

Chlamydia Partner Services for Females in California Family Planning Clinics

Ying-Ying Yu, PhD,*† Jessica A. Frasure-Williams, MPH,* Eileen F. Dunne, MD, MPH,‡
Gail Bolan, MD,* Lauri Markowitz, MD,‡ and Heidi M. Bauer, MD, MS, MPH*

Background: Prompt treatment of exposed partners is critical for preventing further transmission of chlamydia, reinfection, and sequelae among females. Patient-delivered partner therapy (PDPT) has been allowable in California since 2001; however, few data are available regarding PDPT use and treatment outcomes.

Methods: Eight family planning clinics participated in a partner services evaluation from 2005 to 2006. Females aged 16 to 35 years with chlamydia were interviewed to determine the partner service received and partner treatment outcomes; a subset of partners was also interviewed. Determinants of reported partner treatment were assessed using multivariate logistic regression. Selected medical records were reviewed to assess reinfection rates.

Results: Overall, 743 female patients disclosed 952 partners; 58% of whom were identified as steady partners. Reported partner services included concurrent patient-partner treatment visits (15% of partners), PDPT (19%), patient referral (55%), health department referral (0.1%), and no partner management (11%). On the basis of patient report, 82% of partners were notified and 54% received treatment. Of the 166 (17%) partners interviewed, 139 (84%) reported that they had received treatment, which correlated well with patient report. Reported partner treatment was higher for concurrent treatment visits and PDPT (79% and 80%, respectively) compared to patient referral (44%, $P < 0.0001$).

Adjusted for clinic and relationship status, partners managed with concurrent treatment visits or PDPT were more likely to receive treatment compared with partners managed with patient referral (adjusted odds ratios, 3.5; 95% confidence interval, 2.1–5.8 and adjusted odds ratios, 4.3; 95% confidence interval, 2.6–7.2, respectively). Among the patients retested within 6 months after treatment, 18% were reinfected; reinfection rates did not differ by type of partner service.

Conclusions: Although overall rates of reported partner treatment were low, concurrent patient-partner treatment visits and PDPT were associated with significantly higher rates of partner treatment. However, these methods may be underutilized in California family planning settings.

Chlamydia is the most common reportable communicable disease in the United States. In California, over 145,000 cases (381 per 100,000 population) were reported in 2009, including over 100,000 cases among females.¹ Rates have continued to rise, in part because of increased screening and use of the more sensitive nucleic acid amplification tests (NAATs). Repeat chlamydial infection among females is common (20%–30%)² and increases the risk for reproductive sequelae, including pelvic inflammatory disease, which can lead to ectopic pregnancy and infertility.^{3,4} Risk factors for repeat chlamydial infections include having untreated partners, new partners, and partners with concurrent partnerships.^{5,6} Partner treatment is critical to prevent reinfection and subsequent complications in the patient and to reduce the burden of infection at the community level by preventing further transmission.⁷

Treating male partners can be challenging because chlamydial infections in men are often asymptomatic, and overall health care utilization is lower because of the lack of health insurance and limited access to primary care services, especially among younger males.⁸ Commonly, the burden of partner notification is on the patient (i.e., patient referral); however, partner notification also can be accomplished by the provider or by health department disease investigation specialists.⁹ Although providers in California are required to make a good faith effort to ensure treatment of sexually transmitted disease (STD) contacts,¹⁰ the majority of clinicians are too busy, have concerns regarding confidentiality of their clients, or are not adequately trained in partner notification.¹¹ Thus, providers usually rely on patients to notify their partners, after which the partner is responsible for getting treated. Given the limited public health resources and the substantial number of chlamydia cases, most health jurisdictions provide assistance for only a limited proportion of reported chlamydia cases.¹²

Patient-delivered partner therapy (PDPT) is a strategy in which patients deliver either medications or prescriptions directly to partners. Although partners are still able to seek clinical services, a clinical evaluation is not necessary to receive treatment for chlamydia. Randomized trials have demonstrated that PDPT for chlamydia-infected patients is either better than or comparable to patient referral in improving

