

PARTNER MANAGEMENT STRATEGIES FOR HIV/STI CONTROL

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Overview

- What is partner management?
- Partner management as clinical practice and as a public health strategy
- Partner management methods
 - Partner Treatment
 - Partner Notification
 - Anonymous Partner Management
 - Notification of Commercial Sex Partners
- Public health approaches to partner management for integrated HIV/STI control

Who Am I?

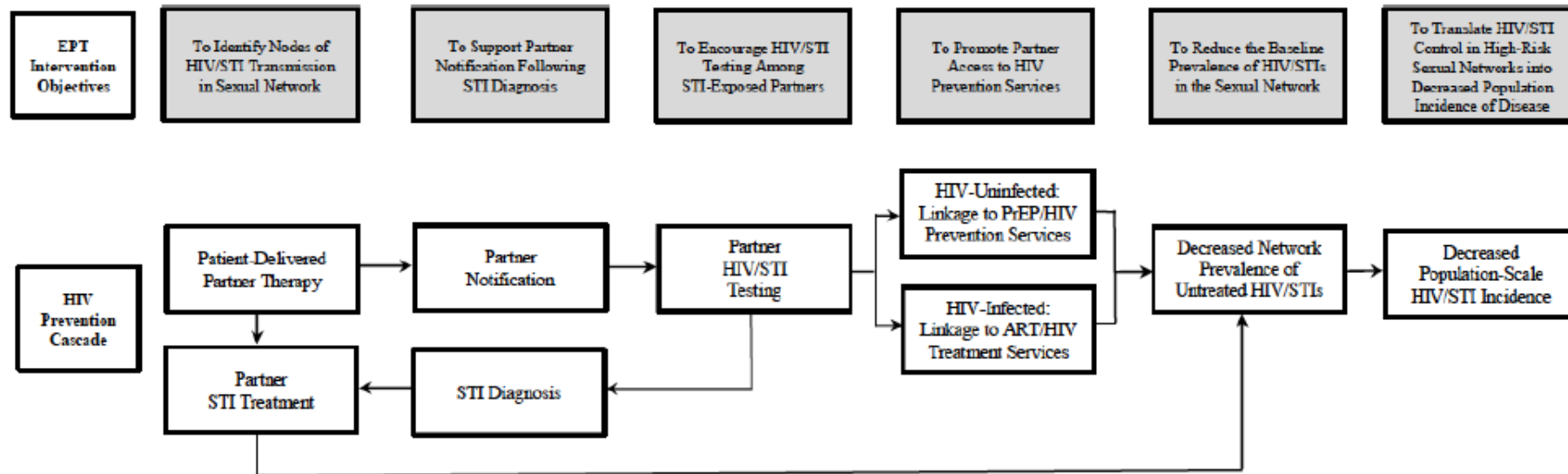
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 - Medical Director, UCLA Vine Street Clinic
 - Program Director, UCLA South American Program in HIV Prevention Research (SAPHIR)
- Research on HIV/STI Epidemiology, Prevention and Treatment among MSM and TW from 2005
 - Epidemiology of HIV and STIs Among MSM-TW in Peru
 - Partner Notification and Treatment
 - Social Network-Based Approaches to PrEP/ART Adherence for TW
 - Contingency Management for Integrated HIV Prevention and Substance Use Harm Reduction in Methamphetamine Users

What Is Partner Management?

- Notification and/or treatment of the recent sexual partners of an individual diagnosed with an STI (Index patients)
 - Encompasses both notification as well as treatment
 - Today's talk limited to curable STIs (GC/CT, Syphilis) but notification following diagnosis of viral infections (e.g., HIV, HSV-2) shares many key possibilities/problems
- Addresses the diversity of partnership formations and sexual network structures within diverse populations
- Reduces the risk of STI re-infection (ping-pong effect)
- Retraces transmission networks for the delivery of testing and treatment interventions to individuals at highest risk of HIV/STIs

Partner Management Cascade

- Act of notification is only the first step
- Patient goal is to reduce risk of re-infection from untreated partners
- Public health goal is to promote HIV/STI testing, treatment, and prophylaxis (if applicable) among individuals exposed to STI
 - Targeted intervention for sexual networks at high risk of ongoing transmission (“Core Groups”)



Common Sexual Partnership Formations

Attention to the specific aspects of sexual partnership types is essential to understanding and managing STI risks

- Primary or Stable Partners
 - Spouse, Partner, Boyfriend/Girlfriend, Significant Other
- Casual or Secondary Partners
 - Single- or recurrent-contact sexual partners with known identity (and contact information)
- Anonymous Partners
 - Single-contact sexual partners for whom no name or other identifying characteristics are known
- Commercial Partners
 - Transactional sex partners (sex for money or goods)

PARTNER TYPES FOR CLINICAL PRACTICE

When to use: This grid may be used in any setting to support discussions about sexual partners and relationships. It may be particularly useful for STI partner notification and contact tracing and to discuss people's sexual networks. However, in cases of sexual assault, alternatives may be more appropriate.

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PARTNER TYPE		Established partner	New partner	Occasional partner	One-off partner	Sex worker
CHARACTERISTICS	Risk of transmission to others	↓	↔	↔	↑↑	↔
	Emotional connection	↑↑	↑	↔	×	↔
	Likelihood of sex with index patient again	↑↑	↑	↑	×	↔
	Sexual Exclusivity	↑	↑	↑	×	×
	Time-frame	↑ has a significant past & anticipating a future	↑ Anticipating a future	↔	×	↔
	Degree of sexual mixing across diverse networks	↓	↔	↑	↑	↑
	Contactability*	✓	✓	✓	↔	↔

***Definition:**
When an index patient is able and willing to contact the sex partner by one or more means of communication (e.g. telephone, messaging, online, mail), and/or to supply those details to the health care professional.

- KEY**
- Very high
 - High
 - Low
 - Variable
 - Yes
 - No

Established partner:
This could be a primary partner (e.g. spouse/civil partner, wife/husband) or a secondary partner (e.g. a long-term 'affair'). There is often a high likelihood of this being a stable relationship, characterised by some or all of the following features: a significant future-oriented, highly developed romantic emotional connection, co-habiting.

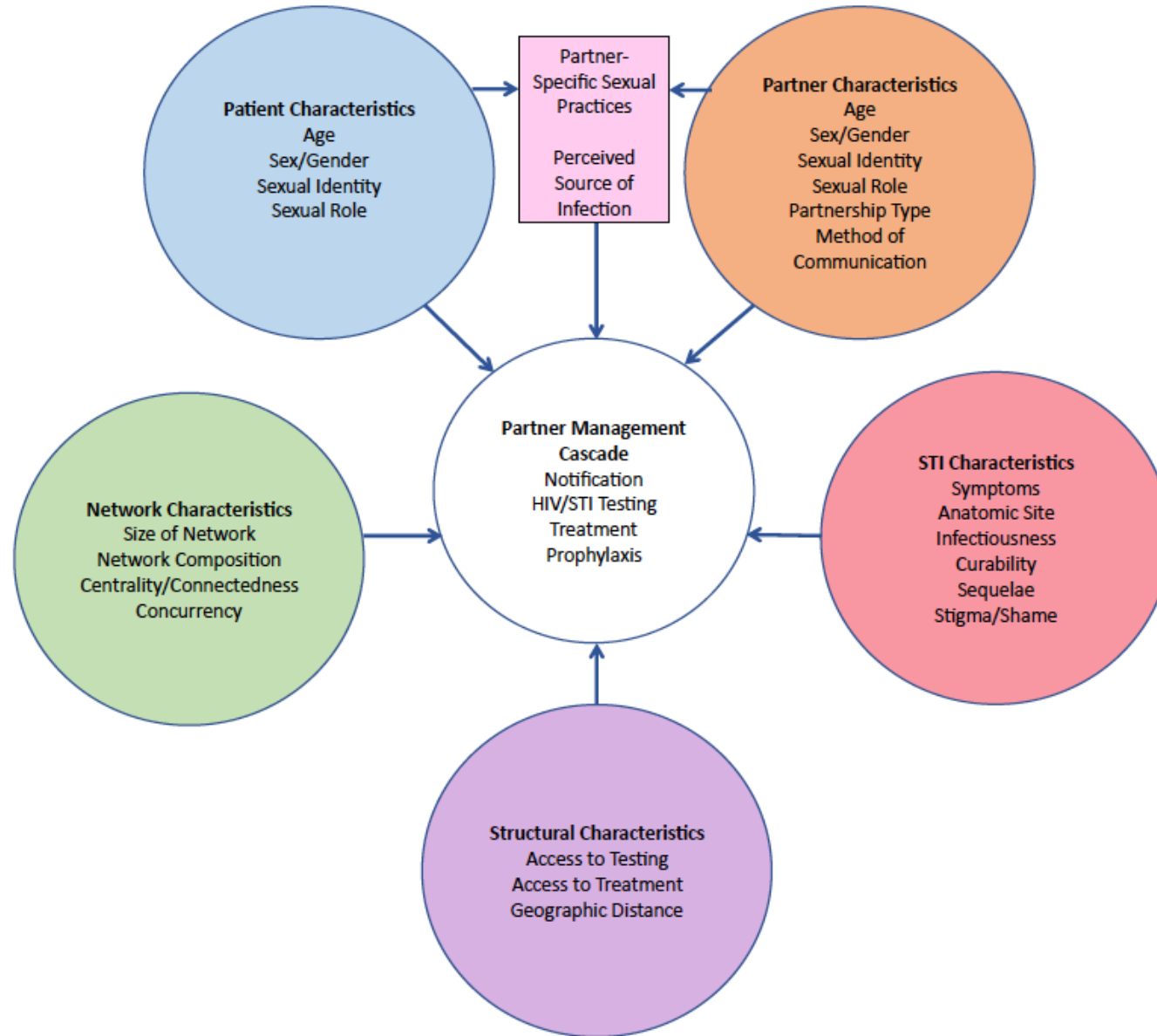
New partner:
This could be person with whom the index patient is likely to have had sex on more than one occasion. Their relationship may be characterised by some or all of the following features: little/no past, growing romantic emotional connection and intentions to form a stable relationship in the future.

Occasional partner:
This could be a person with whom the index patient has had sex on more than one occasion and with whom there is an expectation of sex again, on a sporadic or regular basis. Their relationship may be characterised by some or all of the following features: no or low anticipation of a stable partnership forming, no or minimal romantic emotional connection, sex for pleasure. It is likely that the partner/index patient is also engaging in concurrent sex with other partners/other partner types.

One-off partner:
This could be a person with whom the index patient has had sex on one occasion only, most likely for pleasure or recreation. Characteristics which might help identify this type of partner include: no past and no future, no anticipation of sex again, little/no romantic emotional connection.

Sex worker:
This could be a person to whom the index patient has provided money or goods in direct exchange for sexual services. The term sex worker encompasses a wide range of types of sex work with variable risks of STI & HIV transmission. Partners identified as sex workers by index patients may share characteristics with those suggested for one or more alternative partner types.

Partner Management Factors



Types of Partner Notification

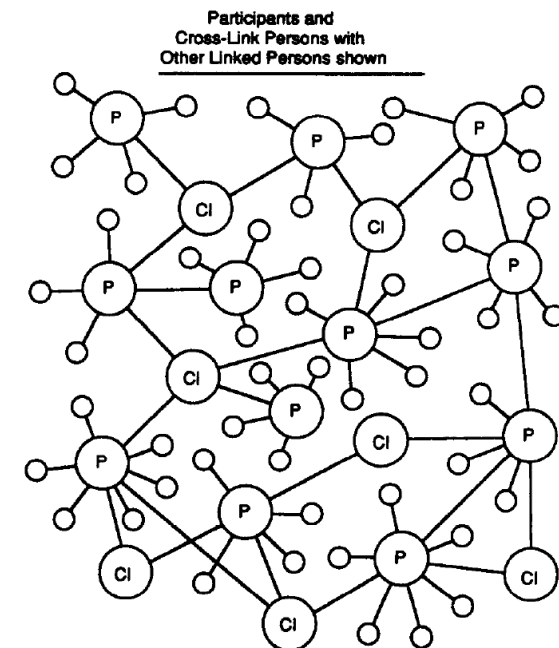
Three main types of PN recognized

- 1. First-party/Patient-Directed
 - Patient is encouraged to notify recent sex partners
- 2. Third-party/Provider Directed
 - Physician, nurse, or DIS staff notify partners identified by patient
- 3. Contract
 - Agreement that HCW will contact partners if patient has not already done so by a mutually agreed upon date
- Third Party notification more effective, but much more resource-intensive (Disease Intervention Specialists [DIS] in United States)
- First-party notification is standard of care in developing countries and new techniques are needed to support the practice

Sexual Network Structures

Partner management provides an opportunity for focused diagnosis and treatment of curable STIs within the larger population

- Targets efforts to the networks at highest risk for transmission
- Decreased cost and resource needs compared with non-specific, population-scale screening efforts
- Addresses likely co-transmission of HIV and other STIs
- Controlling transmission at the central nodes of a sexual network will control transmission in the larger population



Klovdahl et al., *Social Science and Medicine* 1993

Patient Case 1: Maria/Visit #1 (Annual Physical Exam)

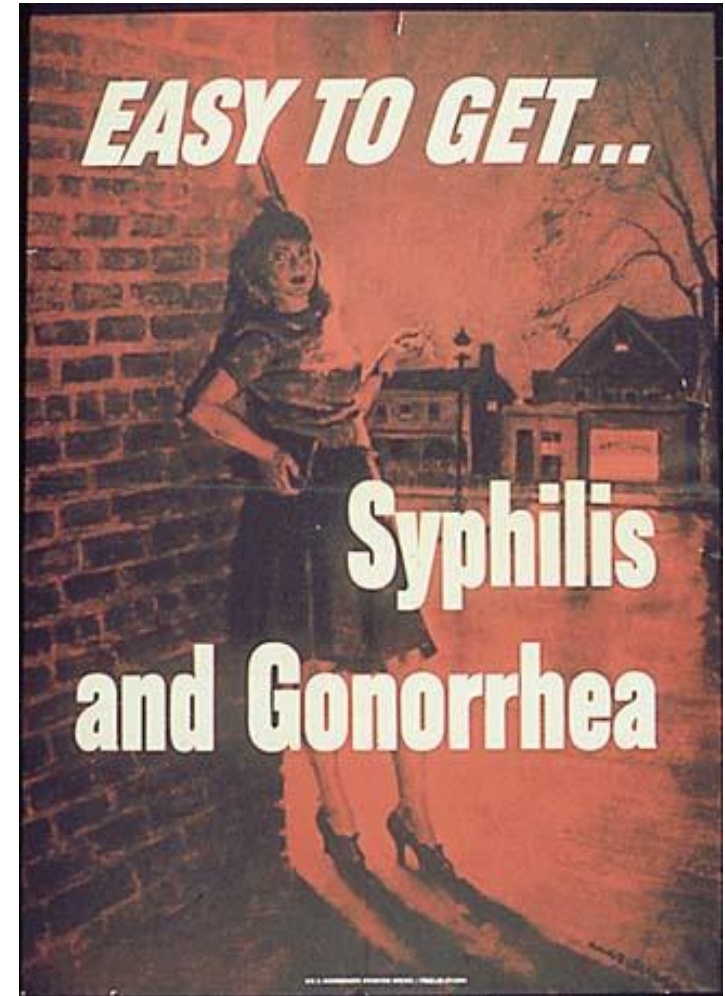
Maria

- 27 yo cis-gender woman
- Married to Jon for 3 months, no other sexual partners for > 1 year
- Actively trying to become pregnant, no birth control, urine pregnancy test negative
- Vaginal CT+ on routine screening (pap smear)
- Treated with Azithromycin 1g PO once
- Standard partner notification counseling

Patient Case 1: Maria Visit #2 (Test of Cure)

1 Month Later

- Test of cure performed on urine sample (lab visit only)
- Urine CT+
- Urine GC+



How Do You Solve A Problem Like Maria?

