic participants were the most likely to have been HCV tested ($\chi^2(6) = 22.40$, $p = .001$). The likelihood of having been tested for HCV increased with age ($\chi^2(6) = 23.36$, $p < .001$). Those participants with a history of injection drug use ($\chi^2(4) = 242.83$, $p < .001$) and those recruited from an opioid treatment program ($\chi^2(4) = 188.49$, $p < .001$) were more likely to have ever been tested for HCV. The pattern of HCV testing by individual site also follows the pattern of treatment site modality.

Results of the logistic regression analysis of ever HCV testing showed that individuals with a history of injection drug use were over three times as likely as those who had no IDU history to have been HCV tested (OR = 3.44, 95% CI[2.74, 4.31], $\chi^2(1) = 114.82$, $p < .001$). Individuals from opioid treatment were more likely than individuals from both residential (OR = 3.18, 95% CI[2.31, 4.38], $\chi^2(1) = 50.17$, $p < .001$) and outpatient (OR = 2.76, 95% CI[2.08, 3.67], $\chi^2(1) = 48.86$, $p < .001$) treatment to have been HCV tested. The other demographic characteristics- age group ($\chi^2(3) = 0.55$, $p < .908$), gender ($\chi^2(1) = 2.70$, $p = .100$) and race ethnicity ($\chi^2(3) = 2.54$, $p = .469$)- were not statistically significant predictors of self-report receipt of an HCV test once IDU history and treatment modality were controlled. There were no significant interactions by the following characteristics: age by gender: $\chi^2(3) = 2.54$, $p = 1.89$, $p = .597$, age by race/ethnicity: $\chi^2(3) = 3.43$, $p = .329$, or gender by race/ethnicity: $\chi^2(3) = 5.70$, $p = .127$).

Self-reported HCV Status—The overall self-reported HCV-positive status in this study was 30.6%. Of those HCV-positive, 40.5% were diagnosed in the past year; 32.1% between 1 and 5 years prior to study screening, and 27.4% were diagnosed more than 5 years ago. The proportions by participant demographics are presented in columns 4 & 5 of Table 5.

Hispanic participants had the highest HCV-positive self-reported status ($\chi^2(3) = 10.11$, $p = .018$). The rate also increased with age ($\chi^2(3) = 187.36$, $p < .001$). Over half of those participants with an injection drug history were HCV-positive whereas, the HCV-positive rate for those without any history of injection drug use was 4.3% ($\chi^2(2) = 407.17$, $p < .001$).

DISCUSSION

The present analysis confirms missed opportunities for HIV and HCV screening and diagnosis in settings serving substance users who are at high risk of acquiring these viral infections. First, findings suggest that substance use patients are not testing regularly despite being at heightened risk for HIV and HCV infection. To date, the focus of research on this topic has been on the availability of testing in treatment programs [32–34] [42–44]. This is the only study, to our knowledge, to show HIV and HCV testing patterns from the client perspective. Second, results indicate that members of groups at highest risk for HIV and HCV acquisition were more likely to have been tested, tested recently and frequently, and be aware of their serostatus, suggesting that risk-factor based screening may be occurring among high-risk populations. Nevertheless, a significant proportion of substance use patients had not been recently tested demonstrating the need for broader, more expanded routine screening approaches in community-based venues. This particular finding supports the expansion of both HIV and HCV testing in community-based substance use treatment programs, which counters earlier suggestions that providing such testing would be duplicative of testing efforts in outside settings [45]. Moreover, the CDC's recommendations to expand routine testing of both HIV and HCV in health care settings and other community-based venues (i.e. STD clinics, emergency rooms and primary care clinics) are especially relevant for increasing testing among substance users who remain at elevated risk of infection [26] [49] but may not be prepared to seek substance use treatment services.

The present study's findings suggest that additional strategies are needed to increase uptake of HIV and HCV testing among persons with substance use disorders, particularly at outpatient and residential substance use treatment programs. Screening high-risk populations such as patients in substance use treatment programs will increase the proportion of Americans who are aware of their HIV or HCV diagnosis. However, testing is just the first step in the continuum of care. Resources are vitally needed to ensure that newly-identified seropositive individuals and those seropositive who are out of care that present to substance use treatment programs are linked to care, provided access to appropriate antiretroviral therapy (ART) for HIV infection and appropriate evaluation (including RNA testing to confirm current HCV infection) for the initiation of HCV therapy, long-term engagement in care and achievement of virologic suppression and/or cure in the case of HCV.