From the *California Department of Public Health, Center for Infectious Diseases, Division of Communicable Disease Control, Sexually Transmitted Disease Control Branch, Richmond, CA; †Epidemic Intelligence Service Program, Field Assignments Branch, Office of Workforce and Career Development, Centers for Disease Control and Prevention (CDC), Atlanta, GA; and ‡Division of Sexually Transmitted Disease Prevention, National Centers of HIV, Hepatitis, STD, and TB Prevention, CDC, Atlanta, GA

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Correspondence: Heidi Bauer, MD, MS, MPH, California Department of Public Health, STD Control Branch, 850 Marina Bay Parkway, Bldg P, 2nd Floor, Richmond, CA 94804. E-mail: heidi.bauer@cdph.ca.gov.

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partner notification and treatment and reducing reinfection among females.^{13–16} The Centers for Disease Control and Prevention (CDC) considers PDPT a useful option to facilitate partner management among heterosexual men and women with chlamydia or gonorrhea.⁷ Before 2001, prescribing medication for sex partners exposed to chlamydia without a medical examination was a violation of California's Medical Practice Act, and the practice was subject to sanctions by the Medical Board.¹⁷ As of January 2001, PDPT is allowed by California law¹⁰ and recommended by the Department of Public Health and the California STD Controllers Association for partners who are unable or unlikely to seek timely medical care.¹⁸

In California, a considerable proportion of reported chlamydia cases in females are diagnosed in family planning clinics. The purpose of this evaluation was to describe the partner services used in family planning clinics to treat male partners of female patients diagnosed with chlamydia, evaluate partner notification and treatment outcomes, and assess determinants of partner treatment. Additionally, we interviewed partners to assess the degree to which patient and partner treatment reports correlated and we reviewed medical records to determine the proportions of patients retested and reinfected within 6 months after treatment.

MATERIALS AND METHODS

Eight geographically diverse family planning clinics in California were selected based on high morbidity (at least 100 chlamydia cases per year), reported use of PDPT as a partner service option for chlamydia-infected female patients, experience conducting program evaluation, and interest in participation. Combined, these clinics served over 64,000 female clients annually, with an average chlamydia positivity rate of 6% (range, 4%–8%) among female patients.

Female patients aged 16 to 35 years with laboratory-confirmed genital chlamydia were eligible to participate. With the goal of enrolling 100 patients per clinic, the study began in January 2005 and ended in December 2006. All chlamydia testing was performed using NAATs on urine or cervical specimens according to manufacturer's specifications. Patients coinfecting with trichomoniasis, gonorrhea, or syphilis, or those seeking testing as a result of a known exposure to an infected partner, were not eligible. When patients were notified of their test result, they were invited to participate in the partner services evaluation. Telephone interviews were conducted in English or Spanish by a trained bilingual interviewer who also obtained verbal informed consent. Patients were informed that all information they shared would be confidential and that their name and information would not be shared with partners. No compensation was provided for patient participation; however, clinics were reimbursed for staff time to enroll patients. The project was funded and determined to be nonresearch by CDC through the Office of Women's Health and the National Center for HIV, STD, and TB Prevention.

This evaluation consisted of 3 components: (1) 2 telephone interviews (an initial and a follow-up interview) of the chlamydia-infected female patients to determine the partner service used and partner treatment outcomes; (2) a telephone interview of partners identified by the patients to evaluate the degree to which patient-reported partner treatment was consistent with the partner's report of treatment; and (3) a review of a sample of patients' medical records to determine reinfection rates after treatment.

