HIV Partner Notification: Predictors of Discussion and Agreements from Provider Reports

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Abstract This study examines organizational, provider, client, and test-event level predictors of HIV partner notification (PN) *discussion* and *agreements* based on providers' most recent HIV-positive post-test counseling session. Staff ($n = 621$) were sampled from for-profit, nonprofit, and county government HIV testing organizations ($N = 159$) in Los Angeles County from 2003 to 2007. Among providers who conducted an HIV-positive post-test counseling session ($n = 204$), 65% discussed PN but only 10% had confirmed agreement to provider-involved PN (PIP). In multi-level regression analyses PN discussion was predicted by provider HIV-test training and knowledge, and patients requesting a test while presenting HIV/AIDS symptoms. The strongest predictor of PIPN agreement was public health HIV testing settings followed by counseling by program managers or infectious disease specialists across settings. None of the injecting drug users or patients presenting with AIDS, but not requesting a test, agreed to PIPN. Organizational and provider-level interventions on PN will be needed to realize cost-effective benefits of expanded HIV testing and counseling.

Keywords HIV testing · Partner notification · Provider practice · Organizational factors

Introduction

HIV testing and counseling are critical elements in HIV prevention, enabling treatment, care, and risk reduction for people living with HIV (PLH). Although the impact of HIV testing has typically been coupled with HIV-test counseling, there is substantial evidence that testing positive for HIV results in significant behavioral risk reduction among PLH (Holtgrave and McGuire 2007). Meta-analyses find that PLH aware of their serostatus are at least half as likely to engage in sexual risk behaviors compared to unaware PLH (Marks et al. 2005; Weinhardt et al. 1999). Unaware PLH in the US are estimated to be at least 3.5 times more likely to transmit the virus than aware PLH (Marks et al. 2006).

However, about 25% of PLH in the US are estimated to be unaware of their serostatus (Centers for Disease Control and Prevention 2004; Glynn and Rhodes 2005). Given the stigma associated with HIV testing that targets those “at risk” (Chesney and Smith 1999) and the unreliability of risk screening and targeted testing (Klein et al. 2003), the CDC (Branson et al. 2006) and others (Rotheram-Borus et al. 2006) have recommended universal, “opt-out” routine HIV testing in general health care settings to reach those unaware of their HIV infection. Recent evidence suggests that routine testing results in three to fourfold increases in HIV testing compared to standard physician referral (Greenwald et al. 2006a) and identification of at least half of the positive cases that would have otherwise been missed (Greenwald et al. 2006b).

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The efficacy and cost-effectiveness of routine HIV testing are partially dependent on partner referral or notification (PN) and subsequent testing, risk reduction counseling, and treatment for exposed and seropositive sex and injection drug using partners (Varghese et al. 1999; Coco 2005). This bundle of prevention strategies is referred to by the CDC (2008) as Partner Services, which rely on discussing PN options and, preferably, obtaining agreement to PN involving a public health department provider. PN and Partner Services are also likely to be cost-effective, potentially one of the most cost-effective HIV prevention strategies available (Cohen et al. 2004; Varghese et al. 1999; Coco 2005). Yet, a recent review of PN research finds that while clients and providers report positive attitudes toward PN, providers do not consistently refer to Partner Services programs and clients do not universally agree to PN (Passin et al. 2006). Limited research suggests that only about one-third of newly diagnosed PLH are interviewed by public health departments for some form of partner intervention (Golden et al. 2004). As a result of these trends, PN and social network intervention have earned renewed attention to reach the untested and unaware (Dooley et al. 2007; Golden 2007; Janssen et al. 2001; Pilcher et al. 2006).

The recent CDC (2008) update on Partner Services recommendations outlines five PN referral strategies for HIV and other sexually transmitted diseases (STDs): provider referral notification is conducted by a public health department disease intervention specialist (DIS) trained to provide Partner Services, including PN; Self-referral notification (i.e., client or patient referral) gives the HIV-positive client full responsibility for notifying and referring partners for testing and services with no follow-up by a DIS; Contract referral notification involves the client agreeing to provider referral notification if the client does not complete self-referral in an agreed upon timeframe; Dual referral notification involves the client and a DIS jointly notifying partners by phone or by the partner coming to provider's office for testing and Partner Services; Third-party referral notification is conducted by non-health department HIV counselors or clinicians and may include dual or contract referrals as well as other Partner Services strategies.

Although the evidence-base for PN and Partner Services relative to other HIV prevention strategies is limited (Golden 2007; Hogben et al. 2007; Passin et al. 2006), systematic review finds that Partner Services with provider referral notification is effective in identifying previously undiagnosed PLH and unidentified high risk networks (Hogben et al. 2007). The limited evidence also indicates that self-referral notification is less effective than provider referral, and while there is insufficient evidence on effectiveness of other PN referral strategies (Hogben et al. 2007;

CDC 2008) any provider-involved partner notification (PIPN) is likely to be more effective than self-referral.