It is also clear from our findings that HIV testing and knowledge of HIV status remain more common than HCV testing and knowledge of HCV status, despite the 3–5 fold higher prevalence of HCV in the US. This finding reflects disparities in HCV among particular at-risk groups and is consistent with general trends reported elsewhere [50]. The advent of improved HCV testing alternatives including a rapid testing kit with an oral swab (similar to that increasingly standard in HIV testing) along with new treatment options are poised to significantly improve screening and treatment options [48] [51–53]. As HCV testing and

drug therapies become more widely available, the uptake of HCV testing and treatment is likely to increase significantly [54–55]. Furthermore, expanded HIV and HCV prevention, care and treatment options increase opportunities for identifying and treating co-morbid conditions when bundled.

LIMITATIONS

This study has several limitations including the limited number of variables in the brief study screening tool, which were primarily intended to capture a minimal amount of information to determine eligibility in the larger RCT. Moreover, while we found that many of the respondents who were positive reported a recent diagnosis, we do not know how late in the disease progression they were identified because we did not collect biomarker information such as CD4 and viral load. An additional limitation is self-reports of HIV and HCV serostatus, which may not exhibit high concordance with testing results, although some research has found high rates of concordance in HIV and HCV self-reported serostatus and testing results [56]. We also did not collect comprehensive data in the screening instrument regarding substance use patterns. Therefore, we were unable to distinguish between substance use types and severity. Finally, whereas this is a multi-site trial with a relative large sample size, it is not a random sample of either substance use treatment centers or patients.

CONCLUSION

To conclude, our findings lend credence to addressing a key opportunity for improving services to persons at risk for HIV and HCV by augmenting the capacity in substance use treatment programs for testing and linkage to care. The present analysis demonstrates the potential for community-based substance use treatment programs to identify substance users at-risk for HIV and HCV infection. Once identified as positive, however substance users often encounter significant impediments in accessing care and treatment services due to issues such as housing insecurity, mental illness, stigma and discrimination in health care settings, transportation challenges, poverty and histories of incarceration [22–23]. Therefore, while community-based substance use treatment programs may be appropriate venues for identifying new cases, a considerable gap remains in linking and retaining patients in care. Moreover, access to high quality care and services that are attentive to the unique needs of substance users is vital to a) realizing optimal results in both HIV and HCV, b) reducing the incidence of late diagnoses, c) extending life expectancy, d) improving health outcomes and quality of life and e) decreasing the use of costly medical services [4] [33] [57–58]. In understanding the prevalence of HIV and HCV of substance users, more integrated approaches can be developed to advance linkage to care and retention for HIV and/or HCV-positive individuals and their sexual or substance-using partners [18] [27–29] [54] [59]. The results herein suggest future efforts to both identify new cases through testing and to actively link those newly diagnosed or of previously known HIV and/or HCV-positive status to appropriate care and treatment may benefit from models that offer comprehensive/wrap-around services within community-based substance use treatment programs [60–62]. This may require establishing a multi-service model in which substance use treatment services

are co-located with onsite health services or combined with case management. Implementation of the Affordable Care Act may facilitate these efforts.

