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Using Peer-Referral Chains with Incentives to Promote HIV Testing and Identify Undiagnosed HIV Infections Among Crack Users in San Salvador

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Abstract

In El Salvador, crack users are at high risk for HIV but they are not targeted by efforts to promote early HIV diagnosis. We evaluated the promise of peer-referral chains with incentives to increase HIV testing and identify undiagnosed HIV infections among networks of crack users in San Salvador. For 14 months, we offered HIV testing in communities with a high prevalence of crack use. For the following 14 months, we promoted chains in which crack users from these communities referred their peers to HIV testing and received a small monetary incentive. We recorded the monthly numbers of HIV testers, and their crack use, sexual risk behaviors and test results. After launching the referral chains, the monthly numbers of HIV testers increased significantly ($Z = 6.90$, $p < .001$) and decayed more slowly ($Z = 5.93$, $p < .001$), and the total number of crack-using testers increased nearly fourfold. Testers in the peer-referral period reported fewer HIV risk behaviors, but a similar percentage (~5 %) tested HIV positive in both periods. More women than men received an HIV-positive diagnosis throughout the study ($\chi^2(1, N = 799) = 4.23$, $p = .040$). Peer-referral chains with incentives can potentially increase HIV testing among networks of crack users while retaining a focus on high-risk individuals.

Keywords

HIV prevention; HIV testing; Central America; Social networks; Access to health care

Introduction

El Salvador has been a transshipment corridor for cocaine traveling from South America to the United States for decades [1, 2]. An internal drug market developed as drug transporters were paid with cocaine, which they then converted into crack to make it more economically accessible to the local market. The use of cheaper forms of cocaine has been rising rapidly in El Salvador and across Latin America, becoming a real epidemic [3, 4]. In El Salvador, illicit substance-use rates are above the average for Latin America (8 %) [5] and may reach dramatic levels in marginalized communities (from 30 to 64 %) [6]. In a study of service utilization in El Salvador, 100 % of those seeking treatment for drugs other than alcohol listed crack or other forms of cocaine as their substances of abuse [7].

Regardless of whether injected or not, the use of stimulants such as crack and cocaine has been associated with a high risk for becoming infected with the human immunodeficiency virus (HIV) [8]. Individuals who use crack are less likely to use condoms due to intoxication, impaired cognition and withdrawal symptoms, and they often agree to unprotected sex in exchange for money or drugs [9]. Given their widespread use and association with sexual risk of HIV, stimulants are a major contributor to the HIV epidemic in Latin America [10].

In line with the aforementioned research, our studies have found high rates of HIV and sexual risk behaviors among Salvadoran crack users. In a recent study with 420 crack users in the San Salvador metropolitan area, the estimated HIV prevalence ranged from 4.9 to 7 %, which is larger than the national HIV prevalence among sex workers (3.4 %), who, unlike crack users, are the target of intensive HIV prevention efforts [11, 12]. Consistent with their high HIV prevalence, Salvadoran crack users had frequent sexual risk behaviors and low access to HIV testing and treatment. Seventy-two percent of participants reported having had sex with multiple partners, 40 % unprotected sex with casual partners, and 51 % sex under the influence of substances in the previous month. Nearly a quarter of crack users also reported having had risky sex with other crack users, which further increases HIV risk given the high prevalence in the group [13]. Compounding their high HIV prevalence and risk behavior rates, less than a half of the surveyed crack users had ever tested for HIV, and more than 60 % of those who knew their HIV-positive status had never received HIV treatment [11].

Given Salvadoran crack users' high risk profile and low HIV testing rates, interventions should promote timely HIV diagnosis so that those who are HIV positive receive antiretroviral therapy that reduces mortality and HIV transmission [14, 15]. Unfortunately, in El Salvador, crack users seldom access healthcare and outreach services, the entry points to HIV diagnosis [16, 17]. First, despite their evident HIV risk, crack users are rarely the target of HIV prevention efforts [8]. Moreover, crack users are often afraid of disclosing their substance use to healthcare staff, do not have contact with service organizations, and are reluctant to respond to outreach efforts that target stigmatized populations with whom they do not identify (e.g., commercial sex workers, men who have sex with men, injection drug users) [8, 16, 17].

