Pharmacy Intervention to Improve HIV Testing Uptake Using a Comprehensive Health Screening Approach

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ABSTRACT

Objective. HIV testing is increasingly available, yet barriers to HIV testing persist for low-income black and Latino people, especially those who use illicit drugs. HIV exceptionalism, or the idea that a positive HIV diagnosis is drastically different from a diagnosis for any other disease, may influence HIV testing-related stigma, resulting in reduced willingness to undergo HIV testing. This pharmacy-based intervention combined HIV testing with less stigmatized chronic disease screening tests (e.g., blood pressure, glucose, and cholesterol) to equate the concept of an HIV diagnosis with other diagnoses.

Methods. Three pharmacies located in low-income, minority neighborhoods in New York City were enrolled in an intervention to provide (*1*) HIV testing, chronic disease screening, and a healthy lifestyles video that normalized all screening tests and destigmatized HIV as a fatal disease (comprehensive arm); (*2*) HIV testing and the video (video arm); and (*3*) HIV testing only (control arm). Injection drug users (IDUs) and pharmacy staff recruited un- and under-insured pharmacy customers, IDUs, and IDU peers from 2010 to 2012. Participants in the control group were compared with those in the comprehensive and video intervention groups.

Results. Participants in the comprehensive arm (prevalence ratio [PR] = 1.61, 95% confidence interval [CI] 1.03, 2.49, p=0.08) and the video arm (PR=1.59, 95% CI 1.00, 2.53, p=0.09) were marginally significantly more likely to receive an HIV test in the pharmacy compared with those in the control arm after adjustment.

Conclusions. These findings suggest that adoption of strategies that destigmatize and normalize HIV testing can improve uptake. Implementation of this strategy in low-access, minority communities with high HIV prevalence and among high-risk populations may help reduce racial/ethnic disparities in HIV.

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Early detection through routine human immunodeficiency virus (HIV) testing is the most effective strategy for preventing further HIV transmission.[1] Despite the increased availability of HIV testing facilities and the development of testing technologies that improve HIV testing privacy and reduce the wait time for test results, HIV prevalence and incidence remain disproportionately high among African American and Latino populations.[2] Although structural characteristics, such as lack of access to HIV testing facilities and lack of health insurance, may act as barriers to HIV testing, these disparities persist even when HIV testing facilities are available and among those who are insured and have a regular source of health care.[3,4] It is possible that these barriers are compounded by stigma[5,6] associated with getting an HIV test because of HIV exceptionalism, or the idea that a positive HIV diagnosis is drastically different from a diagnosis for any other disease.[7]

The perception of HIV as a fatal disease related to socially stigmatized behaviors, including substance use and high-risk sex, likely influences lower HIV testing uptake in an opt-in testing model.[8] The Centers for Disease Control and Prevention (CDC) has recommended routine opt-out HIV testing where assent is inferred unless the patient declines testing.[9] Despite this recommendation, many health-care providers are untrained or unwilling to discuss high-risk drug and sex behaviors related to HIV transmission with their patients (which is required for pre- and posttest counseling); therefore, many health-care providers do not routinely test their patients for HIV.[10–13] Likewise, patients may be reluctant to seek HIV testing due to fear of being identified as a drug user and/or someone who engages in socially stigmatizing behavior.[14,15] Thus, HIV exceptionalism may be operating on both patient and provider levels.