Patient Interview

Clinics collected and reported the name and contact information for all eligible patients who agreed to be inter-

viewed. An initial telephone interview was conducted 1 to 2 weeks after patient treatment. The standardized interview instrument included questions about demographics (age, education level, race, and ethnicity), STD history, and number of male partners with whom she had had vaginal sex in the 2 months before chlamydia diagnosis. For each disclosed partner (up to 3 partners), the patient was asked whether someone at the clinic had discussed getting that partner treated for chlamydia, and if so, which partner treatment strategy was selected (but not necessarily used by the patient). In the analysis, partner services were categorized into 5 management methods: (1) patient-partner concurrent treatment visit, characterized post hoc as the "bring in your own partner or BYOP" strategy, if the patient was instructed to bring her partner when she returned for treatment; (2) PDPT, if the patient was given a prescription or medication for chlamydia to deliver to her partner; (3) patient referral, if the patient was asked to notify her partner of the need to be treated; (4) provider or health department staff referral, if the patient was told that clinic or health department staff would contact her partner; and (5) no partner services, if the patient did not report having been offered partner management.

For each disclosed partner, patients were asked whether they had informed that partner of his exposure to chlamydia, whether that partner was treated for chlamydia, and whether the relationship was steady or nonsteady. "Steady" was not defined for patients, but was intended to measure her willingness, comfort, and investment in getting a particular partner treated. A follow-up interview was conducted 4 to 6 weeks after treatment. If the patient had not notified her partner by the initial interview, she was asked questions concerning the same partner again to ascertain subsequent partner notification and treatment outcomes. For those who reported no sex partners in the previous 2 months, information was collected regarding the most recent sex partner.

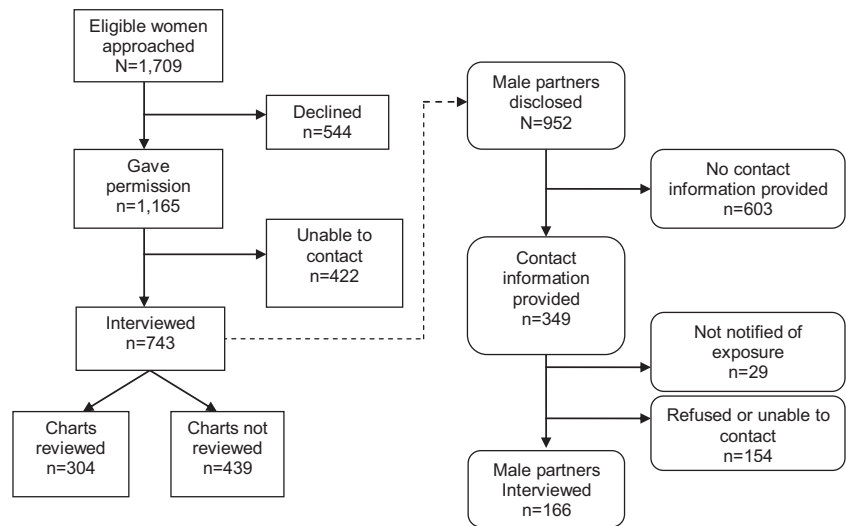
Partner Interview

Partner interviews were conducted to evaluate the degree to which patient-reported partner treatment was consistent with the partner's report of treatment. If the patient provided contact information for her partner(s), the interviewer telephoned the partner 4 to 6 weeks after the patient was treated and asked questions to determine whether he had been treated for chlamydia. The correlation between the partner's report of treatment with the patient's account of partner treatment was calculated using Kendall τ -b correlation coefficients.

Medical Record Review

Retesting and reinfection rates were ascertained through medical record review. Because limited resources precluded a record review at all clinics, 4 of the 8 clinics were randomly selected. All visits in the 6 months after treatment were abstracted. Reinfection was defined as a positive chlamydia NAAT between 1 and 6 months after treatment. Because patients with multiple partners may have used different partner service options, it was necessary to create patient-centered categories to examine whether reinfection varied by the type of partner service used. For this analysis, we created 5 mutually exclusive groups: (1) BYOP for all disclosed partners, (2) PDPT for all disclosed partners, (3) patient referral for all disclosed partners, (4) mixed strategies for different partners, and (5) no management for any partner.

Figure 1. Eligibility, enrollment, and participation among female patients and their male partners.