Another recent systematic review (Passin et al. 2006) found that most research conducted on PN to date focuses on *client attitudes* regarding acceptability and variations in referral options. Relatively few studies examined provider reports (about 12 vs. about 40 with clients), and the majority of those examine provider attitudes and expectations in hypothetical situations. Only five studies examined providers' reports of actual PN practices and these suggest that about half of providers report routinely referring patients to a Partner Services program, while about 85% generally encouraged self-disclosure. None of the studies examined organizational or provider-level factors associated with discussing PN or agreements to PN or Partner Services. However, one recent study not included in the review suggested that disparities in clients' reports of being offered and using provider referral notification (i.e., by a public health department DIS) in Chicago and Los Angeles was a result of higher proportions of HIV-positive survey respondents receiving care at public health clinics in Chicago (40.7%) compared to Los Angeles (3.3%); only 1.3% of Los Angeles respondents used provider referral compared to 20.1% in Chicago (MacKellar et al. 2008). This suggests that organizational and provider-level factors that prioritize provider referral and Partner Services through public health clinic organizational norms and mandates, and staff training and role specialization, influence client agreements to referral strategies.

This paper examines provider reports of PN practices in their most recent HIV-positive post-test counseling session. The two aims are to identify organization, provider, client, and test-event level predictors of PN *discussion* and *agreements* to provider-involved PN (PIPN), with the latter including both DIS and non-public health department providers, as described below.

Hypotheses

Organization-level policies, capacities, and structure related to HIV testing are hypothesized to support PN through organizational norms and mandates, cues to action, and other contextual effects that drive providers' and clients' service priorities. Specifically, public health department HIV testing units (i.e. STD clinics and mobile testing units) are hypothesized to have higher levels of PN discussion and PIPN agreements.

Provider-level HIV testing knowledge, training, experience and role specialization are hypothesized to be associated with higher rates of PN discussion and PIPN agreement. Patient load, administrative demands, and other indicators of role stress or conflict are hypothesized to be negatively associated with PN outcomes.

In prior studies some behavioral risk groups (BRGs) such as drug users or men who have sex with men (MSM) have been found to be less willing to agree to PN or specific referral strategies (Passin et al. 2006). Therefore, we also hypothesize that PN discussion and PIPN agreement are associated with client-level indicators of risk (i.e., BRG, HIV/AIDS or STD symptoms, seeking an HIV-test), and other background factors (i.e., race/ethnicity, age, gender).

Methods

Study Design and Sample

The “Organizational Factors in the Early Detection of HIV” study surveyed health care organizations providing HIV-tests in Los Angeles County from 2003 through 2007. The study assessed all aspects of HIV testing processes including: risk screening, pre-test counseling, post-test counseling, supervisory practices, and organizational policies and factors. Organizations were enumerated and sampled from seven strata: for-profit private-practices (FP), nonprofit community-based organizations (CBOs), public health STD clinics and personal health centers (PUB), mobile testing units (MTUs) operated by the public health departments or through contracts to CBOs, and three strata of hospitals (for-profit, nonprofit, and county public). Within each organization, up to six front line providers (FLPs) of HIV testing and counseling services (e.g., doctors, nurses, DIS, public health investigators, outreach workers, etc.) were enumerated and randomly selected for interview. In addition, up to three managers at each

organization (e.g., executives, clinic managers, testing supervisors) were selected for interviews. Overall, 621 staff were interviewed from 159 organizations.

Chief executive or medical officers provided consent for organizational participation. Staff participation was completely voluntary with separate informed consent. Face-to-face computer-assisted personal interviews (CAPI) assessed respondents’ background characteristics, experience and training, HIV testing expertise, and working roles/responsibilities. Organization-level data was collected in manager interviews, in forms completed by administrators, and from local public health departments.

FLPs were queried about their most recent HIV-negative and HIV-positive test session conducted in the prior 6 months. Managers were also queried about positive test sessions, as applicable, typically referral for positive disclosures, confirmatory results, or follow-up ‘referral’ sessions. A total of 385 staff reported conducting an HIV-test in the past 6 months, of which 204 reported conducting a positive post-test counseling session and had the opportunity to discuss PN with clients. Of these cases, about one-third ($n = 69$) were manager referrals. Table 1 shows organization and provider samples by organization type.

