HHS Public Access

Author manuscript

Sex Transm Dis. Author manuscript; available in PMC 2024 August 01.

Published in final edited form as:

Sex Transm Dis. 2023 August 01; 50(8): 506–511. doi:10.1097/OLQ.0000000000001822.

Previous STIs and partner services interviews as predictors of subsequent interview completion among cisgender MSM: Partner services fatigue?

Michael P. Barry, MPH[1,2], **Christina S. Thibault, MPH**[2], **Anna Berzkalns, MPH**[2], **Dawn R. Spellman, MA**[2], **Emily Rowlinson, PhD**[1], **Lindley A. Barbee, MD**[2,3], **Matthew R. Golden, MD**[1,2,3], **Roxanne P. Kerani, PhD**[1,2,3]

[1]Department of Epidemiology, University of Washington, Seattle, WA

[2]HIV/STD Program, Public Health – Seattle and King County, Seattle, WA

[3]Department of Medicine, Division of Allergy and Infectious Diseases, University of Washington, Seattle, WA

Abstract

Background: Anecdotal reports suggest that partner services (PS) is less successful among people with repeat STI diagnoses and/or previous PS interactions. We examine whether having repeated STI diagnoses, and/or PS interactions are associated with PS outcomes among men who have sex with men (MSM).

Methods: With STI surveillance and PS data for MSM diagnosed with gonorrhea, chlamydia, and/or syphilis from 2007-2018, in King County, WA (KC), we used Poisson regression models to examine the relationships between PS outcomes (e.g. completing a PS interview and providing identifying information for a contact) with 1) number of previous STI case episodes and 2) number of previous PS interviews completed.

Results: Of the 18,501 MSM STI case patients initiated for interview in the analytic period (2011-2018), 13,232 (72%) completed a PS interview, and 8,030 (43%) had at least one prior PS interview. The proportion of initiated cases successfully interviewed declined from 71% among those with no previous PS interview to 66% among those with ≥ 3 prior interviews. Similarly, the proportion of interviews with ≥1 partner identified declined with greater numbers of previous PS interviews (from 46% [0 interviews] to 35% [≥3 interviews]). In multivariate models, having ≥1 prior PS interview was negatively associated with completing a subsequent interview and of providing partner locating information.

Conclusion: Having history of previous STI PS interviews is associated with less PS engagement among MSM. New approaches to PS should be explored to address the growing epidemic of STIs among MSM.

Corresponding author: Michael P. Barry, MPH, Department of Epidemiology, University of Washington, Harborview Medical Center, Box 359777, 325 9th Ave, Seattle, WA 98104, Phone: 503-826-4808, Fax: 206-744-4151, mpbarry@uw.edu.
Note: Affiliations are from the time of study initiation. LAB is now affiliated with the Centers for Disease Control.

Conflicts of Interest:
LAB has received research support unrelated to this work from Hologic, Nabriva and SpeeDx. Other authors have no COI to declare.

Summary

An analysis of STI surveillance and partner services data found that MSM with prior health department interactions were less likely to participate in STI partner services.

Keywords

Program evaluation; partner services; sexually transmitted infections; men who have sex with men; partner notification

Introduction

Over the past decade, bacterial sexually transmitted infections (STIs) have increased sharply in the U.S., particularly among men who have sex with men (MSM).[1] Mirroring this national trend, in King County, WA (KC), syphilis and gonorrhea rates increased by 370% and 410% respectively from 2009 to 2019.[2] In 2019, among MSM in KC, incidence of syphilis was at a 25-year-high[3] and incidence of gonorrhea reached a historic high.[2] The incidence of syphilis, which affected primarily heterosexual populations in the United States for much of the 20th Century has shifted toward MSM in the past 25 years.[4] Moreover, MSM carry a disparate burden of HIV in the U.S., comprising two-thirds of incident cases nationally.[5] Concurrent with rising rates of STIs and their concentration among MSM, repeat infections are more common[6,7] and known to be associated with risk of subsequent HIV acquisition.[8,9]

Since the mid 20th Century, health departments around the United States have employed partner services (PS) to control the spread of HIV and STIs. While an original goal of PS interviews was to assist patients with STIs to notify their partners to facilitate their treatment and prevent onward transmission, PS interviews also present an opportunity to link index cases and their sex partners to HIV Pre-exposure Prophylaxis (PrEP), HIV/STI testing and HIV care.[10,11]

Traditional PS, however, may not be an effective intervention for MSM with repeated bacterial STI diagnoses, and thereby repeated PS interactions. Prior work suggests that MSM with repeat STI diagnoses often do not want to disclose their diagnoses to a sexual partner[12] and perceive PS as judgmental or bothersome.[13] Other work from health departments across the US has found declining PS success among repeat or first-time syphilis patients.[14-16] Of note, PS has never been evaluated in a randomized controlled trial as an intervention to prevent STI transmission. To evaluate the effectiveness of PS for MSM in its current format and to compare PS outcomes among MSM with and without a history of STIs and PS interactions, we examined trends in PS engagement among MSM diagnosed with STIs between January 2007 and August 2018 in KC. We defined PS engagement with two outcome metrics: (1) completion of a PS interview and (2) provision of useable partner locating information to Disease Intervention Specialist (DIS) staff. We calculated trends in PS success over the study period and we examined the association of the outcomes described with (1) the number of previous PS interviews completed and (2) the number of previous STI cases reported per case patient.

