
The Effectiveness of HIV Partner Counseling and Referral Services in Increasing Identification of HIV-Positive Individuals

A Systematic Review

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Abstract: Partner counseling and referral services (PCRS) are part of the spectrum of care for HIV-positive people and their sexual or needle-sharing partners. Referral includes notifying partners of exposure, after which they are (ideally) tested and receive prevention or risk reduction counseling or enter into care (if they test positive). Using *The Guide to Community Preventive Services's* methods for systematic reviews, the effectiveness of PCRS was evaluated, including partner notification, in identifying a population at high risk of HIV infection and in increasing testing in those populations. In this review, PCRS efforts using provider referral were found to be effective in reaching a population with a high prevalence of HIV.

Nine studies qualified for the review. In these studies, a range of one to eight partners was identified per index case (a person newly diagnosed with HIV who has partners who should be notified); a mean of 67% of identified partners were found and notified of their potential exposure to HIV, and a mean of 63% of those notified were tested (previously known "positives" were not tested). Of those tested, a mean of 20% were HIV positive. Therefore, even given that not all partners could be found and notified and that some who could be found did not accept testing, 1% to 8% of people named as potentially exposed and not previously known to be HIV positive were identified as HIV positive through partner notification (although these people were not necessarily infected by the index case).

Evidence was insufficient to determine whether PCRS, including partner notification, was also effective in changing behavior or reducing transmission because available studies did not generally report on these outcomes. Little empirical evidence was available to assess potential harm of the interventions, but current studies have not shown substantial harms. Based on *Community Guide* rules of evidence, sufficient evidence shows that PCRS with partner notification by a public health professional ("provider referral") effectively increases identification of a high-prevalence target population for HIV testing.

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Introduction

Partner counseling and referral services (PCRS) comprise a range of services intended to support HIV-positive individuals and their partners in making healthy choices and receiving appropriate health care as well as to promote healthier communities by reducing

the spread of HIV. Partner notification (also known as *contact tracing*) is the central activity in PCRS and the precise focus of this effectiveness review. Partner notification is a process whereby the sexual or needle-sharing partners of an index case (a person diagnosed with HIV who has partners who should be notified) are informed of their exposure to infection and thus the need to visit a health service for counseling, medical treatment, or both. Partners may be notified by index cases, a method known as *patient referral*, *client referral*, or *self-referral*.^{1,2} Notification may also come from a public health professional, a practice known as *provider referral*.² Combinations of the basic forms of patient and provider referral are discussed in the information to follow: both have been a part of control efforts in the United States for sexually transmitted diseases (STDs) since early in the 20th century.³

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Table 1. Components and goals of partner counseling and referral services

PCRS component	Method(s) and/or purpose
Partner notification (also called contact tracing)	● Provider referral: Provider or other public health professional notifies partners^a ● Patient referral: Index case^b notifies partner(s) ● Dual referral: Index case and provider jointly notify partners ● Contract referral: Index case agrees to notify partners within a certain time period; if all partners are not contacted and notified, the provider can complete the process
Testing of partner HIV status	● To determine if sex- or needle-sharing partner of HIV-positive individual is also infected
Counseling	● To prevent the further spread of HIV
Treatment	● For those partners newly diagnosed as HIV positive

Note: This review evaluated the effectiveness of PCRS in increasing the number of partners of HIV-positive individuals who are contacted and tested for HIV.

^aIn both provider and contract referral, the HIV-positive patient voluntarily discloses information about partners.

^bThe index case is a person who (1) is diagnosed with HIV, (2) is a candidate for partner notification (in sexually transmitted diseases, this means a candidate for a partner elicitation interview). PCRS, partner counseling and referral service.

This systematic review centered on the concept of using partner notification primarily to reach individuals at increased risk of HIV. Previous recommendations on screening for HIV have included a strong recommendation for screening both in populations with $\geq 1\%$ HIV prevalence and for anyone who has been exposed to the virus, regardless of prevalence.⁴ Systematic reviews of referral strategies in partner notification have concluded that provider referral, rather than patient referral, is the most effective overall means of ensuring notification and treatment for HIV/STD of sexual partners of infected individuals.⁵⁻⁷ However, the principal comparison on which these conclusions about HIV partner notification effectiveness are based is a single randomized controlled trial, albeit one showing a large improvement in notification and treatment with provider referral compared to patient referral.⁸ This review includes the Landis et al. study,⁸ along with a broader range of program evaluations of HIV partner notification outcomes by state and local health authorities (virtually all provider referral partner notification programs in the U.S. are conducted by state and local health authorities). Where possible, provider and patient referral are compared, although most evaluations are of provider referral. In this article, *partner notification* refers to provider referral by public health professionals, unless otherwise noted (see Table 1 for definition of terms).

