

Partner Referral by HIV-Infected Persons to Partner Counseling and Referral Services (PCRS) - Results from a Demonstration Project

Binwei Song¹, Elin B. Begley^{*2}, Linda Lesondak³, Kelly Voorhees⁴, Magdalena Esquivel⁵, Ronald L. Merrick⁵, Jack Carrel⁶, Douglas Sebesta⁷, James Vergeront⁸, Dhana Shrestha⁸, Emeka Oraka¹, Annisa Walker⁹ and James D. Heffelfinger²

¹Northrop Grumman, Atlanta, GA, USA

²Division of HIV/AIDS Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, Centers for Disease Control and Prevention, Atlanta, GA, USA

³Chicago Department of Public Health, Chicago, IL, USA

⁴Colorado Department of Public Health and Environment, Denver, CO, USA

⁵Los Angeles County Department of Public Health, Los Angeles, CA, USA

⁶Louisiana Office of Public Health, New Orleans, LA, USA

⁷San Francisco Department of Public Health, San Francisco, CA, USA

⁸Wisconsin Division of Public Health, Madison, WI, USA

⁹Business Computer Applications, Atlanta, GA, USA

Abstract: *Objective:* The objectives of this article are to determine factors associated with refusal and agreement to provide partner information, and evaluate the effectiveness of referral approaches in offering PCRS.

Methods: Index clients from 5 sites that used 3 different PCRS approaches were interviewed to obtain demographic and risk characteristics and choice of partner referral method for PCRS. Logistic regression was used to assess factors associated with providing partner information.

Results: The percentage of index clients who refused to provide partner information varied by site (7% to 88%). Controlling for PCRS approach, index clients who were older than 25 years, male, or reported having male-male sex in the past 12 months were more likely ($p < 0.01$) to refuse to provide partner information. Overall, 72% of named partners referred by index clients were located and offered PCRS. The proportion of partners who were located and offered PCRS differed by referral approach used, ranging from 38% using contract referral (index clients agree to notify their partners within a certain timeframe, else a disease intervention specialist or health care provider will notify them) to 98% using dual referral (index clients notify their partners with a disease intervention specialist or provider present).

Conclusion: Success in obtaining partner information varied by the PCRS approach used and effectiveness in locating and notifying partners varied by the referral approach selected. These results provide valuable insights for enhancing partner services.

Keywords: HIV, index clients, partners, partner counseling and referral services, risk behaviors, referral.

INTRODUCTION

Partner counseling and referral services (PCRS) have long been an important method for providing comprehensive HIV prevention and treatment [1, 2]. Centers for Disease Control and Prevention (CDC) recently issued guidelines for Partner Services programs [3] which update the 1998 HIV Partner Counseling and Referral Services Guidance [4], and include PCRS activities, and support integration of HIV and

sexually transmitted disease (STD) program activities. The project described in this manuscript was conducted prior to these recommendations and focused on HIV. The activities described in this manuscript will be referred to as PCRS. As part of PCRS, HIV-infected persons, referred to as index clients, are interviewed to provide information about their sexual or needle-sharing partners. Partners are then located, notified of their potential exposure to HIV, counseled, and offered HIV testing. This approach effectively reaches a population with high HIV prevalence and has been shown to be cost-effective in preventing HIV transmission in the USA [5-7]. Traditionally, PCRS is conducted by trained disease intervention specialists (DIS) from state or local health departments. Recently, novel approaches have been used in

*Address correspondence to this author at the Division of HIV/AIDS Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, Centers for Disease Control and Prevention, 1600 Clifton Rd NE, MS E-46, Atlanta, GA 30333, USA; Tel: 404.639.5175; Fax: 404.639.0929; E-mails: eqb5@cdc.gov, elin.begley@gmail.com

an attempt to increase numbers of persons who accept PCRS. For example, an enhanced approach of PCRS using HIV counselors from community-based organizations (CBOs) in addition to DIS has been demonstrated to be effective [8, 9], and more recently, the internet has increasingly been used for partner notification [10-12].

In practice, the success of partner notification depends on whether index clients are willing to provide information about their partners, the content of the information that they provide (i.e., whether they provide names and locating information of their partners), and how they choose to inform their partners that they have been exposed to HIV. Four referral approaches have been used to notify partners of HIV-infected persons about their potential exposures to HIV: *self-referral* (index clients agree to notify their partners by themselves), *provider referral* (index clients agree to let DIS or health care providers notify their partners), *dual referral* (index clients agree to notify their partners with a DIS or health care provider present), and *contract referral* (index clients agree to notify their partners within a certain timeframe, and if the notification is not completed within that timeframe, DIS or providers notify them) [4, 7].

