HIV and Public Policy: Predictors for Chronic Homelessness in Persons Living with HIV/AIDS

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Abstract

HIV/AIDS is markedly more prevalent in the homeless population than in the population of individuals in stable dwellings. Challenges such as inadequate access to care, HIV-risk behaviors and the costs of healthcare make it difficult for homeless persons living with HIV/AIDS (PLWHA) to improve their health. Conversely, PLWHA are more susceptible to homelessness due to diminished financial agency and emotional support. Recent policies enacted by the U.S. Department of Housing and Urban Development have increased the amount of funding available to supportive housing programs, yet 25% of all homeless PLWHA fall into chronic homelessness and worse health outcomes over time. This paper tests the association between HIV-related risk factors and the likelihood of chronic homelessness in PLWHA. Our results highlighted that incarceration was a significant contributor, Odds Ratio 1.83, after adjusting for illicit substance use.

Considering that the U.S. federal and state governments spend more than $587 million dollars annually on housing and health support for the homeless, it may prove beneficial to the health of homeless PLWHA and more cost effective to the government over time to combine tailored housing prevention activities with programs known to reduce the transmission of HIV for homeless PLWHA who are more likely to recede into chronic homelessness.

Introduction

Since the introduction of highly active antiretroviral therapy (HAART) in 1996, the mortality rates of persons living with HIV/AIDS (PLWHA) in the United States has decreased. However, HAART is not curative, and as more people are living with HIV/AIDS, the prevalence of the disease has steadily increased in the U.S.[1] At the end of 2009, an estimated 1,148,200 persons aged 13 years or older were living with HIV.[2] Of that population, 476,732 persons were confirmed to have AIDS—91,830 more than in 2002.[3,4] Despite advances in diagnostic interventions and pharmacologic management, HIV/AIDS disproportionately affects certain subsets of the population, such as the homeless. According to the U.S. Department of Housing and Urban Development, 0.12% of the U.S population, an estimated 394,397 persons, were homeless in 2012. 25.3% of those (99,894 persons) were chronically homeless.[5] The rate of HIV among homeless and marginally housed PLWHA is five to 10 times that of domiciled PLWHA.[6]

The markedly higher rate of HIV among homeless and marginally housed PLWHA can largely be attributed to the social, behavioral and structural determinants of the disease. Homeless PLWHA frequently have delayed and inadequate access to medical care. Most of them cannot afford to pay for the uninterrupted treatment of their disease and thus display poor adherence to HAART regimens. Homeless PLWHA are also frequently exposed to comorbidities and opportunistic infections prevalent among the homeless population, such as tuberculosis, which further worsen their health.[8,9] Importantly, studies have demonstrated associations between homelessness and the behavioral risk factors for contracting HIV, such as illicit drug use, increased rates of incarceration and sexual exchanges. On the other hand, approximately 50% of domiciled PLWHA in the United States are at risk of homelessness due to job-related discrimination, periodic hospitalization, the high costs of healthcare and a diminished sense of social belonging.[9,11] The increased prevalence of HIV among the homeless, in combination with the aforementioned risk behaviors, exposures and predicaments of homeless individuals, has created an infectious disease reservoir of HIV amongst the homeless population, which is already highly burdened with the illness.

> Few studies have outlined issues, such as the effectiveness of the supportive housing program model in reducing individual homelessness over the long term, or explicitly targeted the root causes of chronic homelessness in PLWHA.

Supportive housing, a combination of housing and services such as job training, assistance with housing placement and the coordination of healthcare through an allocated professional, has been the major accepted

solution to this predicament after several studies demonstrated the positive impact of stable housing on the health outcomes of homeless PLWHA. One such study was the 2008 Chicago Housing for Health Partnership study of 407 homeless persons suffering from HIV/AIDS or chronic health conditions, such as diabetes. Participants were randomly assigned to one of two case managers, each of whom assisted in housing placement, a form of supportive housing. Participants were followed by the case managers for 18 months after discharge from the hospital. Others in the study were randomly assigned to usual care (homeless shelters). The study revealed cost savings of $873,000 for the state-funded housing programs and 110% fewer hospitalizations for the group randomly assigned to supportive housing. In 2003, a multicenter randomized trial enrolled 630 HIV-positive persons in immediate rental assistance against usual housing; the trial showed that homelessness was significantly associated with reduced HAART use and a more detectable viral load (a measure of the severity of HIV viral infection) in the group randomly assigned to immediate rental assistance, although there was no difference found between the groups in HIV risk behaviors, such as the number of sex partners homeless PLWHA had or their sexual relations with HIV-negative persons and persons of unknown status. Another observational study of 27 chronically homeless PLWHA, followed for up to three years, indicated that chronically homeless PLWHA who were provided with stable housing were able to maintain their adherence to HAART therapy and thus had lower mean HIV viral loads, a significant predictor of favorable clinical outcomes.[14]