To improve HIV testing accessibility, several pharmacy-based interventions have provided evidence of feasibility for rapid HIV testing,[16,17] particularly for first-time testers.[18] These studies have also shown that pharmacy staff members are receptive and willing to administer HIV testing.[17,19]

In an effort to further normalize HIV testing and remove barriers to accessing HIV testing facilities, we implemented a pharmacy-based HIV testing intervention using a comprehensive health framework that also promoted chronic disease screening services for hypertension, diabetes, and hypercholesterolemia, as well as HIV, from 2010 to 2012. This intervention was informed by social cognitive theory,[20,21] which posits that an individual's beliefs and behaviors can be influenced through increasing knowledge, self-efficacy, and the observation of others' behaviors. The intervention included a computer-based video in which fictional and real-life HIV and chronic disease advocates were portrayed to (*1*) normalize HIV and HIV testing, (*2*) increase educational awareness about drug use, (*3*) destigmatize drug use by providing information on how HIV affects the entire community, not just the drug-using population, and (*4*) promote HIV testing and awareness of one's HIV status as part of general health awareness that also encompasses being aware of hypertensive, diabetic, and hypercholesterolemic status. Computer-based videos have been used to deliver HIV pretest information[22,23] and to influence rapid HIV testing uptake in a clinic-based setting.[24] To our knowledge, this HIV testing intervention was the first to use a computer-based video that aimed to normalize HIV and HIV testing behaviors by combining the message to test for HIV with a message that promotes knowledge of one's overall health—rather than just sexual health—in a community pharmacy setting. We hypothesized that HIV testing uptake would be higher among those who received the intervention, specifically among those who reported stigmatizing beliefs related to HIV.

METHODS

This Pharmacists as Resources Making Links to Comprehensive Testing Services (PHARM-Services) study was a community-based, non-randomized pharmacy intervention that aimed to evaluate HIV testing uptake patterns when HIV testing is offered as part of a comprehensive chronic disease screening program.

Study population, recruitment, and eligibility

Three pharmacies located in high drug-activity neighborhoods in Harlem and the Bronx, New York, that were registered with the Expanded Syringe Access Program (ESAP) were invited to participate in this intervention. ESAP allows pharmacies to sell syringes without a prescription to reduce transmission of infectious disease among injection drug users (IDUs). The New York State Department of Health provided ESAP registration information. From this list, we identified pharmacies located in neighborhoods previously identified through an ethnographic mapping approach as having high levels of drug activity.[25,26] Given the sample size required to obtain sufficient power to detect an intervention effect, eligible pharmacies had to have five new non-prescription syringe customers each month and be willing to sell syringes to IDUs without additional requirements other than those specified in the law (i.e., proof of being ≥18 years of age).

Four pharmacies were screened for participation,

and three pharmacies that had similar numbers and types of customers, and had enough space to conduct study activities, were enrolled in the study. Upon enrollment, pharmacy staff members (i.e., pharmacists, technicians, and sales clerks) in all pharmacies were trained to engage with and recruit IDU customers who purchased a syringe without a prescription into the PHARM-Services study. (Detailed methods of our pharmacy training and engagement with IDUs has been described elsewhere,[25] and training manuals are available upon request.)

To avoid stigmatization of IDU customers by singling them out because of their IDU status, pharmacy staff members also recruited customers who were un- or underinsured, noted by their purchase of prescription drugs. We targeted those who were un- and underinsured rather than all participants regardless of insurance status because we aimed to reach individuals who were disconnected or had a limited connection with the health-care system. As such, these un- and underinsured individuals were likely to not have been recently offered or recently received any of the screening tests. It should be noted, however, that HIV testing and chronic disease screening tests were not denied to anyone who requested these services. Customers were asked discreetly if they were interested in participating in a study about their general health. Those who expressed an interest were given an appointment card for the next time and day available for study participation. Customers were also asked if they wanted a reminder about their appointment at intermittent pharmacy visits.

All customers who participated in the study were told that they might also be eligible for a sub-study and that their eligibility would be determined during the survey assessment. Because we were interested in obtaining a larger IDU sample, participants who were eligible for the sub-study were those who self-reported injecting drugs in the past six months. We informed all participants about the possibility of this study and maintained secrecy of the eligibility for the sub-study to prevent stigmatization of IDUs. Following the survey assessment, IDU participants were invited to refer three of their peers to participate in the study. IDU participants received peer referral coupons (with a unique identification number linking each person referred to the peer who referred him or her) and the phone number for the study office to schedule an appointment.