Conceptual and Analytic Models

The conceptual model for PCRS, including partner notification, is presented in Figure 1, and the corresponding analytic framework, showing the outcomes specifically sought in partner notification and therefore in this review, is presented in Figure 2, which is an operational model of the relevant notification concepts shown in Figure 1. The process of PCRS for HIV is approximately as follows: People who seek HIV prevention counseling and testing, and test positive for HIV, are encouraged by their providers to participate in PCRS and can choose among four partner notification options (Table 1): (1) provider referral, in which the provider or some other public health professional takes full responsibility for contacting and notifying the partners; (2) patient referral, in which the HIV-positive patient does the notification; (3) dual referral, in which the patient and provider jointly contact and notify partners, or (4) contract referral, in which the HIV-positive patient agrees to notify his or her partners and agrees that, if notification is not completed within a certain time period, the provider can step in and complete the process. For both provider and contract referral, the HIV-infected patient must voluntarily disclose information about his or her partners.

As shown in Figures 1 and 2, the partner notification process, including the choice of notification strategy, may affect notification behaviors (Path A, Figure 2) and subsequent risk-related behaviors (Path B). Potential unintended negative consequences or harms (Path C) may also be systematically related to referral strategies and are therefore also covered in this review.

Purposes of Partner Notification in HIV Treatment and Counseling

Two key reasons for notifying partners of HIV-positive individuals are to (1) provide appropriate services, including counseling, testing, and treatment, to those infected with the virus and (2) provide testing and prevention counseling to HIV-negative individuals who have been exposed to HIV, in an effort to reduce risky behavior. These two purposes are analogous to case-finding and prophylactic treatment, the two cornerstones of STD partner notification.^{2,9} The advent of highly active antiretroviral therapy (HAART) in 1996, which reduces potential immunologic damage from HIV, makes entry into care through partner notification more useful than prior to HAART.¹⁰ Another reason for partner notification is that it can provide data to epidemiologists on the patterning of the epidemic and on sexual or needle-sharing networks in their communities of interest, thus suggesting points for community intervention. Finally, HIV partner notification may fulfill a moral duty to warn individuals of