Acknowledgments

Funding for this study and analysis was provided by the National Drug Abuse Treatment Clinical Trials Network under the following cooperative agreements, awards, and contracts: U10DA013720, U10DA13720-09S, U10DA020036, U10DA15815, U10DA13034, U10DA013038, U10DA013732, U10DA13036, U10DA13727, U10DA015833, HHSN271200522081C, and HHSN271200522071C. We acknowledge the site principal investigators: David Avila, Michael DeBernardi, Lillian Donnard, Antoine Douaihy, Louise Haynes, Ray Muszynski, Patricia E. Penn, Ned Snead, Kevin Stewart, Robert C. Werstein, and Katharina Wiest. Site principal investigators' contributions to the work reported in this article included directing all aspects of the proposed study at their site(s), having overall responsibility for achieving the specific aims of the study, maintaining the proposed study schedule and budget, supervising the project staff, and ensuring quality control over all aspects of this study. We also acknowledge the following site staff: Walitta Abdullah, Elizabeth Alonso, Anika Alvanzo, Anna Amberg, Holly Angel, Rebekka M. Arias, Natasha Arocho, Carolyn Baron-Myak, Sarah Battle, Melissa Beddingfield, Dan Blazer, Stacy Botex, Sarah Bowles, Audrey Brooks, Elizabeth Buttrey, Betty Caldwell, Lynn Calvin, Maria Campanella, Sarah Carney, Angela Casey-Willingham, Jack Chally, Roberta Chavez, Nicholas Cohen, Zoe Cummings, Elisa Cupelli, Dennis Daley, Meredith Davis, Kay Debski, Andrea Dedier, Ashley Dibble, Bruce Dillard, Debbie Drosdick, Monica Eiden, Matthew Elmore, Sarah Essex, Laura Feldberg, Elizabeth Ferris, John Gary, Daniel Gerwien, Marisa Gholson, Melissa Gordon, Lauren Griebel, Laurel Hall, Stephanie Hart, Joshua Hefferen, Beverly Holmes, Christine Horne, Alice Huang, Aleks Jankowska, Beth Jeffries, Kristen Jehl, Eve Jelstrom, Andrew Johnson, Jacob Johnson, Shanna Johnson, Emily Kinsling-Law, Amy Knapp, Eric Kohler, Beatrice Koon, Emily Kraus, Lynn Kunkel, Robert Kushner, Diane Lape, Theresa Latham, Larry Lee, Carol Luna-Anderson, Sue McDavit, Michael McKinney, Cindy Merly, Melody Mickens, Jenni Mulholland, Roger Owen, Barbara Paschke, Wayne Pennachi, Sharon Pickrel, Kimberly Pressley, John Reynolds, Gillian Rossman, Lauretta Safford, Christine Sanchez, Lynn Sanchez, Dorothy Sandstrom, Carmel Scharenbroich, Robert Schwartz, Nicolangelo Scibelli, Michael Shopshire, Jessica Sides, Eugene Somoza, Maxine Stitzer, Joseph Sullivan, Krishna Suwal, Danielle Terrell, Lauren Thomas, Rena Treacher, Dominic Usher, Angel Valencia, Tammy Van Linter, Rosa Verdeja, Joanne Weidemann, Brandi Welles, Lindsay Worth, and Pamela Yus. Site staff contributions to the work reported in this article included conducting recruitment and enrollment activities, performing assessment interviews, conducting study interventions, performing quality assurance monitoring activities, performing data entry, and completing other day-to-day study activities that led to the collection of the study data. We also would like to acknowledge Jacques Normand and Lynda Erinoff of the National Institute on Drug Abuse, Office of the Director, AIDS Research Program, for their review of the article and contributions to protocol development.

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Table 1

Screening Sample Compared to Community Treatment Provider Population Demographics

Characteristics	Screened Sample (N=2473)	Treatment Program Records ^I (N=6662)
Gender		
Male	1455/2473 (58.8%)	4257/6659 (63.9%)
Female	1018/2473 (41.2%)	2402/6659 (36.1%)
Age range		
<18	7/2473 (0.3%)	149/6592 (2.3%)
18–29	676/2473 (27.3%)	1916/6592 (29.1%)
30–39	590/2473 (23.9%)	1576/6592 (23.9%)
40–49	753/2473 (30.4%)	1698/6592 (25.8%)
50–59	384/2473 (15.5%)	1044/6592 (15.8%)
60–69	62/2473 (2.5%)	188/6592 (2.9%)
>69	1/2473 (<0.1%)	21/6592 (0.3%)
Ethnicity/Race		
Non-Hispanic White	1378/2473 (55.7%)	4374/6448 (67.8%)
Non-Hispanic Black	670/2473 (27.1%)	1585/6448 (24.6%)
Hispanic	257/2473 (10.4%)	372/6448 (5.8%)
Other Race/Ethnicity	168/2473 (6.8%)	117/6448 (1.8%)

^I Data represents information provided by the sites for participants accessing services from the date on which sites began actively recruiting to date of last randomization.