Analysis

Data analysis was conducted by using SAS 9.2 (SAS Institute, Inc., Cary, NC). For patient-level analysis, we used the Mantel-Haenszel χ^2 test and multivariate logistic regression. The generalized estimating equations were used in multivariate analyses to adjust for correlation between multiple partners per patient.¹⁹ We used the Mantel-Haenszel χ^2 test in bivariate analysis for partner-level data. We adjusted for covariates that affected the magnitude of association between partner service and partner treatment by at least 10%.

RESULTS

The length of participation at each of the 8 clinic sites varied from 6 to 24 months, depending on the volume of chlamydia cases and enrollment rates. A total of 1709 eligible patients were asked by clinic staff to participate in the evaluation and 544 declined (Fig. 1). Of those patients who granted permission and had valid contact information ($n = 1165$), 743 (64%) were contacted and interviewed within 2 weeks after treatment. Of those, 591 (80%) were also contacted for a follow-up telephone interview.

Overall, 83% of the female patients were aged 16 to 24 years, 72% had at least a high school education, and 55% were Hispanic (Table 1). The majority of patients (72%) reported 1 male sex partner in the previous 2 months, and 79% reported no history of chlamydia.

Partner Services and Partner Treatment Outcomes

Of the 952 male sex partners disclosed by patients, 15% were reportedly managed with BYOP, 19% with PDPT, and 55% with patient referral (Table 2). Only 1 partner (0.1%) was managed through health department referral and no partners were managed through provider referral. No partner management was reported for 11% of partners. The type of partner service varied across clinics: BYOP ranged from 4% to 29%; PDPT, 1% to 45%; patient referral, 38% to 78%; and no partner management, 7% to 16%. The majority of reported PDPT involved medication (84%) rather than a prescription.

Overall, 550 (58%) partners were identified by patients as steady and 402 (42%) were identified as nonsteady. The type of partner service used varied significantly by relationship

status (Table 2). Steady partners were more likely than nonsteady partners to have been managed with BYOP (21% vs. 7%; $P < 0.0001$) or PDPT (25% vs. 11%; $P < 0.0001$), whereas nonsteady partners were more likely to have received patient referral (61% vs. 50%; $P < 0.001$) or no management (21% vs. 4%; $P < 0.0001$). Of the 103 partners with no reported partner management, the majority (89%) were identified as nonsteady by patients with more than 1 partner in the previous 2 months. Patient demographics (age, race/ethnicity, and educational level) were not significantly associated with reported partner service.

TABLE 1. Characteristics of Female Chlamydia Patients Participating in the Partner Services Evaluation of Family Planning Clinics in California, 2005–2006 ($n = 743$)

Patient Characteristics	N*	% [†]
Age group, yr		
16–19	311	41.9
20–24	308	41.5
25–35	124	16.7
Education		
Less than high school	200	26.9
High school	220	29.6
More than high school	315	42.4
Race/ethnicity		
White, non-Hispanic	154	20.7
Black, non-Hispanic	105	14.1
Hispanic	411	55.3
Other	73	9.8
No. male sex partners in previous 2 months		
0	32	4.3
1	533	71.7
2–3	170	22.9
>3	7	0.9
Self-reported history of chlamydia		
None	585	78.7
Within past 6 months	27	3.6
More than 6 months ago	128	17.2

*Numbers do not always sum to total because of missing values.

[†]Percentage does not always sum to 100% because of rounding or missing values.