Measures

Outcome variables. Providers were asked if PN was *discussed* with the client and if the client *agreed* to any ‘formal’ PN defined as any provider-involved partner notification (PIPn) referral strategy. The assessment operationalized PIPn to include all referral strategies in the CDC Partner Services referral framework (provider referral, dual referral, contract referral, and third-party referrals

Table 1 Sample distribution and percents (%) of HIV-test providers and organizations reporting positive HIV-test sessions, partner notification discussion and agreement from providers’ most recent HIV-positive test sessions in the 6 months prior to assessment

	Total	Organization type				
	All Orgs	FP	Hospitals	CBO	MTU	Public
Total sample sizes						
Providers conducting HIV-tests in past 6 months	385	40	143	97	30	75
Orgs with at least one provider conducting HIV-test	145	19	50	36	12	28
Conducted HIV ± post-test counseling session						
HIV-test Providers (% of total)	204 (53)	35 (88)	59 (41)	52 (54)	26 (87)	32 (57)
Orgs (% of total)	105 (73)	16 (84)	36 (72)	29 (81)	10 (83)	14 (50)
Provider discussed partner notification						
Providers (% of those conducting post-test session)	133 (65)	20 (57)	33 (56)	39 (75)	16 (62)	25 (78)
Orgs (% of orgs with providers conducting post-test)	58 (55)	12 (75)	5 (14)	19 (66)	10 (83)	12 (86)
Client agreed to provider-involved partner notification						
Providers (% of those conducting post-test session)	21 (10)	3 (~1)	4 (~1)	4 (~1)	3 (12)	7 (22)
Orgs (% of orgs with providers conducting post-test)	18 (17)	3 (19)	4 (11)	4 (14)	2 (20)	5 (36)

that may have incorporated dual and contract referral options) except self-referrals. This study compared all provider-involved referrals to self-referrals because the latter could not be confirmed by the providers' reports.

Provider characteristics. Demographic characteristics included age, race/ethnicity, highest degree of education, and other professional training. Work experience included tenure in position and at organization, and years of experience in current occupation. Several questions assessed HIV-test training and providers were classified as untrained (0), trained (1), or certified/specialists (2). All respondents rated their HIV testing knowledge as 'not at all' (0), 'somewhat' (1), 'very' (2), or 'extremely' (3).

Patient/Client and Test-event Characteristics. The HIV seropositive client's gender, age, race/ethnicity, and behavioral risk group (BRG) were reported by providers. BRG was classified by county public health department definitions: men who have sex with men (MSM) and women (MSM/W); injection drug users (IDU); MSM/IDUs; women at sexual risk (WSR; defined as having high risk and/or multiple unprotected partners); and transgender (TG). Other test session characteristics assessed included test initiation, risk and symptom presentation, and test session type (e.g., initial test, confirmatory test, follow-up for referrals).

Organizational characteristics. Organization structure was classified by type or stratum (as described above; hospital, CBO, public, for-profit, MTU), whether it was part of a larger system of organizations, and the proportion of public funding. HIV service focus was categorized as: (1) general health care or service provider with no specific HIV focus; (2) general health care or service provider with some HIV/AIDS focus or importance; or (3) an organization highly dedicated to HIV/AIDS prevention or treatment. Indications of HIV identification capacities included provision of HIV-related treatment, anonymous tests, and rapid HIV-tests. Organization size and reach were measured by the number of locations in the county and the number that offer HIV testing. Organization locations were mapped to county public health HIV prevalence data by census tract.

Statistical Methods

Random effects logistic regression analyses were conducted using Stata 9SE, xtlogit procedure. Provider and client/event level predictors were tested to develop multivariate models at 'level-one' before testing and 'level-two' (organizational) predictors (Snijders and Bosker 1999). All models tested random intercepts. Random slopes could not be estimated because about half of organizations had only one provider who conducted a positive test result session in the prior 6 months. When predictors explained all between

organization variation (i.e., intra-class correlation approaches 0) standard logistic regression was used with cluster adjusted robust standard errors. PN discussion analyses included the full sample of 204 provider test cases. Analysis of PN agreement used the full sample and the subsample of providers who discussed PN ($n = 133$) in parallel.

Results

Descriptive Univariate Statistics across Organization Type

HIV-test providers' ($n = 385$) average age was 44 ($SD = 11$), 56% were male, 10% Asian, 12% African-American, 33% Hispanic/Latino, and 39% White. Providers worked an average of 12 years in their occupations ($SD = 10$) and 6 years in their current position ($SD = 7$). Most (72%) were state certified HIV-test counselors or HIV specialist providers, and reported being either 'very' (61%) or 'extremely' (28%) knowledgeable about HIV testing.