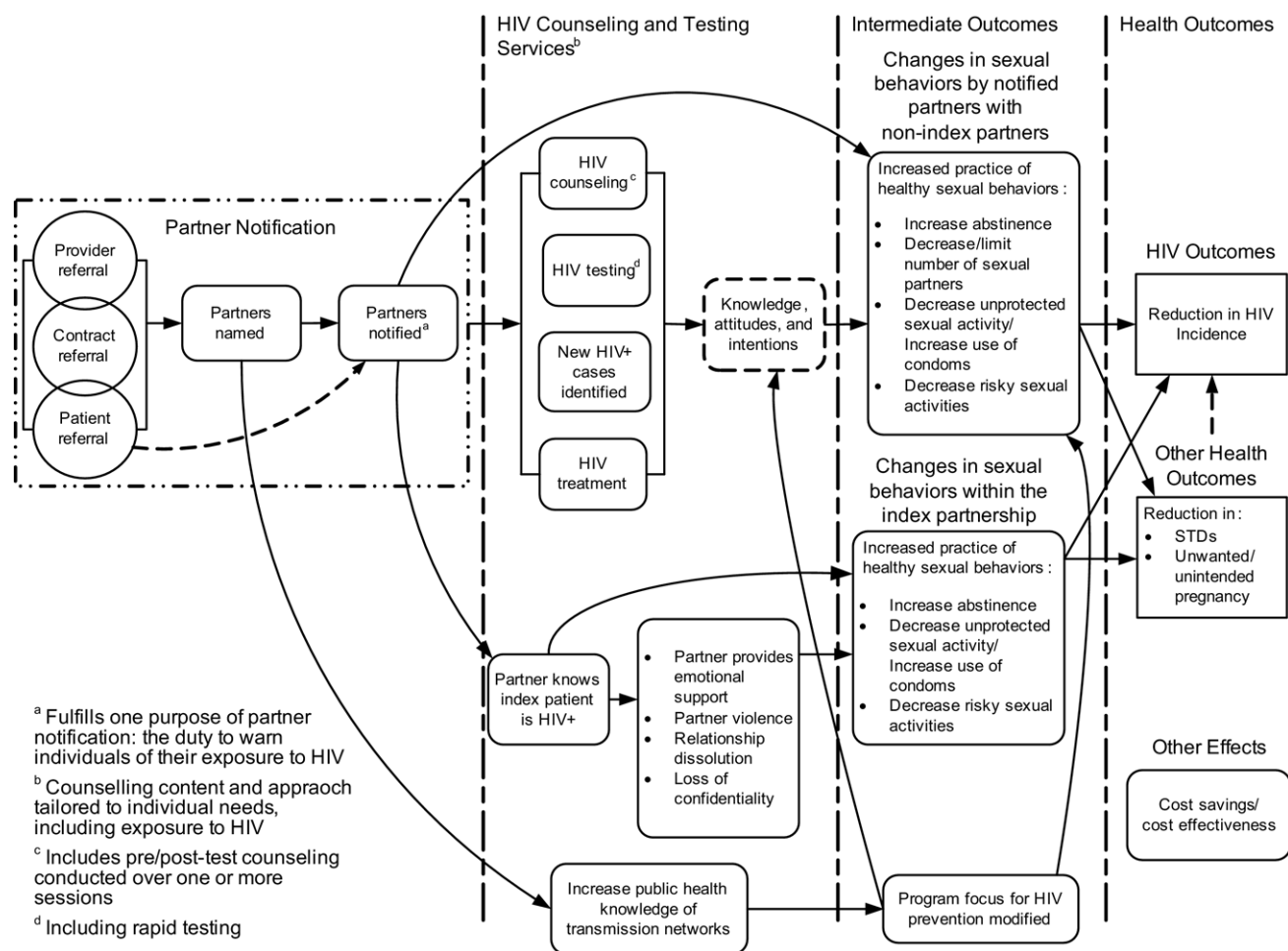


Figure 1. Logic model for partner counseling and referral services, showing the hypothesized direct and indirect relationships of partner notification on subsequent HIV transmission and acquisition, as well as on the health of infected people and the mediators through which these effects occur. (Circles represent interventions, rectangles with rounded corners represent intermediate outcomes, and rectangles with squared corners represent health outcomes.)

exposure, although the existence of this duty outside of public health is under debate.¹¹

HIV Infection Characteristics Relevant to Partner Notification

Partner notification was initially developed to help control epidemics of syphilis and, to some extent, gonorrhea. However, syphilis and gonorrhea have short incubation periods and early symptoms, and effective cures are now commonplace.¹² In contrast, HIV has a long asymptomatic phase, late symptoms, and no known cure. Nevertheless, identification of infection can allow effective treatment with HAART as well as preventive treatment for some opportunistic infections. This treatment, which does not cure HIV infection but does prolong the life of HIV-positive people, might actually increase the importance of partner notification in reducing further transmission of the disease because infected people, living longer, have the potential to transmit the disease for longer periods of time, even

if their per-act transmission risk is decreased with HAART.

Multiple research efforts have shown the effectiveness of HAART and other treatments in reducing morbidity and mortality from HIV.¹³ The potential benefit of dramatic reductions in morbidity and mortality through current and evolving HIV treatments is considered a strong basis for encouraging individuals exposed to the virus to be tested and those found to be HIV positive to be treated. Partner notification is one means of increasing this testing, by increasing notification of people exposed to the virus. Several analyses have found HAART to be cost effective, further supporting the case for identifying and encouraging infected individuals to enter the healthcare system.^{14–16}

The Guide to Community Preventive Services

The systematic reviews in this report present the findings of the independent, nonfederal Task Force on

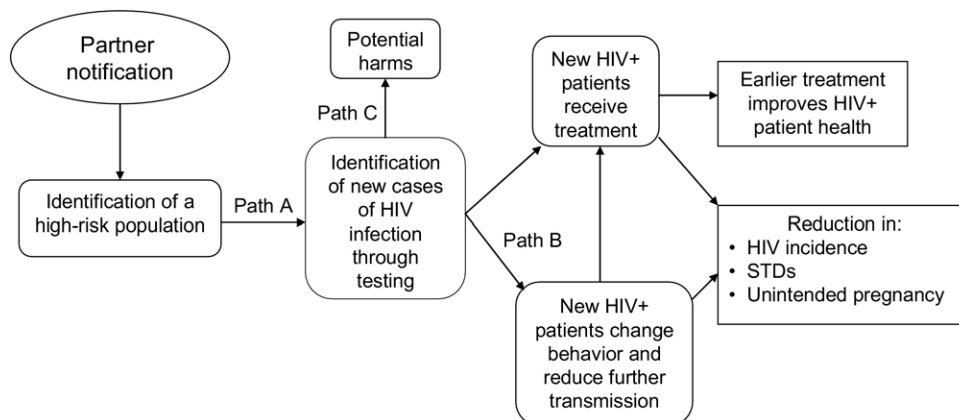


Figure 2. Analytic framework for partner notification within partner counseling and referral services. When used in a population at high risk for HIV transmission (defined by a high prevalence of the disease), partner notification can help to identify people who have not yet been screened (Path A). In addition to increasing the number of people who are tested for HIV, those who receive a diagnosis of HIV can enter into treatment, as well as being counseled on behavior changes that will reduce the spread of the disease (Path B). Because partner notification likely brings people into treatment earlier than waiting for symptoms to appear, the treatment can be more effective at improving their health. Overall, partner notification should ultimately lead to a reduction in the incidence of HIV, STDs, and unintended pregnancies. Although potential harms of partner notification have been postulated (e.g., partnership dissolution, violence; Path C), current studies have not shown substantial harms.