Despite the barriers, in San Salvador, crack users associate in networks that satisfy their instrumental needs and help them to cope with substance use [16]. Peer-referral chains with incentives can take advantage of the relationships that permeate these networks and engage them in HIV prevention efforts [18, 19]. In particular, peer-referral chains with incentives may reach crack users who are less visible and motivated to receive an HIV test. Through successive waves, peer referrals with incentives can diffuse information about trusted services among hard-to-reach individuals [20]. Through dual incentives for referrals and testing, this strategy may enhance HIV testing motivation among individuals who do not assess their behaviors as risky or cannot envision the advantages of testing for HIV [18]. In this study, we used a 28-month interrupted time-series design to evaluate the potential of peer-referral chains with incentives to increase access to HIV testing and to identify undiagnosed infections among networks of crack users in the San Salvador metropolitan area, El Salvador. We expected that the introduction of incentivized peer-referral chains to HIV testing in three San Salvadoran communities would be associated with increases in the monthly numbers of crack users who receive HIV testing, as well as with a larger number of detected HIV infections compared with a traditional self-referral approach. We also observed differences in demographics and risk behaviors between self-referred and peer-referred testers to explore whether peer-referral chains with incentives have the potential to reach more disadvantaged and unmotivated individuals than those requesting HIV tests on their own (e.g., individuals who do not report behaviors that are targeted by HIV prevention efforts).

Methods

Overview

The current study was a part of a larger project that used an interrupted time-series design to evaluate a multi-level community-based HIV prevention intervention. The intervention consisted of two main components that were introduced sequentially: Peer referrals with incentives to encourage crack users to receive an HIV test, and peer-facilitated counseling with ego-networks of crack users to reduce sexual risk behaviors. We presently describe the independent effect of the peer-referrals on monthly numbers of HIV testers reporting crack use before the introduction of the peer-facilitated counseling component.

From August 2011 to September 2012, we offered confidential rapid HIV testing to adults in three community sites with a high prevalence of substance use in the San Salvador metropolitan area. Both the provision of testing outside of governmental sites and the use of rapid HIV testing were novel in these communities. Testing sites were located in a soup kitchen and community center in two marginal communities, and at a non-governmental organization in the historical center of the city. The confidential HIV testing services were announced in posters placed throughout the communities in which the sites were located and through word of mouth by community members who had received services. In September 2012, we recruited crack users to initiate peer-referral chains with incentives to receive HIV testing at the aforementioned community sites. In this phase, which ended in November 2013, all adults who requested an HIV test received counseling and testing and an incentive for their participation. However, crack users who reported sexual risk for HIV (regardless of

whether they were self-referred or peer-referred) also received coupons to recruit, in exchange for a secondary incentive, other crack users to be tested for HIV. All procedures were approved by the institutional review boards of the involved institutions in El Salvador and the United States.

Participants and Procedures

Participants who initiated the referral chains, or “seeds,” were identified and recruited in collaboration with our community partners in San Salvador. Seeds included 35 crack users over 17 years of age, who were well connected in one of our three target communities. Twenty-seven seeds were men and eight women, which closely reflects the ~3.50 male-to-female ratio in substance use in El Salvador [21]. Seeds and peer-referred HIV testers who were 18 years of age or over, and had not received an HIV test at the study sites in the previous three months, provided their written informed consent, completed a short questionnaire assessing demographics, substance use and sexual risk behavior, and received HIV counseling and testing following the World Health Organization (WHO) guidelines [22]. After counseling, the study staff asked HIV testers who reported crack use and HIV risk in the past month (i.e., sex with more than one partner, sex with an HIV-positive partner, sexual violence, men who had sex with men, sex work, or injection drug use) to list the initials of persons who they thought would need an HIV test, and to describe those persons in terms of their sexual risk behaviors and substance use. From this list, interviewers selected the network members who were described as using crack and being at risk for HIV, and they gave them three coupons to refer them to take an HIV test. The researchers did not disclose the eligibility criteria to avoid false reporting of eligibility. Counselors scheduled appointments for participants to bring their peers, asking them to inform their potential recruits of the confidentiality of the HIV test. However, counselors did not provide special instructions about how or where to recruit them. Testers who were also crack users and reported past-month sexual risk received HIV counseling and testing and obtained three coupons to refer their own networks of crack users. Finally, testers who successfully referred three crack users were given two extra coupons to leverage their referral efficacy. All testers received \$5 regardless of whether they were eligible based on crack use and sexual risk to refer network members for an HIV test; testers who recruited other testers received \$2 for each tester, regardless of whether the referred person was a crack user or engaged in risky behaviors. These incentives are not high enough to be coercive or influence drug use patterns, as they would barely cover the cost of a rock of crack in San Salvador. Testers who received an HIV positive result were referred to the Salvadoran Ministry of Health’s hospitals for further diagnosis and treatment.