Table 2

Characteristics Associated with Self-reported HIV Testing History

	Never Tested		Tested More Than One Year Ago		Tested in Last Year		Total	
	N	Row %	N	Row %	N	Row %	N	Column %
Gender	$\chi^2(2) = 75.79, p < .001$							
Male	377	26.2%	695	48.3%	367	25.5%	1439	58.7%
Female	120	11.8%	583	57.6%	310	30.6%	1013	41.3%
Race/Ethnicity	$\chi^2(6) = 111.87, p < .001$							
Hispanic	52	20.3%	147	57.4%	57	22.3%	256	10.4%
Black	78	11.7%	314	47.1%	274	41.1%	666	27.2%
White	344	25.2%	716	52.5%	305	22.3%	1365	55.7%
Other	23	13.9%	101	61.2%	41	24.8%	165	6.7%
Age Categories	$\chi^2(6) = 84.98, p < .001$							
29 Years	203	31.2%	263	40.5%	184	28.3%	650	26.5%
30–39 Years	77	13.4%	349	60.7%	149	25.9%	575	23.5%
40–49 Years	141	18.8%	397	52.8%	214	28.5%	752	30.7%
50 Years	76	16.0%	269	56.6%	130	27.4%	475	19.4%
Injection Status^a	$\chi^2(4) = 71.41, p < .001$							
Never Inject	362	26.1%	680	49.0%	346	24.9%	1388	56.6%
Ever Inject	135	12.7%	598	56.2%	331	31.1%	1064	43.4%
Recent Injector ^a	73	15.3%	263	55.3%	140	29.4%	476	19.4%
Prior Injector ^a	62	10.6%	334	56.9%	191	32.5%	587	23.9%
Treatment Modality	$\chi^2(4) = 153.14, p < .001$							
Opioid Treatment	42	6.2%	411	60.3%	229	33.6%	682	27.8%
Outpatient	272	22.2%	608	49.6%	345	28.2%	1225	50.0%
Residential	183	33.6%	259	47.5%	103	18.9%	545	22.2%
Total	497	20.3%	1278	52.1%	677	27.6%	2452	100.0%

A separate test is done for each characteristic.

The difference is between ever and never inject. Recent and Prior injectors are not statistically different ($\chi^2(2) = 5.67, p = .059$).

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Table 3

Multivariable Logistic Regression: Independent Factors associated with Self-reported Ever Testing for HIV (n=2452)

Comparison	OR	95% CI	$\chi^2(1)$	p-value
Ever Injected vs Never Injected	1.93	(1.51, 2.48)	27.25	<.001
Age Group	$\chi^2(3) = 34.73, p < .001$			
Under 30 vs 30 – 39	0.40	(0.29, 0.54)	34.46	<.001
Under 30 vs 40 – 49	0.71	(0.55, 0.93)	6.25	0.012
Under 30 vs 50 plus	0.67	(0.49, 0.92)	6.00	0.014
30 – 39 vs 40 – 49	1.78	(1.30, 2.45)	12.67	<.001
30 – 39 vs 50 plus	1.68	(1.16, 2.41)	7.73	0.006
40 – 49 vs 50 plus	0.94	(0.68, 1.31)	0.14	0.715
Treatment Modality	$\chi^2(2) = 58.13, p < .001$			
Opioid vs Residential	4.38	(2.98, 6.43)	56.25	<.001
Outpatient vs Residential	1.64	(1.29, 2.09)	16.08	<.001
Opioid vs Outpatient	2.67	(1.84, 3.87)	26.83	<.001
Gender	$\chi^2(1) = 1.89, p = .168$			
Race/Ethnicity	$\chi^2(2) = 24.32, p < .001$			
Gender $\times$ Race/Ethnicity	$\chi^2(3) = 12.81, p = .005$			
Men versus Women within Race/Ethnicity				
Hispanic	1.36	(0.71, 2.60)	0.86	0.352
Black	0.33	(0.18, 0.59)	13.47	<.001
White	0.41	(0.30, 0.55)	35.76	<.001
Other	0.50	(0.19, 1.34)	1.90	0.168
Race/Ethnicity within Males				
Hispanic vs Black	0.72	(0.43, 1.20)	1.61	0.204
Hispanic vs White	1.60	(1.03, 2.51)	4.28	0.038
Hispanic vs Other	0.77	(0.38, 1.56)	0.52	0.471
Black vs White	2.23	(1.61, 3.09)	23.43	<.001
Black vs Other	1.07	(0.57, 2.02)	0.05	0.826
White vs Other	0.48	(0.27, 0.86)	6.00	0.014
Race/Ethnicity within Females				
Hispanic vs Black	0.17	(0.08, 0.36)	22.85	<.001
Hispanic vs White	0.48	(0.28, 0.83)	6.76	0.009
Hispanic vs Other	0.29	(0.11, 0.73)	6.92	0.009
Black vs White	2.78	(1.55, 5.00)	11.70	<.001
Black vs Other	1.66	(0.64, 4.31)	1.08	0.300
White vs Other	0.60	(0.26, 1.37)	1.49	0.223

Results are from a single model including the gender by race/ethnicity interaction. Contrasts were constructed to enumerate all odds-ratios amongst categories.