- You address her actual STI risk factors
- **Spoiler alert:** Maria isn't the problem here



Pregnant Women Living with HIV in Peru: Sexual Network Size

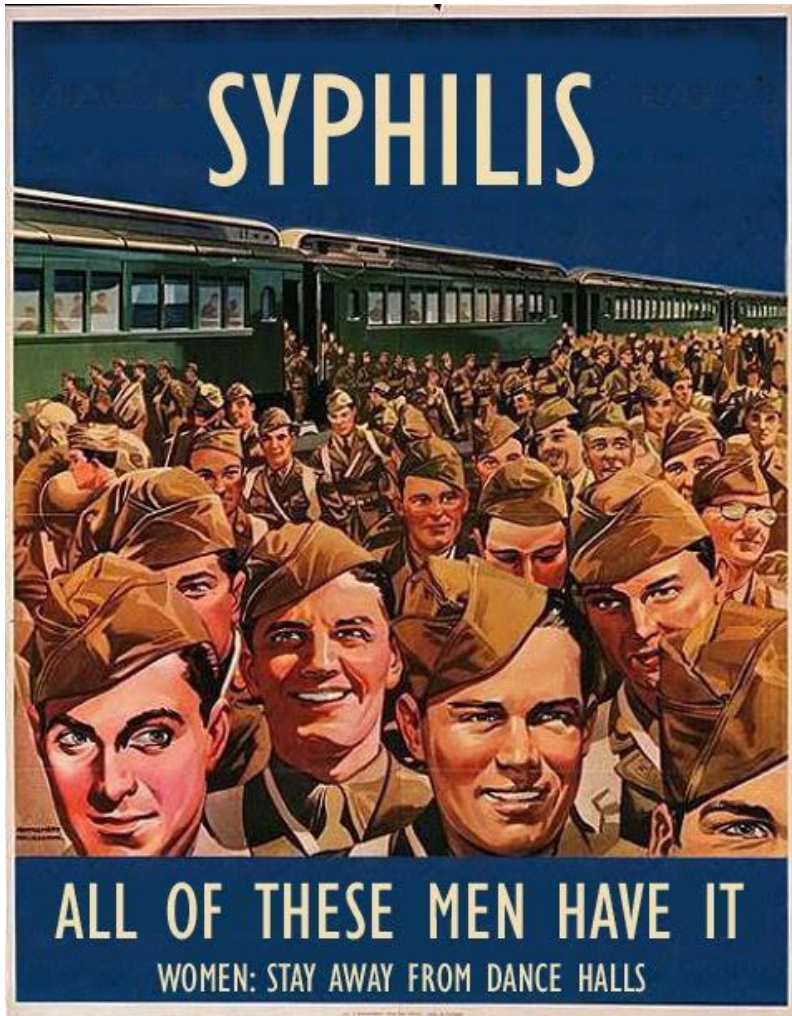


Table 3. Estimated mean sexual network sizes for HIV-seropositive and control group women through the second generation of partners.^a

	Mean number of male partners reported by pregnant women (G1)	Mean number of partners reported by male partner (excluding the pregnant women) (G2')	Mean total network size (G1 + G2)
Past year			
HIV seropositive	1.0	0.5	1.6
Control group 1	1.0	0.1 ^b	1.1 ^b
Control group 2	1.1	0.2	1.3
Past five years			
HIV seropositive	1.4	4.5	8.4
Control group 1	1.2	1.2 ^b	2.5 ^b
Control group 2	1.2	0.6 ^b	1.9 ^b
Lifetime			
HIV seropositive	2.3	7.9	21.9
Control group 1	1.5	3.8 ^b	6.8 ^b
Control group 2	1.5	4.2	8.0

^aEstimated sexual network size for each woman = $G1 + G2 = G1 + (G1 \times G2')$ where G1 is the mean number of first generation partners reported per pregnant women, and G2' is the mean number of partners of the most recent partner of the pregnant woman (see Methods). ^bDiffers from the HIV-positive group at $P < 0.05$.

Pregnant Women Living with HIV in Peru: Sexual Risk Behavior

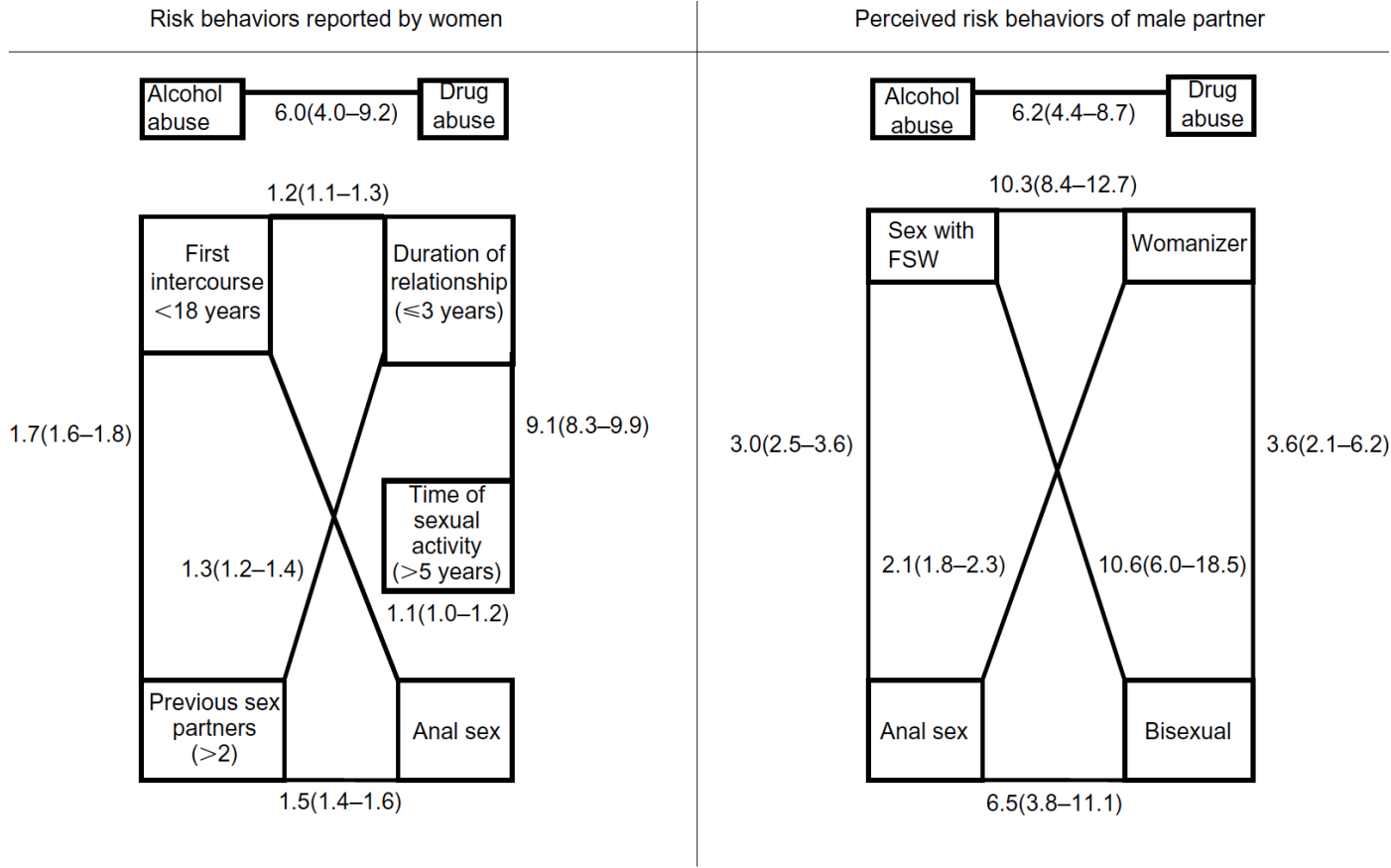


Fig. 1. Interrelationships of behavioral risk factors of women, and of their male partner (as perceived by the women). Numbers show odds ratios (95% confidence interval); risk behavior variables of partners were coded as Yes or No.

- In these cases, the primary risk factor for the index patient is their primary (or only) sexual partner
- Emphasizes the importance of partner notification and treatment in “closed circuit” networks
- Important to address in preventing congenital STIs among pregnant women

There is always this machismo among men, like they don't value you and they think that they know everything, and they think that they are the boss. But as women, as a wife, we have the right to speak up about these things and to have opinions. And we must, like brave women we must, if we are going to be able to confront these things. And if we are not brave and if we keep having fear, we will always be sick. Always we will be sick with these diseases.

It was a little difficult telling him, but, I had to tell him because if I didn't, and he didn't get the treatment, it would have been my fault. And then if he didn't get the treatment he would just turn around and re-infect me all over again. And if someone hides it from their partner, maybe one day he finds out in some other way.

Klisch et al., *Social Science and Medicine* 2006

Power Dynamics and Partner Violence

- Many sexual partnerships have an implicit power differential that structures the partnership (cis-male/cis-female, transwoman/cis-male, gay-*pasivo* cis-male/*nongay-activo* cis-male)
- Potential for violence or abuse following notification is a common fear but fortunately not a common outcome

“... At first I was afraid, afraid that he would probably yell at me or that I would be physically abused”

“... I had fear, I feared that he would tell me I was a liar or something ... fear that he would get upset or that he would somehow want to hurt me”

Diaz-Olavarietta et al., *STD* 2007

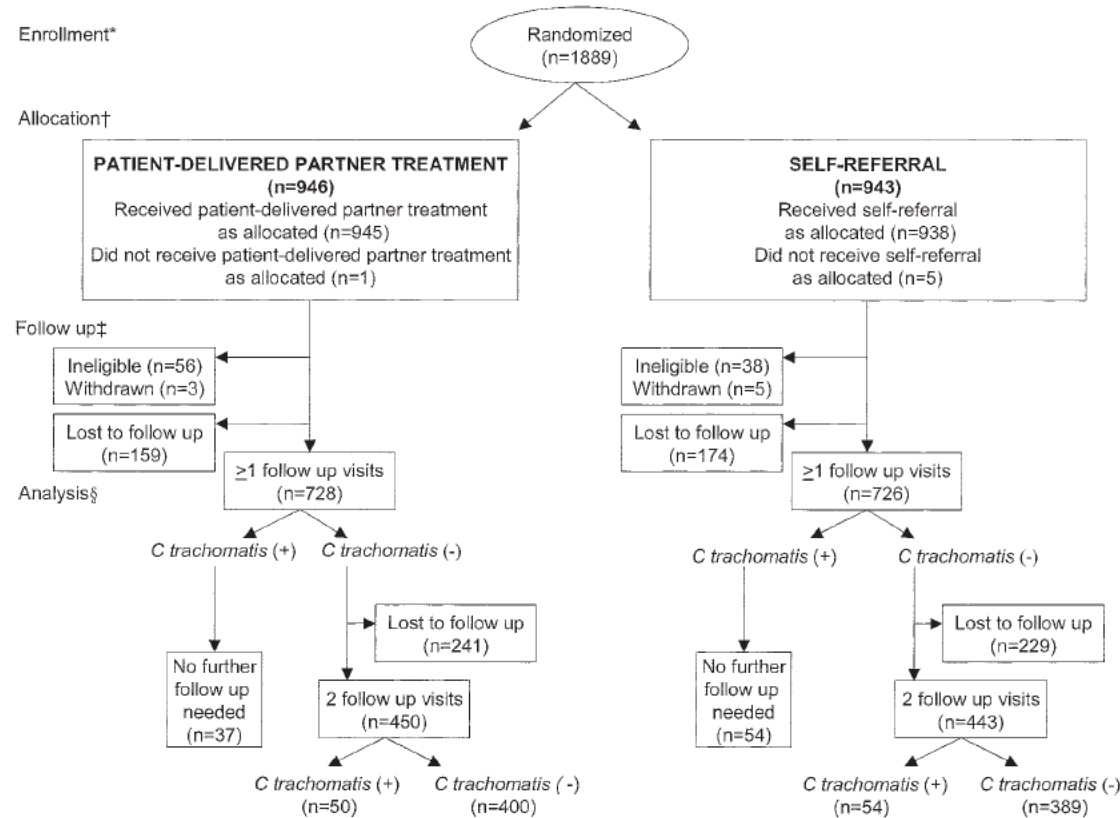
- Assessment of potential for violence or abuse should be performed and the safety of the patient prioritized in all cases

Patient Case 1: Maria Visit #3 (Post-Test Counseling)

After Results Available

- Thorough sexual history: No partners other than Jon for > 2 years
- HIV Ab negative
- RPR negative
- Treated with Ceftriaxone 250 mg IM Once and Doxycycline 100 mg PO BID x 7 d
- Partner Treatment Packet (Azithromycin and Cefixime) for Jon

PDPT for Women with Vaginal CT



→ **1,889 Women Enrolled**
(How Many Screened?)

→ **333 (18%) Women Lost**
After Enrollment Visit

→ **470 (25%) Women Lost**
After F/U 1 Visit

TABLE 2. Chlamydial Infections Detected at Follow-Up Visits, by Baseline Characteristics and Study Arm

Characteristic	Chlamydial Infections Detected at Follow-Up, Per Group					
	Patient-Delivered Partner Treatment			Self-Referral		
	N	n	(%)	N	n	(%)
Total	728	87	(12)	726	108	(15)*
Age (y)						
14–19	391	50	(13)	338	58	(17)
20–24	222	30	(14)	252	32	(13)
25–29	90	4	(4)	93	10	(11)
30–34	25	3	(12)	41	8	(20)
Race						
White	163	18	(11)	183	23	(13)
Black	447	54	(12)	417	63	(15)
American Indian	15	1	(7)	27	3	(11)
Asian Pacific Islander	36	9	(25)	41	6	(15)
Other	40	5	(13)	38	7	(18)
Unknown	26	0	(0)	20	6	(30)
Hispanic ethnicity						
Yes	117	9	(8)	118	21	(18)
No	610	78	(13)	608	87	(14)
No. of named sex partners in previous 2 months						
1	591	65	(11)	576	80	(14)
2	118	20	(17)	110	19	(17)
3	13	1	(8)	28	5	(18)
≥ 4	6	1	(17)	12	4	(33)
Research center						
Birmingham	82	10	(12)	83	10	(12)
Indianapolis	74	12	(16)	72	15	(21)
New Orleans	231	21	(9)	225	26	(12)
Southern/Northern California	189	20	(11)	189	28	(15)
Seattle	152	24	(16)	157	29	(18)
One partner, considered “steady”	522	59	(11)	515	70	(14)
All other women [†]	206	28	(14)	211	38	(18)
Lives with partner [‡]						
Yes	142	13	(9)	139	19	(14)
No	449	52	(12)	437	61	(14)
Adherence to the intervention [‡]						
Gave partner medication/referral sheet	505	56	(11)	432	62	(14)
Did not give medication/referral sheet	86	9	(10)	144	18	(13)
New sex partner reported at follow-up visit [§]						
Yes	167	24	(14)	201	22	(11)
No	561	63	(11)	525	86	(16)

*Relative risk = 0.80, 95% CI = 0.62–1.05; $P = 0.102$.

[†]Includes women with one partner who is not characterized as steady and all women with more than one partner.

[‡]Among 1167 women with one partner only.

[§]As reported at follow-up visits after treatment.

PDPT for Male Urethritis

Table 2. Behavioral and sexual outcomes for subjects in a study of patient-delivered partner treatment (PDPT) for male urethritis, by intervention arm.