Materials & Methods

Data source

In KC, medical providers and laboratories are required to report cases of syphilis, gonorrhea, and chlamydia to Public Health - Seattle & King County (PHSKC) within three business days of receipt of a positive test. Upon receipt of STI case reports, PHSKC DIS initiate cases to conduct PS interviews. For all STI cases initiated for interview, DIS make at least four contact attempts before cases may be closed and dispositioned as “not located” (addressed in the next paragraph). Throughout the study period of 2007-2018, DIS typically attempted to contact case patients indicated for PS interview at least four times and through at least three of the following means: by phone, by letter, by email, and/or on social media. Once a case patient was reached, DIS attempted to conduct the PS interview by phone or in person. In rare cases, such as if there is evidence that the case patient is disengaged from HIV care or has not received adequate STI treatment, DIS may also conduct a field visit to the patient’s home to ensure treatment and PS are provided.

PS interviews include questions regarding demographics, sexual behavior, substance use, previous STI diagnoses, and where sexual partners live. DIS work to elicit identifiable partner locating information so they may notify the partner of exposure and/or confirm the receipt of appropriate STI testing and treatment. For each partner identified, information is collected from the case patient about partner meeting location, duration of sexual relationship, sexual behaviors with partner(s), and testing and treatment outcomes. DIS also complete an interview disposition for each case. Dispositions indicate whether the case patient completed the interivew, refused the interview, was not successfully located, or was not contacted by the DIS (e.g. they lived outside of KC). Additionally, data from the Washington State Public Health STI surveillance and PS interview data system (PHIMS-STD) are routinely matched against HIV surveillance data by the Washington State Department of Health to determine whether STI patients have been previously diagnosed with HIV.

While DIS attempted to contact all early syphilis cases PS until 2018, the proportion of chlamydia and gonorrhea cases initiated for PS has varied over time based on program resources. Chlamydia and gonorrhea cases among MSM were prioritized for interview when the case patient was untreated for either infection, was a contact to HIV or syphilis, or was evidently out of HIV care. In addition to those prioritized for interview, PHIMS-STD randomly selects a percentage of cases (typically 5-10%) for interview at the time that a case report is entered into the system.

Study sample

We included cases of syphilis, gonorrhea, and/or chlamydia among MSM reported to PHSKC between January 1, 2007 and August 31, 2018. We defined cases as a single case report with one or more of these bacterial STIs diagnosed at any combination of anatomical sites (e.g. urethra, rectum, pharynx). We considered two or more STIs or sites diagnosed concurrently as one case. We considered cases diagnosed within 30 days of an earlier diagnosis of the same infection(s) duplicate case reports excluded them. We also

excluded case episodes among individuals under age 15 at the time of diagnosis. Cases were presumed to be among MSM patients when they met the following criteria: (1) the corresponding case report indicated the patient's sex assigned at birth was male, (2) self-identified gender was male/man or was absent from the PS interview data (e.g. presumed cisgender man), and (3) the case report and/or the PS interview data reflected that the case patient had male sex partners prior to the STI diagnosis reported. While PHSKC provides HIV partner services to all incident HIV cases in King County, WA, we did not include HIV diagnoses or HIV PS interviews in the total number of previous STIs or PS interviews as HIV cases are prioritized for PS to a greater degree than bacterial STI cases and involve ongoing DIS relationships following diagnosis, leading patients newly diagnosed with HIV to have a different level of DIS contact.

Analyses

Primary Analyses—The two outcome variables were (1) completing a PS interview and (2) providing identifiable partner contact information. We defined successful interviews as those that met either of the following criteria (a) dispositioned by the DIS worker as "completed" or "partially completed" or (b) the case patient provided useable contact information for at least one contact. We defined usable partner locating information as having any one of the following: (a) telephone number, (b) mailing address, (c) email address, and/or (d) name and age. In some cases, none of these were indicated in the PS database, but a partner disposition indicated that DIS followed up with the partner in some capacity; such records were defined as being identifiable.