Community Preventive Services (the Task Force). The Task Force is developing the *Guide to Community Preventive Services* (the *Community Guide*) with the support of the U.S. Department of Health and Human Services in collaboration with public and private partners. The Centers for Disease Control and Prevention (CDC) provides staff support to the Task Force for development of the *Community Guide*. The book, *The Guide to Community Preventive Services. What Works to Promote Health?*¹⁷ (also available at www.thecommunityguide.org) presents the background and the methods used in developing the *Community Guide*.

This review—of the effectiveness of partner notification in increasing the number of high-risk people tested for HIV infection—is one in a series of planned reports on reducing risky sexual behavior as well as HIV and STD infection. Other topics that have been addressed in the *Community Guide* include tobacco use, physical activity, diabetes, cancer, oral health, vaccine-preventable diseases, preventing violence, reducing injuries to motor vehicle occupants, and the effects of the social environment on health.

Healthy People 2010

Partner counseling and referral services, including partner notification, may be useful in reaching objectives specified in *Healthy People 2010*,¹⁸ the disease prevention and health promotion agenda for the U.S. To achieve the goal of preventing HIV and its related illness and death, specific objectives include: (1) reduce AIDS to 1 case in 100,000 people aged 13 and older (Objective 13-1); (2) reduce the number of cases of HIV infection among adolescents and adults (Objec-

tive 13-5); and (3) reduce deaths from HIV infections to 0.7 per 100,000 population (Objective 13-14).

Recommendations From Other Advisory Groups CDC

The CDC requires all HIV counseling and testing programs it funds to offer PCRS, including partner notification, to their clients. Such programs must provide access to PCRS for people who test anonymously without requiring that the infected client disclose his or her identity.¹ The frequency with which PCRS services are offered may increase as healthcare settings implement the CDC's recent guidance to offer testing at least once to all adults and adolescents in healthcare settings.¹⁹ It is of note, however, that to offer PCRS is not necessarily to engage in provider referral: client preferences and program capacity have often resulted in a choice of patient referral as the primary partner notification strategy.

The U.S. Preventive Services Task Force

In 2004, the U.S. Preventive Services Task Force conducted a systematic review of the effectiveness of screening for HIV.²⁰ They strongly recommended HIV screening for all adolescents and adults at increased risk for HIV disease (rating: "A" recommendation). Individuals at increased risk are people in populations with >1% HIV prevalence and people with individual risk factors for infection including sexual partners who are infected. This recommendation is based on the potential of earlier entry into the clinical system to provide for effective treatment and other forms of care

for HIV-positive individuals, resulting in improved health outcomes.

Methods

The *Community Guide's* methods for conducting systematic reviews and linking evidence to recommendations have been described elsewhere.²¹ In brief, for each *Community Guide* topic, a diverse team representing a range of disciplines, backgrounds, experiences, and work settings conducts a review by:

1. Developing a conceptual framework for organizing, grouping, and selecting the interventions for the health issues under consideration and for choosing the outcomes used to define success for each intervention;
2. Systematically searching for and retrieving evidence;
3. Assessing the quality of and summarizing the strength of the body of evidence of effectiveness;
4. Summarizing information about other evidence; and
5. Identifying and summarizing research gaps.

This report describes the specific methods used in the systematic review to determine the effectiveness of partner notification in identifying a high-risk population of individuals who might then benefit from HIV testing.

The intervention reviewed was selected for evaluation by the systematic review development team (the team, which consisted of a Task Force member, *Community Guide* staff, and experts in HIV/AIDS from the Division of HIV/AIDS Prevention, CDC; Division of STD Prevention, CDC; Primary HIV Prevention and Behavior Program, National Institute of Child Health and Human Development; and the University of Medicine and Dentistry of New Jersey). The team drafted the logic model and analytic framework for the review, coordinated the data-collection and review process, and drafted evidence tables, summaries of the evidence, and the reports.

Research Questions Addressed in the Review

The conceptual and analytic frameworks in Figures 1 and 2 provided the source of the primary research questions:

1. Does partner notification identify people who are HIV positive (see Path A)?
2. Is partner notification associated with changes in behavior that may reduce the incidence of HIV infection (see Path B)?
3. Is partner notification associated with harms to the person who is screened and found to be HIV positive (see Path C)?

In a recent U.S. Preventive Services Task Force review, Chou et al.⁴ found that HIV screening in a high-risk population was associated with positive health outcomes. Therefore, the focus of this review was on assessing the ability of partner notification to locate a high-risk population to be evaluated.