Outcome	Intervention arm, % of subjects				<i>P</i>	
	PDPT (<i>n</i> = 705)	BEPR (<i>n</i> = 707)	PR (<i>n</i> = 579)	Total (<i>n</i> = 1520)	PDPT arm vs. BEPR arm	PDPT vs. PR arm
Behavioral outcome						
Subject saw partner	65.1	53.7	54.4	57.8	.002	.005
Subject talked to partner about infection	70.6	52.8	49.1	57.8	.001	.001
Subject checked to see whether partner was treated	63.7	46.8	43.0	51.5	.001	.001
Partner reported to index patient that the medication was taken	55.8	45.6	35.0	46.0	.007	.001
Subject saw partner taking the medication	48.2	32.6	27.1	36.4	.001	.001
Subject gave intervention to partner	69.7	58.3	49.0	59.4	.005	.001
Sexual outcome						
Subject had unprotected sex before partner took medication	8.4	10.2	12.7	10.3	.36	.04
Subject reinitiated sex with baseline partner	34.6	35.3	36.9	35.5	.83	.50
Subject had unprotected sex with any partner ^a	26.5	31.7	34.6	30.8	.19	.05

NOTE. *P* values are from unadjusted (bivariate) generalized estimating equations. BEPR, booklet-enhanced partner referral; PR, partner referral.

^a Analysis conducted by index patient rather than by partnership (*n* = 779).

Kissinger et al., *CID* 2005

Table 4. Multivariable model of factors associated with positive results of a follow-up test for sexually transmitted diseases.

Characteristic	Percentage of subjects positive for <i>Neisseria gonorrhoeae</i> or <i>Chlamydia trachomatis</i> (n = 289)	OR (95% CI)	
		Unadjusted	Adjusted
Age, years			
<24	31.5	1.84 (1.07–3.18) ^a	2.00 (1.12–3.57) ^a
≥24	20.0	1.00	1.00
Intervention arm ^b			
BEPR	14.3	0.22 (0.11–0.45) ^c	0.22 (0.11–0.44) ^c
PDPT	23.0	0.40 (0.21–0.78) ^a	0.38 (0.19–0.74) ^c
PR	42.7	1.00	1.00

NOTE. BEPR, booklet-enhanced partner referral; PDPT, patient-delivered partner treatment; PR, partner referral.

^a $P < .05$.

^b If all men are considered in the denominator (and if patients who did not provide a follow-up urine specimen were considered to have negative test results), the percentages of men are as follows: BEPR arm, 4.6%; PDPT arm, 5.8%; and PR arm, 12.3% ($P < .01$).

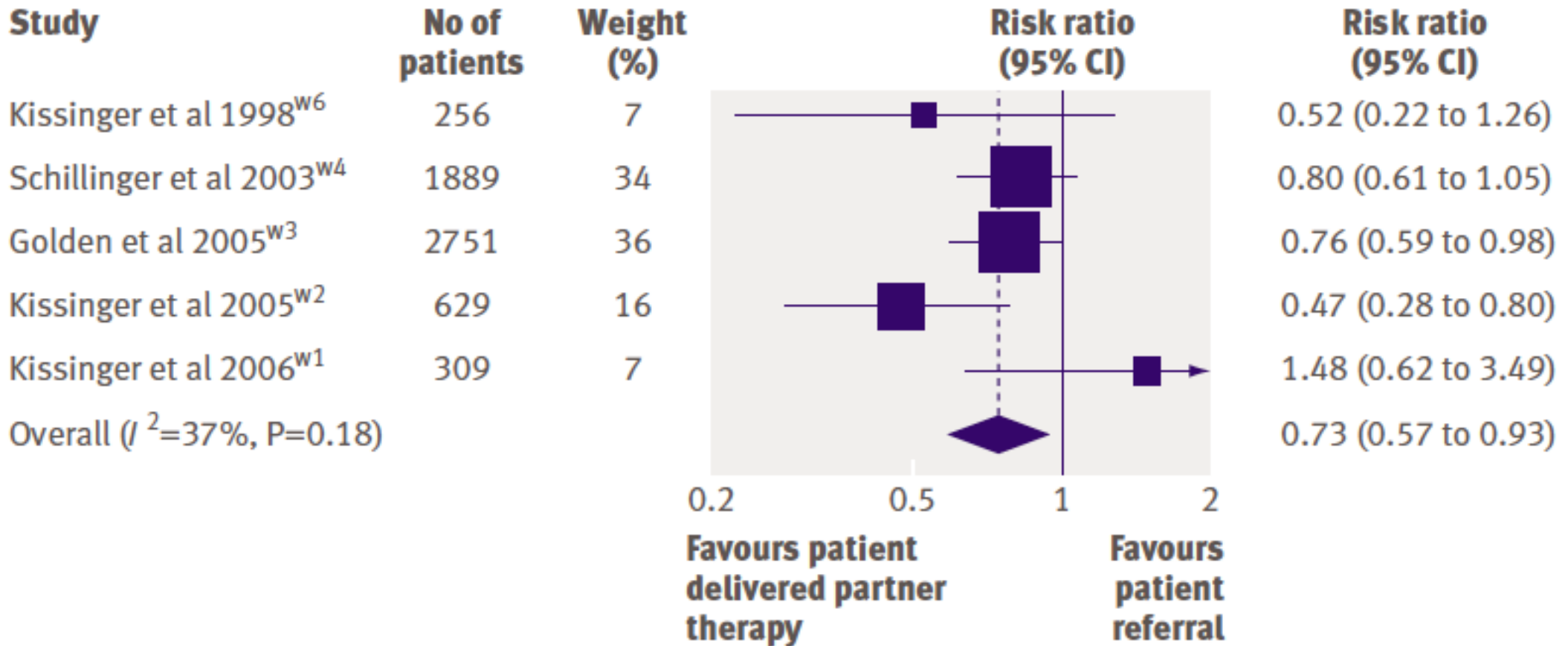
^c $P < .001$.

Table 3. Persistent or Recurrent Gonorrhea and Chlamydial Infection.

Variable	Expedited Treatment of Partner	Standard Referral of Partner	Unadjusted Relative Risk (95% CI)*
	<i>no./total no. (%)</i>		
Either gonorrhea or chlamydial infection†	92/929 (10)	121/931 (13)	0.76 (0.59–0.98)
Men	13/194 (7)	24/202 (12)	0.56 (0.30–1.08)
Women	79/735 (11)	97/729 (13)	0.81 (0.61–1.07)
Gonorrhea‡	6/179 (3)	19/179 (11)	0.32 (0.13–0.77)
Men	3/72 (4)	8/85 (9)	0.44 (0.12–1.61)
Women	3/107 (3)	11/94 (12)	0.25 (0.07–0.83)
Chlamydial infection‡	86/797 (11)	105/798 (13)	0.82 (0.62–1.07)
Men	10/132 (8)	17/135 (13)	0.60 (0.29–1.27)
Women	76/665 (11)	88/663 (13)	0.86 (0.65–1.15)

Golden et al., *NEJM* 2005

Persistent or recurrent infections



Partner Treatment: EPT

- Expedited Therapy (EPT) or Patient-Delivered Partner Therapy (PDPT) provides antibiotic therapy to partners of index cases with curable STIs
- Removes structural barrier to testing/treatment and potentially provides an individual/interpersonal incentive for notification
 - Single dose, partner-observed treatment
 - Success with heterosexuals diagnosed with GC/CT, Trichomonas, Urethritis
 - CDC recommendation for management of STIs in heterosexual patients: Cefixime 400 mg PO/Azithromycin 1g PO
 - But not yet for partners of MSM
 - And maybe not for cases of pharyngeal GC...? Or any GC? Or CT?
 - What about the effect of non-Rx tools to support partner notification?

Changes in CDC Recommendations for STI Treatment-Chlamydia

TABLE 2. Number and Proportion of Repeat Positive Rectal Chlamydia Tests (i.e., Persistent/Recurrent Infection), by Therapy Received and Timing of Repeat Test

Time of Repeat Test*	Azithromycin, n/N [†] (%)	Doxycycline, n/N [†] (%)	<i>P</i> [‡]	Unadjusted RR§ (95% CI)	Adjusted RR§, ¶ (95% CI)
14–30 d	4/53 (7.6)	0/20 (0.0)	0.570	—	—
14–60 d	23/136 (16.9)	0/36 (0.0)	0.005	—	—
14–90 d	50/230 (21.7)	2/56 (3.6)	0.001	5.2 (1.3–20.8)	5.2 (1.3–21.0)
14–180 d	88/407 (21.6)	8/95 (8.4)	0.002	2.3 (1.2–4.6)	2.4 (1.2–4.8)

Khosropour et al., *STD*, 2014

Changes in CDC Recommendations for STI Treatment-Gonorrhea

Table 2. Repeat Test Positivity by Treatment Regimen and Timing of Repeat Test

Treatment Regimen	7–45 d	46–90 d	91–180 d	Total, 7–180 d	Relative Risk (95% CI)	Adjusted ^a Relative Risk (95% CI)	P Value
Combination therapy with ceftriaxone	2/22 (9.1)	3/19 (15.8)	2/21 (9.5)	7/62 (11.3)	1.62 (.62–4.27)	1.20 (.43–3.33)	.731
Ceftriaxone + azithromycin	2/21 (9.5)	3/19 (15.8)	2/20 (10.0)	7/60 (11.7)			
Ceftriaxone + doxycycline	0/1 (0)	...	0/1 (0)	0/2 (0)			
Combination therapy with oral cephalosporins + azithromycin	3/44 (6.8)	2/30 (6.7)	3/41 (7.3)	8/115 (7.0)	Reference group ^b	Reference group ^b	...
Cefixime + azithromycin	2/24 (8.3)	0/11 (0)	1/15 (6.7)	3/50 (6.0)			
Cefpodoxime + azithromycin	1/20 (5.0)	2/19 (10.5)	2/26 (7.7)	5/65 (7.7)			
Combination therapy with oral cephalosporins + doxycycline	7/16 (43.8)	4/11 (36.4)	3/15 (20.0)	14/42 (33.3)	4.79 (2.16–10.6)	4.18 (1.64–10.7)	.003
Cefixime + doxycycline	5/12 (42.7)	3/8 (37.5)	1/11 (9.1)	9/31 (29.0)			
Cefpodoxime + doxycycline	2/4 (50.0)	1/3 (33.3)	2/4 (20.0)	5/11 (45.5)			
Oral cephalosporin monotherapy	12/24 (50.0)	2/11 (18.2)	3/22 (13.6)	17/57 (29.8)	4.29 (1.97–9.35)	3.98 (1.70–9.36)	.002
Cefixime	4/15 (26.7)	1/6 (16.7)	0/3 (0)	5/24 (20.8)			
Cefpodoxime	8/9 (88.9)	1/5 (20.0)	3/19 (15.8)	12/33 (33.4)			
Ceftriaxone monotherapy	3/18 (16.7)	0/8 (0)	1/18 (5.6)	4/44 (9.1)	1.31 (.41–4.13)	0.81 (.18–3.60)	.786
Azithromycin (1 or 2 g) monotherapy	1/8 (12.5)	0/4 (0)	1/3 (33.3)	2/15 (13.3)			
Fluoroquinolone (± azithromycin)	2/7 (28.6)	0/6 (0)	0/10 (0)	2/23 (8.7)			
Doxycycline monotherapy	...	0/1 (0)	0/1 (0)	0/2 (0)			
Total repeat tests (n = 360)							

Barbee et al., *CID*, 2013

What is the population-level impact of EPT and cephalosporin-resistant GC?

Effect of Change in Gonorrhea Treatment Practices to Promote Intramuscular Therapy, Assuming Oral Therapy is 75% Curative for Decreased Susceptibility *N. gonorrhoeae*

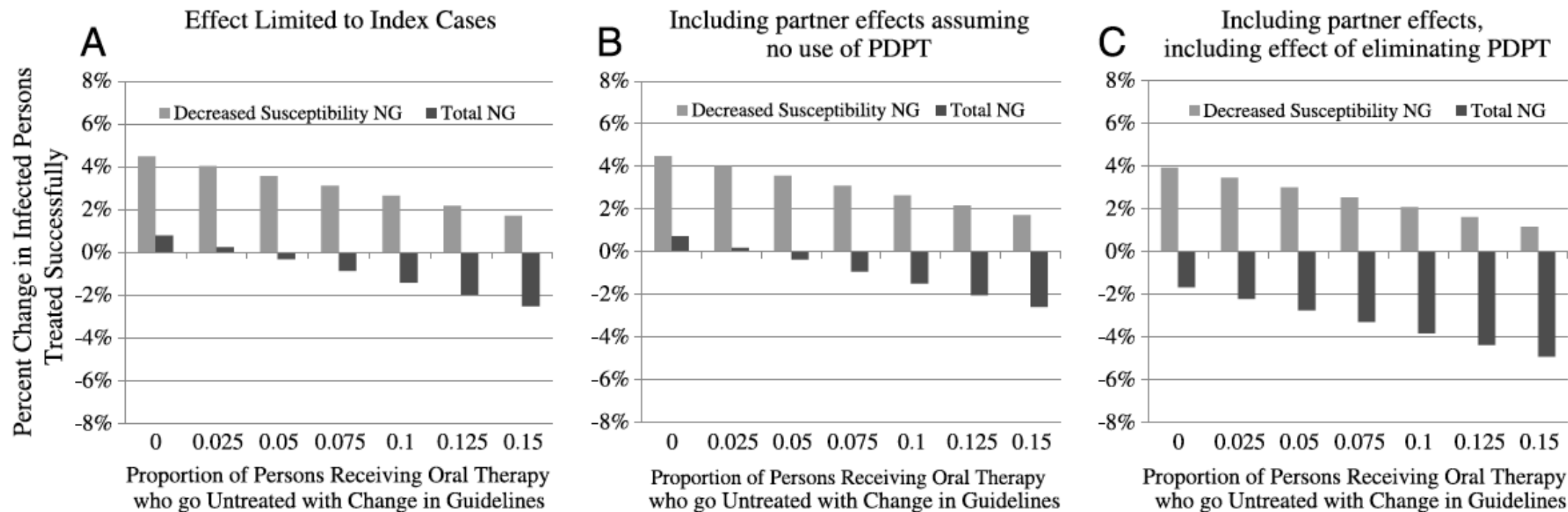


Figure 2. Effect of change in gonorrhea treatment practices to promote intramuscular therapy, assuming oral therapy is 75% curative for decreased susceptibility *N. gonorrhoeae*.