The two primary exposure variables of interest were (1) number of previously completed interviews and (2) number of previously reported STI case episodes. We calculated each by leveraging the person-based nature of the dataset, which allowed us to link previous cases for each individual to their subsequent records. We categorized both exposure variables as zero (referent for both), one, two, and three or more. For each new case reported, we determined the number of previous STI cases that case patient had been reported with during the study period, as well as the number of times they completed a PS interview.

To examine temporal trends in PS outcomes, we calculated the proportion of cases who (1) were successfully interviewed and (2) provided useable partner locating information for at least one contact overall and by the number of previous STI cases and PS interviews. For this analysis, we restricted the sample to cases that were indicated as having been attempted for interview by DIS (i.e., initiated), meaning that a DIS attempted to follow up with the case in some capacity.

To examine the association between previous STI diagnoses and PS interviews with subsequent PS outcomes, we used Poisson regression with log link and robust standard errors to account for individuals present multiple times in the dataset to estimate prevalence ratios (PR) and 95% confidence intervals. We used Poisson regression because log binomial regression models did not converge.[17] In the regression analyses, we excluded cases reported prior to January 1, 2011, to include a "wash out" period during which we counted previous STIs and PS interviews. For example, a case episode reported on January 1, 2007 for a patient who had been interviewed one or more times previously would artificially be

classified as never having received PS, as data from before that date were not available. Models examining interview completion were adjusted for calendar year of diagnosis, HIV status, age, racial/ethnic background, and whether the case was diagnosed in the PHSKC Sexual Health Clinic. We adjusted for place of diagnosis because DIS are stationed in the PHSKC Sexual Health Clinic and therefore have a greater opportunity to reach case patients seen there. The models examining partner identification as the primary outcome controlled for the same variables, plus additional variables that are collected during PS interviews. These include: whether the case patient reported meeting partners in bathhouses and/or online, report of methamphetamine use, travel during the exposure period, and STI symptoms either in the case report (e.g. from the provider) or during the PS interview (e.g. from the case patient). Adjusted covariates were selected *a priori* by the authors.

Sensitivity Analysis—An underlying assumption of our analyses was that STI cases were all worked at the same level of intensity by DIS, and therefore we anticipated that the associations of interested would be consistent for all STIs. To understand whether this is so, we repeated all four of the analyses described above among sub-samples of the analytic sample. These groups were cases where (1) syphilis, (2) gonorrhea, or (3) chlamydia were involved.

While HIV PS data could not be included in the analyses, we were interested in the potential that effects of prior PS interviews and/or infections were different for case patients who were living with HIV at the time of their STI diagnosis. Therefore, we conducted a sensitivity analysis with identical models to those described above, but included an interaction term between HIV status and the number of previous PS interviews or STI diagnoses.

We conducted analyses in the RStudio (Build 492, 2022.02.03)[18] and Stata IC 16[19] software environments. This study was approved by the University of Washington Institutional Review Board.

Results

From January 2007 through August 2018, there were 23,480 STI case episodes reported among MSM aged 15 or over in KC and included in the study. Of these, 18,501 (79%) cases among 9,973 unique persons were initiated for interview by DIS, with 7,563 (41%) involving chlamydia, 10,196 (55%) involving gonorrhea, and 2,417 (13%) involving syphilis. Most patients with initiated cases were aged 20-34 (58%) and were White (71%, Table 1). One-third (33%) of initiated cases were among patients living with HIV. Among case patients with at least one prior STI case in the study period, the maximum number of previous cases was 30 and the median was 2 (IQR: 1, 4). Among case patients with at least one prior STI interview, the maximum was 18 and the median was 2 (IQR: 1, 3).

Between January 1, 2011 and August 31, 2018, 19,780 MSM STI cases were reported PHSKC, of which 15,562 (79%) cases were initiated for PS and comprised the analytic sample after accounting for the washout period. In the analytic sample, 10,774 (69%) of initiated cases resulted in a completed a PS interview. In 4,440 (34%) of those initiated, 8,883 (57%) were among patients with at least one previous STI diagnosis during the study

period and in 7,326 (47%), the case patient had completed at least one previous PS interview (Table 1). Of the 10,774 cases in the analytic sample with completed PS interviews, 6,517 (60%) provided locating information for at least one sex partner. In the full study sample, the proportion of initiated cases each year that resulted in a completed PS interview declined from 88% to 62% and, among interviewed cases, the proportion in which at least one partner's locating information was provided declined from 86% to 29% (Figure 1).