To date, most studies on partner notification have been focused on the assessment of provider referral or self-referral approaches. These studies have shown that index clients, particularly men who have sex with men (MSM) and injection drug users (IDUs), prefer the self-referral approach, possibly because of concerns about confidentiality [8, 13]. However, several systematic reviews of referral strategies have indicated that provider referral, rather than self-referral, may be the most effective means of ensuring successful partner notification [1, 7, 14]. In a recent review, Passin and coworkers showed that the choice between self-referral and provider referral might be influenced by the type of relationship that index clients have with their partners. Index clients may be more willing to notify their main partners than their casual partners without assistance [15]. There are few reports evaluating the contract referral and dual referral approaches [7].

In response to the continuing HIV epidemic in the USA, the CDC launched the Advancing HIV Prevention (AHP) initiative in 2003, which aimed to reduce barriers to early diagnosis of HIV infections and increase access to quality medical care, treatment, and ongoing prevention services [16]. Key strategies of the AHP initiative included implementing new approaches for diagnosing HIV infections outside medical settings and preventing new infections by working with persons diagnosed with HIV and their partners. As part of this initiative, CDC funded a project to demonstrate the feasibility of incorporating rapid HIV tests into PCRS using a variety of approach. Participating sites used a variety of PCRS approaches, including the traditional PCRS approach and a CBO-based approach during the project. Details about this project have been reported previously [9].

The objectives of this article are to determine factors associated with refusal to provide information about partners, identify factors associated with provision of named vs unnamed partner information, and evaluate the effectiveness of referral approaches in successfully locating and offering PCRS to partners.

METHODS

Participating Sites

Six state or local health departments (Chicago, Colorado, Los Angeles County, Louisiana, San Francisco, and Wisconsin) were funded by CDC to participate in a demonstration project to assess the feasibility of incorporating rapid HIV testing into PCRS. The participating sites used several approaches to provide PCRS and rapid HIV testing during 2004-2006. Colorado, Louisiana, and Wisconsin used the traditional PCRS approach, in which health department DIS provided PCRS services. At these sites, persons who were identified with HIV infection in health department programs were interviewed by DIS to obtain information about their partners. DIS were then assigned to locate partners and offer PCRS. Chicago offered an expanded approach of PCRS, which involved using staff from CBOs as well as health department DIS to provide PCRS; persons who were tested with HIV infection in 15 CBOs and 6 STD clinics were interviewed to obtain information about partners, thereby expanding the reach of the health department to identify index patients for PCRS. Partner elicitation information was provided to the health department and DIS were then assigned to locate partners to offer PCRS. Los Angeles used a CBO-based PCRS approach, in which PCRS was provided by HIV counselors from 3 local CBOs where HIV testing was offered. Persons newly diagnosed with HIV infection and those with longstanding HIV-infection who sought care in the health care centers affiliated with the CBOs were offered PCRS. Participating index clients were encouraged to bring their partners to the CBOs to be notified of their potential exposure to HIV. Partners were then offered rapid HIV counseling and testing. San Francisco developed and implemented the Partner Disclosure Assistance Program (PDAP), in which promotional materials such as flyers and brochures were distributed to health-care providers, CBOs, and the general public to encourage HIV-infected individuals to participate in PCRS by contacting the health department to receive assistance in learning how to disclose their HIV status to their partners. This was a passive recruitment method that focused on the self referral method rather than other partner notification methods.

Data Collection

DIS or CBO counselors conducted interviews with index clients. Standardized paper forms were used by each site for data collection and were completed during the interview or afterwards using notes taken during interviews. Data from existing surveillance or laboratory reports were also used to obtain information about index clients who could not be located.