Table 1: **Demographic Information**

Variable	Total N (%)
Race	
Black/African American	129 (54.4%)
Hispanic	75 (31.7%)
Other, not Black, Hispanic	33 (13.9%)
Age	
18-40	55 (23.2%)
41-50	89 (37.6%)
51+	93 (39.2%)
Gender	
Male	176 (74.3%)
Female	53 (22.4%)
Transgender	7 (3.0%)
Education	
Less than 12 years	95 (40.1%)
Exactly 12 years	75 (31.7%)
Greater than 12 years	67 (28.3%)
Income Sources	
Recevied SSDI	196 (82.7%)
Received SSI	154 (65.0%)
Incarceration	
Jail/ Prison/ Juvenile D.	185 (78.1%)
Mental Health	
Diagnosed w/ mental illness	137 (57.8%)
Substance Use	
Binge Drinking	186 (78.48%)
Illicit Substance	155 (65.40%)

Although such evidence outlines the myriad benefits of supportive housing as a public health solution for homeless PLWHA, few studies have outlined issues such as the effectiveness of the supportive housing program model in reducing individual homelessness over the long term or explicitly targeted the root causes of chronic homelessness in PLWHA. This gap in information prompted the launch of the Enhanced Housing Project Assistance (EHPA) study, a two-year, randomized, controlled trial conducted by the New York Department of Health and Mental Hygiene in collaboration with the U.S. Department of Housing and Urban Development's Housing Opportunities for Persons with HIV/AIDS, a program commonly known as HOPWA. The purpose of the EHPA study was to investigate the different forms of enhanced housing placement assistance and highlight which ones are most beneficial for homeless PLWHA as a measure to increase effectiveness and further save costs for the U.S. federal government. The emphasis of our study was, however, different. As supporting PLWHA constitutes a significant portion of the $587 million annual budget of healthcare and supportive housing programs for the homeless,[15, 16] we thought it imperative to identify those PLWHA who over-utilize these funds by being chronically homeless. In addition, we aim to provide recommendations on how to alleviate the challenges they face and the burden placed on public health systems by their circumstances. Using baseline data collected from the EHPA randomized control trial, this paper uses a cross-sectional analysis to test the association between the risk factors for homelessness and the odds of chronic homelessness in PLWHA.

Methods

Eligibility criteria for enrollment in the EHPA study included persons who were seropositive for HIV, aged 18 or older, English-speaking and clients of the HIV/AIDS Services Administration (HASA) in New York City. Of the 237 eligible participants enrolled, 225 persons were used in complete case analysis of the covariates of interest. (Incomplete data and loss to follow-up were responsible for the reduction in sample size.) The recruitment began in March 2012 at single-room-occupancy (SRO) hotels. Each SRO was visited door-to-door in a randomly selected order, and eligible participants were followed for at least 12 months. At recruitment, our cohorts were randomly allocated to a treatment or non-treatment group. In the treatment group, individuals were assigned to case managers from CITIWIDE, a non-profit, community-based housing program designed to help place homeless PLWHA in permanent housing of their choice. The onus to follow up with the manager lay with the participant. Participants in the non-treatment group were not assigned to case managers and did not pursue permanent housing through other avenues. The information regarding the research participants and investigators were neither blinded nor concealed in this study, as all chronically homeless were able to differentiate between the levels and standards of care that were given.

For data collection in the EHPA study, our research investigators in the New York Department of Health and Mental Hygiene utilized a computer-generated survey to conduct one-on-one, in-person interviews of eligible participants. Interviews occurred in the field. All persons gave informed consent to participate in research prior to administration of the survey. Survey implementation took approximately one hour and participants received a $20 gift card at the end of their baseline and 12-month follow-up assessments. Surveys measured objective data which included social demographics, HAART medication use, self-reported CD4 count, drug and alcohol use, sexual history, income, various sources of financial support and social networks. Data on previous history of homelessness, incarceration, mental health disorders, illicit drugs and alcohol use were also collected.

For specific information on their housing, participants were queried about former housing status, longest length of time spent in an SRO and the number of previous utilizations of SROs. To reduce the likelihood of self-reported bias regarding housing, housing history was verified using the HASA-HIV Surveillance data match system, a supplemental database developed by the New York Department of Health and Mental Hygiene. The outcome variable of chronic homelessness was then classified using two possible values, as participants either met the U.S. Department of Housing and Urban Development's definition of chronic homelessness or failed to meet the definition.