Study appointments were conducted in a private area in each pharmacy. Mobile partitions with sound-blocking curtains and noise machines were used to enhance privacy. Informed consent procedures and the 45-minute survey instrument were administered using audio computer-assisted self-interview software[27] on tablet computers with privacy screens and headphones.

Pharmacy intervention

In-pharmacy HIV testing was offered to all participants in the study. To determine whether in-pharmacy HIV testing uptake was improved by a comprehensive approach to health vs. one that focused on sexual health only, we implemented intervention activities in two of the three pharmacies enrolled in the study. In one pharmacy, participants viewed a 10-minute video titled "Healthy Lifestyles," which was based on social cognitive behavior theory to reduce stigma associated with HIV prior to HIV testing ("video arm"). In another pharmacy, HIV testing was offered as part of a chronic disease health screening package that included glucose, cholesterol, and blood pressure screening and the "Healthy Lifestyles" video ("comprehensive arm"). For this article, participants visiting the HIV testing-only pharmacy ("control arm") were compared with participants attending the video arm and comprehensive arm pharmacies. Participants were compensated $30 for completing the survey instrument regardless of their willingness to take part in the health screenings.

Data collection and variables

The survey instrument assessed sociodemographic characteristics; sex and drug use risk behaviors; and attitudes toward drug use, IDUs, and HIV testing. We compared actual HIV testing uptake (yes/no) among participants attending each of the three pharmacy arms: control, video, and comprehensive arms.

Sociodemographic characteristics, substance use and sexual behaviors, and health-care access characteristics related to HIV testing behaviors were assessed for differences across the intervention arms. Sociodemographic characteristics included age (continuous), sex (female or male), race (Latino, black/black Hispanic, and white/other), marital status (married or unmarried), education (<high school, high school/general educational development, or >high school), annual legal income (≤$5,000 and >$5,000), annual illegal income (≤$5,000 and >$5,000), and recruitment method (peer referred, non-syringe pharmacy customer, or syringe pharmacy customer). Substance use and sexual behaviors assessed included past-three-month drug use status (yes/no), past-three-month injection drug use status (yes/no), condom use (not sexually active, 100% condom use, or <100% condom use), male sex partners (continuous), and female sex partners (continuous). Health-care use variables included having a regular doctor (yes/no) and past-three-month health insurance (yes/no).

We also adapted a seven-item HIV testing stigma scale validated by the U.S. Agency for International Development that is used in international settings.[28] The scale assessed feelings of shame, blame, and judgmental attitudes toward people living with HIV/acquired immunodeficiency syndrome (AIDS). Responses were assessed on a five-point Likert scale ranging from "strongly disagree" (0) to "strongly agree" (4), with increasing scores indicating higher levels of HIV stigma. We performed exploratory and confirmatory factor analyses to determine the number of dimensions underlying the scale and to assess model fit. The methods of this factor analysis are explained in detail elsewhere.[29] In brief, the responses were recategorized to responses ranging from "disagree" to "agree" for inclusion in factor analyses. Confirmatory analysis revealed that the psychometric properties for the scale were consistent with the original intent of the scale in our population. Therefore, based on U.S. Agency for International Development recommendations, we dichotomized appropriate item responses into HIV shame ("I would be ashamed if I were infected with HIV," "I would be ashamed if someone in my family had HIV/AIDS," and "People with HIV should be ashamed of themselves") and HIV blame ("HIV is a punishment from God," "HIV/AIDS is punishment for bad behaviors," "People with HIV are promiscuous," and "People with HIV use illegal drugs"). A participant had to have an affirmative response to at least one of the item responses for HIV shame and HIV blame. Both HIV shame and HIV blame were dichotomized as "yes to any form of stigma" and "no forms of stigma."