Index clients and partners were considered eligible to participate in the rapid testing project if they were: a) alive at the time of the interview; b) residing within respective jurisdictions; and c) ≥ 13 years. All index clients and partners were eligible to receive PCRS, even if they did not meet the eligibility requirements for the rapid testing project. Information collected from index clients during interviews included demographic characteristics, risk behaviors during the past 12 months, and willingness to participate in PCRS. Index clients were also asked when they were diagnosed

with HIV infection, whether they agreed to speak with DIS or CBO counselors, and whether they were willing to provide information about their partners in the past 12 months, or since their last HIV-negative test result, if available. Index clients were then asked to provide the number, gender, names, and locating information of their partners. Some index clients provided all information requested about their partners, whereas others could not or did not provide names and/or locating information of partners. DIS are trained to use any information that they gather (including nicknames, locating information and descriptions of partners) to identify, locate and notify partners. Index partners were offered the choice of self-referral, provider referral, dual referral, or contract referral approaches for partner notification.

Partners who were located were interviewed and offered free HIV testing. Because the demographic characteristics, risk behaviors, and test results of partners have been reported previously [9], this analysis concentrates on information collected from index clients.

Data Management and Analysis

Some variables were reclassified for analysis. Relationship status was dichotomized into “married” and “single”, with the latter category including widowed and divorced. HIV risk behavior factors were classified based upon patient’s self-reported sexual orientation as well as their sexual or drug using activities in the previous 12 months. They included the following mutually exclusive categories: male-male sex, injection drug use, or both male-male sex and injection drug use. Heterosexual patients that used injection drugs were classified as injection drug users and patients who did not identify any of the aforementioned risk behaviors (and reported heterosexual behavior) were classified as heterosexual.

To assess the effectiveness of each referral method for locating and offering PCRS to partners, index clients who provided names and contact information for their partners were first categorized into 6 groups based on the referral methods they chose: self-referral, provider referral, dual referral, contract referral, combined referral approach (in which index clients chose more than one of the above four referral methods), or missing (in which index clients reported the number of partners for which they had names and contact information, but information about the type of referral method was not collected). The aggregate number of partners for whom index clients provided partner information was calculated for each group of index clients. Likewise, the aggregate number of referred partners who were located and offered PCRS was calculated for each group. The proportion of referred partners who were located was then calculated by dividing the total number of referred partners by the total number of located partners for each group of index clients.

We used the SAS software package 9.2 (SAS Institute, Cary, NC) for data quality assurance and analysis. We performed logistic regression [17], controlling for PCRS approach (i.e. traditional, expanded, and CBO-based PCRS approaches), to produce adjusted odds with 95% confidence

intervals for factors that were associated with provision of partner information.

Human Subjects Considerations

The CDC determined that this project was a programmatic evaluation of incorporation of rapid HIV testing into PCRS and not a research activity, and so this project did not require review by the CDC’s Institutional Review Board. However, participants provided informed consent prior to HIV testing.

Data Collected by the San Francisco Project Site

Only 11 index patients and 27 partners participated in the project in San Francisco. Because of the low participation and the absence of variability in the outcome of interest, including San Francisco data resulted in instability in the multivariate analysis. Therefore, the data from this site were removed from the analysis and are not included in the tables.

RESULTS

Refusal to Provide Information About Partners by Index Clients

During the project, 2667 index clients were identified by health departments or CBO counselors in the 5 sites included in this analysis. Of these, 2648 (99%) were eligible to participate in the project. A total of 2330 (88%) had spoken to a DIS or CBO counselor, of whom 1562 (67%) refused to provide partner information.

The percentages of index clients who refused to provide information about partners varied by the PCRS approach used; the percentage was relatively low at sites that used the traditional approach for providing PCRS (Wisconsin, Colorado, and Louisiana), ranging from 7% to 42%. Forty-nine percent of index clients recruited in Chicago, a site that used a combination of traditional and CBO-based PCRS approaches, refused to provide partner information. The percentage of index clients refusing to provide information about partners was highest (88%) in Los Angeles, where a CBO-based approach to conducting PCRS was used. Overall, 85% of the index clients who refused to provide information about their partners were recruited in Los Angeles.

The majority of index clients were male, Hispanic, older than 25 years, single, and reported male-male sex. The majority of index clients who refused to provide information about their partners were Hispanic, older than 25 years, male, single, or without health insurance (Table 1). Fifty-four percent of those refusing to provide partner information reported having had multiple sex partners, 74% reported having male-male sex in the past 12 months, and 87% were interviewed ≥ 3 months of HIV diagnosis. In comparison, only 49% of index clients who provided partner information reported having male-male sex in the past 12 months, and 42% of these persons were interviewed ≥ 3 months of HIV diagnosis. Index clients who reported having male-male sex and/or using injection drugs were more likely to report having anonymous partners than those who did not report these risk behaviors (30% vs 11%, $p < 0.01$, data not shown).