TABLE 2. Patient-Reported Partner Service by Relationship Status (N = 952 Disclosed Partners)

Partner Service	Total	Steady Partner	Nonsteady Partner	P*
	N = 952 N (%)	N = 550 N (%)	N = 402 N (%)	
Bring your own partner (BYOP) [†]	142 (14.9)	115 (20.9)	27 (6.7)	<0.0001
Patient-delivered partner therapy (PDPT)	184 (19.3)	139 (25.3)	45 (11.2)	<0.0001
Patient referral	522 (54.8)	275 (50.0)	247 (61.4)	0.0005
Health department referral	1 (0.1)	1 (0.2)	0 (0.0)	— [‡]
Provider referral	0 (0.0)	0 (0.0)	0 (0.0)	—
No partner management reported by patient	103 (10.8)	20 (3.6)	83 (20.7)	<0.0001

*Mantel-Haenszel χ^2 test.[†]This method, also known as concurrent patient-partner treatment visit, involves instructing the patient to bring her partner when she returns to the clinic for treatment.[‡]P value cannot be calculated because of limited cell counts.

Of the 952 disclosed partners, 777 (82%) were reportedly notified of their exposure to chlamydia. Of those notified, 95% had been notified by the time of the initial patient interview. Rates of partner notification varied by the type of partner service received: 97% for BYOP, 97% for PDPT, 74% for patient referral, and 47% for no management. Just over half (54%) of the disclosed partners had reportedly received treatment (Table 3). Of those treated, 89% had received treatment by the time of the initial patient interview. Steady partners were more likely to have received treatment than nonsteady partners (75% vs. 25%, $P < 0.0001$). After adjusting for the clinic and type of partner service, steady partners were 7 times more likely to receive treatment: adjusted odds ratios [AOR], 7.1; 95% confidence interval [CI], 5.1 to 9.8. BYOP and PDPT were associated with higher rates of partner treatment (79% and 80%, respectively) compared with patient referral (44%; $P < 0.0001$). This association remained significant after adjusting for clinic and relationship status: AOR, 3.5; 95% CI, 2.1 to 5.8 and AOR, 4.3; 95% CI, 2.6 to 7.2, respectively.

Concordance of Patient-Partner Treatment Reports

Of the 952 male partners disclosed by the patients, contact information was obtained for approximately one-third, and 166 (17%) were interviewed (Fig. 1). The majority ($n = 139$, 84%) of interviewed partners were identified as steady

partners by the patients. Of those interviewed, 139 (84%) reported that they had received chlamydia treatment. In comparison, by patient report, 134 (96%) of these partners had received treatment, 4 (3%) had not, and 1 (1%) had unknown treatment status. Of the 27 partners who reported they had not received treatment, 20 (74%) were consistent with patient report, 6 (22%) had unknown treatment status, and 1 (4%) had received treatment according to the patient. The overall concordance of the partner's self-reported treatment with patient-reported partner treatment was 154/166 (134 + 20/139 + 27) and the Kendall's τ -b correlation was 0.88 ($P < 0.0001$). Partners' reasons for lack of treatment included testing negative ($n = 2$), lack of or resolution of symptoms ($n = 7$), too busy or unable to get to clinic ($n = 10$), or unknown ($n = 8$).

Reinfection With Chlamydia

Medical records of 304 female patients were reviewed. Of these, 134 (44%) returned to the clinic at least once within 6 months after treatment, and 92 (30%) were retested for chlamydia at one of their return visits. Of the 92 patients who were retested, the most common partner service reported at time of the initial diagnosis was patient referral ($n = 49$, 53%), followed by BYOP (18, 20%) and PDPT (16, 17%). Seven patients reported mixed strategies for different partners and 2 patients reported no partner management. Of those tested, 17 (18%) were positive. Reinfection rates did not differ signifi-

TABLE 3. Determinants of Patient-Reported Partner Treatment (N = 952 Disclosed Partners)

	Total	Percentage of Partners Treated	Unadjusted OR (95% CI)	Adjusted OR* (95%CI)
Overall	952	53.6%	—	—
Relationship status				
Steady	550	74.5%	9.0 (6.7–12.1)	7.1 (5.1–9.8)
Nonsteady	402	24.9%	1.0	1.0
Partner service				
Bring your own partner (BYOP) [†]	142	78.9%	4.8 (3.0–7.8)	3.5 (2.1–5.8)
Patient-delivered partner therapy (PDPT)	184	79.9%	5.1 (3.4–7.7)	4.3 (2.6–7.2)
Patient referral	522	43.7%	1.0	1.0
None reported	103	21.4%	0.4 (0.2–0.6)	0.6 (0.4–1.0)

OR indicates odds ratio; CI, confidence interval; AOR, adjusted odds ratio.