Statistical analysis

Descriptive characteristics of the sample, including medians and interquartile ranges for continuous variables and frequencies and percentages for categorical variables, are presented. In a bivariate analysis, the frequency of HIV testing uptake was compared among participants exposed to each intervention arm using chi-squared tests. Index IDU participants and their referred peers were defined as a network cluster. Those who were not index IDU participants or did not refer peers were defined as their own individual network cluster. To determine if the intervention improved HIV testing uptake among participants across the intervention arms, we used generalized estimating equations (GEEs) to account for clustering of participants within a network. For parsimony, we only included sociodemographic characteristics that remained significant (at $p<0.05$) after adjustment in the final model. Because the intervention aimed to reduce HIV testing stigma, we also restricted our analysis to examining HIV testing uptake among only those who reported at least one belief of HIV shame or HIV blame. Participants who reported being HIV positive (n=54) were removed from the unadjusted and adjusted models because they would not have a reason to agree to HIV testing.

RESULTS

The median age of the 688 respondents in the sample was 46 years. Most participants were male (n=463, 67.3%), Latino (n=341, 49.6%), black/black Hispanic (n=228, 33.1%), and unmarried (n=569, 82.7%); had <high school education (n=273, 39.7%) or a high school diploma/general educational development (n=256, 37.2%); and had ≤$5,000 annual legal income (n=599, 87.1%). A total of 89 (12.2%) respondents reported currently using illicit drugs and 141 (20.5%) reported ever injecting drugs. Although a large portion of the sample (n=312, 45.4%) was not sexually active, 256 (37.2%) respondents did not engage in protected sex all of the time (Table 1). Although the median number of male and female sexual partners was 0, only 10% of those who were sexually active had sex with ≥1 man, and 32% had sex with ≥2 women (data not shown). Most of the sample had a usual source of health care (n=489, 71.1%) and health insurance (n=564, 82.0%). Finally, most of the sample was non-peer referred through the pharmacy (n=554, 80.5%) (Table 1).

We found differences across the comprehensive health screening (n=255), video (n=193), and control (n=240) arms by sex, race/ethnicity, marital status, education, legal income, current drug use, injection drug use, condom use, number of male and female sex partners, usual source of care, health insurance, and recruitment strategy. Seventy-eight of 255 participants (30.6%) who were offered HIV testing in the comprehensive screening arm received HIV testing, 55 of 193 participants (28.5%) offered screening in the video arm received HIV testing, and 49 of 240 participants (20.4%) offered screening in the control arm received HIV testing (p=0.028). Of the 688 respondents, 254 (36.9%) reported at least one form of HIV shame and 363 (52.8%) reported at least one form of HIV blame (Table 1). A total of 172 (67.7%) of the 254 respondents who reported shame also reported blame, and 172 (47.3%) of the 363 respondents who reported blame also reported shame (data not shown).

Before adjusting for relevant sociodemographic characteristics, participants who received the comprehensive arm (prevalence ratio [PR] = 1.40, 95% confidence interval [CI] 0.98, 2.00) or the video intervention

(PR=1.44, 95% CI 1.00, 2.09) were more likely to receive an HIV test in the pharmacy than those who were only offered in-pharmacy HIV testing (control arm) (Table 2). This estimate was attenuated (p=0.08 for the comprehensive arm and p=0.09 for the video arm) after adjusting for age and race/ethnicity, which remained significant in the final model. Nevertheless, it is important to note that the intervention was positive, suggesting that these approaches may improve HIV testing uptake.

Finally, among those who only reported at least one form of HIV shame or blame, we found a marginally substantial increase of about 60% in HIV testing in each intervention arm. After adjusting for age and race/ethnicity, those who viewed the video were 1.59 (95% CI 1.00, 2.53) times more likely to get tested than those who were only offered in-pharmacy HIV testing. Those who received the comprehensive intervention were 1.61 (95% CI 1.03, 2.49) times more likely to be tested than those who were only offered in-pharmacy HIV testing (Table 3).