Table 1. Demographic Characteristics and HIV Risk Behaviors of Index Clients (HIV-Infected Persons) by Provision of Partner Information—Partner Counseling and Referral Services Demonstration Project, 5 sites, 2004-2006

	Index Clients who Did Not Provide Partner Information (N=1562)	Index Client who Provided Named Partner Information (N=768)	
Characteristics	n ^a (%)	n ^a (%)	AOR (95% CI) ^b
Age			
≤25 years	92 (5.9)	163 (21.3)	1.0
>25 years	1468 (94.1)	603 (78.7)	2.2 (1.6–3.1)
Race			
White, not Hispanic	406 (26.2)	227 (30.1)	1.0
Black, not Hispanic	264 (17.0)	293 (38.9)	0.6 (0.5-0.8)
Hispanic/Latino	806 (52.0)	201 (26.7)	0.8 (0.6-1.2)
Other races ^c	75 (4.8)	33 (4.4)	0.7 (0.4-1.2)
Gender			
Male	1334 (88.2)	584 (76.7)	1.0
Female	178 (11.8)	177 (23.3)	0.6 (0.5-0.8)
Education			
High school or less	853 (57.1)	373 (59.6)	1.0
More than high school	640 (42.9)	253 (40.4)	1.3 (1.0-1.7)
Relationship Status^d			
Married	438 (28.5)	341 (46.4)	1.0
Single	1101 (71.5)	394 (53.6)	3.4 (2.7-4.4)
Living Condition			
Homeless	60 (4.0)	27 (3.8)	1.0
Non-homeless	1447 (96.0)	687 (96.2)	0.9 (0.5-1.5)
Health Insurance Status			
No	898 (58.6)	357 (49.6)	1.0
Yes	634 (41.4)	363 (50.4)	1.1 (0.9-1.4)
Number of Sex Partners			
0-1	583 (46.2)	350 (50.4)	1.0
≥2	678 (53.8)	345 (49.6)	1.6 (1.2-2.0)
HIV Risk Factor			
Heterosexual	273 (22.0)	332 (46.6)	1.0
Male-male sex	926 (74.4)	346 (48.6)	2.7 (2.1-3.5)
Injection drug use	14 (1.1)	23 (3.2)	1.3 (0.5-3.0)
Male-male sex and injection drug use	31 (2.5)	11 (1.5)	3.1 (1.3-7.6)
Time from Diagnosis to Interview			
Within 3 months	194 (12.9)	427 (58.4)	1.0
≥3 months	1311 (87.1)	304 (41.6)	2.5 (1.8-3.3)

AOR: adjusted odd ratio, CI: confidence interval, HET: heterosexual risk behavior, MSM: Men sex with Men.

^aNumber may not add up to total due to missing values.^bControlled for PCRS approach.^cOther races include Native American, Asian, Pacific Islanders, and multiple races.^dMarried includes partnered; single includes widowed and divorced.

Controlling for PCRS approach, index clients were more likely to refuse to provide information about partners if they were older than 25 years, single, or reported male-male sex, or both male-male sex and injection drug use in the past 12 months (compared to heterosexual risk). Female and non-Hispanic black (compared to white) index clients were less likely to refuse to provide partner information (Table 1). In addition, index clients interviewed ≥ 3 months following HIV diagnosis were more likely to refuse to provide information about partners compared to those who were interviewed <3 months following diagnosis. Homelessness, educational attainment, and health insurance status were not significantly associated with refusal to provide partner information when controlling for PCRS approach.

Provision of Partner Information by Index Clients

A total of 768 index clients provided information about their current or past partners during the project (Table 2). Two-thirds of the 768 index clients who provided partner information provided the names or contact information of all partners they reported having in the past year or since their last negative HIV test result. Only 8% of index clients did not disclose the names or contact information of any of their partners. Among 680 index clients who provided contact information for their partners, 37% chose the provider referral approach, 30% chose the self-referral approach, 20% chose the dual referral approach, and 3% chose the contract referral approach to notify their partners that they might have been exposed to HIV infection. The most commonly used referral options by PCRS approach were self-referral in expanded PCRS (35.9%), provider referral in traditional PCRS (47.2%), and dual referral in CBO-based PCRS (87.0%).