RCT of EPT for Pregnant Women with CT Infection

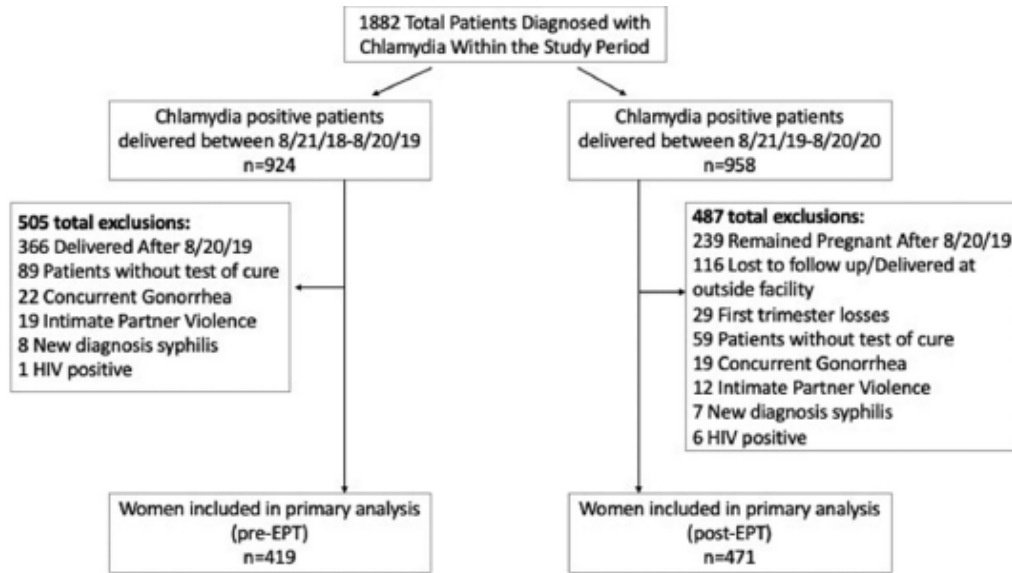


TABLE 2

Primary and secondary outcomes before and after the implementation of the EPT program for CT

Outcomes	Before EPT (n=419)	After EPT (n=471)	Odds ratio (95% confidence interval): post-EPT group vs pre-EPT group	P value
Primary outcome				
CT reinfection during pregnancy	61 (15.0)	60 (13.0)	0.86 (0.58–1.26)	.43
Secondary outcomes				
PROM	68 (16.0)	64 (14.0)	0.81 (0.56–1.18)	.27
Chorioamnionitis	72 (17.0)	68 (14)	0.81 (0.57–1.17)	.26
Endometritis	7 (2.0)	1 (0.2)	0.13 (0.02–1.02)	.02
Wound infection	3 (1.0)	2 (0.4)	0.59 (1.10–3.56)	.56
NICU admission	55 (13.0)	50 (11.0)	0.79 (0.52–1.18)	.25
Neonatal pneumonia	7 (2.0)	6 (1.0)	0.76 (0.25–2.28)	.62
Neonatal sepsis	2 (0.5)	1 (0.2)	0.44 (0.04–4.91)	.50
Neonatal conjunctivitis	4 (1.0)	2 (0.4)	0.44 (0.08–2.43)	.33

Data are presented as number (percentage), unless otherwise indicated.

CT, Chlamydia trachomatis; EPT, expedited partner therapy; NICU, neonatal intensive care unit; PROM, premature rupture of membranes.

Zofkie et al. Chlamydia expedited partner therapy in pregnancy. Am J Obstet Gynecol 2021.

Check It: Community-Based CT Screening and EPT for Heterosexual African-American Men in New Orleans

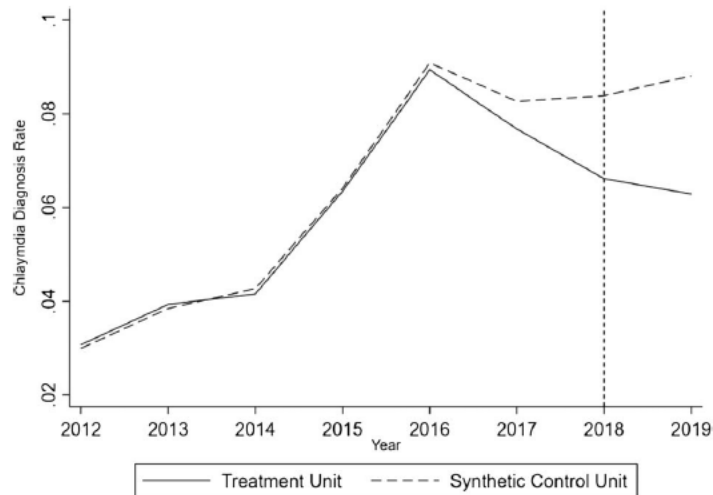


Figure 1. Trend deviation for chlamydia test positivity rates in Medicaid data in young Black women between Orleans Parish and synthetic Orleans Parish, all parishes. Results were obtained from comparing Orleans Parish with a synthetic version of Orleans Parish. The vertical dotted line in 2018 shows the first full year of *Check It* implementation. *Check It* was partially implemented in 2017. Data are from Medicaid claims for Black women between 15 and 24 years of age and span all parishes in Louisiana.

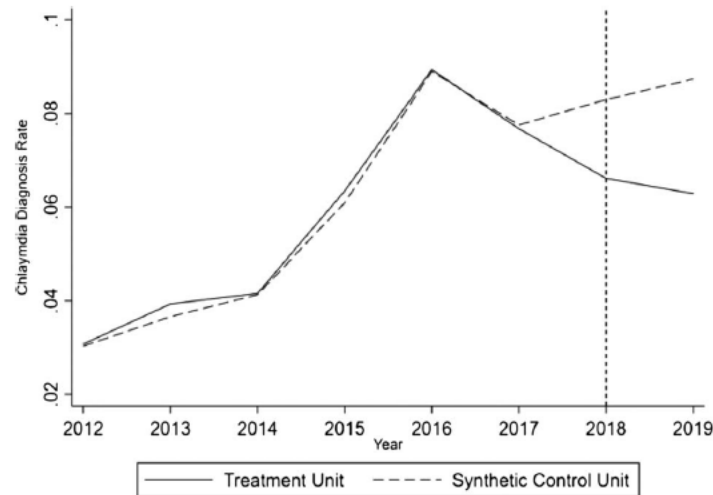


Figure 2. Trend deviation for chlamydia test positivity rates in Medicaid data in young Black women between Orleans Parish and synthetic Orleans Parish, parishes with the largest Black populations. Results were obtained from comparing Orleans Parish with a synthetic version of Orleans Parish. The vertical dotted line in 2018 shows the first full year of *Check It* implementation. *Check It* was partially implemented in 2017. Data are from Medicaid claims for Black women between 15 and 24 years of age and span the 40 parishes Louisiana with the largest Black populations.

- Community-based CT screening for AA men in local venues
- EPT (PDPT or electronic prescription) for female partners of CT+ cases
- 1,291 Testing Events Performed
- 2,496 Screened/1,736 Enrolled
- 193 CT+ Cases Diagnosed
- Impact of program on community-level CT incidence among hetero women estimated

TABLE 1. Impact of *Check It* Program on Chlamydia Rates in Women

Year	Orleans	Synthetic	Difference
Panel A: All Louisiana parishes			
2018	6.61%	8.39%	1.77%
2019	6.29%	8.80%	2.51%
Panel B: 40 Parishes with the largest Black population			
2018	6.61%	8.30%	1.69%
2019	6.29%	8.73%	2.44%

Shown here is the difference in chlamydia testing rates between Orleans Parish and a synthetic version of Orleans Parish in post-*Check It* program years. Data are from Medicaid claims for Black women aged 15 to 24 years in the specified year. Panel A shows results when using all parishes as potential contributors to the synthetic version of Orleans. Panel B limits potential synthetic contributors to the 40 parishes with the largest Black populations.

Stoecker et al., *STD*, 2022

Community-Based Cluster-Randomized Trial of EPT for GC/CT Management

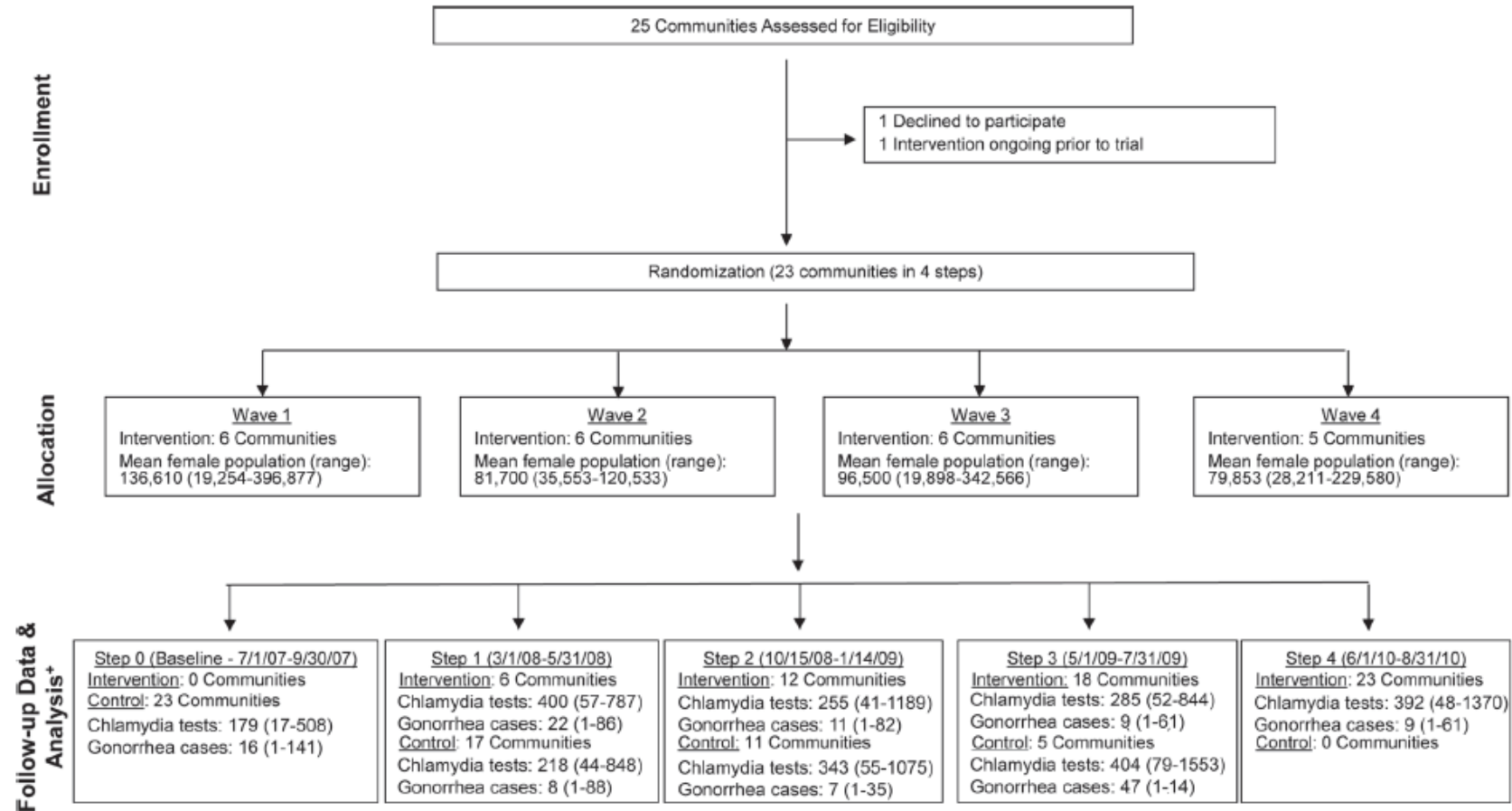


Figure 1. Study flow diagram. Modified for stepped-wedge design from suggested CONSORT criteria format for cluster randomized trials [47]. *Numbers of tests and cases presented as means with ranges.

GC/CT Incidence Lower, But Not Significantly

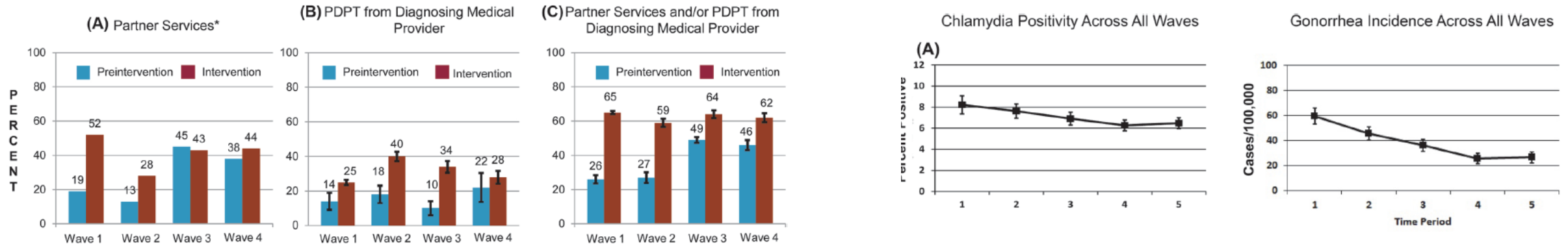
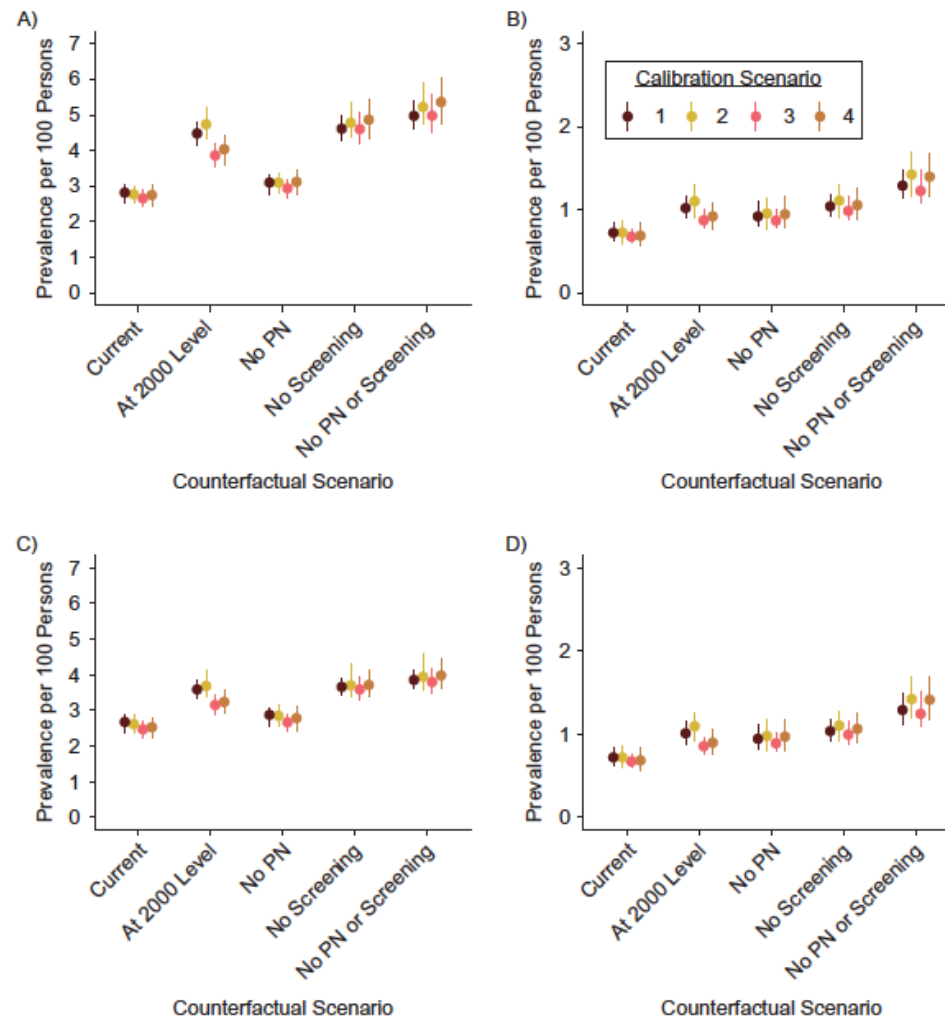


Figure 3. Percentage of persons with gonorrhea or chlamydial infection who received components of the study intervention in periods before and during the study intervention, by study wave. Percentage of persons receiving (A) PDPT from their diagnosing clinician, (B) public health partner services, or (C) either PDPT or public health partner services. *The percentage of persons receiving partner services was directly measured and is not an estimate. Consequently, there are no confidence intervals on data for this outcome.

Table 5. Association of the study intervention with chlamydia test positivity and reported gonorrhea incidence in women.