In the analytic sample, the number of previous interviews completed since January 2007 was negatively associated with completion of a PS interview (1 previous interview PR: 0.93 [95% CI:0.90, 0.96], 2 previous interviews PR: 0.95 [0.91, 0.98], ≥3 previous interviews PR: 0.91 [0.87, 0.94). However, the number of previous STI case episodes reported since January 2007 was not significantly associated with completion of a PS interview (1 previous case PR: 1.01 [0.97, 1.06], 2 previous cases PR: 0.95 [0.89, 1.02], ≥3 previous cases PR: 1.00 [0.94, 1.07], Table 2). The number of previous interviews since January 2007 was negatively associated with providing useable partner locating information to a DIS worker (1 previous interview PR: 0.93 [95% CI: 0.90, 0.96], 2 previous interviews PR: 0.89 [0.86, 0.93], ≥3 previous interviews PR: 0.83 [0.80, 0.86]). Finally, the number of previous STI case episodes reported since January 2007 was not associated with providing useable partner locating information to a DIS worker (1 previous case PR: 1.01 [0.96, 1.05], 2 previous cases PR: 0.94 [0.89, 1.00], ≥3 previous cases PR: 0.96 [0.91, 1.02], Table 3).

In sensitivity analyses in which we stratified our multivariate models by STI, the associations we observed between number of previous interviews and completing a PS interview were not observed among cases involving syphilis, were observed among cases involving gonorrhea, and were weaker among cases involving chlamydia. We observed a significant association in each of the three STI-specific subsamples between having at least three prior STI case episodes and completing a PS interview (syphilis PR: 0.90 [0.85, 0.96], gonorrhea PR: 0.84 [0.80, 0.87], and chlamydia PR: 0.85 [0.81, 0.90], Table S1). The associations we observed between number of previous interviews and providing partner locating information to a DIS worker were not observed among any of the STI-specific stratified samples. However, there was a significant association between prior STI case episodes and providing partner locating information to DIS among gonorrhea cases with two prior STI diagnoses (PR: 0.93 [0.88, 0.99], Table S2).

Of the 12 interaction term coefficients produced by the HIV status sensitivity analysis, the interaction term was significant in two cases. Living with HIV was associated with lower likelihood of completing a PS interview, but only for those with 2 previous PS interviews and 3 or more previous STI diagnoses (data not shown).

Discussion

We observed a clear, negative association between the number of prior PS interviews and the likelihood of completing a subsequent interview or providing partner locating information across a roughly eight-year period among MSM diagnosed with syphilis, gonorrhea, and chlamydia in KC. Notably, we did not observe a significant relationship between prior STI diagnoses and the likelihood of either completing a subsequent interview or providing

partner locating information. These findings suggest that, while repeat STI infections among MSM are common, these diagnoses, alone, do not impact engagement in PS; rather, repeated interactions with the health department may play a role. We also found an overall decrease in the proportion of cases initiated by DIS for PS that resulted in successful interviews or partner elicitation in that period. Of note, only half of case patients with no prior interview since 2007 provided useable partner locating information during the study period of 2011-2018, suggesting that PS in its current format may not be sufficient as an STI control intervention among MSM. Given that key STI control strategies such as partner testing and treatment rely to a large degree on PS provided by health department staff, all of our findings are concerning, especially considering local and nationwide increases in syphilis among MSM in the past two decades.[1,20]

Our findings, that PS success has declined overall since 2011, and more specifically with greater numbers of previous PS interviews, may be attributed in part to partner services fatigue, whereby individuals with many interactions with DIS and health department staff in the context of repeated STI infections are less likely to participate in public health prevention services. This phenomenon has been suggested by earlier work,[21,22] and is supported by the present analyses. It may also be true that after multiple STI interviews, MSM feel comfortable notifying partners themselves, and do not feel that they need the help of the health department. Previous work from the University of North Carolina among Black and Latinx MSM[13] supports the potential for qualitative research with MSM STI case patients to provide a more in-depth understanding of facilitators and barriers to MSM PS engagement and the benefits that they associate with PS. These investigators found that participants preferred self-notifying sex partners (as opposed to DIS-notification) and that they sometimes felt harassed by intensive PS follow-up. Qualitative research in King County may reveal similar barriers among MSM in this region.

As with many public health programs, DIS practices and PS resources have varied over time at PHSKC, and we assume that higher staffing coverage and resource allocation generally led to times of better PS outcomes. We controlled for such effects by adjusting for case report year in our models. Further, we limited our study period to end on August 31, 2018 to avoid any influence of a local HIV outbreak.[23] This outbreak was identified in mid-2018 and was ongoing through 2019, which diverted DIS staffing away from bacterial STIs and was shortly followed by staffing changes due to the COVID-19 pandemic. We would have liked to center gender equity and comment on PS outcomes among transgender and nonbinary people who have sex with men over time, but gender identity data were not consistently and accurately reported for STI cases in KC throughout the study period.