Controlling for PCRS approach, index clients were more likely to provide information about their named partners if they were female, or married (Table 3). However, index clients were less likely to provide named partner information if they reported >1 sex partner or reported male-male sex, injection drug use, or both in the past 12 months (compared with heterosexual risk).

Proportion of Referred Partners who were Located and Offered PCRS

The 768 index clients who provided information about their partners during the project reported a total of 2969 partners, or an average of 4 partners each. Overall, 1145 (39%) of the partners reported were named by 680 index clients, an average of 1.7 named partners per index client. Almost three-fourths of these 1145 named partners were located, contacted, and offered PCRS during the project.

Among index patients who provided partner names and locating information, the number of index clients choosing the different referral options ranged widely, from 21 selecting the contract referral method to 253 opting for the provider referral method (Table 4). Almost all of the partners referred by the dual referral method were located and offered services, approximately three-quarters of the partners referred by the provider and self-referral methods were located and offered PCRS, and $<40\%$ of partners referred using the contract referral method were located and offered PCRS.

Table 2. Provision of Partner Information by 768 Index Clients (HIV-Infected Persons) - Partner Counseling and Referral Services Demonstration Project, 5 Sites, 2004-2006

	n (%)
Number of Partners for whom Information Was Provided	
0	27 (3.5)
1	359 (46.7)
2-5	295 (38.4)
6-10	41 (5.3)
> 10	46 (6.0)
Type of Partner Information Provided	
Named only	517 (67.3)
Both named and unnamed	163 (21.2)
Unnamed only	59 (7.7)
Other ^a	29 (3.8)
Referral Type ^b	
Provider referral ^c only	253 (37.2)
Self-referral ^d only	205 (30.1)
Dual referral ^e only	138 (20.3)
Contract referral ^f only	21 (3.1)
Combined approaches ^g	50 (7.4)
Missing information	13 (1.9)

^aOther includes no partner or missing information.

^bOnly for those index clients who provided named partners (n=680).

^cA referral method where a Disease Intervention Specialist (DIS) or health service provider informs partners on the behalf of index clients.

^dA referral method where the index clients notify their partners by themselves.

^eA referral method where index clients notify their partners in the presence of a DIS or health care provider.

^fA referral method where index clients agree to notify their partners within a certain timeframe, and if the notification is not completed within that timeframe, providers or DIS will notify partners.

^gA combination of referral approaches used together to conduct the notification.

DISCUSSION

Results from this article demonstrate that persons who were older than 25 years, male, or reported male-male sex and/or injection drug use in the previous year or since their last negative HIV test were more likely to refuse to provide partner information. Among those who provided partner information, those who reported being single or having male-male sex, injection drug use, or both in the past year were less likely to provide the names or contact information for their partners. Almost three-quarters of named partners who were referred by index clients were located and offered PCRS. The dual referral approach for notifying partners yielded the highest proportion and the contract referral approach yielded the lowest proportion of referred partners who were subsequently located and offered PCRS.

The percentages of index clients who refused to provide information about their partners varied by the PCRS approach used. The lowest refusal rates were observed at

Table 3. Demographic Characteristics and HIV Risk Behaviors of 576 Index Clients (HIV-Infected Persons), by whether they Provided Names of their Partners or Unnamed Contact Information for their Partners – Partner Counseling and Referral Services Demonstration Project, 5 Sites, 2004-2006

	Index Client who Provided Named Partner (N=517)	Index Client who Provided Unnamed Partner (N=59)	
Characteristics	n ^a (%)	n ^a (%)	AOR (95% CI) ^b
Age			
≤ 25 years	108 (21.0)	7 (11.9)	1.0
> 25 years	407 (79.0)	52 (88.1)	0.4 (0.2-0.9)
Race			
White, not Hispanic	124 (24.3)	29 (51.8)	1.0
Black, not Hispanic	211 (41.5)	16 (28.6)	4.0 (2.0 – 7.8)
Hispanic/Latino	149 (29.3)	9 (16.1)	2.3 (1.0 -5.2)
Other races ^c	25 (4.9)	2 (3.6)	1.9 (0.4-8.9)
Gender			
Male	367 (71.7)	54 (93.1)	1.0
Female	145 (28.3)	4 (6.9)	6.2 (2.2 – 17.4)
Relationship Status^d			
Single	227 (45.9)	47 (82.5)	1.0
Married	268 (54.1)	10 (17.5)	4.0 (1.9 – 8.2)
Number of Sex Partners			
0-1	297 (62.7)	17 (32.7)	1.0
≥ 2	177 (37.3)	35 (67.3)	0.3 (0.2 - 0.6)
HIV Risk Factor^e			
Heterosexual	266 (55.2)	11 (20.4)	1.0
Male-male sex and /or injection drug use	216 (44.8)	43 (79.6)	0.2 (0.1 -0.4)
Time from Diagnosis to Interview			
Within 3 months	261 (52.8)	37 (66.1)	1.0
≥ 3 months	233 (47.2)	19 (33.9)	0.9 (0.5 -1.7)