DISCUSSION

Overall, this study showed a borderline substantial increase in HIV testing among individuals who viewed the computer-based video and were offered HIV testing packaged with other health screening tests compared

Table 1. Characteristics of pharmacy patrons (*n*=716) enrolled in an HIV testing intervention at three pharmacies located in low-income, minority neighborhoods in New York City, by intervention type,[a] 2012–2014[b]

Characteristics	*Total number of respondents (percent)*[c]	*Total number of respondents in the control arm (percent)*	*Total number of respondents in the video arm (percent)*	*Total number of respondents in the comprehensive health screening arm (percent)*	P-*value*[d]
Total	688 (100.0)	240 (34.9)	193 (28.0)	255 (37.1)	
Age (in years) (median [IQR])	46 (16)	45 (13)	45 (17)	47 (15)	0.487
Sex					<0.001
Male	463 (67.3)	175 (72.9)	109 (56.5)	179 (70.2)	
Female	225 (32.7)	65 (27.1)	84 (43.5)	76 (29.8)	
Race					<0.001
Latino	341 (49.6)	89 (37.1)	119 (61.7)	133 (51.2)	
Black/black Hispanic	228 (33.1)	96 (40.0)	56 (29.0)	76 (29.8)	
White/other	119 (17.3)	55 (22.9)	18 (9.3)	46 (18.0)	
Marital status					<0.001
Married	119 (17.3)	29 (12.1)	52 (26.9)	38 (14.9)	
Unmarried	569 (82.7)	211 (87.9)	141 (73.1)	217 (85.1)	
Education					0.003
<High school	273 (39.7)	85 (35.4)	95 (49.2)	93 (36.5)	0.004
High school/GED	256 (37.2)	101 (42.1)	66 (34.2)	89 (34.9)	
>High school	159 (23.1)	54 (22.5)	32 (16.6)	73 (38.6)	
Annual legal income					0.009
≤$5,000	450 (65.4)	165 (68.7)	109 (56.5)	176 (69.0)	
>$5,000	238 (34.6)	75 (31.3)	84 (43.5)	79 (31.0)	
Annual illegal income					0.360
≤$5,000	599 (87.1)	203 (84.6)	170 (88.1)	226 (88.6)	
>$5,000	89 (12.9)	37 (15.4)	23 (11.9)	29 (11.4)	
Current drug use (yes)	84 (12.2)	42 (17.5)	12 (6.2)	30 (11.8)	0.002
Current injection drug use (yes)	141 (20.5)	70 (29.2)	24 (12.4)	47 (18.4)	<0.001
Ever used injection drugs (yes)	249 (36.2)	107 (44.6)	46 (23.8)	96 (37.7)	<0.001
Condom use					0.068
100%	120 (17.4)	51 (21.3)	31 (16.1)	38 (14.9)	
<100%	256 (37.2)	84 (35.0)	84 (43.5)	88 (34.5)	
Not sexually active	312 (45.4)	105 (43.7)	78 (40.4)	129 (50.6)	
Number of male sex partners (median [IQR])	687 0 (0)	0 (0)	0 (1)	0 (0)	0.291
Number of female sex partners (median [IQR])	688 0 (1)	1 (2)	0 (1)	0 (1)	0.067

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Table 1 (continued). Characteristics of pharmacy patrons (*n*=716) enrolled in an HIV testing intervention at three pharmacies located in low-income, minority neighborhoods in New York City, by intervention type,[a] 2012–2014[b]