Largely in response to the growing STI epidemic among MSM, PS has evolved over the past decade as it has become increasingly common for MSM to seek sex partners online.[24] DIS and PS providers have turned to locating and contacting case patients and partners through the internet, including social media, and with SMS texting.[25,26] Still, locating the partners of case patients who report meeting partners through geospatial mobile applications may make PS more challenging, and the use of internet PS is not consistent across all health departments.[16] Additionally, recent work has found marketing testing services to MSM on these applications may be ineffective.[27] Notably, while it is possible

that individuals in our sample declined PS because they had notified their partners and did not need DIS help with partner notification, we would not be aware of this information among patients who did not complete an interview so we cannot measure the impact of self-notification of partners. Additional alternate notification routes to traditional PS include using anonymous web-based applications such as tellyourpartner.org, though the actual use of such applications appears to be minimal.[28] Additional opportunities for novel approaches to PS and, more broadly, STI control among MSM may lie in leveraging close sexual networks where STIs may be transmitted among a small number of people.[29] The Enhanced Peer Outreach and Risk Network Referral Approaches proposed by FHI 360 for HIV control among marginalized populations, which employ peer outreach workers to provide PS and related services,[30] provide promising models that may be replicated specifically to reduce STI transmission clusters among networks of MSM.

This work quantifies, with a large longitudinal dataset in a single U.S. jurisdiction, the extent to which traditional PS to control the STI epidemic among MSM is facing diminished success among those with repeated PS interactions. We conclude that, at a time when HIV PrEP use is common among MSM and locating partners online and through mobile applications has become ubiquitous, conventional approaches to PS for bacterial STIs among MSM are reduced in effectiveness for many MSM. We recommend that the public health research community explores new, durable models for PS that meet the needs of this population, which is vulnerable to ongoing community spread of HIV, bacterial STI, and emerging infections such as mpox.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Funding:

This work was supported by CDC 6 NU50CK000388-03-01.

References

1. Centers for Disease Control and Prevention. Sexually Transmitted Disease Surveillance 2019. Atlanta, GA, USA: Department of Health and Human Services; 2021.
2. Berzkalns A, Golden MR. King County Sexually Transmitted Infection Epidemiology Report, 2019. Seattle, WA, USA: Public Health - Seattle & King County https://kingcounty.gov/depts/health/communicable-diseases/hiv-std/patients/epidemiology/~/media/depts/health/communicable-diseases/documents/hivstd/2019-STI-Epidemiology-Report.ashx. Accessed July 1, 2021.
3. Public Health - Seattle & King County. Syphilis Trends Epi Summary, King County 2016-2021. Seattle, WA, USA; 2021. https://kingcounty.gov/depts/health/communicable-diseases/hiv-std/patients/epidemiology/~/media/depts/health/communicable-diseases/documents/hivstd/syphilis-trends-2016-2021.ashx. Accessed July 1, 2021.
4. Willeford WG, Bachmann LH. Syphilis ascendant: a brief history and modern trends. Trop Dis Travel Med Vaccines. 2016;2(1):20. [PubMed: 28883964]
5. Centers for Disease Control and Prevention. HIV Surveillance Report, 2019. Atlanta, GA, USA: Centers for Disease Control and Prevention; 2021. https://www.cdc.gov/hiv/library/reports/hiv-surveillance.html.