Measures

Testers who reported not having received an HIV positive diagnosis, completed a very brief demographic, crack use, and risk behavior survey. Demographic questions included gender, age, education, and employment status. To determine their eligibility to recruit others for an HIV test, participants also responded whether, in the previous month, they had used crack, had any type of sex with men (men only), had injected drugs, had more than one partner, had been raped, had sex with an HIV-positive partner, and had sex in exchange for money and

goods. On each day, study staff recorded the number of HIV testers they received and their test results.

Data Analyses

We first calculated means and percentages to describe the peer-referral chains. Then, we compared testers in the self-referral and peer-referral periods in demographics, crack use, risk behaviors, and HIV test results using linear and logistic mixed-effects regressions. The regressions included the recruiters' identifier as an intercept random-effect term to account for the potential dependence among testers referred by the same person. Each self-referred tester was assigned a unique recruiter identifier. Finally, we compared the overtime trends in the monthly number of testers during the 14 months before and the 14 months after the introduction of the peer-referral chains with incentives using piece-wise Poisson regression. To account for the spike in HIV testers resulting from the initial participation of the easier-to-reach individuals, the models included the peer-referral starting month (October 2012) as a separate term. The trends in the monthly numbers of HIV testers during the self-referral and the peer-referral periods were modeled using intercept (level) and slope (trend) terms in a Poisson regression model, and the number of testers in the month in which the peer-referral chains started, using an intercept (level) term only. All analyses excluded chain referral seeds and 56 tests of repeated testers.

Results

During the 14-month self-referral period, 263 community members requested an HIV test at the three testing sites, with an average of 5.55 ($SD = 3.91$) HIV testers a month. In the 14-month peer-referral period, 536 community members requested testing, with an average of 19.80 ($SD = 4.44$) testers per month. As shown in Table 1, most of the testers in the peer-referral period were peer-referred. Nearly two-thirds of the peer-referred testers were eligible for coupons based on their crack use and HIV risk. Of these testers, half referred at least one other HIV tester. Most testers referred between two or three of their network members to HIV testing. The number of recruitment waves in the chains ranged from 0 to 13. Forty-five percent of the peer-referred testers were recruited following wave 5.

Table 2 describes characteristics of testers in each of the study periods. Testers in the self-referral period were older and less likely to have used crack. Self-referred testers were also more likely to report that they had sex with another man, had injected drugs, had sex with an HIV-positive sexual partner, and had experienced sexual violence. However, testers in the self-referral and the peer-referral groups were similarly likely to be HIV positive, with ~5 % of the testers receiving an HIV positive diagnosis at each time, and the absolute number of identified HIV infections nearly doubling in the peer-referral period (24 vs. 14 in the self-referral period). The HIV positive rates among women were greater than those for men in both periods (self-referral 8.77 vs. 4.42 %, $\chi^2(1, N = 263) = 1.67, p = .196$; peer-referral 7.53 vs. 3.84 %, $\chi^2(1, N = 536) = 2.43, p = .162$), but the difference was statistically significant only in the aggregated group of testers (8.00 vs. 4.02 %, $\chi^2(1, N = 799) = 4.23, p = .040$).

Table 3 presents the piece-wise Poisson regression models and Fig. 1 provides the corresponding predicted trends in monthly numbers of HIV testers before and after the

introduction of the peer-referral chains with incentives for all testers (Model A) and for those who reported crack use (Model B). In both models, the intercepts before and after the peer-referral strategy were significantly different (Model A: $Z = 6.90$, $p < .001$; Model B: $Z = 6.38$, $p < .001$), indicating that monthly numbers of HIV testers were higher during the 14 months of the peer-referral period considering all testers (Model A) and considering only testers who reported crack use (Model B). Moreover, for both the complete group of testers and the crack-user subgroup, monthly numbers of HIV testers in the peer-referral group decayed more slowly than those in the self-referral period (Model A: $Z = 5.93$, $p < .001$; Model B: $Z = 5.38$, $p < .001$). The differences in level and trend between the two periods were observed without considering the month in which the peer-referral intervention was introduced, which showed a large spike in the number of HIV testers and stands by itself in the model without contributing to the estimation of the trends in the monthly numbers of HIV testers in the self-referral and peer-referral periods.