Characteristics	*Total number of respondents (percent)*[c]	*Total number of respondents in the control arm (percent)*	*Total number of respondents in the video arm (percent)*	*Total number of respondents in the comprehensive health screening arm (percent)*	P-value[d]
Regular doctor or provider (yes)	489 (71.1)	154 (64.2)	162 (83.9)	173 (67.8)	<0.001
Health insurance (yes)	564 (82.0)	188 (78.3)	171 (88.6)	205 (80.4)	0.016
Recruitment strategy					<0.001
Non-syringe pharmacy customer	458 (66.6)	130 (54.2)	162 (83.0)	166 (65.1)	
Syringe customer	96 (13.9)	51 (21.2)	12 (6.2)	33 (12.9)	
Peer-referred	134 (19.5)	59 (24.6)	19 (9.8)	56 (22.0)	
HIV testing uptake[e] (yes)	182 (26.4)	49 (20.4)	55 (28.5)	78 (30.6)	0.028
HIV shame[f] (yes)	254 (36.9)	92 (38.3)	63 (32.6)	99 (38.8)	0.347
HIV blame[f] (yes)	363 (52.8)	129 (53.7)	101 (52.3)	133 (52.2)	0.930

[a]Control arm participants were only offered HIV testing. Video arm participants viewed a 10-minute video on healthy lifestyles aimed at reducing stigma associated with HIV prior to being offered HIV testing. Comprehensive arm participants viewed the healthy lifestyles video and were offered HIV testing with chronic disease health screenings for glucose, cholesterol, and blood pressure.

[b]For dichotomous variables, only the affirmative response is shown.

[c]Percentages may not total to 100 because of rounding.

[d]*P*-values calculated from Pearson's chi-squared tests

[e]HIV testing uptake was defined as those who agreed to and received an HIV test in the pharmacy.

[f]HIV shame was defined as an affirmative response to any of the following: "I would be ashamed if I were infected with HIV," "I would be ashamed if someone in my family had HIV/AIDS," or "People with HIV should be ashamed of themselves." HIV blame was defined as an affirmative response to any of the following: "HIV is a punishment from God," "HIV/AIDS is punishment for bad behaviors," "People with HIV are promiscuous," and "People with HIV use illegal drugs."

HIV = immunodeficiency virus

IQR = interquartile range

GED = general educational development

AIDS = acquired immunodeficiency syndrome

with those who were offered HIV testing alone. However, when the study sample was limited to those who reported having some form of HIV stigma, either through feelings of HIV shame or blame (i.e., those who were the least educated of the sample and would benefit most from our intervention), our intervention effect held. Our results showed that disease screening in a pharmacy-based setting could drastically improve the availability and accessibility of HIV testing and chronic disease screening in low-access communities with excess circulatory, disease-related mortality and HIV-related mortality.[2,30] Chronic disease screening and HIV tests have been successfully implemented in a pharmacy setting independently,[31–33] but these tests could be offered in conjunction with each other for the convenience of the patient to maximize the use of fluids drawn in the pharmacy for each test and to reduce stigma associated with HIV testing. Combining HIV testing with screening tests for less stigmatized diseases may have normalized testing, but a positive intervention effect was also seen among participants who viewed the computer-based video compared with those who were offered HIV testing only.

Computer-based video interventions have been shown to influence HIV testing knowledge and willingness to receive an HIV test in a hospital emergency room setting.[22,23,34] The video developed for this intervention was created based on social cognitive theory to encourage behavior change through increasing knowledge of HIV transmission, one's ability to make decisions about one's health, and the observation of others' behaviors who did not perceive HIV as a disease that was exceptional from other health outcomes. The use of a social cognitive model may have normalized HIV testing health behaviors and destigmatized HIV and populations who engage in high-risk behaviors to successfully improve HIV testing outcomes. Increased accessibility of HIV testing, coupled with HIV testing messages informed by social cognitive models, have the potential to (*1*) normalize and routinize HIV testing for high-risk and non-high-risk individuals; (*2*) reduce stigma associated with HIV testing because of

Table 2. Unadjusted and adjusted relationship between intervention type and HIV testing uptake (*n*=624) among un- and underinsured[a] patrons of three pharmacies located in low-income minority neighborhoods in New York City, 2012–2014

	HIV testing			
	Unadjusted		*Adjusted*[b]	
Intervention type[c]	*Prevalence ratio (95% CI)*	P-*value*	*Prevalence ratio (95% CI)*	P-*value*
Control arm	Ref.		Ref.	
Video arm	1.44 (1.00, 2.09)	0.057	1.33 (0.92, 1.94)	0.127
Comprehensive screening arm	1.40 (0.98, 2.00)	0.061	1.34 (0.94, 1.91)	0.101

[a]Un- and underinsured individuals did not have any form of health insurance or had inadequate health insurance signified by uncovered prescription expenses.