6. Lukac CD, Consolacion T, Ryan V, et al. Population-Level Outcomes of Partner Notification Among Gay, Bisexual, and Other Men Who Report Sex With Men Diagnosed With Infectious Syphilis in British Columbia, Canada. Sexual Trans Dis. 2021;48(12):901–908.
7. Cope AB, Bernstein KT, Matthias J, et al. Effectiveness of Syphilis Partner Notification After Adjusting for Treatment Dates, 7 Jurisdictions. Sexual Trans Dis. 2022;49(2):160–165.
8. Barbee LA, Khosropour CM, Dombrowksi JC, et al. New Human Immunodeficiency Virus Diagnosis Independently Associated With Rectal Gonorrhea and Chlamydia in Men Who Have Sex With Men. Sexual Trans Dis. 2017;44(7):385–389.
9. Harney BL, Agius PA, El-Hayek C, et al. Risk of Subsequent HIV Infection Following Sexually Transmissible Infections Among Men Who Have Sex With Men. Open Forum Infectious Diseases. 2019;6(10):ofz376. [PubMed: 31660341]
10. Katz DA, Dombrowski JC, Barry M, et al. STD Partner Services to Monitor and Promote HIV Pre-exposure Prophylaxis Use Among Men Who Have Sex With Men. JAIDS Journal of Acquired Immune Deficiency Syndromes. 2019;80(5):533–541. [PubMed: 30649032]
11. Norkin SK, Benson S, Civitarese AM, et al. Inadequate Engagement in HIV Care Among People With HIV Newly Diagnosed With a Sexually Transmitted Disease: A Multijurisdictional Analysis. Sexual Trans Dis. 2021;48(8):601–605.
12. Feinstein BA, Dellucci TV, Graham S, et al. Sexually Transmitted Infections Among Young Men Who Have Sex with Men: Experiences with Diagnosis, Treatment, and Reinfection. Sex Res Soc Policy. 2018;15(2):172–182.
13. Gonzalez Rodriguez H, Barrington C, McCallister KN, et al. Perceptions, experiences, and preferences for partner services among Black and Latino men who have sex with men and transwomen in North Carolina. Ethnicity & Health. March 2021:1–15.
14. Cope AB, Bernstein K, Matthias J, et al. Unnamed Partners From Syphilis Partner Services Interviews, 7 Jurisdictions. Sexual Trans Dis. 2020;47(12):811–818.
15. Hamid S, Onwubiko UN, Holland DP, et al. Selective Participation in Syphilis Partner Services and Implications for Control Efforts, Fulton County, Georgia, 2013-2015. Journal of the Georgia Public Health Association. May 2022. https://digitalcommons.georgiasouthern.edu/cgi/viewcontent.cgi?article=1311&context=jgpha.
16. Rowlinson E, Goings S, Minnerly S, et al. Differences in Partner Services Outcomes for Men Who Have Sex With Men Diagnosed With Primary and Secondary Syphilis by HIV Serostatus. Sexual Trans Dis. 2018;45(3):152–157.
17. Spiegelman D, Hertzmark E. Easy SAS Calculations for Risk or Prevalence Ratios and Differences. American Journal of Epidemiology. 2005;162(3):199–200. [PubMed: 15987728]
18. R Studio Team. RStudio: Integrated Development for R. 2020. http://www.rstudio.com/.
19. StataCorp. Stata Statistical Software: Release 17. 2021.
20. Kerani RP, Handsfield HH, Stenger MS, et al. Rising Rates of Syphilis in the Era of Syphilis Elimination. Sexually Transmitted Diseases. 2007;34(3):154–161. [PubMed: 17179773]
21. Chen SY, Weide D, McFarland W. Are the recent increases in sexual risk behavior among older or younger men who have sex with men? Answer: Both. AIDS. 2003;17(6):942–943. [PubMed: 12660553]
22. Stockman JK, Schwarcz SK, Butler LM, et al. HIV Prevention Fatigue Among High-Risk Populations in San Francisco: JAIDS Journal of Acquired Immune Deficiency Syndromes. 2004;35(4):432–434. [PubMed: 15097163]
23. Golden MR, Lechtenberg R, Glick SN, et al. Outbreak of Human Immunodeficiency Virus Infection Among Heterosexual Persons Who Are Living Homeless and Inject Drugs — Seattle, Washington, 2018. Morbity and Mortality Weekly Report. 2019;68(15):344–349.
24. Beymer MR, Weiss RE, Bolan RK, et al. Sex on demand: geosocial networking phone apps and risk of sexually transmitted infections among a cross-sectional sample of men who have sex with men in Los Angeles county. Sex Transm Infect. 2014;90(7):567–572. [PubMed: 24926041]
25. Hightow-Weidman L, Beagle S, Pike E, et al. “No One’s at Home and They Won’t Pick up the Phone”: Using the Internet and Text Messaging to Enhance Partner Services in North Carolina. Sexually Transmitted Diseases. 2014;41(2):143–148. [PubMed: 24413497]