Table 4

Characteristics Associated with Self-reported HIC and HCV Status

Characteristic	HIV Positive		HCV Positive	
	n/N	%	n/N	%
Gender	$\chi^2(2) = 0.63, p < .428$		$\chi^2(2) = 9.49, p < .003$	
Male	33/1000	3.3%	229/836	27.4%
Female	34/852	4.0%	226/649	34.8%
Race/Ethnicity	$\chi^2(3) = 27.90, p < .001$		$\chi^2(3) = 10.11, p < .018$	
Hispanic	3/196	1.5%	68/165	41.2%
Black	39/553	7.1%	112/392	28.6%
White	20/970	2.1%	241/820	29.4%
Other	5/133	3.8%	34/108	31.5%
Age Categories	$\chi^2(3) = 14.93, p < .002$		$\chi^2(3) = 187.36, p < .001$	
29 Years	7/424	1.7%	28/359	7.8%
30–39 Years	10/470	2.1%	91/348	26.2%
40–49 Years	29/579	5.0%	160/461	34.7%
50 Years	21/379	5.5%	176/317	55.5%
Injection Status¹	$\chi^2(2) = 6.53, p < .039$		$\chi^2(2) = 407.17, p < .001$	
Never Inject	25/939	2.6%	29/676	4.3%
Ever Inject	42/888	4.7%	426/809	52.7%
Recent Injector	20/383	5.2%	194/352	55.1%
Prior Injector	22/505	4.4%	232/447	51.9%
Treatment Modality	$\chi^2(2) = 19.48, p < .001$		$\chi^2(2) = 199.90, p < .001$	
Opioid Treatment	39/624	6.3%	290/551	52.6%
Outpatient	23/896	2.6%	118/641	18.4%
Residential	5/67	1.5%	47/293	16.0%
Total	67/1852	3.6%	455/1485	30.6%

A separate test is done for each characteristic

Table 5

Characteristics Associated with Self-reported HCV Testing History

Characteristic	Never Tested		Tested More Than One Year Ago		Tested in Last Year		Total	
	N	Row %	N	Row %	N	Row %	N	Column %
Gender	$\chi^2(2) = 12.80, p < .002$							
Male	468	40.3%	415	35.7%	279	24.0%	1162	58.2%
Female	271	32.5%	341	40.8%	223	26.7%	835	41.8%
Race/Ethnicity	$\chi^2(6) = 22.40, p = .001$							
Hispanic	67	30.0%	103	46.2%	53	23.8%	223	11.2%
Black	211	37.3%	182	32.2%	172	30.4%	565	28.3%
White	413	38.6%	415	38.8%	242	22.6%	1070	53.6%
Other	48	34.5%	56	40.3%	35	25.2%	139	7.0%
Age Categories	$\chi^2(6) = 23.36, p < .001$							
29 Years	217	44.3%	154	31.4%	119	24.3%	490	24.5%
30–39 Years	177	37.2%	186	39.1%	113	23.7%	476	23.8%
40–49 Years	227	36.0%	243	38.6%	160	25.4%	630	31.5%
50 Years	118	29.4%	173	43.1%	110	27.4%	401	20.1%
Injection Status^a	$\chi^2(4) = 242.83, p < .001$							
Never Inject	564	52.7%	305	28.5%	202	18.9%	1071	53.6%
Ever Inject	175	18.9%	451	48.7%	300	32.4%	926	46.4%
Recent Injector ^a	86	20.6%	197	47.2%	134	32.1%	417	20.9%
Prior Injector ^a	89	17.5%	253	49.8%	166	32.7%	508	25.4%
Treatment Modality	$\chi^2(4) = 188.49, p < .001$							
Opioid Treatment	89	14.7%	295	48.8%	220	36.4%	604	30.2%
Outpatient	441	46.5%	308	32.5%	199	21.0%	948	47.5%
Residential	209	47.0%	153	34.4%	83	18.7%	445	22.3%
Total	739	37.0%	756	37.9%	502	25.1%	1997	100.0%

A separate test is done for each characteristic.

The difference is between ever and never inject. Recent and Prior injectors are not statistically different ($\chi^2(2) = 1.50, p = .473$).

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