HIV-positive post-test session clients ($n = 204$) were mostly male (91%) with a mean age around 35 ($SD = 10$). Ethnicity was similar to providers (i.e., 33% white, 36% Hispanic/Latino) but with a higher proportion of African-American (19%), American Indians (5%), and only two Asian or Pacific Islanders (1%). About two-thirds were MSM (55% MSM, 9% MSM/W, and 4% MSM/IDU). Other BRGs included IDUs (5%), WSRs (5%), and four transgendered (2%). The remaining clients (18%) were either heterosexual men with varying levels of risk disclosure or presented/disclosed no behavioral risk. About 25% were not seeking an HIV-test as the purpose of their visit, 30% were specifically seeking a test and 43% were confirmatory tests or referral follow-up sessions. Of the initial testers (i.e., not confirmatory or referral sessions), 26% presented with HIV/AIDS symptoms and 38% did not present symptoms or behavioral risks.

Partner Notification Discussion

Overall, 65% of providers reported discussing PN in their most recent HIV-positive test session. Rates varied $\pm 10\%$ across organization type (See Table 1). In bivariate analyses statistically significant predictors of PN discussion included provider ethnicity, gender, and HIV-test training and knowledge, but not education, training, tenure, or years in occupation. Client-level correlates of PN discussion included anonymous tests; and the test-visit reason being to: (a) request a test in conjunction with AIDS symptoms presentation; or conversely (b) not requesting a test and not presenting risk or symptoms. Other client demographic and

risk characteristics, including BRG, were not statistically significant in bivariate or multivariate models. Statistically significant organization-level correlates of PN discussion in bivariate analyses included organization type and HIV testing policies, but not funding type, test capacities and experience, HIV services focus, or location. None of the hypothesized organization-level predictors were statistically significant or improved model fit when controlling for provider and client-level predictors.

Table 2 shows three final multivariate models predicting PN discussion. The first column shows the random intercept ‘null’ model with no predictors, assessing the base intraclass correlation (ICC) that reflects between organization variability in PN discussion. Only 3% (ICC = 0.032) is attributable to organizational variation, which is also reflected by the lack of statistically significant organization-level predictors.

The second column in Table 2 shows the final multivariate model estimated with a random intercept. The ICC was reduced to 0, indicating that a random effect model was not necessary. The third column in Table 2 shows the final multivariate model with cluster adjusted robust standard errors that account for correlations between observations within organizations.

Certified/specialist providers were about twice as likely to discuss PN as those with some test counseling training,

and about 10 times more likely to discuss PN than untrained providers (See Table 2). Providers who reported being “extremely knowledgeable” about HIV testing were about 3 times more likely to discuss PN compared to those “very knowledgeable” or less. Provider gender and ethnicity were not statistically significant in multivariate models.

Anonymous test cases had a very slight but statistically significant positive association with PN discussion. Test cases involving clients who were not requesting an HIV-test and not presenting symptoms or transmission risk were about 4 times less likely to have providers report PN discussion compared to the overall average. Test cases involving clients requesting an HIV-test and also presenting HIV/AIDS symptoms were 6 times more likely to have PN discussions, although the cluster adjusted standard errors render this category statistically insignificant (See Table 2). Similarly, the overall 3-level test-visit reason variable was marginally statistically significant [$\chi^2(2) = 5.05$, $P = .08$] but model fit statistics supported retention of the variable as categorized.

Agreement to Partner Notification

As shown in Table 1, clients agreed to PIPN in only 21 test cases in 18 organizations representing 10% of total post-test sessions, and 15% of those in which PN was discussed.

Table 2 Odds ratios (OR), 95% confidence intervals, and random effect estimates for logistic regressions for providers’ reports of partner notification discussion at their most recent HIV-positive test case ($n = 204$)

	Models				
	Random intercept only	Final model with random intercept		Final model ^b	
		OR	95% CI	OR	95% CI
Provider characteristics					
HIV-test training					
Untrained vs. state certified/HIV specialists		0.10	(0.02, 0.51)	0.10	(0.02, 0.56)
Some training vs. state certified/specialists		0.44	(0.21, 0.93)	0.44	(0.22, 0.91)
HIV-test knowledge					
Extremely vs. very/somewhat		2.99	(1.30, 6.84)	2.99	(1.39, 6.43)
Test-event and client characteristics					
Test type					
Anonymous vs. confidential		1.004	(1.001, 1.007)	1.004	(1.001, 1.007)
Reason for test session visit ^a					
Not requesting test and no symptoms or risk		0.23	(0.08, 0.70)	0.23	(0.06, 0.95)
Requesting test and presenting symptoms		6.06	(1.05, 34.8)	6.06	(0.55, 66.5)
Random effect estimates					
	Estimate	(SE)			
Person-level residual error (Sigma U)	0.33	(0.45)	0.001	(0.37)	
Intra-class correlation (ICC)	0.032	(0.085)	0	(0.002)	

^a Reference group is all other test reasons. Estimates represent deviations from the population average estimate

^b Estimates based on Robust standard errors adjusted for organizational clustering of respondents

Providers reported that clients agreed to PIPN from 12% of MTU, 22% of public health, and only about 1% of FP, hospital, and CBO post-test session reports.