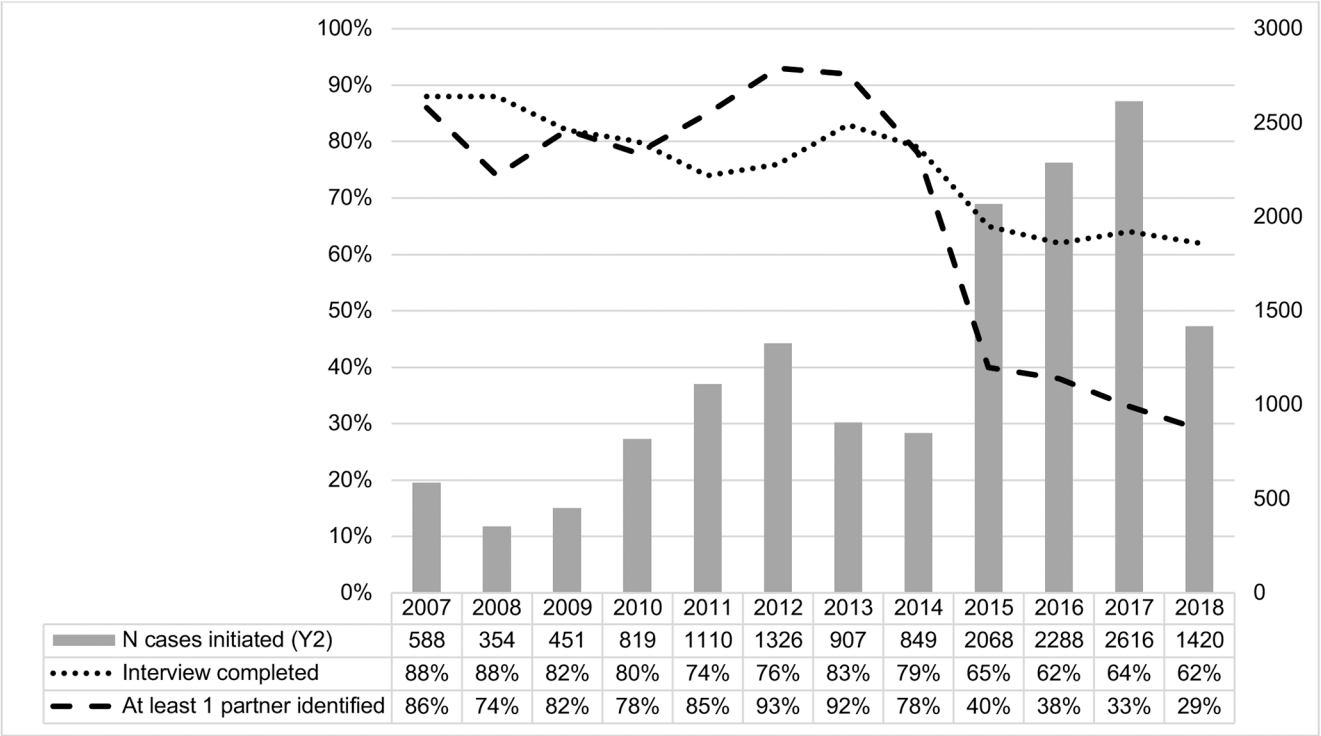
26. Udeagu CCN, Bocour A, Shah S, et al. Bringing HIV Partner Services Into the Age of Social Media and Mobile Connectivity. Sexually Transmitted Diseases. 2014;41(10):631–636. [PubMed: 25211262]

27. Ross C, Shaw S, Marshall S, et al. Impact of a social media campaign targeting men who have sex with men during an outbreak of syphilis in Winnipeg, Canada. Canada Communicable Disease Report. 2016;42(2):45–49. [PubMed: 29770003]

28. Pellowski J, Mathews C, Kalichman MO, et al. Advancing Partner Notification Through Electronic Communication Technology: A Review of Acceptability and Utilization Research. Journal of Health Communication. 2016;21(6):629–637. [PubMed: 27144318]

29. Tilchin C, Wagner J, Schumacher CM, et al. HIV Transmission Potential and Sex Partner Concurrency: Evidence for Racial Disparities in HIV Risk Among Gay and Bisexual Men (MSM). AIDS Behav. 2022;26(3):709–718. [PubMed: 34405302]

30. LINKAGES Project. Index Testing, Risk Network Referral (RNR), Enhanced Peer Outreach Approach (EPOA): What's the Difference? Chapel Hill, NC: FHI 360; 2019. https://www.fhi360.org/sites/default/files/media/documents/linkages-index-testing-rnr-epoa.pdf. Accessed March 13, 2023.



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
N cases initiated (Y2)	588	354	451	819	1110	1326	907	849	2068	2288	2616	1420
Interview completed	88%	88%	82%	80%	74%	76%	83%	79%	65%	62%	64%	62%
At least 1 partner identified	86%	74%	82%	78%	85%	93%	92%	78%	40%	38%	33%	29%

Figure 1:

Partner services outcomes for sexually transmitted infection cases among men who have sex with men, by year of case report with number of cases initiated for partner services, King County, WA, January 2007 – August 2018

Table 1:

Characteristics associated with case episodes of early syphilis, gonorrhea, and chlamydia case episodes among men who have sex with men in King County, WA