AOR: adjusted odd ratio, CI: confidence interval, HET: heterosexual risk behavior, MSM: Men sex with Men.

^aNumber may not add up to total due to missing values.

^bControlled for PCRS approach.

^cOther races include Native American, Asian, Pacific Islanders, and multiple races.

^dMarried includes partnered; single includes widowed and divorced.

^eMale-male sex and injection drug use alone each had insufficient numbers to include within the table. These are included in the “male-male sex and/or injection drug use” category.

sites that used the traditional referral approach, whereas the highest refusal rate occurred at the site using the CBO referral approach. This may be explained in part by the possibility that the health departments have the most experience using the traditional approach for PCRS, whereas CBOs may not have comparable experience with and also may not prioritize PCRS. Although the Los Angeles site had the highest percentage of index clients who refused to provide partner information, this site recruited more than half of all of the index clients who participated in this project, it recruited the second highest number of index clients who provided partner information among participating sites, and tested more named partners than any other participating site [9]. These findings indicate that a CBO referral approach to PCRS may be able to offer PCRS to large numbers of partners of index clients even if refusal

rates using this approach are high. However, these conclusions should be interpreted with caution because it is not clear whether they are due to the approach, site characteristics, or a combination of the two. It is also possible that these findings were due in part to the ability of the CBO to reach a large number of index clients in an area with a high prevalence of HIV infection.

Index clients who were married were more likely to provide information about and names of partners than single index clients, whereas persons who reported male-male sex and/or injection drug use in the past year were less likely to provide information about and names of partners. In addition to the finding that people who engaged in male-male sex and/or injection drug use may have been more likely to have anonymous partners, our findings might indicate that MSM and IDUs may be more reluctant to share personal

Table 4. Proportion of Partners Located and Offered PCRS by Referral Type – Partner Counseling and Referral Services Demonstration Project, 5 Sites, 2004-2006

Index Clients	Number of Index Clients	Number of Partners Provided by Index Clients	Number of Referred Partners Located and Offered PCRS	Proportion of Partners Located and Offered PCRS (%)
All index clients provided partner information	768	2969	834	28
Index clients who provided named partners ^a	680	1145	828	72
Provider referral ^b	253	455	326	72
Dual referral ^c	138	163	159	98
Contract referral ^d	21	47	18	38
Self-referral ^e	205	309	237	77
Combined ^f	50	148	82	55
Missing ^g	13	23	6	26

^aIndex clients could select more than one of the above four referral methods.

^bA referral method where a Disease Intervention Specialist (DIS) or health service provider informs partners on the behalf of index clients.

^cA referral method where index clients notify their partners in the presence of a DIS or health care provider.

^dA referral method where index clients agree to notify their partners within a certain timeframe, and if the notification is not completed within that timeframe, providers or DIS will notify partners.

^eA referral method where the index clients notify their partners by themselves.

^fA combination of referral approaches used together to conduct the notification.

^gIndex clients reported the total number of named partners but referral method information was missing.

information, possibly due to social stigma, negative feelings toward being HIV-positive [18], or misconception about named-based partner notification, as reported previously [19]. Therefore, additional effort will likely be needed to encourage MSM and IDUs to participate fully in PCRS.