In bivariate analyses, organization-level correlates of PN agreements included public funding, HIV/AIDS services focus, and providing HIV treatment or anonymous tests. All 18 organizations that had PIPN agreement reports also had HIV testing policies, precluding testing this variable in multivariate models. Provider ethnicity was statistically significant in bivariate analyses, but not education, training, tenure, years in occupation or HIV testing knowledge or training. Statistically significant client-level correlates included age, ethnicity, and reason for test-visit. Other demographic and risk characteristics, including BRG, were not statistically significant in bivariate models. None of the client-level characteristics were statistically significant in multivariate models. However, there are two exceptions that could not be tested in statistical models; none of the IDU and MSM/IDU clients agreed to PIPN and none of the clients presenting with HIV/AIDS symptoms but not requesting an HIV-test agreed to PIPN.

Table 3 shows results of three final multivariate models for PN agreement. The base ICC in the random intercept-only model was 0.29 (0.27 for the full sample). Over a quarter of the variability in PIPN agreement is attributable to organizational variation, also reflected by the variety of organization-level correlates identified in bivariate analyses.

The second column in Table 3 shows the final multivariate model estimated with a random intercept. In preliminary analyses, provider African-American ethnicity

was associated with higher odds of PIPN agreement (See Table 3) and a similar trend was observed for client African-American ethnicity (OR = 2.68; 95% CI, 0.99–7.26); when both provider and client ethnicity were included as predictors neither were statistically significant ($P = 0.212$ and $P = 0.241$, respectively). Tests of interactions to assess provider-client ethnic parity were not statistically reliable due to small cell sizes; 12 of 21 sessions with PN agreements had African-American clients or providers, but only four of the 21 had provider-client parity. Thus, only provider ethnicity was retained as a predictor of PIPN agreements.

Trends in organization-level analyses indicated that public health organizations, those with 100% public funding (versus partial or no public funding), and HIV/AIDS focused services, were all associated with PIPN agreement. A more specific hypothesis was formulated that 100% publicly funded HIV testing units (either STD clinics or MTUs) would have higher PN agreement due to their specific mission, authority, and familiarity with PN and Partner Services. Providers in these settings were about 6 times more likely to report formal PIPN agreement compared to all other organizations (while controlling for African-American ethnicity and ‘referral’ to manager or specialist visit type). When the other hypothesized predictors were tested with this public testing category, the only other statistically significant correlate (or variable that improved model fit) were provider ethnicity and referral case as reason for visit, which was not statistically significant in bivariate analysis. Referral sessions were about

Table 3 Odds ratios (OR), 95% confidence intervals, and random effect estimates for logistic regressions for providers’ reports of agreements to provider-involved partner notification at their most recent HIV-positive test case ($n = 133$)

	Models				
	Random intercept only		Random intercept		Final model ^b
			OR	95% CI	OR 95% CI
Provider characteristics					
Ethnicity					
African-American provider			3.16	(0.88, 11.28)	3.07 (1.03, 9.12)
Reason for test case visit ^a					
Referral case to program manager or specialist			3.47	(1.02, 11.87)	3.41 (1.15, 10.14)
Organization characteristic					
Organization mission and mandate					
County public health STD clinics and mobile units			7.15	(1.85, 27.64)	6.95 (1.94, 24.94)
Random effect estimates	Estimate	(SE)	Estimate	(SE)	
Person-level residual error (Sigma U)	1.15	(0.47)	0.39	(1.51)	
Intra-class correlation (ICC)	0.29	(0.17)	0.05	(0.33)	

^a Reference group is all other test reasons

^b Robust standard errors adjusted for organizational clustering of respondents

3 times more likely than any other visit reason to have an agreement to PIPN. Public health STD clinic or MTU organizational setting was the strongest predictor of PIPN agreements in all models tested.

In the final multivariate model (Column 2 of Table 3) the ICC approaches 0, again indicating that a random effect model may not be necessary. The third column in Table 3 shows the final model with cluster adjusted robust standard errors. Results analyses using the subsample of those who discussed PN (presented in Table 3) were consistent with analyses using the full sample ($n = 204$) with estimates as follows: African-American provider (OR = 3.36; 95% CI, 1.18–9.56); referral cases to managers or infectious disease specialists (OR = 2.9; 95% CI, 0.98–8.30); and publicly funded and operated HIV-test settings (OR = 6.06; 95% CI, 1.85–19.84).