Study Outcome	Prevalence/Rate Ratio (95% CI)	p-Value
Chlamydia positivity in women ages 14–25 y	0.89 (0.77–1.04)	0.15
Reported gonorrhea incidence in women	0.91 (0.71–1.16)	0.45
Combined chlamydia positivity and gonorrhea incidence	0.90 (0.80–1.01)	0.06

doi:10.1371/journal.pmed.1001777.t005



Counter-factual assessment of population-level reductions in Chlamydia prevalence from 2000-2015 among hetero women and men following screening and PN measures implemented in 2000

- A: Women 15-24 yo
- B: Women 25-54 yo
- C: Men 25-24 yo
- D: Men 25-54 yo

Figure 3. Model-estimated prevalence of chlamydia infection (mean values (circles) and 95% credible intervals (bars)) in the United States in 2015 in a calibrated model (current level) and in 4 counterfactual scenarios: 1) keeping screening at the year 2000 level, 2) no partner notification (PN), 3) no screening, and 4) no screening or PN. Results are presented for women aged 15–24 years (A), women aged 25–54 years (B), men aged 15–24 years (C), and men aged 25–54 years (D). Calibration scenario 1: more constrained priors on reporting and screening; calibration scenario 2: less constrained priors on reporting and more constrained priors on screening; calibration scenario 3: more constrained priors on reporting and less constrained priors on screening; calibration scenario 4: less constrained priors on reporting and screening.

Referral Cards as a Notification Tool (Heterosexual Partnerships)

- EPT packets included printed information for partner referral
- Printed card includes information on local testing/treatment resources as well as antibiotic side effects and contra-indications
- Advises against using the enclosed medication unless there is no other alternative
- **So... what is the impact of a referral card alone?**

LA County DPH STD Referral Cards

Your sex partner just told you that he/she has been diagnosed with chlamydia

- ➔ This infection is spread through vaginal, oral & anal sex
- ➔ If left untreated, it can cause serious health problems
- ➔ You may be infected and have no symptoms

Get Tested & Treated

Take this card to your doctor, clinic
or LA County STD clinic today

*For more information, clinic referrals, and free condoms,
call the STD Hotline 1-800-758-0880
or visit <http://publichealth.lacounty.gov/std>*

To the doctor or nurse:

The person with this card has been exposed to chlamydia.
The CDC recommends sexual contacts to chlamydia be treated
presumptively with:

Azithromycin 1 g orally in a single dose

-OR-

Doxycycline 100 mg orally twice a day for 7 days

Testing for gonorrhea, chlamydia, syphilis and HIV is also recommended

For complete CDC treatment guidelines and
other STD information, visit:
<http://lapublichealth.org/std/providers.htm>



EPT vs. Referral Cards: Meta-Analysis 1

Partners treated per elicited partner

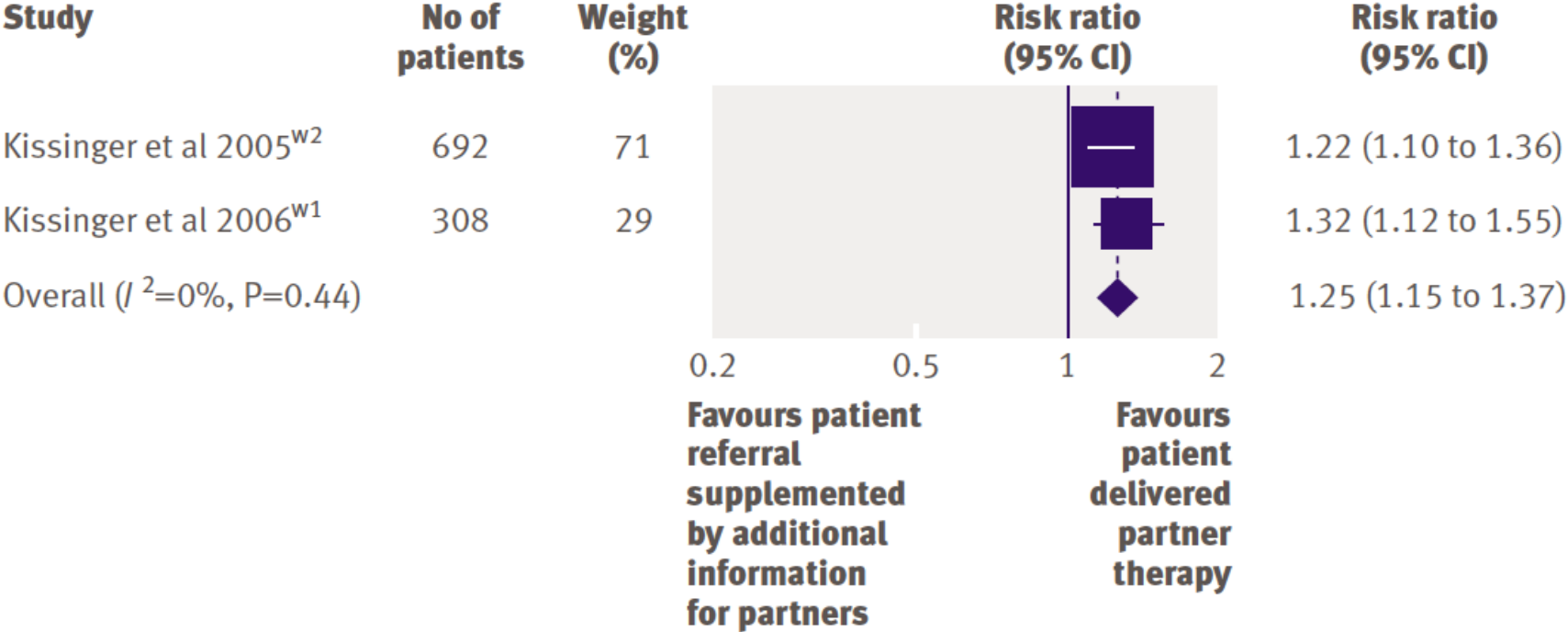


Fig 3 | Random effects meta-analysis of secondary outcome in trials comparing patient delivered partner therapy with patient referral supplemented by information for partners. Both trials had unclear or inadequate concealment of allocation

Trelle et al., *BMJ* 2007

EPT vs. Referral Cards: Meta-Analysis 2

Figure 7. Forest plot: 3 Expedited partner therapy versus simple patient referral, outcome 3.3 Number of partners notified.

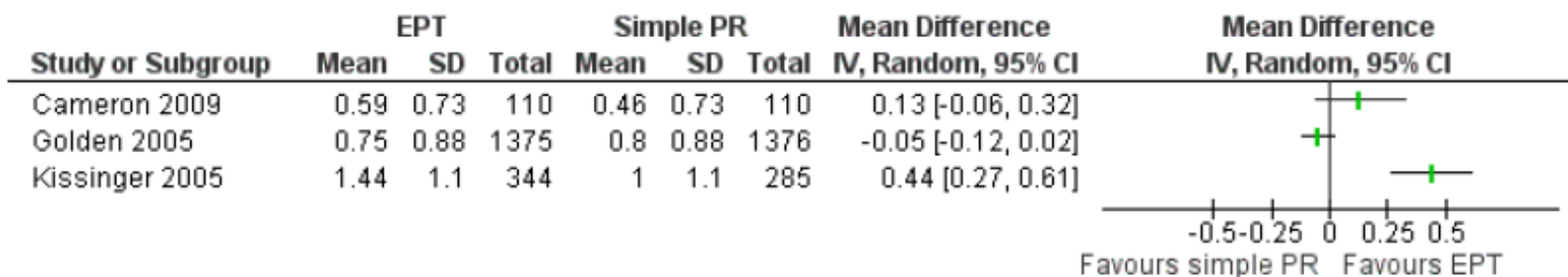
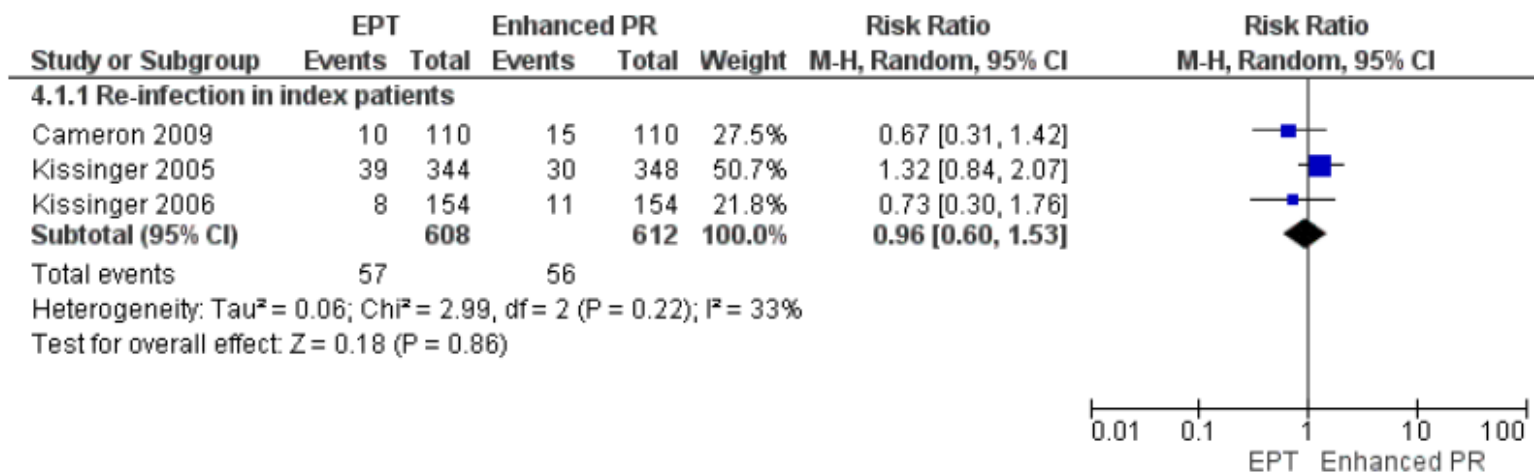


Figure 9. Forest plot: 4 Expedited partner therapy versus enhanced patient referral, outcome: 4.1 Re-infection in index patients.



Patient Case 2: Jon/Visit #1 (STI Testing)

Jon

- 28 yo cis-gender man
- Married to Maria for 3 months, initially denies any other sexual partners
- Did not take partner-delivered Abx, presents for testing
- Concerned about strange rash...

Jon/Visit #1: Physical Exam



Patient Case 2: Jon/Visit #1 (STI Testing)

Jon

- Treatment for secondary syphilis infection: Benzathine PCN G 1.2 million IU
- RPR 1:512
- Urethral CT+ (Doxycycline 100 mg PO BID x 7d)
- Pharyngeal GC+ (Ceftriaxone 500 mg IM Once)
- Rectal GC/CT-
- HIV Ab Neg (HIV-1 PCR Neg)
- Open discussion about sex, sexual partners, and STIs

Sample Partner Notification Worksheet

Partner #1

Partner Identifier (First Name or Other Description):

Partner Gender: Male/Female/Transfemale/Transmale

Partner Serostatus? HIV-Positive/HIV-Negative/Unknown

If HIV-positive, Partner on ARV's? Y N

If HIV-negative, Partner on PrEP? Y N

Partnership Type: Stable/Casual/Anonymous/Commercial-Worker/Commercial-Client

Anal Intercourse?	Y	N			Vaginal Intercourse?			
Insertive?	Y	N	With condom?	Y	N	Y	N	
Receptive?	Y	N	With condom?	Y	N	With condom?	Y	N

Partner Notification:

Able to notify partner? Y N

If yes, how (Mark all that apply)?

Face-to-Face Telephone Email SMS/Text Social Media (Facebook, GooglePlus, etc.)

Hook-up Site (Grindr, Manhunt, Adam-4-Adam, etc.) Other: _____

Willing to notify partner? Y N

If no, why not (Mark all that apply)?

Fear of rejection/break-up Fear of violence Fear that HIV/STI status will become public

Other: _____

If yes, why (Mark all that apply)?

Protect my health Protect partner's health Responsible thing to do Partner infected me

Other: _____

Patient Case 2: Jon/Visit #1 (STI Testing)

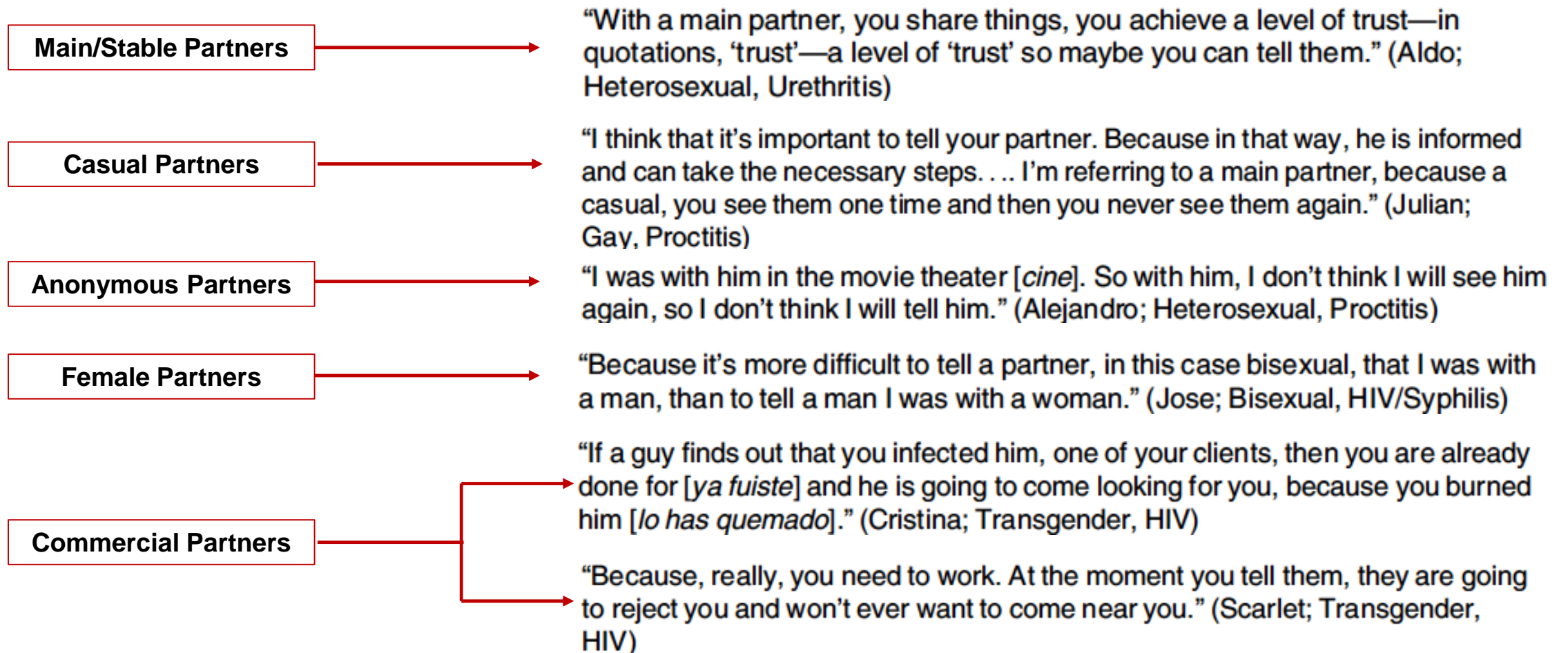
Jon

- Detailed sexual history
 - 1 Stable partner
 - Maria, Wife, 27 yo cis-F; Last contact 1 week ago
 - 2 Casual Partners
 - Rob, Coworker, 26 yo cis-M recurrent partner
 - Gay, Versatile, HIV- on PrEP, no known STIs, no condom use; Last contact 2 days ago
 - Jeff, College Friend, 28 yo cis-M single encounter
 - Hetero, Top, HIV status unknown not on PrEP, recently informed of GC, no condom use; Last contact 3 weeks ago
 - 1 Commercial Partner
 - Lucia, CSW, 24 yo transwoman recurrent partner
 - Trans, Receptive, HIV- on PrEP, no known STIs, routine condom use; Last contact 1 month ago
 - Multiple Anonymous Partners
 - >5 in past month, all cis-male, met at public sex and SOP venues while on business trips
 - Insertive/receptive oral/anal sex sometimes with condoms, usually not; Last contact 2 days ago

Stable and Casual Partner Management

- Face-to-Face Notification
 - EPT
 - Referral Cards
- Anonymous Notification
 - Provider Notification
 - Internet-Based PN
- Choice of method depends on relationship dynamics, communication patterns, perceived STI risk, and perceived ability to maintain anonymity

Notification Decisions and Partnership Types Among MSM and TW in Lima, Peru



Clark et al., *PLoS One* 2016

Table 3. Characteristics Associated with Unprotected Anal Intercourse in Recent Partnerships of MSM and TGW Diagnosed with HIV and/or STI; Lima, Peru 2011–2012.