Description of the Outcomes

Of the four cited approaches for notifying partners of HIV-positive individuals, outcome data for three were found: patient referral, provider referral, and contract referral. (The lack of data for dual referral largely reflects the fact that this approach is rare and may often be reported as part of provider-referral notifications.) Although the bulk of current studies in this review evaluate provider referral, in practice, a

combination of approaches may be used, even for individual HIV-positive patients, who may prefer different approaches with different partners. Other approaches, such as outreach-assisted partner notification,²² are being tailored to meet the needs of different communities affected by HIV, but no studies were found that evaluated the effectiveness of these approaches and therefore none were reviewed.

Primary outcome (research question 1). The primary outcome measured in this review was the proportion of individuals who received testing through partner notification and were newly diagnosed as HIV positive (Figure 2, Path A). This outcome was selected because it provided a means of (1) comparing the effectiveness of partner notification and other counseling and testing approaches that target a population considered to be at high risk (i.e., in which $\geq 1\%$ of the people are infected with HIV)^{1,4} and (2) directly assessing the effectiveness of PCRS for identifying new cases (based on the assumption that notified people would not have otherwise been tested). Although many HIV-positive people identified by partner notification would almost certainly enter the care system at some point, partner notification likely brings them to care earlier.

Secondary outcomes (research questions 2–3). Additional outcomes assessed included behavioral changes (Figure 2, Path B) such as sexual abstinence, condom use at last sexual episode, numbers of protected and unprotected sexual acts, and acquisition of new sexual partners, as well as harm including partnership dissolution and emotional and physical abuse. Researchers and health advocates have been concerned that the effect of telling a partner that one is HIV positive may produce unintended harm (Figure 2, Path C), and fear of this harm might decrease partner notification, thereby increasing HIV transmission in the community and population as a whole.^{23,24} Importantly, some of these types of harms are not only unintended but unavoidable on a case-by-case basis. Moreover, some emotional distress and anger may be expected as the legitimate prerogative of a person who believes he or she has been unknowingly exposed to HIV.

Search Strategy

A comprehensive search strategy for studies evaluating HIV PCRS, including partner notification, was developed in conjunction with HIV reference librarians from the CDC Information Center. The literature search was initiated in September 2003 and later updated in September 2004 using five database-specific search strategies for AIDSline, Embase, Medline, PsycINFO, and Sociofile. To reduce publication bias and gaps in the automated search, the *Community Guide* staff conducted additional searches using the Internet, reference lists, and referrals from HIV specialists at the CDC and members of the team that conducted the systematic review. Studies were eligible for inclusion if they:

- were published in English during 1985–2004;
- were conducted in a country with a high-income economy^a;
- assessed partner notification; and

^aCountries with high-income economies as defined by the World Bank are Andorra, Antigua and Barbuda, Aruba, Australia, Austria, The Bahamas, Bahrain, Barbados, Belgium, Bermuda, Brunei, Can-

- provided data to calculate the proportion of individuals tested through partner notification who tested positive for HIV.

Review of Evidence

Search Results

Literature searches yielded 1544 titles and abstracts to be screened for their relevance to this review. After reviewing the abstracts and consulting with specialists in the field, a total of 106 articles were retrieved and considered for the review. Of these articles, 97 were excluded and were not considered further: 72^{1,5–7,11,25–91} did not report on HIV partner notification interventions; 19^{10,12,92–108} did not permit reviewers to distinguish types of referral from one another clearly; and 6^{22–24,109–111} did not report on the outcome of interest.

Each of the nine remaining studies^{8,9,112–118} was evaluated using a standardized abstraction form (available at www.thecommunityguide.org/methods/abstractionform.pdf) and was assessed for suitability of the study design and threats to validity. On the basis of the number of threats to validity, studies were characterized as having good, fair, or limited quality of execution. All nine of the candidate studies were considered to have either good or fair execution, and therefore all qualified for review and were included in the summary of the effect of the intervention. Study details are presented in Table 2.

Effectiveness

Does partner notification identify people who are HIV positive? (research question 1). The nine qualifying studies^{8,9,112–118} provided adequate data to evaluate the effectiveness of provider referral in increasing the number of high-risk individuals who are tested for HIV (Table 3, see Table 2 for study details). (These studies also included the limited amount of data available to evaluate patient and contract referral.) Results were consistent across studies, with a mean of 20% (range, 14%–26%) of tested individuals being newly diagnosed as HIV positive. A mean of 67% of named partners were notified (8 estimates; range, 44%–89%) and 63% of those notified were tested (6 estimates; range, 43%–97%). The proportion of notified people who were found to be HIV positive (20% of *contacted* partners)

validates partner notification as an effective strategy and forms the basis for the Task Force recommendation for use of this intervention.¹¹⁹ Even when the number of individuals who test positive is viewed as a proportion of all partners *identified* by the index case (1%–8%), this still shows the benefit of notification. The lack of a relationship between study year and proportion of cases found (Table 3, last column) suggests that neither the introduction of HAART nor the stage of the HIV epidemic is related to partner notification effectiveness, although most data predate the introduction of HAART.