Discussion

There are many subtleties and contingencies in positive post-test counseling sessions that are difficult to completely assess and analyze with survey data. This is particularly relevant in this study, due to modest sample size and low rate of PIPN agreement. Providers have several competing priorities in positive post-test counseling sessions ranging from emotional support and treatment/care linkages to prevention related risk reduction counseling and PN. One provider's open-ended response eloquently highlights the tension:

“We spent a good deal of time exploring his feelings, what he was going through, discussed a lot of medical referrals, treatment, insurance possibilities, types of medical specialists he can go to, how this will connect to his regular physician and insurance network, but I spent a lot of time exploring what he was going through. How he wanted to inform his previous partners, went through risk reduction, how he can help his own health, and how he can prevent transmission to others, and types of non-medical services as well, what we can do here for him. The difficult thing about positive disclosure is that you want to spend time letting them process their feelings, but there's so much medical information to give...”

These tensions between emotional support, treatment linkage, and preventive intervention are reflected in the regression results demonstrating that certain combinations of test seeking and symptom and risk presentation are associated with PN discussion or PIPN agreement. Positive test cases involving clients who did not visit the organization to request an HIV-test and who also did not present symptoms or exposure risks were less likely to have PN

discussion. Given pressures that limit provider time with patients, and the multiple and competing priorities inherent in post-test counseling, this makes sense in terms of transmission risk. These cases likely have minimal exposure risk (perhaps infected by a primary partner) and low viral loads (i.e., asymptomatic) that reduce transmission risks, thus giving some license to providers to focus more on support and less on prevention and PN. By contrast, test sessions with clients requesting HIV-tests and also presenting AIDS symptoms had higher rates of PN discussion. These clients may have greater risk awareness (and perhaps higher behavioral risk) reflected in their HIV-test seeking, and higher transmission risks due to higher viral loads manifesting as symptoms. Providers tailor post-test counseling based on a variety of factors, which is appropriate, but PN efforts may suffer.

The association between PIPN agreements and African-American provider ethnicity (and trends in client ethnicity) warrants further discussion. The result may reflect selection bias in that African-Americans may be more likely to work (or be tested) in public health STD clinics or MTUs. Higher proportions of African-American providers were sampled from MTUs (35%) and public clinics (22%), compared to CBOs (17%), hospitals (7%) and private-practices (6%). Yet, half of the African-American providers with PIPN agreements were from public testing organizations (STD clinics and MTUs) and half from other organizations; thus provider ethnicity remained statistically significant in multivariate models that also controlled for public testing settings. African-American client ethnicity was also higher in MTUs (31%) and public clinics (41%), compared to hospitals (24%), CBOs (6%), and private-practices (3%). Two-thirds of the African-American clients who agreed to PIPN were from public test settings, and thus client ethnicity was not statistically significant in multivariate models. The trend for African-American client agreement to PIPN is most likely a result of higher representation in public health settings where organizational mandates and norms encourage PIPN. African-American provider impacts on PIPN agreements may warrant further investigation but results should be interpreted cautiously due to the low number of PIPN agreements and subsequent limitations in statistical power.

The rarity of PIPN agreement also limited more detailed regression analyses of some factors, notably organization HIV testing policy and client IDU status. All 18 organizations from the 21 PIPN agreement cases had formal HIV testing policies, suggesting that policies are a necessary but not a sufficient condition for effective PIPN. The lack of IDU PIPN agreement in test cases is consistent with prior studies finding that drug users have less favorable attitudes toward PN, although these findings are not consistent across studies and contexts (Passin et al. 2006). PN for

IDUs requires disclosure of both sex and drug-use partners; the stigmatized and illegal status of IDU behavior may be a significant barrier to PIPN and especially government coordinated Partner Services. Positive IDU testers may require specialized PN intervention.

Open-ended responses and interviewer notes about the PN agreement process suggest that providers from non-public HIV-test settings use both Partner Services and handle PIPN themselves. Providers in the public health test settings tended to report using Partner Services, which is not surprising. Often this is simply Partner Services conducted by the public health investigators, reflecting closer organizational linkages with Partner Services programs. However, non-Partner Services partner notification may not be as thorough or effective, which warrants further research to inform effective PN practices.

Conclusions

There are substantial differences in the rates and predictors of PN discussions compared to agreements. While PN discussion is relatively common (about two-thirds of test cases), rates of PIPN agreement are much lower, about 10% of total positive test cases reported. PN discussion does not vary substantially by organization type but half of PIPN agreements were in public health clinics and their MTUs, and this organizational factor was the strongest predictor of PIPN agreements.

It is encouraging that relatively high rates of PN discussion are reported by providers across organizations. These rates, averaging 67% and ranging between 56% and 78% by organization type, are consistent with prior research documenting providers' positive attitudes towards PN (Passin et al. 2006) and recent research conducted in Los Angeles and Chicago finding that 66% of HIV medical-care providers discussed PN (MacKellar et al. 2008). However, there is still room for improved PN discussion rates and discussing PN does not guarantee client agreement, particularly to Partner Services and provider referral notification.