For social and demographic variables, gender was self-reported as male, female, or transgender; the race/ethnicity covariate was collapsed into Black, Hispanic or Other primarily because most participants that were enrolled represented these ethnicities. Age was categorized into three groups: ages 18 to 40, 41 to 50 and 50 and above. Highest level of education was similarly collapsed into three groups: those with less than a high school education, a high school education and more than a high school education. Because this population is predominately disabled and unemployed, income was categorized as those receiving Social Security Disability Income (SSDI) and Supplemental Security Income (SSI).

Information on alcohol and drug use was derived from a series of questions quantifying weekly, monthly and yearly alcohol consump-

Table 2: ***Crude Model Forward Selection***

Selection	SLE	Model: log (P(Y=1)|x1-P(Y=1)|x)	Wald Chi-aq.	P-Value
Forward	0.10	=β0+β1(incarceration)	4.8240	0.0281
Forward	0.25	=β0+β1(incarceration)+ β2(illicit) + β3(Dx_Mental)	5.9957	0.8737

tion. Participants were classified as meeting or failing to meet the criteria of binge drinking. Binge drinking was defined using the Centers for Disease Control and Prevention (CDC) criteria of drinking five or more drinks during a single occasion for men and four or more drinks during a single occasion for women. Participants who used drugs were asked to categorize their monthly and yearly drug use as injection or non-injection drug use and were asked to quantify usage of each self-reported drug. Non-injection use included marijuana, methamphetamine, powder cocaine, prescription pills, etc. These variables were then combined to create a single drug use covariate to cover all those that had used injection and non-injection drugs in the past year. It was important to create this singular variable, as intoxication from drug use, for example, is a contributor to HIV-related risk behaviors, such as unprotected sex, in the same manner that sharing needles while using intravenous drugs is an HIV-related risk behavior. Incarceration was classified as a participant reporting ever having been to a jail, prison or juvenile detention center, while the covariate for mental health covered all persons that self-reported having ever being diagnosed with a mental disorder, unspecified.

Statistical Analysis

To determine the variables most common or relevant to chronic homelessness in PLWHA, we used a logistic regression analysis of a full model. (Relationships between all variables were represented in the form of mathematical equations.) We included all possible predictors of chronic homelessness for which data was gathered, which include gender, age, race, illicit drug use, mental illness and incarceration, as well as social demographic variables, including SSI, SSD and education. Variables were computer generated, with the largest frequency group used as the reference category. A crude model was generated using forward, backward and stepwise logistic regression methods (see below)[17] and significance levels of 0.10 and 0.25 were used. Multiplicative interaction, a test for possible extraneous relationships between the variables, was investigated. The results are provided below. The final adjusted model is reported at a level of significance of 0.05. All statistical procedures were run using SAS 9.2.

Results

The demographic summary of the EHPA cohort we used to conduct our study shows that participants were predominantly Black or African American (54.4%), older than 51 (39.2%) and male (74.3%). Notably, the study population had few social and financial resources; 40.1% have less than high school education, 82.7% receive SSDI and 65.0% receive SSI. Additionally, 78.1% had been incarcerated at some point in their lifetime, and 65% had used some form of illicit substance, including marijuana.

The results of our statistical analysis of the risk factors for chronic homelessness in PLWHA in particular showed that incarceration was the only predictor of odds of chronic homelessness among HIV-positive HASA-eligible persons age 18 or older [Odds Ratio (OR): 2.06] at a level of significance of 0.1. Other variables, such as illicit substance use within the past 12 months or a diagnosed mental health disorder, were not ignored. They were indeed considered in the logistic regression model using a level of significance of 0.25. However, the results of these variables in the model were not statistically significant. We could therefore not draw any conclusions from the interactions of any these variables with chronic homelessness in the EHPA cohort.

We decided to further investigate the model that included incarceration for the presence of effect modification and confounding. These tests are done to ensure that the OR that showed an increased association between incarceration and chronic homelessness in PLWHA was not distorted or modified by the presence of other variables that were being tested. The results showed that, while no variable was an effect modifier, illicit substance use in particular was significantly associated with incarceration (<0.0001) and thus confounds the association between incarceration and chronic homelessness in the EHPA cohort by as much as a 10% change in the OR.

After adjusting for substance abuse as a confounder, the final statistical model suggests that the odds of chronic homelessness among the EHPA cohort (HASA clients) who have been incarcerated at any point in their lifetime is 1.827 times those of homeless PLWHA who have never been incarcerated.