Characteristic	*Cases reported January 2007 through August 2018 (Source Sample)*						*Cases reported January 2011 through August 2018 (Analytic Sample)*					
	All cases among MSM (N=23,480)		**Initiated for interview (N=18,501)**		**Received PS (N=13,232)**		**All cases among MSM (N=19,780)**		**Initiated for interview (N=15,562)**		**Received PS (N=10,774)**	
	N	***Col %***	***N***	***Col %***	***N***	***Col %***	***N***	***Col %***	***N***	***Col %)***	***N***	***Col %***
Age												
15-19	548	2%	409	2%	304	2%	448	2%	334	2%	246	2%
20-24	3,459	15%	2,762	15%	2,055	16%	2,891	15%	2,297	15%	1,661	15%
25-29	5,085	22%	3,966	21%	2,922	22%	4,385	22%	3,412	22%	2,455	23%
30-34	4,262	18%	3,347	18%	2,351	18%	3,652	18%	2,870	18%	1,958	18%
35-39	3,109	13%	2,465	13%	1,643	12%	2,569	13%	2,032	13%	1,292	12%
40-44	2,464	10%	1,949	11%	1,374	10%	1,953	10%	1,544	10%	1,031	10%
≥45	4,553	19%	3,603	19%	2,583	20%	3,882	20%	3,073	20%	2,131	20%
Race												
American Indian & Alaska Native	234	1%	187	1%	126	<1%	201	1%	158	1%	104	1%
Asian	1,433	6%	1,086	6%	838	6%	1,273	6%	956	6%	733	7%
Black	1,739	7%	1,412	8%	989	7%	1,422	7%	1,173	8%	793	7%
Native Hawai'ian & Pacific Islander	279	1%	237	1%	190	1%	255	1%	216	1%	162	1%
White	16,332	70%	13,133	71%	9,584	72%	13,556	69%	10,866	70%	7,650	71%
Multiple Races	766	3%	650	4%	510	4%	677	3%	571	4%	441	4%
Another Race	678	3%	579	3%	462	3%	635	3%	545	5%	431	4%
Unknown or did not disclose	*2,019*	*9%*	*1,217*	*7%*	*533*	*4%*	*1,761*	*9%*	*1,077*	*9%*	*460*	*4%*
Ethnicity												
Hispanic or Latinx	3,781	16%	3,117	17%	2,406	18%	3,331	17%	2,726	18%	2,056	19%
Not Hispanic or Latinx	18,148	77%	14,638	79%	10,741	81%	15,146	77%	12,177	78%	8,644	80%
Unknown or did not disclose	*1,551*	*7%*	*746*	*4%*	*85*	*1%*	*1,312*	*7%*	*659*	*4%*	*74*	*1%*
HIV Status at time of diagnosis †												
Positive	7,284	31%	6,098	33%	4,023	30%	6,018	30%	5,063	33%	3,160	29%
Negative	16,196	69%	12,403	67%	9,209	70%	13,762	70%	10,499	67%	7,614	71%
STI(s) present at case episode ‡												
Early syphilis	2,458	10%	2,417	13%	2,119	16%	1,798	9%	1,781	11%	1,510	14%
Gonorrhea	11,143	47%	10,196	55%	6,991	53%	9,484	48%	8,803	57%	5,847	54%
Chlamydia	11,419	49%	7,563	41%	5,337	40%	9,840	50%	6,414	41%	4,422	41%

[†] Case patients may have seroconverted between interviews.

[‡] Multiple STIs may have been present at case episodes; proportions will sum >100%.

Table 2:

Multivariate results for probability of completing a partner services interview among sexually-transmitted infection case episodes in men who have sex with men in King County, WA – 2011-2018 (N=15,562)

Dependent Variable	N	PR (95% CI)	Proportion successfully completing interview
Number of previous PS interviews†			
None	8,236	*Referent*	71%
One	3,425	0.93 (0.90, 0.96)	68%
Two	1,667	0.95 (0.91, 0.98)	69%
Three or more	2,234	0.91 (0.87, 0.94)	66%
Number of previous STI case episodes†			
None	6,679	*Referent*	73%
One	3,274	1.01 (0.97, 1.06)	70%
Two	1,888	0.95 (0.89, 1.02)	68%
Three or more	3,721	1.00 (0.94, 1.07)	62%

†Adjusted for year of case report, HIV status, age, race/ethnicity, and whether the STI case was diagnosed at the Public Health Sexual Health Clinic.

Table 3:

Multivariate results for probability of providing partner locating information to a Disease Intervention Specialist among sexually-transmitted infection case episodes in men who have sex with men in King County, WA – 2011-2018 (N=15,562)

Dependent Variable	N	PR (95% CI)	Proportion providing partner locating information
Number of previous PS interviews[ǂ]			
None	8,236	*Referent*	46%
One	3,425	0.93 (0.90, 0.96)	41%
Two	1,667	0.89 (0.86, 0.93)	40%
Three or more	2,234	0.83 (0.80, 0.86)	35%
Number of previous STI case episodes[ǂ]			
None	6,679	*Referent*	49%
One	3,274	1.01 (0.96, 1.05)	44%
Two	1,888	0.94 (0.89, 1.00)	40%
Three or more	3,721	0.96 (0.91, 1.02)	32%

[ǂ]Adjusted for year of case report, HIV status, age, race/ethnicity, whether the STI case was diagnosed at the Public Health Sexual Health Clinic, whether the case patient reported meeting partners 1) online, 2) at bathhouses, 3) in recent travels, whether the case patient reported meth use, and whether the case patient or STI case report indicated that the patient was symptomatic at time of diagnosis.