Discussion

Crack users in El Salvador are at risk of becoming infected with HIV, but they have not been the target of the country's prevention efforts. We used peer-referral chains with incentives to engage crack users in HIV testing and to identify undiagnosed HIV infections among this population.

Overall, our results indicate that peer-referral chains with incentives are an acceptable and feasible method for engaging crack users in HIV testing. First, half of the crack users eligible for referrals were able to bring one or more persons to test for HIV, and more than half of the referred persons were also crack users at risk for HIV. Moreover, 45 % of the peer-referred testers were tested after the fifth recruitment wave, suggesting that the chains proceeded well beyond our community partners' immediate contacts.

Our results also indicate that peer-referral chains with incentives is a promising strategy for increasing access to HIV testing among crack users in communities with a high prevalence of substance use. Specifically, after a spike in the number of testers following the introduction of the peer-referral chains, monthly counts of HIV testers remained significantly higher and decayed significantly more slowly than those in the self-referral period. Moreover, increases in the number of HIV testers in the peer-referral period were due to the larger number of crack-using testers, which almost quadrupled after the introduction of the peer-referral chains with incentives.

Incentivized peer-referral chains to HIV testing may also serve to identify undiagnosed infections that may have gone undetected with a self-referral approach. First, the number of diagnosed HIV positive testers nearly doubled during the peer-referral period. Moreover, more individuals received HIV testing in the peer-referral period, but the percentages of positive testers remained similar, indicating that peer-referral chains with incentives may increase access to HIV testing while maintaining a focus on at-risk networks. Notably, despite similar percentages of HIV positive testers in both groups, exploratory analyses showed that HIV testers in the peer-referral period were less likely to report risks for HIV, particularly those targeted by prevention campaigns (e.g., sex with other men), suggesting

that they may have been less aware of their risk and less motivated to request testing on their own. Further research may disentangle the unique contribution of peer referrals and monetary incentives on improving access to HIV testing among individuals who do not perceive themselves to be at risk or do not access services.

Our study replicates previous research suggesting that female substance users are more vulnerable to HIV and more difficult to engage in services than substance-using males [23–25]. On the one hand, crack-using women were more likely to test positive for HIV than crack-using men. On the other hand, ~4.50 times more men than women received HIV testing in both periods, which is larger than the ~3.50 male-to-female substance-use ratio in El Salvador [20]. Female substance users face unique challenges that may explain this disparity, including more reliance on sex exchanges and less ability to negotiate condom use [9] as well as greater stigmatization from healthcare staff and society [26, 27]. Future interventions should address the factors that make substance-using women more vulnerable and difficult to engage in HIV prevention for example, by integrating HIV testing with reproductive services that are not stigmatized.

The increase in monthly HIV tester counts after the introduction of the peer-referral chains was sustained during the 14 post-intervention months. For long-term sustainability, periodic community observations and key informant interviews may help to identify new networks of crack users and the seeds who could reach them. Moreover, among at-risk groups, promoting regular HIV testing is as necessary as increasing testing rates. Training effective referrers to provide reminders for high-risk crack users to test for HIV every 3 months may contribute to increasing detection of undiagnosed HIV infections among this population.

Limitations and Conclusions

Several limitations should be noted in this study. We used an interrupted time-series design instead of a cluster randomized controlled trial given the high risk of cross-contamination between clusters assigned to the control and intervention groups, the lack of information about the equivalency of clusters, and the difficulty of maintaining multiple full-time testing sites in areas that periodically become unsafe to conduct research activities. In this regard, the observed effects could potentially be confounded by community events unrelated to the peer-referral chains with incentives strategy. Our community partners and we, however, are not aware of any HIV-related interventions or media campaigns implemented at the time we introduced the peer-referral chains. Although questionnaires were simple, risk behaviors were self-reported and memory and self-presentation biases were possible in responses. In spite of these limitations, this is the first study that evaluates the promise of a strategy to encourage HIV testing and identifying undiagnosed infections among Salvadoran crack users, and possibly the first of this type of study in this area of the world. Our study suggested that peer-referral chains with incentives are promising for reaching networks of crack users who may not otherwise request an HIV test and for increasing the detection of undiagnosed HIV infections. Given the widespread use of cheaper forms of cocaine throughout Latin America, our results can inform future interventions in El Salvador and other areas of the continent.