[b]Adjusted for age and race/ethnicity

[c]Control arm participants were only offered HIV testing. Video arm participants viewed a 10-minute video on healthy lifestyles aimed at reducing stigma associated with HIV prior to being offered HIV testing. Comprehensive arm participants viewed the healthy lifestyles video and were offered HIV testing with chronic disease health screenings for glucose, cholesterol, and blood pressure.

HIV = human immunodeficiency virus

CI = confidence interval

Ref. = reference group

Table 3. Adjusted relationship between intervention type and HIV testing uptake among un- and underinsured[a] patrons of pharmacies located in low-income minority neighborhoods in New York City who reported HIV shame or blame[b] (*n*=408), 2012–2014

	HIV testing[c]	
Intervention type[d]	*Prevalence ratio (95% CI)*	P-*value*
Control arm	Ref.	
Video arm	1.59 (1.00, 2.53)	0.052
Comprehensive screening arm	1.61 (1.03, 2.49)	0.034

[a]Un- and underinsured individuals did not have any form of health insurance or had inadequate health insurance signified by uncovered prescription expenses.

[b]HIV shame was defined as an affirmative response to any of the following: "I would be ashamed if I were infected with HIV," "I would be ashamed if someone in my family had HIV/AIDS," or "People with HIV should be ashamed of themselves." HIV blame was defined as an affirmative response to any of the following: "HIV is a punishment from God," "HIV/AIDS is punishment for bad behaviors," "People with HIV are promiscuous," and "People with HIV use illegal drugs."

[c]Adjusted for age and race/ethnicity

[d]Control arm participants were only offered HIV testing. Video arm participants viewed a 10-minute video on healthy lifestyles aimed at reducing stigma associated with HIV prior to being offered HIV testing. Comprehensive arm participants viewed the healthy lifestyles video and were offered HIV testing with chronic disease health screenings for glucose, cholesterol, and blood pressure.

HIV = immunodeficiency virus

CI = confidence interval

Ref. = reference group

AIDS = acquired immunodeficiency syndrome

its availability to everyone vs. only those perceived as high risk; and (*3*) reduce HIV exceptionalism.

Limitations

Given that this intervention was not a randomized design, it is plausible that confounding and selection biases influenced the results of the study. To reduce these biases, we controlled for key demographic and behavioral characteristics that were different across the pharmacy intervention arms. We also used GEE to account for potential dependencies among individuals who were referred by their peers. The small sample, however, may have limited our ability to detect a significant effect after adjusting for multiple potential confounders. As such, replication of this intervention is warranted in a larger sample. Given that we ascertained immediate HIV testing uptake behaviors, it is unclear if this intervention influenced long-term beliefs about HIV and HIV testing. Thus, future studies should assess HIV testing beliefs during a longer period of time following a computer-based video informed by a social cognitive model. Finally, external validity of the study may also be limited to individuals who patron pharmacies in high-drug-activity neighborhoods in New York City.

CONCLUSION

This pharmacy-based intervention revealed marginally improved HIV testing uptake behaviors among a high-risk, low-access community by packaging HIV testing

within a comprehensive disease screening framework and presenting a computer-based video that aimed to reduce HIV testing stigma. Future studies should test whether or not this intervention improves HIV testing knowledge and uptake in clinic and physician offices, as this strategy may improve HIV testing in other clinical settings where clinical staff members have received minimal HIV training. HIV-related stigma-reduction strategies may encourage clinical staff members to be more inclined to offer HIV testing and more comfortable relaying test results.

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