Studies revealed little difference among the three partner-notification methods evaluated (provider, patient, and contract referral) in terms of the mean number of infected individuals identified (although very few studies tested patient or contract referral). Two studies^{8,116} reported substantial variations in notification rates for contract referral (34% and 85%, respectively). The same two studies^{8,116} provided the statistics on patient referral: 7% and 57% notified. The first study⁸ also reported that 50% of partners were tested, and 20% of those tested were identified as HIV positive. Although these results are similar to those for provider referral, the paucity of data precludes confidence in the similarity.

Is partner notification associated with changes in behavior that may reduce the incidence of HIV infection? (research question 2). Two studies^{23,24} measured behavioral changes after partner notification. Hoxworth²³ compared HIV-positive and HIV-negative individuals after voluntary counseling and testing services and analyzed differences in outcomes by partnership types. They found that, at follow-up, protection was more likely to be used during sex between someone found to be HIV positive and those partners who had been notified of their exposure via partner notification than if the HIV-positive individual had sex with partners who had not been so notified ($p=0.002$). In comparing HIV and syphilis partner notification, Kissinger²⁴ found that condom use at last act was more likely among the HIV group than among the syphilis group (odds ratio=3.04; 95% confidence interval =1.22–7.43). Although both findings suggest changes in the direction of safer sexual behavior with HIV partner notification, the small number of studies and diversity of comparisons and outcomes precludes firm conclusions.

Is partner notification associated with harms to the person who is screened and found to be HIV positive? (research question 3). Two studies^{23,24} assessed potential harm of partner notification, defined as partnership dissolution and violence. Neither found a harmful effect resulting from notification, but Kissinger²⁴ found that partnerships for which services were completed were less likely to dissolve or to have

ada, Cayman Islands, Channel Islands, Cyprus, Denmark, Faeroe Islands, Finland, France, French Polynesia, Germany, Greece, Greenland, Guam, Hong Kong (China), Iceland, Ireland, Isle of Man, Israel, Italy, Japan, Republic of Korea, Kuwait, Liechtenstein, Luxembourg, Macao (China), Malta, Monaco, the Netherlands, Netherlands Antilles, New Caledonia, New Zealand, Norway, Portugal, Puerto Rico, Qatar, San Marino, Singapore, Slovenia, Spain, Sweden, Switzerland, Taiwan (China), United Arab Emirates, United Kingdom, United States, and Virgin Islands (U.S.).

Table 2. Sample, setting, and study conditions from studies included in the analyses

Study	Sample	Setting Location Study period	Study condition notes ^a
MMWR (1988) ¹¹¹	N=230 (59% of 387 patients returning for test results) No demographic information on index cases; infected partners were 72% gay or bisexual; 15% IDU.	STD clinics Virginia 1986–1987	Program evaluation: Numbers of partners elicited from index cases is unknown.
Crystal (1990) ¹¹²	N=99 (8% of 1218 reported cases) No demographic information on cases; partners 60% male; 38% IDU; 58% black; 29% white	Statewide New Jersey 1988–1989	Program evaluation: Completely voluntary PCRS with client satisfaction ratings. Note low uptake.
Rutherford (1991) ¹¹⁴	N=51 (35% of 145 eligible cases reported: 42 had died, 25 out of jurisdiction) 88% male; 61% white; mean age 38 years	Public health department San Francisco, California 1985–1987	Program evaluation: Principally conducted with index cases that had AIDS (HIV was not then reportable) Only sexual partners traced; only opposite-sex partners included in analysis.
Wykoff (1991) ¹¹⁷	N=42 persons identified as HIV+ not through partner notification No index case demographics; partners 83% male and 75% gay or bisexual.	Health district (6 counties, rural) South Carolina 1986–1990	Program evaluation: PCRS for partners dating back up to 3 years, implicit patient permission to contact needed. Some partners tested up to 3 times over 12 months. Interviews include partners of partners (second-generation partners).
Landis (1992) ⁸	N=74 people returning for HIV test results (46% of 162 eligible). 69% male; 87% black; 76% gay or bisexual	Three public health departments (predominantly rural) North Carolina 1988–1990	RCT: Patient referral versus provider referral (study counselor as provider) Participants in provider referral could self-notify partners, if desired
Spencer (1993) ¹¹⁵	N=190 reporting unsafe behaviors (84% of 226 interviewed, 226 were 98% of 231 assigned for interview) 85% male; 70% white; 55% gay; 20% bisexual. 91 asked for provider referral	Public health department and other testing sites (except Colorado Springs) Colorado 1988	Program evaluation: Patients offered the choice of contract or provider referral if they named partners, and patient referral counseling if they did not. Referral offered as a priority to those reporting unsafe sexual behaviors.
Hoffman (1995) ¹¹³	N=401 persons (81% of 493 people not identified through partner notification) No demographic information	Statewide (13 confidential testing sites and one anonymous site) Colorado	Program evaluation: All cases assigned for provider referral. The proportion of HIV+ cases among partners was higher at confidential (16/215) than at anonymous (4/142) sites. Testing efforts made for partners not previously counseled or who reported unsafe behavior.
Toomey (1998) ¹¹⁶	N=1070 patients offered provider referral (76% of 1399 referred for partner notification) 47% 25–34 years; 74% black; 63% male; 24% MSM	STD clinic patients and referrals Ft. Lauderdale and Tampa, Florida; Paterson, New Jersey 1990–1993	Program evaluation: Originally an RCT that failed because of unintended crossover
MMWR (2003) ⁹	N=1379 persons located (87% of 1603 case reports) 71% black; 18% white	Statewide North Carolina 2001	Program evaluation: DIS assigned to conduct PCRS and conduct partner notification.