	UAI with Partner (n=337)	No UAI with Partner (n=480)	p
	n (%)	n (%)	
Characteristics			
Age (Years) Mean; SD	31.0; 12.1	30.3; 14.5	0.36
Education			
Less than Complete Secondary School Education	77 (41.2)	110 (58.8)	0.97
Secondary School Graduate	120 (42.0)	166 (58.0)	
Higher education (University, Technical Institute, etc.)	140 (40.7)	204 (59.3)	
Participant Sexual Orientation/Gender Identity			
Heterosexual	5 (35.7)	9 (64.3)	0.49
Bisexual	56 (49.1)	58 (50.9)	
Homosexual	216 (39.6)	329 (60.4)	
Transgender	57 (41.9)	79 (58.1)	
Participant Sexual Role During Intercourse			
Activo (Insertive)	41 (48.2)	44 (51.8)	0.56
Pasivo (Receptive)	143 (41.2)	204 (58.8)	
Moderno (Versatile)	153 (39.9)	230 (60.1)	
Transactional Sex Within Last 3 Months			
Yes	103 (36.3)	181 (63.7)	0.15
No	224 (43.2)	294 (57.8)	
Perceived Partner Sexual Orientation/Gender Identity			
Heterosexual	46 (43.8)	59 (56.2)	0.61
Bisexual	135 (43.1)	178 (56.9)	
Homosexual	124 (38.3)	200 (61.7)	
Transgender	9 (50.0)	9 (50.0)	
Perceived Partner Sexual Role During Intercourse			
Activo (Insertive)	182 (42.5)	246 (57.5)	0.74
Pasivo (Receptive)	46 (38.0)	75 (62.0)	
Moderno (Versatile)	105 (40.5)	154 (59.5)	
Partner Type			
Stable	139 (60.7)	90 (39.3)	<0.05
Non-Stable/Non-Transactional (Casual or Anonymous)	157 (34.4)	299 (65.6)	
Transactional (Sex Client or Sex Worker)	35 (28.9)	86 (71.1)	
Number of Previous Sexual Encounters with Partner			
1	75 (32.1)	159 (76.9)	<0.05
2 to 3	72 (35.8)	129 (64.2)	
4 to 10	67 (42.4)	91 (57.6)	
>10	120 (55.1)	98 (44.9)	

“The Risk of Stable Partners”

Table 3 Participant- and partner-level characteristics associated with perception of the partner as a likely HIV/STI source among recently diagnosed MSM/TW; Lima, Peru, 2011

Characteristics	Crude prevalence ratio (<i>n</i> = 993)	95 % CI	<i>p</i>	Adjusted prevalence ratio ^a (<i>n</i> = 743)	95 % CI	<i>p</i>
Age (years)	1.00	0.99–1.02	0.64	1.00	0.99–1.02	0.91
Education						
Less than high school	Ref	–	–	Ref	–	–
Completed high school	1.25	0.85–1.83	0.26	0.88	0.60–1.30	0.53
Higher education ^b	1.42	0.98–2.05	0.06	1.00	0.69–1.44	0.99
Respondent sexual orientation/gender identity						
Heterosexual	Ref	–	–	Ref	–	–
Bisexual	0.51	0.32–0.81	<0.05	0.52	0.30–0.90	<0.05
Homosexual	0.40	0.27–0.59	<0.05	0.47	0.31–0.73	<0.05
Transgender	0.26	0.15–0.46	<0.05	0.37	0.19–0.70	<0.05
STI diagnosis						
Any non-HIV STI	Ref	–	–	Ref	–	–
HIV	0.80	0.56–1.13	0.20	0.82	0.56–1.21	0.32
HIV plus any other STI	1.06	0.78–1.46	0.70	0.95	0.69–1.30	0.75
Partner sexual orientation/gender identity						
Heterosexual	Ref	–	–	Ref	–	–
Bisexual	1.53	0.94–2.50	0.08	1.49	0.85–2.61	0.16
Homosexual	2.33	1.46–3.70	<0.05	2.07	1.19–3.61	<0.05
Transgender	3.71	2.02–6.80	<0.05	2.84	1.48–5.44	<0.05
Partnership type						
Stable	Ref	–	–	Ref	–	–
Casual	0.83	0.64–1.07	0.16	1.05	0.77–1.42	0.77
Commercial	0.43	0.26–0.70	<0.05	0.71	0.44–1.16	0.17
Unprotected anal intercourse	2.93	2.17–3.97	<0.05	3.2	2.28–4.46	<0.05

Sexual Identity and Perceived Source of STI Transmission Risk

EPT for Partners of MSM

- Use of PDPT among MSM currently limited by concerns surrounding missed opportunities to detect undiagnosed HIV and syphilis infection in MSM networks (Stekler et al, *CID* 2005)
- Current standard of care for antibiotic treatment of MSM is all multi-dose and/or injectable
 - Ceftriaxone for GC
 - Doxycycline for CT

TABLE 2. Number and Proportion of Repeat Positive Rectal Chlamydia Tests (i.e., Persistent/Recurrent Infection), by Therapy Received and Timing of Repeat Test

Time of Repeat Test*	Azithromycin, n/N† (%)	Doxycycline, n/N† (%)	P‡	Unadjusted RR§ (95% CI)	Adjusted RR§, ¶ (95% CI)
14–30 d	4/53 (7.6)	0/20 (0.0)	0.570	—	—
14–60 d	23/136 (16.9)	0/36 (0.0)	0.005	—	—
14–90 d	50/230 (21.7)	2/56 (3.6)	0.001	5.2 (1.3–20.8)	5.2 (1.3–21.0)
14–180 d	88/407 (21.6)	8/95 (8.4)	0.002	2.3 (1.2–4.6)	2.4 (1.2–4.8)

- Penicillin for Syphilis

Khosropour et al., *STD* 2014

Table 2. Prevalences of pelvic inflammatory disease (PID), HIV infection, and sexually transmitted infection (STI) comorbidity among study subjects (partners) with a diagnosis discordant with the STI diagnosed in their contacts, by sex/sexual orientation of partners and clinic site.

Partner group, comorbidity (STI diagnosed in index patient)	Clinic site				Total
	Baltimore, MD	Birmingham, AL	Denver, CO	Seattle, WA	
Female					
Total no. of partners	1415	362	1332	394	3503
PID, no. (%) of partners	45 (3.2)	2 (0.6)	72 (5.4)	14 (3.6)	133 (3.8)
Newly diagnosed HIV infection	6/924 (0.6)	0/178 (0)	0/849 (0)	0/163 (0.0)	6/2114 (0.2)
Early syphilis	15/1415 (1.1)	1/362 (0.3)	0/1332 (0)	1/394 (0.3)	17/3503 (0.5)
Late latent or other syphilis	19/1268 (1.5)	1/295 (0.3)	1/1145 (0.1)	2/183 (1.1)	23/2891 (0.8)
GC (CT)	NA	5/79 (6.3)	17/398 (4.3)	2/147 (1.4)	24/624 (3.8)
GC or CT (TV)	NA	2/24 (8.3)	3/27 (11.1)	NA	5/51 (9.8)
TV (CT, GC, or NGU)	NA	12/338 (3.6)	80/1302 (6.1)	7/394 (1.8)	99/2034 (4.9)
Heterosexual male					
Total no. of partners	1787	459	1757	644	4647
Newly diagnosed HIV infection	10/1012 (1.0)	1/228 (0.4)	1/1023 (0.1)	0/339 (0)	13/2602 (0.5)
Early syphilis	9/1787 (0.5)	0/459 (0)	0/1757 (0)	0/644 (0)	9/4647 (0.2)
Late latent or other syphilis	10/1569 (0.6)	0/402 (0)	2/1516 (0.5)	0/354 (0)	12/3841 (0.3)
GC (CT)	NA	8/124 (6.4)	34/1077 (3.2)	6/401 (1.5)	48/1602 (3.0)
GC or CT (TV)	NA	41/272 (15.1)	32/385 (8.3)	8/128 (6.2)	81/785 (10.3)
MSM or bisexual male					
Total no. of partners	23	1	200	249	473
Newly diagnosed HIV infection	2/8 (25.0)	Not tested	7/96 (7.3)	4/103 (3.9)	13/207 (6.3)
Early syphilis	0/23 (0)	0/1 (0)	2/200 (1.0)	0/249 (0)	2/473 (0.4)
Late latent or other syphilis	2/23 (8.7)	0/1 (0)	1/171 (0.6)	3/169 (1.8)	6/364 (1.6)
GC (CT)	NA	NA	4/32 (12.5)	2/66 (3.0)	6/98 (6.1)

EPT for MSM and TW

- Not recommended because of high risk of undiagnosed HIV and syphilis infection
- Not recommended because of need for injectable and/or extended course antibiotic treatment
- BUT might partial treatment be better than no treatment?
- AND what about a potential improvement in partner notification with EPT and the subsequent impact on HIV/STI testing and treatment?

EPT to Support PN Among MSM in Peru with GC/CT Infection: Pilot Study Design

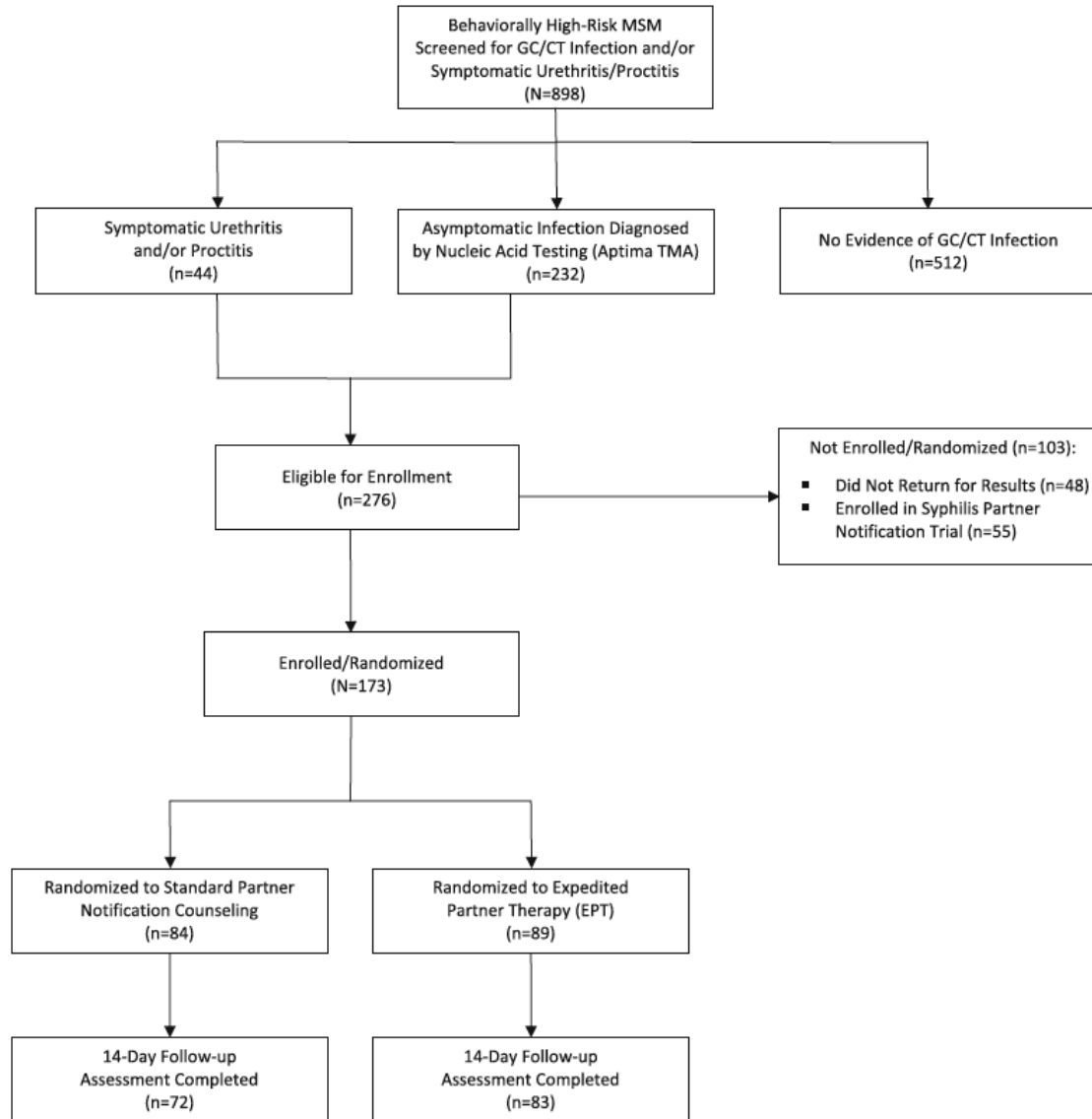


Fig. 1 Screening, enrollment, and follow-up Consolidated Standards of Reporting Trials (CONSORT) flowchart; Lima, Peru 2012–2014

Table 3 Partner notification outcomes among MSM with gonorrhea and/or chlamydia infection

	Expedited Partner Therapy (EPT) (<i>n</i> = 83)	Standard partner notification counseling (<i>n</i> = 72)	Odds ratio (95% CI)
Proportion of participants who notified any recent partners	83.1% (69/83)	58.3% (42/72)	3.52 (1.68, 7.39)
Proportion of participants who notified any recent partners (only participants reporting ≥1 recent partner)	85.2% (69/81)	61.8% (42/68)	3.56 (1.62, 7.80)