The importance of timely interviewing is highlighted by our finding that persons interviewed within 3 month of diagnosis were two and half times as likely to provide partner information as those interviewed later. This likely reflects the fact that persons who have been living with HIV infection for some time may feel that they know how to disclose their HIV status and have had some experience disclosing their status with others. Additionally, some people may have already received PCRS at the time of their diagnosis, and therefore might have been less receptive to participating in PCRS at this time. However, this may also indicate that index clients interviewed more than 3 months after diagnosis may have trouble recalling identifying and locating information for their partners. Although health departments may face challenges with timely reporting of HIV diagnoses, CDC recommends that all persons with newly diagnosed or reported HIV infection should be offered PCRS at diagnosis or as soon after diagnosis as possible [3]. Thus, interviews should be conducted with index patients as early as possible following diagnosis in order to achieve the full public health benefits of PCRS.

To measure the effectiveness of PCRS, it is important to examine not only how many partners are referred by index clients, but also how many referred partners are actually located and offered PCRS. During this project, the dual referral approach resulted in the highest proportion of named partners being located and offered PCRS. This is not surprising since most of the partners referred by this approach were recruited in Los Angeles, where index clients brought their partners to the CBOs for notification using the dual referral method. At the other participating sites, however, fewer people selected the

dual referral approach. Therefore, it is unclear whether this referral approach would be as effective in other jurisdictions.

Provider referral and self-referral are two widely used approaches for partner notification [20, 21]. During this project, almost equal numbers of index clients selected each method of referral for partner notification and both approaches had similar success in reaching partners. In comparison, the contract referral approach was the least effective method used in this project, resulting in only 38% of partners being located and offered PCRS. However, it is important to note that the relative effectiveness of this method may have been related to the characteristics of the sites rather than the approaches themselves. Our findings do suggest that the effectiveness of PCRS may vary by the type of referral approach that is offered. Thus, the choice of referral method for partner notification needs to be taken into consideration for the implementation of future PCRS programs. Further examination of different approaches of PCRS and operational research evaluating the use of different referral approaches by approach should be conducted to identify the best ways to reach and test partners.

Data cited in the CDC partner services recommendations suggest that provider referral is the most effective method for notifying partners [3]. We found that the dual referral method was the most effective method used in our analysis. Because data comparing the effectiveness of various PCRS approaches are limited, this is the first report of the effectiveness of the dual referral method. The provider and dual referral methods both draw on the skills of the DIS to provide information about the process of PCRS, information about HIV as a disease, assistance obtaining HIV testing, and, if needed, linkage to care. Further studies should examine the dual referral method more closely and determine when this method can be best utilized.

Our findings are subject to several limitations. First, convenience sampling was used to recruit index clients to participate in this project, a relatively small number of sites were included in this project, and the selection of participating

sites was not systematic, therefore our results may not be representative of all HIV-infected persons. Second, these data were largely based on self-report from index clients and may therefore be subject to desirability and recall biases. Third, our assessment on the effectiveness of different referral approaches for reaching partners was based on a demonstration project rather than a study designed to compare those referral approaches, and so caution should be used when interpreting some of our conclusions. A systematic evaluation of PCRS including qualitative examination of acceptance and refusal of services would be needed to obtain generalizable findings about which PCRS approaches are most effective.

In this project, we found that various PCRS approaches by participating sites were effective in identifying and reaching partners for notification. Using PCRS approaches that rely on collaboration between health department and CBO staff, or those that are conducted solely by CBO staff may succeed in identifying partners exposed to HIV infection, obtaining partner locating and identifying information and offering PCRS, and sometimes such approaches may be more effective than traditional PCRS approaches. Our data showed that the dual referral method may be the most successful referral method for non-traditional approaches of PCRS, however this finding should be interpreted with caution, as this project was not designed to make direct comparisons between the approaches. This demonstration project sheds light on ways to enhance the implementation of HIV partner services. However, further studies will be needed to evaluate combinations of PCRS approaches and referral approaches and identify the most effective methods to reach partners and prevent HIV transmission. Health departments should implement PCRS approaches that integrate the strengths of traditional approaches with the reach of non-traditional approaches, such as the placement of DIS at CBOs in order to maximize the success of this public health intervention.

DISCLAIMER

The findings and conclusions in this article are those of the authors and do not necessarily represent the views of the CDC or the U.S. Department of Health and Human Services. The use of trade names and commercial sources is for identification only and does not imply endorsement by the U.S. Department of Health and Human Services.