^aEligibility for partners for referral includes sex and needle sharing unless otherwise noted.

DIS, disease intervention specialist; IDU, injection drug user; STD, sexually transmitted disease; MSM, men who have sex with men; PCRS, partner counseling and referral service; RCT, randomized controlled trial.

dissolved than those for which services were not completed ($p=0.012$). This finding could either mean that partner notification is not associated with dissolution or that more stable relationships are

more likely to result in infected people notifying their partners. The available data do not suggest substantial harms resulting from partner notification services.

Table 3. Provider-based partner notification statistics from studies included in analyses

Study	No. index cases	Elicited partners (no. per index case) ^a	Located/notified (% of elicited partners)	Tested		Per 100 partners elicited	New HIV+ (% of no. tested)
				No. tested	% of no. notified		
MMWR (1988) ¹¹¹ Virginia, 1986–1987	230	–	–	318	–	–	44 (14%)
Crystal (1990) ¹¹² New Jersey, 1988–1989	99	218 (2.20)	163 (75%)	–	–	–	–
Rutherford (1991) ¹¹⁴ California, 1985–1987	51	135 (2.65)	59 (44%)	34	58%	17.8	7 (21%)
Wykoff (1991) ¹¹⁷ South Carolina, 1986–1990	42	485 (11.55)	290 (60%)	280	97%	57.7	49 (18%)
Landis (1992) ⁸ North Carolina, 1988–1990	74	157 (2.12)	78 (50%)	36	46%	22.9	9 (25%)
Spencer (1993) ¹¹⁵ Colorado, 1988	91	180 (1.98)	71 (85%) ^b	–	–	–	–
Hoffman (1995) ¹¹³ Colorado	401	377 (0.94)	195 (55%)	76	42% ^c	21.2	20 (26%)
Toomey (1998) ¹¹⁶ Florida and New Jersey, 1993	1070	8633 (8.07)	1035 (80%) ^d	560	71% ^e	6.5	122 (22%)
MMWR (2003) ⁹ North Carolina, 2001	1379	1532 (1.11)	1359 (89%)	610	64% ^f	39.8	125 (20%)
Aggregate value	3437	11,717 (3.65)	3250 (76%)	1914	63%	14.2	20%

^aIn some studies, elicited partners refer to all partners claimed, in others, only to those for whom DIS attempted follow-up efforts.

^bThe denominator for this proportion (84) reflects those partners for whom a locating effort was made and first time counseling was intended. The author did not provide statistics for all 180 elicited partners.

^cThe denominator for this proportion (179) reflects the number of notified partners who were eligible for counseling.

^dThe denominator for this proportion (1290) reflects those partners for whom any locating effort was made.

^eThe denominator for this proportion (787) reflects eligible partners not previously testing HIV positive.

^fThe denominator for this proportion (955) reflects eligible partners not previously testing HIV positive.

DIS, disease intervention specialist.

Applicability

The studies in this review were conducted among a variety of populations (black and white men and women; gay, bisexual, and straight; intravenous drug users or not), in a variety of settings in the U.S. (statewide in seven states and locally in several cities), over a 20-year period (Table 2). Review findings, therefore, are likely to be applicable across a broad range of settings and populations.

Economic Efficiency

An economic review and cost-effectiveness analysis, using the same data set as this review and comparing the three methods of referral (provider, patient, and mixed [dual]) found that provider referral is the most cost effective from both provider and societal perspectives.¹²⁰

Barriers to Implementation

Compared with syphilis and gonorrhea, partner notification for HIV has never been systematically imple-

mented for a variety of reasons. First, acceptance of HIV partner notification among HIV-affected communities has varied. Although acceptance and support is sometimes visible,^{72,108} actual and perceived stigmatization of HIV-positive people still exists,¹²¹ and some individuals and HIV advocacy groups are suspicious of any governmental presence in HIV control efforts.⁷⁴ Moreover, HIV differs from curable STDs in that people, once infected, are theoretically never free of transmission risk. This condition suggests that partner notification should be an ongoing process in which public health professionals encourage new partners of HIV-positive people to be notified of their exposure and tested. But some jurisdictions have laws designed to punish anyone who knows that he or she is HIV positive and admits to having sex without disclosing his or her HIV status.