EPT to Support PN Among MSM in Peru with GC/CT Infection: Pilot Study Results

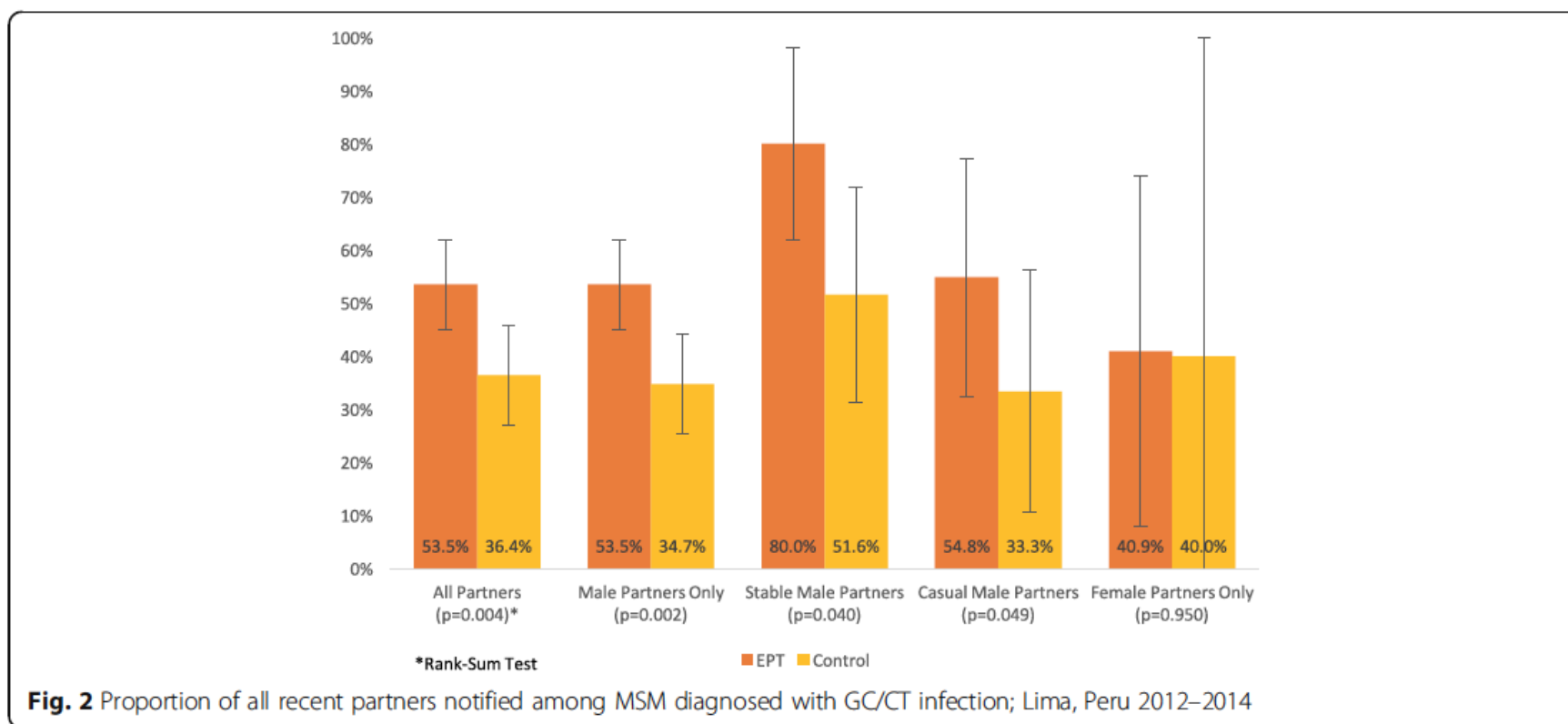


Fig. 2 Proportion of all recent partners notified among MSM diagnosed with GC/CT infection; Lima, Peru 2012–2014

EPT and the HIV Prevention Cascade Among MSM

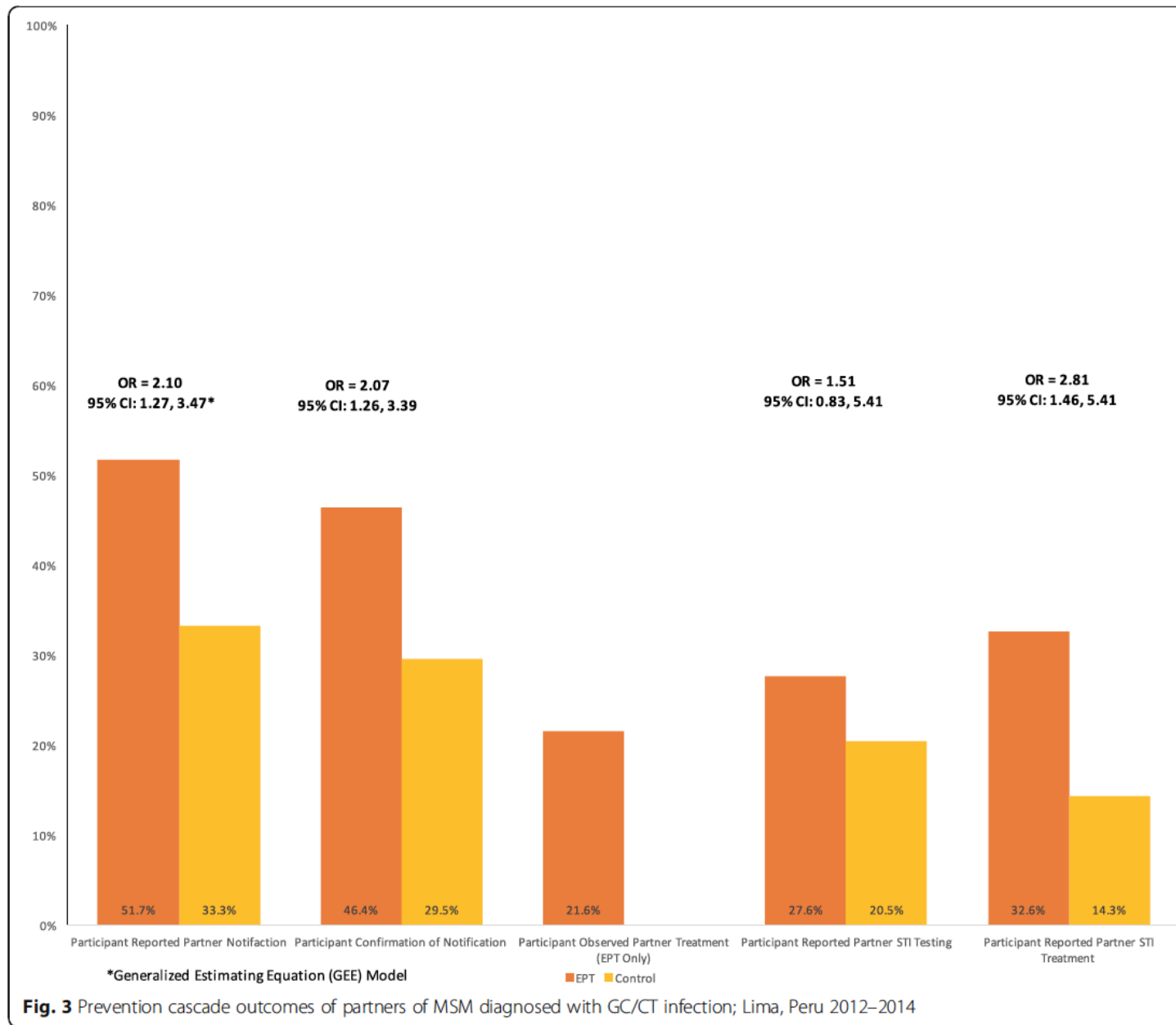
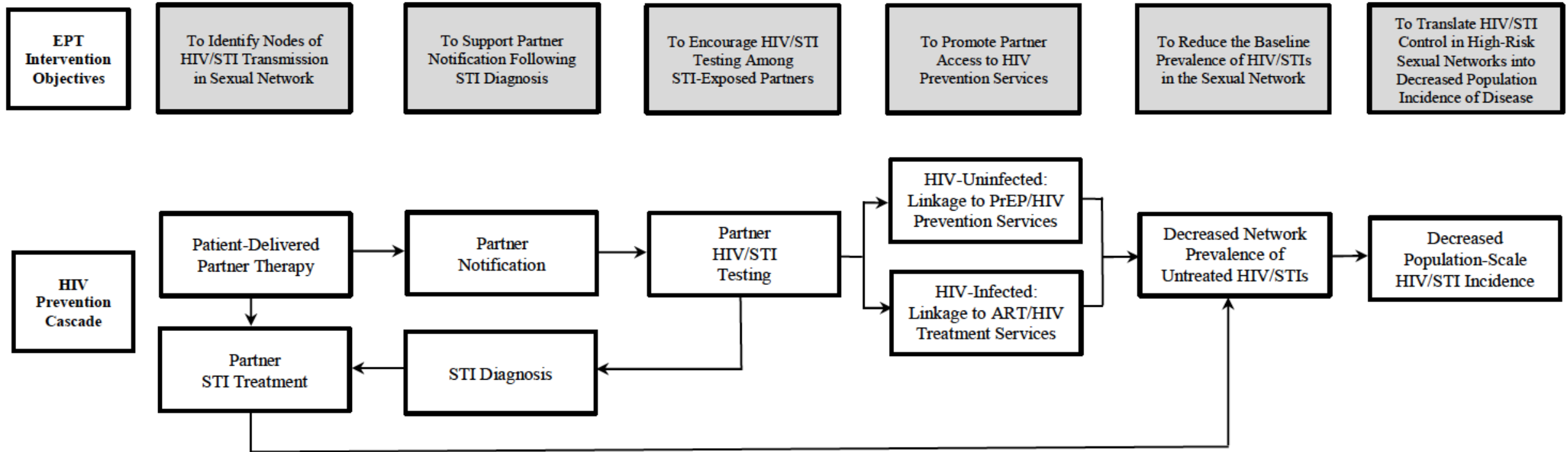
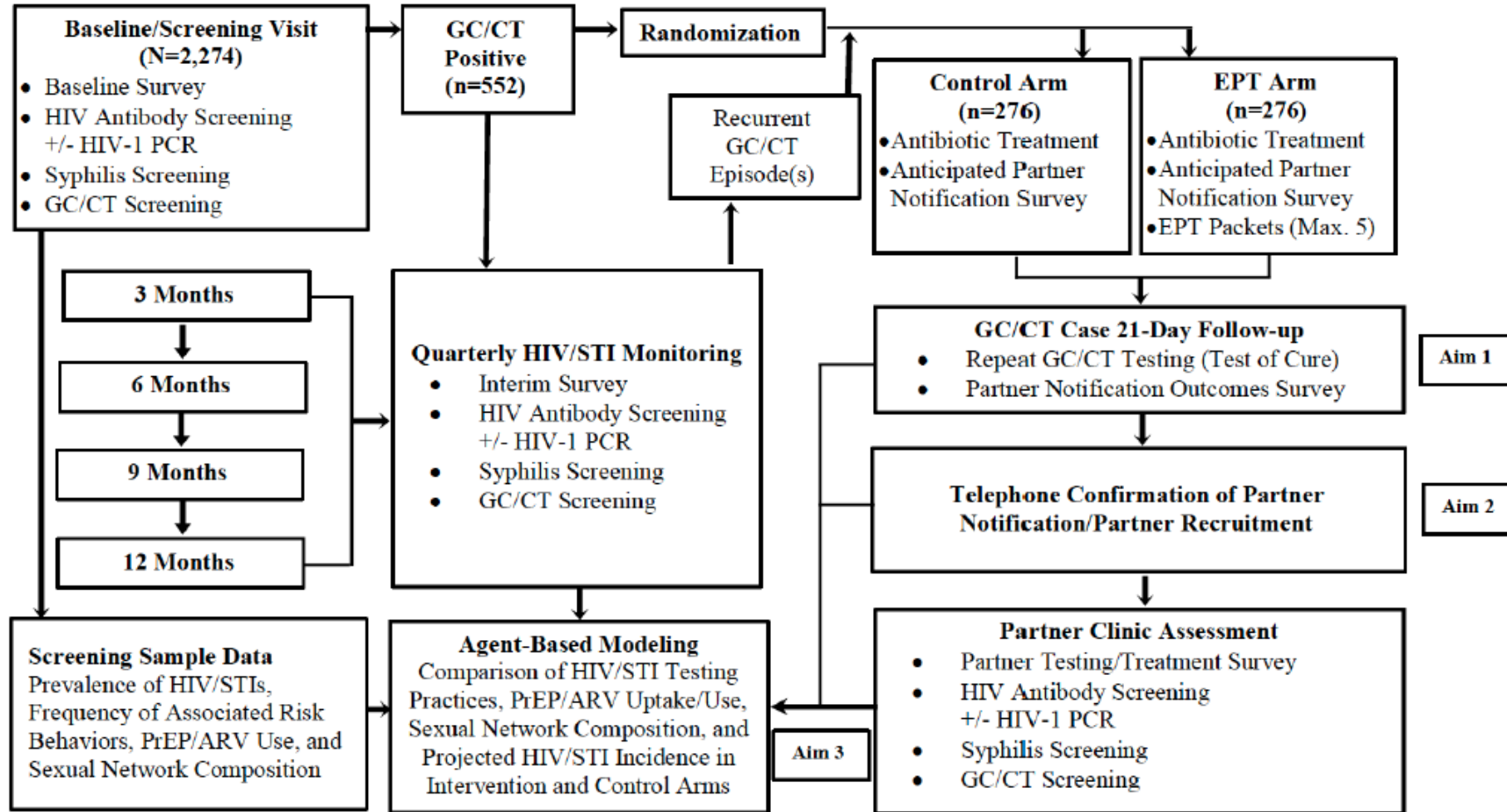


Fig. 3 Prevention cascade outcomes of partners of MSM diagnosed with GC/CT infection; Lima, Peru 2012–2014

EPT and the HIV Prevention Cascade



EPT for MSM in Peru: Study Flowchart



www.inspot.org

TELL

them

To tell your partners they may have been exposed to an STD, follow the 6 easy steps below.

- 1) Select Language
- 2) Select Region
- 3) Pick a Card
- 4) Create Message
- 5) Preview
- 6) Send

[Tips for Telling Your Partners ->](#)
[Advice for Talking about HIV ->](#)

CARD PREVIEW

No one wants to be the bearer of bad news...

But I got diagnosed with STDs.

(You might have one too)



Get checked soon for STDs.

Personal message goes here.

Internet Systems for Anonymous PN: inSpot.org

- www.inSpot.org Operational Statistics
 - During first 5 years of operation (2005-2009)
 - 440,000 site visits
 - 48,263 e-cards sent to 79,980 recipients
- Assessment of clinic patient use and penetrance into MSM community following LA county marketing campaign 2007-2009
(Plant et al., 2012)
 - STD Clinic: 29,857 patient visits/1,287 partner referrals/2 from inSpot notifications
 - Pre-/Post- assessments using TLS methodology
 - Awareness of inSpot: 15.8% pre/14.4% post-intervention
- Similar results with heterosexuals in Colorado STD clinic

Seattle Clinical Trial of inSpot/EPT

- Seattle STD Clinic: Randomized, factorial design trial of inSPOT +/- EPT for MSM diagnosed with GC/CT
- 548 potential participants/393 eligible for enrollment/75 enrolled/53 completed follow-up
- Study terminated early due to poor enrollment

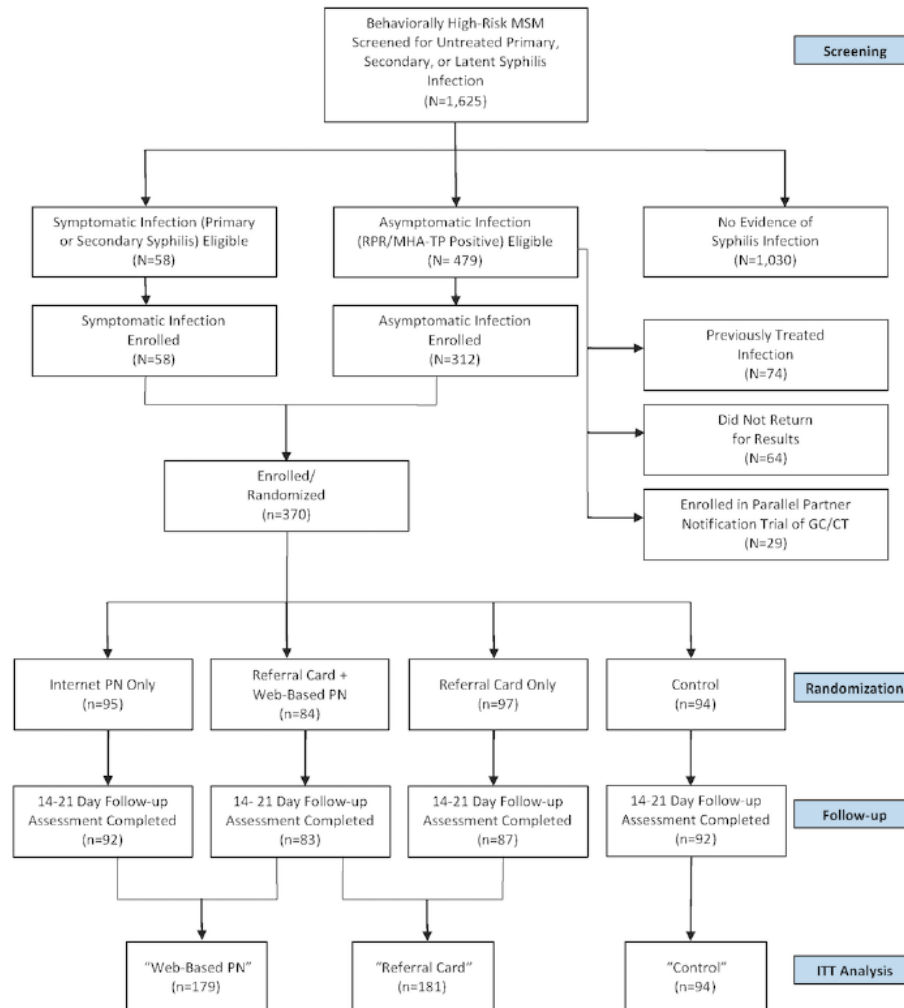
Unadjusted Mean*
Mean (95% CI)

Intervention	PDPT Assignment		inSPOT Assignment		Total
	No PDPT	PDPT	No inSPOT	inSPOT	
Partners managed by study staff	0.74 (0.42–1.32)	0.43 (0.22–0.84)	0.65 (0.37–1.17)	0.48 (0.25–0.94)	0.57
Partners notified	2.70 (2.05–3.54)	3.37 (2.72–4.17)	3.00 (2.34–3.84)	3.15 (2.49–3.99)	3.08
Partners treated	1.52 (1.09–2.13)	2.33 (1.84–2.96) [‡]	1.96 (1.47–2.62)	2.00 (1.50–3.65)	1.98
Partners tested for HIV [¶]	0.91 (0.54–1.54)	0.50 (0.27–0.93)	0.96 (0.60–1.54)	0.40 (0.20–0.83)	0.68
Partners tested for syphilis [¶]	0.57 (0.29–1.12)	0.50 (0.27–0.93)	0.65 (0.36–1.18)	0.42 (0.21–0.85)	0.53

Kerani et al., *STD* 2013

PN Technologies for MSM in Peru (Syphilis): Participant Flow Chart

Figure 1. Screening, enrollment, and follow-up (CONSORT) flowchart; Lima, Peru 2012-2014. MSM: men who have sex with men; RPR/MHA-TP: rapid plasma reagin/microhemagglutination Treponema pallidum; GC/CT: gonorrhea/chlamydia; PN: partner notification; ITT: intention-to-treat.