Provider training and high perceived HIV testing knowledge, but not organizational factors, predicted PN discussion, reflecting providers' capacities and confidence. This result suggests that strategies to improve PN discussion rates should include either: (a) increasing training levels across the spectrum of providers who conduct positive post-test counseling sessions; and/or (b) systematically directing positive post-test counseling sessions to HIV-test experts or specialists, particularly public health department Partner Services.

Reserving positive test disclosures for dedicated experts is also strongly supported by the PIPN agreement results.

PIPN agreement rates were highest among test cases reported by providers who: (a) work in county public health-operated STD and HIV detection programs; and/or (b) are program managers or infectious disease specialists who provide post-test counseling for positives across test settings, regardless of organizational focus. Role responsibilities and expertise are the common provider-level factors in both cases, but these are also dependent on either broad organizational mission or sub-unit focus. However, the factor predicting the highest agreement to PIPN was public health STD clinics and mobile testing units.

These findings suggest that expanded PN, and especially PIPN and Partner Services, which underlie the efficacy of routine HIV testing to identify the 25% of PLH unaware of their status, will require organizations to increase staff HIV-test counseling expertise, dedicate positive post-test counseling to existing specialists, and emphasize referral to Partner Services. Public health agency staff (and other providers dedicated to HIV/STI prevention) may not only be the best-qualified but also the most 'empowered' to negotiate agreements to formal PIPN. Their organizational and professional missions, government-backed authority (in the case of public health investigators), and PN familiarity and skills all enhance ability to obtain agreements to PIPN. Specialists should provide post-test counseling sessions to improve Partner Services referrals, PIPN agreements by clients, and maximize the expected benefits of routine testing.

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References

- Branson, B. M., Handsfield, H. H., Lampe, M. A., Janssen, R. S., Taylor, A. W., Lyss, S. D., et al. (2006). Revised recommendations for HIV testing of adults, adolescents, and pregnant women in health-care settings. *Morbidity and Mortality Weekly Report: Recommendations and Reports*, 55(RR-14), 1–17.
- Centers for Disease Control and Prevention. (2004). Number of persons tested for HIV—United States. *Morbidity and Mortality Weekly Report: Recommendations and Reports*, 53, 1110–1113.
- Centers for Disease Control and Prevention. (2008). Recommendations for partner services programs for HIV infection, syphilis, gonorrhea, and chlamydial infection. *Morbidity and Mortality Weekly Report: Recommendations and Reports*, 57(RR-9), 1–83.