Norms for anonymous sexual encounters may differ among groups who vary in STD and HIV risk. For example, men who have sex with men, among whom HIV is more prevalent than in other groups, appear to also have more anonymous partners, making partner

notification much more difficult (e.g., Brewer⁹⁰ and Hogben et al.¹²²). The long asymptomatic phase of the pathogen can make it difficult to gauge how far back in time to identify partners to be notified.¹²

Conclusion

According to *Community Guide* rules,²¹ sufficient evidence shows that provider referral partner notification, as described in Table 1, identifies a high-prevalence target population for HIV testing, whether judged as a proportion of those tested or all partners elicited. Identification and screening of this population would be expected to result in numerous public health benefits, including earlier entry into care of HIV-positive individuals and reduced transmission of the disease. This finding should be applicable to most populations and settings. However, relatively little evidence was available for the effectiveness of patient referral. Existing evidence suggests a similar proportion of new positive cases are found as for provider referral. More evidence is needed, especially with respect to what proportion of partners are notified and tested via patient referral.

Research Issues

A number of PCRS-related issues warrant additional study and evaluation, primarily on patient, contract, and dual referral and comparisons of relative effectiveness among these methods and provider referral. Approaches to partner notification vary; they include non-health department referral assistance, such as outreach-assisted partner notification²²; incorporation of social, as well as sexual, networks into PCRS and partner notification¹²³; and self-testing algorithms.¹²⁴ The last approach unavoidably delays PCRS compared with in-person counseling and testing (followed by PCRS). Research is ongoing into the effectiveness of these approaches and ways to best match approaches to individuals and communities who are most likely to benefit from them. In trying to compare methods, the field would benefit from further comparisons of provider referral with other referral methods. As noted previously, the Landis⁸ randomized controlled trial demonstrated a large effect size for provider referral versus contract and patient referral. Nevertheless, comparisons with greater numbers of participants and more diverse settings would improve the quality of comparative evidence. Finally, this review did not specifically address the acceptability of PCRS, including partner notification, to patients and their partners, which should be evaluated further as this may affect the success of the process.

More studies are needed of the effects of PCRS on certain outcomes, especially behavior change and possible harm. The reductions in risk behavior found in

Hoxworth²³ subsequent to notification echo the conclusions of a recent meta-analysis showing that risk behaviors among those who know they are HIV positive are, overall, less frequent than risk behaviors among those unaware of their status.¹²⁵ Partner violence, although not proven to be a consequence of notification, is still a putative harm, especially in the context of patient referral.¹²⁶ Moreover, the existence of violence in relationships where HIV/STD transmission occurs is widely supported anecdotally by public health staff. Although the nature of the violence and the extent to which observed violence is attributable to notification is unclear, the risk should continue to be recognized by researchers and practitioners.

To the best of our knowledge, the effect on sexual behavior and partner notification participation of laws punishing “knowing transmitters” has not been studied. Research suggests that transmission of HIV may increase temporarily and substantially with STD coinfection,^{127,128} which speaks both to the importance of ongoing HIV partner notification and to the legal implications of admitting to having sex while HIV positive. (Some jurisdictions have laws against HIV-positive individuals engaging in sex without disclosure of their HIV status. Becoming infected with an STD would constitute proof that the HIV-positive person had had sex, at which point disclosure would become an issue.) This critical contextual variable should receive additional study. Finally, although it seems self-evident that information garnered through PCRS, including partner notification, contributes to our epidemiologic understanding of HIV and its spread, it would be worthwhile to evaluate the benefit of PCRS to the research and programmatic efforts of public health agencies in fighting HIV.

Discussion

The CDC and state health departments are making a concerted effort to systematize HIV partner notification within the context of other available HIV services and to use partner notification as a valuable epidemiologic tool to gather data on sexual and drug networks and to track the spread of the disease. The bulk of the evidence is on provider referral, with the proviso that, although evidence for the effectiveness of patient referral and contract referral is sparse, existing evidence is reasonably consistent and favorable. Continued program evaluation may provide the evidence needed to make more definitive statements about patient referral than have been made here. Furthermore, a mixed program in which results for provider and patient referral were not distinguished identified 14% (39/279) of those tested as HIV positive,⁹⁶ clearly meeting the criterion for sufficient prevalence ($\geq 1\%$). Consequently, further research into the effectiveness, relative effectiveness, and covariates of all forms of

referral is encouraged, with particular attention to collateral effects, including unintended harms. The characteristics of HIV and the social context of HIV in the U.S. suggest that partner notification is not the only means to reduce the spread of HIV and ensure the care of those already infected and that partner notification and other methods can complement each other.

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