Clark et al., *JMIR* 2018

Overall Partner Notification Outcomes

	Control	Internet PN	Referral Card
Any Partners Notified (All Participants)	Prevalence: 53.3% (49/87)	Prevalence: 72.0% (126/175) OR: 2.26 (1.33 to 3.82)	Prevalence: 68.8% (117/181) OR: 1.94 (1.15 to 3.27)
Any Partners Notified (Participants with ≥ 1 Recent Partner)	Prevalence: 59.5% (47/79)	Prevalence: 77.4% (123/159) OR: 2.33 (1.30 to 4.17)	Prevalence: 75.7% (115/152) OR: 2.12 (1.18 to 3.79)

Partner Notification Outcomes: Subgroup Analyses

Figure 2. The proportion of all recent partners notified among men who have sex with men diagnosed with syphilis infection; Lima, Peru 2012-2014. PN: partner notification; *: Calculated using the Rank-Sum Test..

Table 2. Partner notification outcomes among men who have sex with men with recently diagnosed syphilis; Lima, Peru; 2012-2014.

	Percentage who notified any recent partners, n (%)	OR ^a (95% CI)	Percentage who notified any recent partners (≥1 recent partner), n (%)	OR (95% CI)
Arm 1: Web-based PN ^b only (n=95)	62/95 (65.2)		62/86 (72.1)	
Arm 2: Referral cards only (n=97)	53/97 (54.6)		53/79 (67.1)	
Arm 3: Referral cards and Web-based PN (n=84)	64/84 (76.2)		64/73 (87.7)	
Arm 4: Control (n=94)	49/94 (52.1)	—	49/79 (62.0)	—
Arms 1+3: All Web-based PN (N=179)	126/179 (70.4)	2.18 (1.30-3.66)	126/159 (79.2)	2.34 (1.29-4.24)
Arms 2+3: All referral cards (N=181)	117/181 (64.6)	1.68 (1.01-2.79)	117/152 (77.0)	2.05 (1.13-3.70)

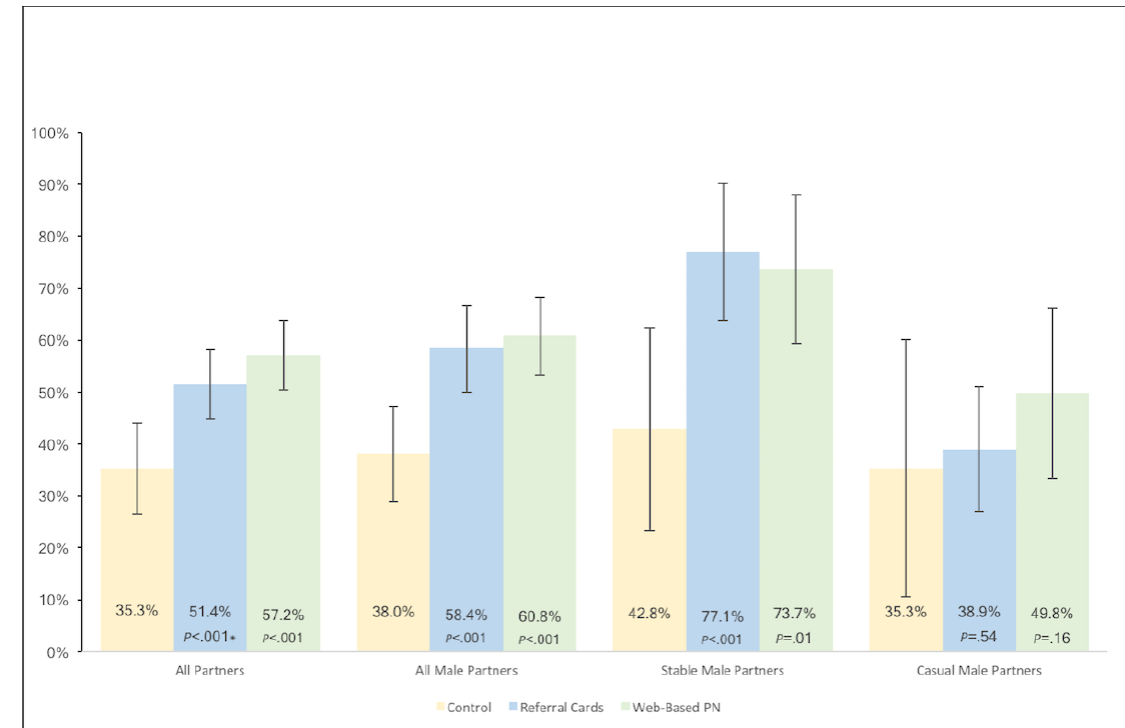
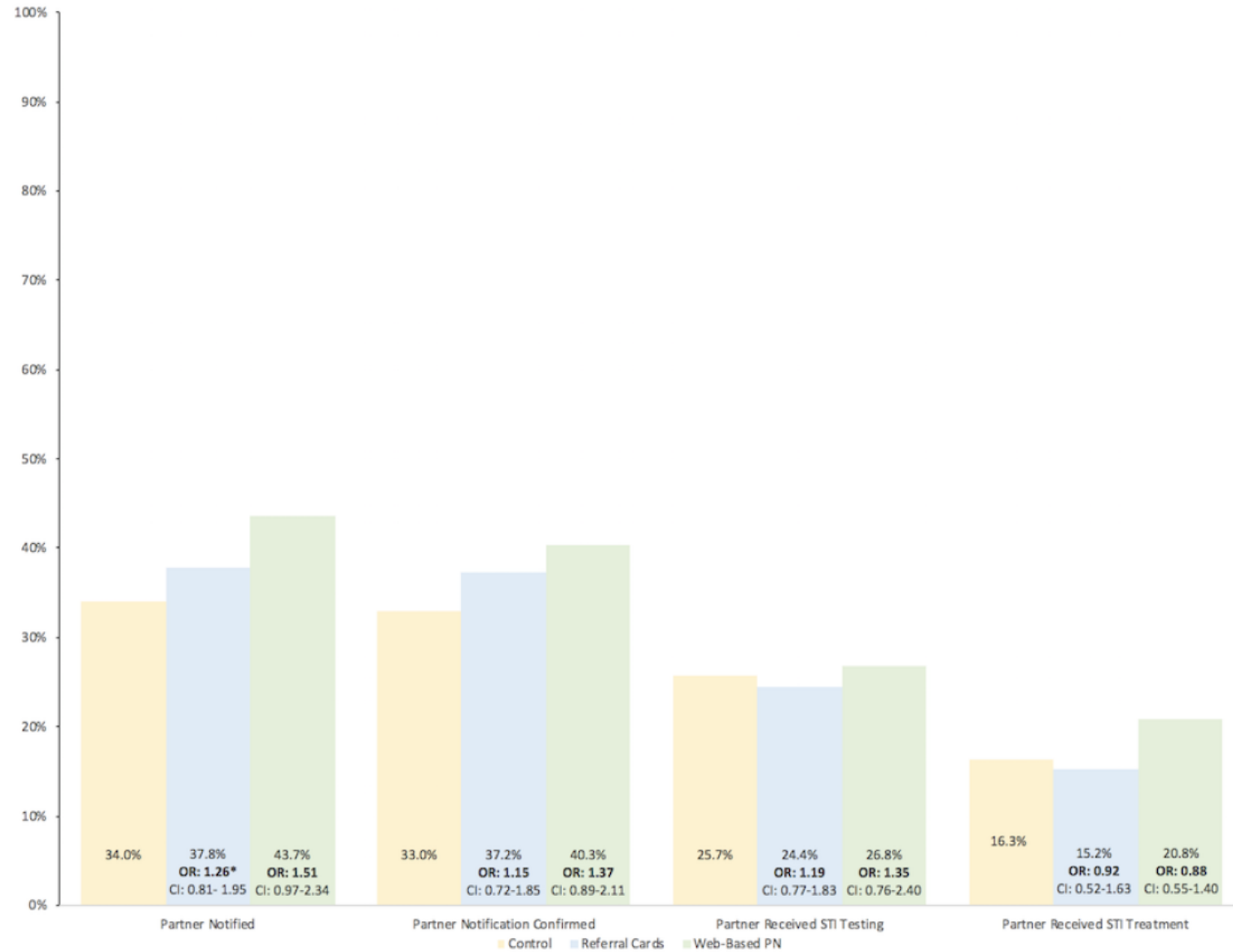


Figure 3. Prevention cascade outcomes of 3 most recent partners of MSM diagnosed with syphilis infection; Lima, Peru 2012-2014. PN: patient notification; STI: sexually transmitted infection. *Generalized Estimating Equation Model.



Anonymous Partners and Sexual Affiliation Networks

It's that many times you can meet someone and not even know their telephone number.... Because sometimes if it's a minor encounter, without any kind of commitment, a lot of times we don't even ask their name, or we make up a name, no? [Bruno, MSM].

Clark et al., *AIDS and Behavior* 2015

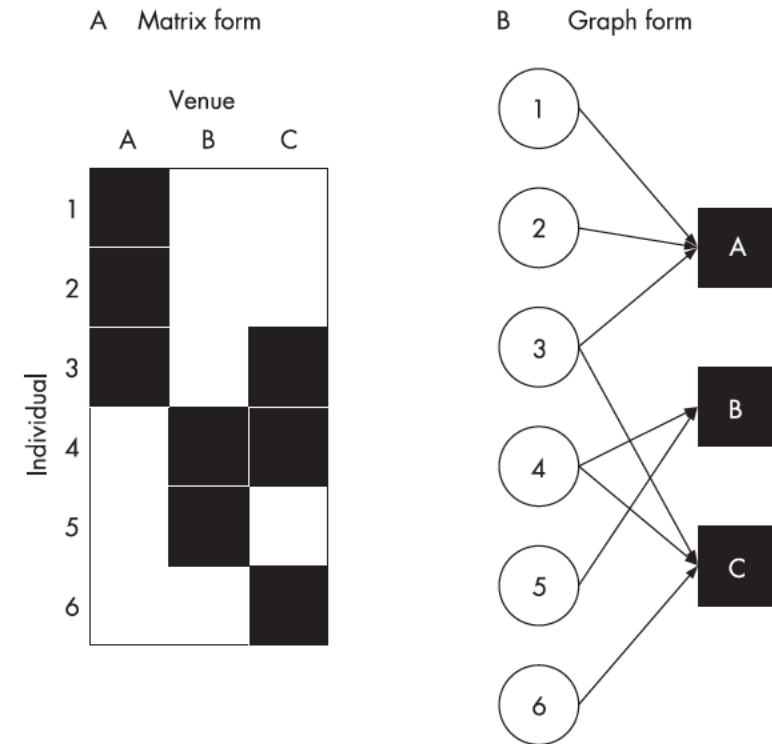
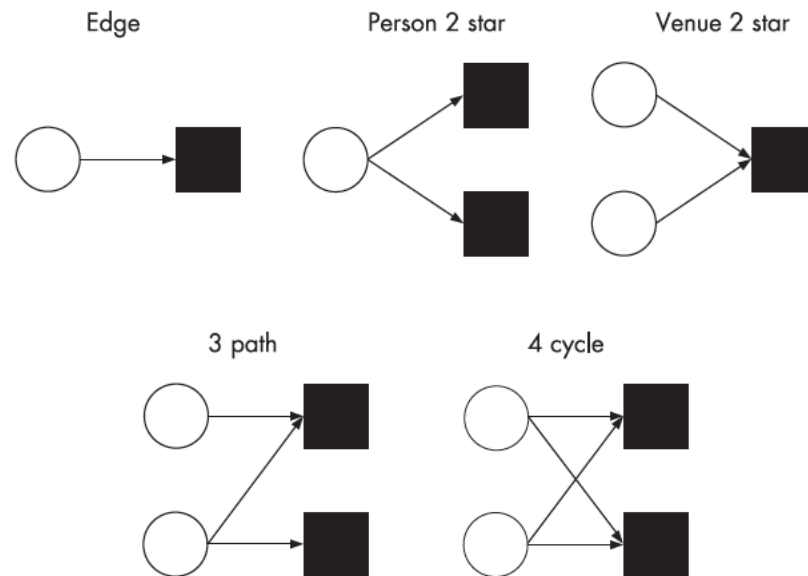


Figure 1 Representations of an affiliation network as a matrix (A) or a graph (B).

Frost, *STI* 2007

Notification of Commercial Sex Partners

- Never. Going. To. Happen.

Finally, for commercial sex partners, financial considerations discouraged notification, “In work, it would be a disadvantage... because they wouldn’t call me anymore, they wouldn’t call me and they wouldn’t pay me” [Jose Luis, MSM].

Clark et al., *AIDS and Behavior* 2015

“Because, really, you need to work. At the moment you tell them, they are going to reject you and won’t ever want to come near you.” (Scarlet; Transgender, HIV)

Clark et al., *PLoS One* 2016

Patient Case 2: Jon/Visit #2 (Test of Cure)

Jon

- Repeat GC/CT negative at all anatomic sites
- Repeat RPR (6 months) 1:4
- HIV Ab and PCR negative
- Partner Outcomes
 - Discussed sexual activity with Maria (epi-treatment for syphilis, in counseling, family planning on hold)
 - Informed Jeff (Gay Casual Partner) with Referral Card
 - Informed Rob (Hetero 1-time Casual Partner) with inSpot.org
 - Did not inform Lucia as he did not think she was at risk (from him)
 - Public health department notified of STI case report and planning outreach/interventions at the venues frequented by Jon



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