*Adjusted for clinic site and the type of partner service or relationship status using generalized estimation equations.

[†]This method, also known as concurrent patient-partner treatment visit, involves instructing the patient to bring her partner when she returns to the clinic for treatment.

cantly by type of partner service: 16% for patient referral, 11% for BYOP, 19% for PDPT, 29% for mixed strategies, and 100% for no partner management.

DISCUSSION

Despite the inherent limitations due to the observational nature of this study, the findings provided important insights into partner service practices in family planning clinics and associated partner notification and treatment outcomes. Although 82% of partners were reportedly notified of their exposure to chlamydia, only 54% were reported to be treated. This gap may indicate an important focus of intervention in terms of getting those notified into care. Even among steady partners, only 75% were reportedly treated. Among nonsteady partners, who comprised 42% of all partners, rates were exceedingly low (25%). These low rates may be an underestimate if patients were not knowledgeable about the treatment status of their partners; however, based on our findings, at least 18% of partners were never notified and, unless they developed symptoms and sought care, were unlikely to have been treated. These findings may partially explain why chlamydia control efforts have been largely unsuccessful at reducing the population prevalence of infection. Clearly, greater emphasis should be placed on improving partner treatment.

As part of this evaluation, we identified a novel partner management strategy in which the patient was instructed to bring her partner to clinic when she returned for treatment: patient-partner concurrent treatment visit, or the BYOP strategy. In California, public family planning services extend to eligible male patients. This policy creates the opportunity to treat the couple at the clinic without significant financial burden on either the clinic or the partner. However, the window of opportunity to use BYOP is limited. Ideally, it should be discussed when the patient is notified of her positive test result before she returns to the clinic for treatment. For patients with more than 1 partner (about a quarter of our participants), the likelihood of treating all partners through this strategy is diminished.

For partners who are unlikely to access care, PDPT programs provide additional opportunities to ensure partner treatment and prevent reinfection,²⁰ yet this strategy was underutilized in family planning clinics in this evaluation. Financial barriers might explain the underutilization of PDPT. In particular, PDPT medication is not a benefit covered by California's public family planning program because of federal restrictions. Clinics evaluated in our study participated in a PDPT medication distribution program funded by the Infertility Prevention Project; however, the prepackaged medication with information sheets ("partner packs") was not available throughout the entire study period. Although we did not assess barriers to PDPT as part of this study, other barriers to the practice of PDPT may have included providers' concern that PDPT results in incomplete care for the partner, may be dangerous without knowing the partner's medical or allergy history, may create medicolegal issues, and may not be delivered by the patient.^{11,21}

The most commonly reported partner management method was patient referral (55%), which was associated with a relatively low rate of reported partner treatment (44%). Although this treatment rate may be an underestimate, at least a quarter of these partners were never notified and thus unlikely to have received treatment. It is unknown whether BYOP and/or PDPT was offered (and refused), thus patient's self-selection for patient referral may have reduced the effectiveness of this method. Five randomized trials designed to measure reinfection rates for PDPT compared with patient referral control arms also examined partner notification

and partner treatment as outcomes.^{13–16,22} Partner notification in the PDPT arms varied from no difference^{13,14,22} to increases of 13% to 48%.^{15,16} Most trials demonstrated that reported partner treatment rates increased (23%–65%).^{14–16} Regardless, providers need to recognize that patient referral is woefully inadequate for ensuring partner treatment and should not be the first-line strategy.