REFERENCES

- [1] Macke BA, Maher JE. Partner notification in the United States: an evidence-based review. *Am J Prev Med* 1999; 17: 230-42.
- [2] Dooley SW Jr, Douglas JM Jr, Janssen RS. Partner counseling and referral services for HIV infection: new endorsement of an old approach. *Am J Prev Med* 2007; 33: S81-3.
- [3] CDC. Recommendations for partner services programs for HIV infection, syphilis, gonorrhea, and chlamydial infection. *MMWR Morb Mortal Wkly Rep* 2008; 57(No. RR-9).
- [4] CDC. HIV partner counseling and referral services guidance. Atlanta, GA: US Department of Health and Human Services 1998.
- [5] Ahrens K, Kent CK, Kohn RP, *et al.* HIV partner notification outcomes for HIV-infected patients by duration of infection, San Francisco, 2004 to 2006. *J Acquir Immune Defic Syndr* 2007; 46: 479-84.
- [6] Varghese B, Peterman TA, Holtgrave DR. Cost-effectiveness of counseling and testing and partner notification: a decision analysis. *AIDS* 1999; 13: 1745-51.
- [7] Hogben M, McNally T, McPheeters M, Hutchinson AB. The effectiveness of HIV partner counseling and referral services in increasing identification of HIV-positive individuals a systematic review. *Am J Prev Med* 2007; 33: S89-100.
- [8] Schwarcz S, McFarland W, Delgado V, *et al.* Partner notification for persons recently infected with HIV: experience in San Francisco. *J Acquir Immune Defic Syndr* 2001; 28: 403-4.
- [9] Begley EB, Oster AM, Song B, *et al.* Incorporating rapid HIV testing into partner counseling and referral services. *Public Health Rep* 2008; 123 (Supp 3): 126-35.
- [10] Mimiaga MJ, Fair AD, Tetu AM, *et al.* Acceptability of an internet-based partner notification system for sexually transmitted infection exposure among men who have sex with men. *Am J Public Health* 2008; 98: 1009-11.
- [11] Hogben M, Kachur R. Internet partner notification: another arrow in the quiver. *Sex Transm Dis* 2008; 35: 117-8.
- [12] Vest JR, Valadez AM, Hanner A, Lee JH, Harris PB. Using e-mail to notify pseudonymous e-mail sexual partners. *Sex Transm Dis* 2007; 34: 840-5.
- [13] Rogers SJ, Tross S, Doino-Ingorsol J, Weisfuse I. Partner notification with HIV-infected drug users: results of formative research. *AIDS Care* 1998; 10: 415-29.
- [14] Mathews C, Coetzee N, Zwarenstein M, *et al.* A systematic review of strategies for partner notification for sexually transmitted diseases, including HIV/AIDS. *Int J STD AIDS* 2002; 13: 285-300.
- [15] Passin WF, Kim AS, Hutchinson AB, Crepaz N, Herbst JH, Lyles CM. A systematic review of HIV partner counseling and referral services: client and provider attitudes, preferences, practices, and experiences. *Sex Transm Dis* 2006; 33: 320-8.
- [16] CDC. Advancing HIV prevention: new strategies for a changing epidemic—United States, 2003. *MMWR Morb Mortal Wkly Rep* 2003; 52: 329-32.
- [17] Bagley SC, White H, Golomb BA. Logistic regression in the medical literature: standards for use and reporting, with particular attention to one medical domain. *J Clin Epidemiol* 2001; 54: 979-85.
- [18] Tobin KE, Muessig KE, Latkin CA. HIV seropositive drug users' attitudes towards partner notification (PCRS): results from the SHIELD study in Baltimore, Maryland. *Patient Educ Couns* 2007; 67: 137-42.
- [19] Klitzman R, Kirshenbaum S, Kittel L, *et al.* Naming names: perceptions of name-based HIV reporting, partner notification, and criminalization of non-disclosure among persons living with HIV. *Sex Res Soc Policy* 2004; 1: 38-57.
- [20] Golden MR, Hopkins SG, Morris M, Holmes KK, Handsfield HH. Support among persons infected with HIV for routine health department contact for HIV partner notification. *J Acquir Immune Defic Syndr* 2003; 32: 196-202.
- [21] Rothenberg R. The transformation of partner notification. *Clin Infect Dis* 2002; 35: S138-45.

Received: August 18, 2011

Revised: September 26, 2011

Accepted: October 14, 2011

© Song *et al.*; Licensee Bentham Open.

This is an open access article licensed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0/>) which permits unrestricted, non-commercial use, distribution and reproduction in any medium, provided the work is properly cited.