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Model A: All testers ($N = 799$)

Model B: Crack user testers ($N = 575$)

Fig. 1.

Predicted trends in the monthly numbers of HIV testers in the self-referral and peer-referral chain with incentives periods

Table 1

Description of the peer-referral chains

	<i>N/%</i>
Seeds	35
Referred testers	
Eligible for coupons	330 (65.22)
Not eligible for coupons	176 (34.78)
Not referred testers	
Eligible for coupons	16 (53.33)
Not eligible for coupons	14 (46.66)
Referred testers who referred other testers	166 (49.80)
Seeds who referred other testers	23 (65.71)
Mean referred testers	
Seeds	3.22
Referred testers	2.62
Number of testers referred	
One	26 (15.24)
Two	56 (33.54)
Three	59 (35.98)
Four and five	25 (15.24)

Table 2

Description of the HIV testers in the self-referral and peer-referral periods

	Self-referral period (<i>n</i> = 262)	Peer-referral period (<i>n</i> = 535)	<i>F</i>
	<i>N</i> (%) / <i>M</i> (<i>SD</i>)	<i>N</i> (%) / <i>M</i> (<i>SD</i>)	
Demographics			
Gender			
Male	205 (78.2)	442 (82.6)	2.7
Female	57 (21.8)	93 (17.4)	
Age	38.13 (12.3)	35.88 (11.7)	3.9 *
Education			
<Middle school	190 (72.2)	414 (77.4)	2.4
Middle school	75 (27.8)	121 (22.6)	
Employed			
Yes	56 (21.3)	102 (19.0)	0.5
No	207 (78.7)	434 (81.0)	
Used crack (last month)			
No	138 (52.5)	86 (16.0)	90.6 ***
Yes	125 (47.5)	495 (84.0)	
Reported Last-Month HIV Risk Behavior			
Had any type of sex with other men	54 (26.2)	84 (19.0)	4.7 *
Exchanged sex for money or goods	44 (16.7)	92 (17.2)	0.0
Injected drugs	18 (6.8)	17 (3.2)	5.7 *
Had sex with an HIV positive partner	29 (11.0)	29 (5.4)	5.5 *
Had more than one partner	169 (64.3)	345 (64.4)	0.0
Was raped	15 (5.7)	18 (3.4)	2.4
Tested positive for HIV	14 (5.3)	24 (4.4)	0.4

Analyses exclude chain referral seeds and tests of repeated HIV testers

*
 $p < .05$;***
 $p < .001$

Table 3

Piece-wise poisson regression of monthly rates of HIV testers in the self-referral and peer-referral chain periods

	<i>B</i>	<i>SE</i>	<i>Z value, p</i>	<i>Z value, p_(self-referral/peer-referral)</i>
Model A: All testers (<i>N</i> = 799, 28 months, deviance = 140) ^a				
Self-referral period (intercept)	2.22	0.11	19.05, <.001	
Peer-referral period (intercept)	3.58	0.16	22.89, <.001	
				6.90, <.001
Self-referral period (slope)	-1.77	0.21	-8.29, <.001	
Peer-referral period (slope)	-0.23	0.16	-1.37, <.170	
				5.93, <.001
Peer-referral start (intercept)	5.10	0.08	65.31, <.001	
Model B: Crack user testers (<i>N</i> = 575, 28 months, deviance = 171) ^a				
Self-referral period (intercept)	1.52	0.17	9.22, <.001	
Peer-referral period (intercept)	3.05	0.18	17.12, <.001	
				6.38, <.001
Self-referral period (slope)	-1.69	0.29	-5.74, <.001	
Peer-referral period (slope)	0.12	0.18	0.68, =.495	
				5.38, <.001
Peer-referral start (intercept)	4.96	0.08	59.64, <.001	

^aAnalyses exclude chain referral seeds and tests of repeated HIV testers