- Chesney, M. A., & Smith, A. W. (1999). Critical delays in HIV testing and care: The potential role of stigma. *The American Behavioral Scientist*, 42(7), 1162–1174. doi:[10.1177/00027649921954822](https://doi.org/10.1177/00027649921954822).
- Coco, A. (2005). The cost-effectiveness of expanded testing for primary HIV infection. *Annals of Family Medicine*, 3(5), 391–399. doi:[10.1370/afm.375](https://doi.org/10.1370/afm.375).
- Cohen, D. A., Wu, S. Y., & Farley, T. A. (2004). Comparing the cost-effectiveness of HIV prevention interventions. *Journal of Acquired Immune Deficiency Syndromes*, 37(3), 1404–1414. doi:[10.1097/01.qai.0000123271.76723.96](https://doi.org/10.1097/01.qai.0000123271.76723.96).
- Dooley, S. W., Douglas, J. M., & Janssen, R. S. (2007). Partner counseling and referral services for HIV infection: New endorsement of an old approach. *American Journal of Preventive Medicine*, 33(Suppl 2), S81.
- Glynn, M., & Rhodes, P. (2005). Estimated HIV Prevalence in the United States at the end of 2003. Paper presented at: National HIV Prevention Conference, Atlanta, GA, June 12–15.
- Golden, M. R. (2007). HIV partner counseling and referral services—finally getting beyond the name. *American Journal of Preventive Medicine*, 33(Suppl 2), S84–S85. doi:[10.1016/j.amepre.2007.04.016](https://doi.org/10.1016/j.amepre.2007.04.016).
- Golden, M. R., Hogben, M., Potterat, J. J., & Handsfield, H. H. (2004). HIV partner notification in the United States—a national survey of program coverage and outcomes. *Sexually Transmitted Diseases*, 31(12), 709–712. doi:[10.1097/01.olq.0000145847.65523.43](https://doi.org/10.1097/01.olq.0000145847.65523.43).
- Greenwald, J. L., Hall, J., & Skolnik, P. R. (2006a). Approaching the CDC's guidelines on the HIV testing of inpatients: Physician-referral versus nonreferral-based testing. *AIDS Patient Care and STDs*, 20(5), 311–317. doi:[10.1089/apc.2006.20.311](https://doi.org/10.1089/apc.2006.20.311).
- Greenwald, J. L., Rich, C. A., Bessega, S., Posner, M. A., Maeda, J. L., & Skolnik, P. R. (2006b). Evaluation of the Centers for Disease Control and Prevention's recommendations regarding routine testing for human immunodeficiency virus by an inpatient service: Who are we missing? *Mayo Clinic Proceedings*, 81(4), 452–458.
- Hogben, M., McNally, T., McPheeters, M., & Hutchinson, A. B. (2007). The effectiveness of HIV partner counseling and referral services in increasing identification of HIV-positive individuals: A systematic review. *American Journal of Preventive Medicine*, 33(Suppl 2), S89–S100. doi:[10.1016/j.amepre.2007.04.015](https://doi.org/10.1016/j.amepre.2007.04.015).
- Holtgrave, D., & McGuire, J. (2007). Impact of counseling in voluntary counseling and testing programs for persons at risk for or living with HIV infection. *Clinical Infectious Diseases*, 45(Suppl 4), S240–S243. doi:[10.1086/522544](https://doi.org/10.1086/522544).
- Janssen, R. S., Holtgrave, D. R., Valdiserri, R. O., Shepherd, M., Gayle, H. D., & De Cock, K. M. (2001). The serostatus approach to fighting the HIV epidemic: Prevention strategies for infected individuals. *American Journal of Public Health*, 91(7), 1019–1024. doi:[10.2105/AJPH.91.7.1019](https://doi.org/10.2105/AJPH.91.7.1019).
- Klein, D., Hurley, L. B., Merrill, D., & Quesenberry, C. P. (2003). Review of medical encounters in the 5 years before a diagnosis of HIV-1 infection: Implications for early detection. *Journal of Acquired Immune Deficiency Syndromes*, 32(2), 143–152.
- MacKellar, D. A., Hou, S., Behel, S., Boyett, B., Miller, D., et al. (2008). Exposure to HIV partner counseling and referral services and notification of sexual partners among persons recently diagnosed with HIV. *Sexually Transmitted Diseases*, Epub ahead of print, November 1.
- Marks, G., Crepaz, N., & Janssen, R. S. (2006). Estimating sexual transmission of HIV from persons aware and unaware that they are infected with the virus in the USA. *AIDS (London, England)*, 20(10), 1447–1450. doi:[10.1097/01.aids.0000233579.79714.8d](https://doi.org/10.1097/01.aids.0000233579.79714.8d).
- Marks, G., Crepaz, N., Senterfitt, J. W., & Janssen, R. S. (2005). Meta-analysis of high-risk sexual behavior in persons aware and unaware they are infected with HIV in the United States—implications for HIV prevention programs. *Journal of Acquired Immune Deficiency Syndromes*, 39(4), 446–453. doi:[10.1097/01.qai.0000151079.33935.79](https://doi.org/10.1097/01.qai.0000151079.33935.79).
- Passin, W. F., Kim, A. S., Hutchinson, A. B., Crepaz, N., Herbst, J. H., & Lyles, C. M. (2006). A systematic review of HIV partner counseling and referral services: Client and provider attitudes, preferences, practices, and experiences. *Sexually Transmitted Diseases*, 33(5), 320–328. doi:[10.1097/01.olq.0000194597.16236.48](https://doi.org/10.1097/01.olq.0000194597.16236.48).
- Pilcher, C. D., Eaton, L., Kalichman, S., Bisol, C., & Silva de Souza, R. (2006). Approaching “HIV elimination.” Interventions for acute HIV infection. *Current HIV/AIDS Reports*, 3(4), 160–168. doi:[10.1007/s11904-006-0011-4](https://doi.org/10.1007/s11904-006-0011-4).
- Rotheram-Borus, M. J., Leibowitz, A. A., & Etzel, M. A. (2006). Routine, rapid HIV testing. *AIDS Education and Prevention*, 18(3), 273–280. doi:[10.1521/aeap.2006.18.3.273](https://doi.org/10.1521/aeap.2006.18.3.273).
- Snijders, T. A. B., & Bosker, R. J. (1999). *Multilevel analysis: An introduction to basic and advanced multilevel modeling*. Thousand Oaks, CA: Sage.
- Varghese, B., Peterman, T. A., & Holtgrave, D. R. (1999). Cost-effectiveness of counseling and testing and partner notification: a decision analysis. *AIDS (London, England)*, 13(13), 1745–1751. doi:[10.1097/00002030-199909100-00019](https://doi.org/10.1097/00002030-199909100-00019).
- Weinhardt, L. S., Carey, M. P., Johnson, B. T., & Bickham, N. L. (1999). Effects of HIV counseling and testing on sexual risk behavior: A meta-analytic review of published research, 1985–1997. *American Journal of Public Health*, 89(9), 1397–1405. doi:[10.2105/AJPH.89.9.1397](https://doi.org/10.2105/AJPH.89.9.1397).