Reported partner treatment was sevenfold higher for steady partners compared to nonsteady partners, even after controlling for the type of partner service. Our findings are consistent with Mohammed et al. who found greater disclosure among patients with only 1 sex partner and among those in steady relationships.²³ Although this observed difference may have been biased by patients' greater level of knowledge of the treatment status of steady partners, the finding likely has some validity. Patients may be more likely to ensure treatment of steady partners, particularly if an ongoing relationship is planned. Because different strategies may be more or less effective depending on the nature of the relationship, patients should be presented with a number of partner treatment options and counseled to help identify which might be most successful. In addition to provider training to improve counseling skills regarding partner treatment,²⁴ patient education focused on the dangers of reinfection and how to talk with their partners may improve the overall success of partner treatment for chlamydia.²⁵

Among the patients with more than 1 partner in the previous 2 months, nonsteady partners may not have been elicited by or disclosed to providers, which may have contributed to the finding that 11% of partners received no partner management. The majority (89%) of these partners were identified as nonsteady by females with multiple partners. Under these circumstances, steady partners may have received partner services, whereas nonsteady partners were overlooked. Although 21% were reportedly treated, obtaining a more complete sexual history may have improved the rate of partner treatment.

Although the interviews with partners confirmed patient reports of treatment outcomes, only a minority of participants provided partner contact information and the partners interviewed were more likely to be steady partners (84% vs. 58% overall). This bias likely contributed to the high correlation of the patient-partner treatment reports, thus findings are unlikely to be generalizable. Moreover, the second patient interview conducted about 4 weeks after the first, yielded only 5% additional partners notified and 12% additional partners treated. Clearly, although only 54% of partners were treated, most received treatment within a relatively short time after the patient received treatment.

Through medical record review, we found that less than half of the patients returned within 6 months after treatment, and even fewer were retested for chlamydia. Clinic policies and interventions to increase retesting are needed to improve compliance with CDC recommendations to retest patients treated for chlamydia 3 months after treatment,⁷ and to better evaluate reinfection rates by partner management methods. Similar to the study by Stephens et al.,²⁶ we found no differences in reinfection rates by reported partner service; however, our study was limited by the small sample size of those retested, and both studies were limited by selection bias and unmeasured confounding. Reinfection also may have resulted from persistent infection or exposures to new sex partners; however, the low retesting rate and high reinfection rate were consistent with other published data.^{27,28}

This study was subject to additional limitations in generalizability and potential for bias. First, this evaluation was completed in selected family planning clinics in California, thus results may not be applicable to other clinic venues,

regions, or populations. Further, observed variations in the strategies used by clinics may have resulted from differences in clinical protocols, patient populations, provider preferences, and availability of PDPT medication. Second, patients included in the evaluation might not be representative of chlamydia-infected females in other settings. Patients who agreed to participate may have been more prone to notify partners and ensure partner treatment, which may have biased results toward higher rates of partner treatment. Third, partner services were ascertained through patient report thus subject to recall bias and misclassification. Whether other strategies were discussed was not assessed. Patients may have reported the method that resulted in their partner(s) getting treated, therefore biasing the association between partner service and treatment away from the null. Fourth, because the outcome of interest (reported partner treatment) was dependent on the patients' knowledge of their partners' treatment status, treatment rates may be biased in favor of strategies with direct partner contact. In particular, patients using BYOP or PDPT may be more knowledgeable about their partners' treatment status, whereas patients using patient referral may not have followed up after notification to determine treatment status. In addition, social desirability bias may have inflated rates of reported partner notification and treatment outcomes.

Given the lack of recommendations for routine chlamydia screening among males, effective partner treatment is a critical component of chlamydia control. Our findings support increasing the use of BYOP and PDPT in family planning settings. Because health department and provider referral were only rarely reported, their effectiveness was impossible to assess; however, these methods may be appropriate for selected high risk patients (e.g., pregnant women). When none of these options are feasible, patient referral is an alternative; however, providers should recognize that partners receiving patient referral are less likely to be notified (and treated), which puts their patients at high risk for repeat infection. To ensure high quality management of chlamydia-infected patients, clinics and providers should implement effective strategies for improving partner treatment and patient retesting for reinfection 3 months after treatment.

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