Discussion

In May 2009, President Barack Obama signed into law the Homeless Emergency and Rapid Transition to Housing (HEARTH) Act, which consolidated and reauthorized three separate homeless assistance programs carried out previously under the McKinney-Vento Homeless Assistance Act. The purpose of the HEARTH Act was to further mitigate homelessness through a continuum of programs designed to improve administrative efficiency in funding and enhancing response systems that cater to the needs of homeless persons in general.[18] Since its implementation, several urban municipalities, such as New York City, where an estimated 33% of PLWHA are homeless or marginally housed,[19] now rely on the funds it has created to take a secondary prevention-focused approach to tackling the problems of both homelessness and HIV through homelessness prevention programs. The importance of the HEARTH Act in places like New York City cannot be overstated. However, challenges such as recidivism, the continuous relapse into homelessness in as much as 25% of homeless PLWHA, considerably hinder the overarching impact of such policies.

The final conclusion from our analysis of the baseline data of the EHPA cohort suggests that a history of incarceration is an indicator of homeless PLWHA who are like to recede into chronic homelessness despite the previous use of supportive housing services. This result is consistent with studies that explain that individuals who are incarcerated face similar burdens to people living with HIV/AIDS when finding homes. For example, previously incarcerated individuals are also vulnerable to social exclusion, have a difficulty finding a job and are more likely to be under-educated and/or have low wages.[6] Other studies have shown an increased risk of chronic homelessness among certain demographics, such as African Americans, persons with less than a high school education and those with a history of mental illness or illicit substance use.[12,14] In the case of this study, which pertains only to the homeless PLWHA subpopulation, no such associations were discovered at a level of significance of 0.10. The exclusion of these findings is a result of insufficient power due to our limited sample size. This sample size is a potential drawback in that the study may suffer a reduced generalizability if applied to the larger population of homeless PLWHA in urban municipalities throughout the United States. To improve this, a larger cohort size will be needed.

Ultimately, the high percentage of chronically homeless PLWHA, together with the study's results that show the link between incarceration and chronic homelessness in PLWHA, suggests that a call for action is appropriate. In finding solutions for chronically homeless PLWHA, novel strategies that go beyond the one-size-fits-all preventive services approach have to be considered. The major tactics employed at the moment to prevent homelessness include housing subsidies, supportive housing services, cash assistance for overdue rent and rapid exit from

Table 3: ***Investigation for Effect Modification and Confounding***

Variables	Model 1: Crude	Model 2: Interaction	Model 3: Confounding			
	=βx (Odds)	P Value	=βx (Odds)	P Value	=βx (Odds)	P Value
Incarceration	0.7213 (2.06)	0.0281	0.4340 (1.54)	0.2763	0.6025 (1.83)	0.0752
Illicit Incarceration			0.3992 (1.59)	0.2205		
Illicit Substance					0.4068 (1.50)	0.1533

> The odds of chronic homelessness among the EHPA cohort (HASA clients) who have been incarcerated at any point in their lifetime is 1.827 times those of homeless PLWHA who have never been incarcerated.

shelter programs. One approach we recommend is to tailor these homelessness prevention activities to homeless PLWHA according to their current predicaments and risks of recidivism. For example, homeless PLWHA who have been incarcerated or those who have a history of chronic homelessness may be better candidates for subsidized housing programs than first-time homeless PLWHA, as subsidized housing strategies have been shown to work better for extremely low-income individuals.[20] With such a strategy, previously incarcerated or chronically homeless PLWHA may not experience discrimination in obtaining a home. In addition, public and private support from state health departments and NGOs working at the community level will be instrumental in carrying out such programs to prevent discrimination. More importantly, these community-level programs may prove useful as an effective tool to carry out programs that are known to reduce the rate of HIV transmission among high-risk groups, such as needle exchanges or behavior modifications.

One last shortcoming of the study was that, because we utilized a cross-sectional analysis of baseline data from the randomized control trial, it was not possible to ascertain the direct causality between the multiple variables on chronic homelessness in PLWHA, if any existed. In other words, identifying what variable might have led to the other was not statistically possible and thus remains obscure to us. Our paper is one piece of the puzzle, as it has identified a link between incarceration and chronic homelessness in PLWHA, but it has limited internal validity—the extent to which causality can be declared outright. Moving forward, researchers could improve this by pooling data from other randomized trials or using a systems-based approach, which could better incorporate the complex cause-and-effect patterns of each structural and behavioral HIV-related variable and simulate how they are relevant to homeless PLWHA. Knowing which actions are causative of chronic homelessness in this elaborate cycle will provide key insights for the government to create and implement more cost-effective public health policies and targeted, program-based interventions. In a time of government sequesters and in a population of homeless individuals where the prevalence of HIV is markedly high, the need for such targeted approaches towards homeless PLWHA is clear, and such approaches could reduce both chronic homelessness and the rates of transmission of HIV among homeless individuals.

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