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ALABAMA AT BIRMINGHAM.

SCHOOL OF MEDICINE



# Love in the Time of PrEP: Navigating Sexual Health in the PrEP Era

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# Disclosures

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I have no conflicts of interest or financial disclosures to declare.

I am currently a Post-Doctoral Scholar in the AHRQ HSOER T32 Training Program (5T32HS013852-17).

# Objectives

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Describe current epidemiology of sexually transmitted infections within the context of PrEP

Discuss the impact of sexually transmitted infections on HIV prevention

Understand current approaches to STI testing and treatment as related to PrEP

Explore the horizon of sexual health among PrEP users

# Case

A 22yo male presents to the Student Health Clinic on campus with complaints of painful bowel movements and some discharge from his anus. You know this patient well as you have seen him regularly to provide PrEP. He reports good adherence to PrEP. He has been sexually active and has had multiple new male partners that he met on dating and social media apps. He enjoys oral and anal receptive intercourse without using condoms. He says that he is surprised by the thought of an STI because his partners say they're "clean," and he feels embarrassed.

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# Case – Highlights of STIs in 2019









- Young man who has sex with men
- Pre-exposure prophylaxis with good adherence
- Use of geo-locating dating and social media apps to locate partners
- Condomless anal sex
- Stigma associated with HIV and STIs

“I’m on PrEP. Why should I care about sexual health?”

Indeed, HIV is an STI, and PrEP prevents this....but so are gonorrhea, chlamydia, syphilis, trichomoniasis, BV, HSV...

Sexual health is more than just STIs. What about intimacy and pleasure? What about pregnancy planning?

# STI Trends– The Not So Secret

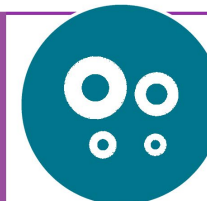
Disease	Reported cases	Change from previous year
HIV diagnoses (2017)	38,182	
Acute Viral Hepatitis C (2017)	3,186	
Acute Viral Hepatitis B (2017)	3,407	
Hepatitis A (2017)	3,366	
Primary and Secondary Syphilis (2017)	30,644	
Chlamydia (2017)	1,708,569	
Gonorrhea (2017)	555,608	
Tuberculosis (2017)	9,105	

**The STATE of STDs in the United States**

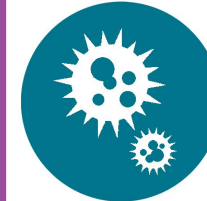


**in 2017**

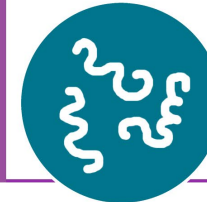
THE NATION EXPERIENCES STEEP AND SUSTAINED STD INCREASES.



**1.7 million**  
CASES OF CHLAMYDIA  
22% increase since 2013



**555,608**  
CASES OF GONORRHEA  
67% increase since 2013



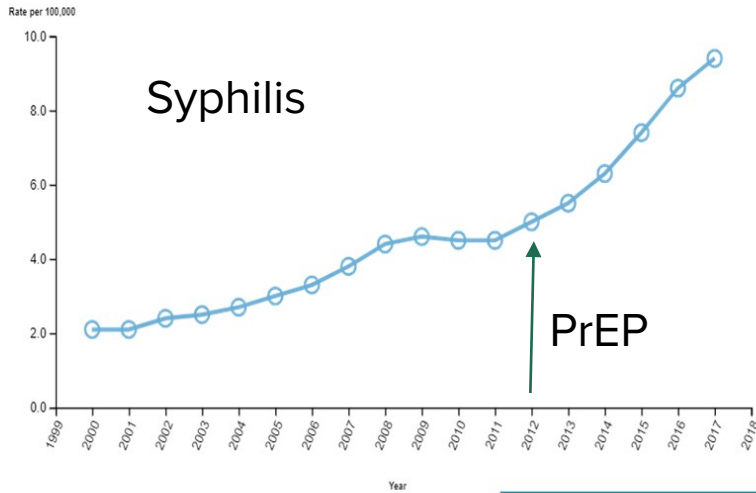
**30,644**  
CASES OF SYPHILIS  
76% increase since 2013



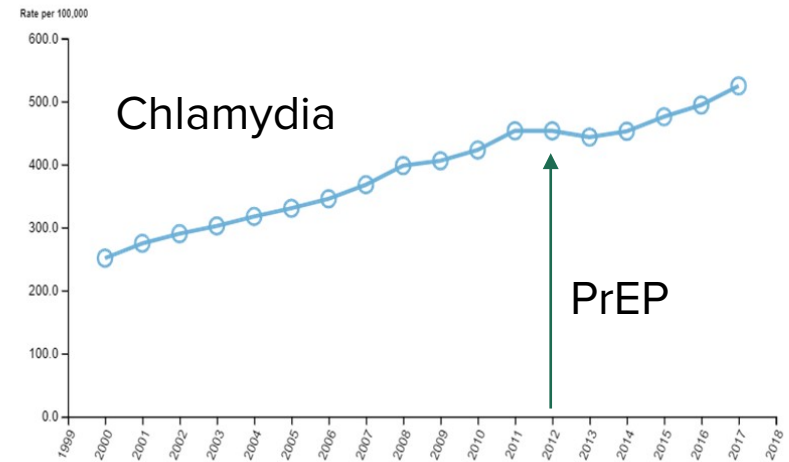
# STI Trends— All Genders



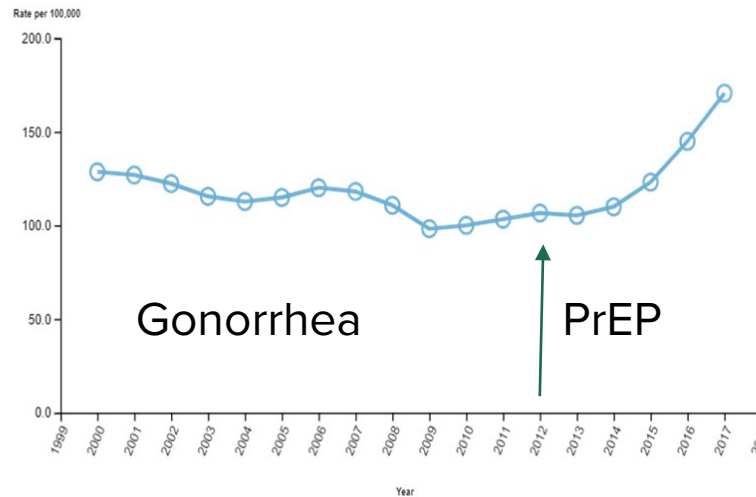
Primary and Secondary Syphilis | 2017 | All age groups | All races/ethnicities | Both sexes | United States



Chlamydia | 2017 | All age groups | All races/ethnicities | Both sexes | United States



Gonorrhea | 2017 | All age groups | All races/ethnicities | Both sexes | United States



Centers for Disease Control and Prevention  
National Center for HIV/AIDS, Viral Hepatitis

vention  
epatitis, STD, and TB Prevention

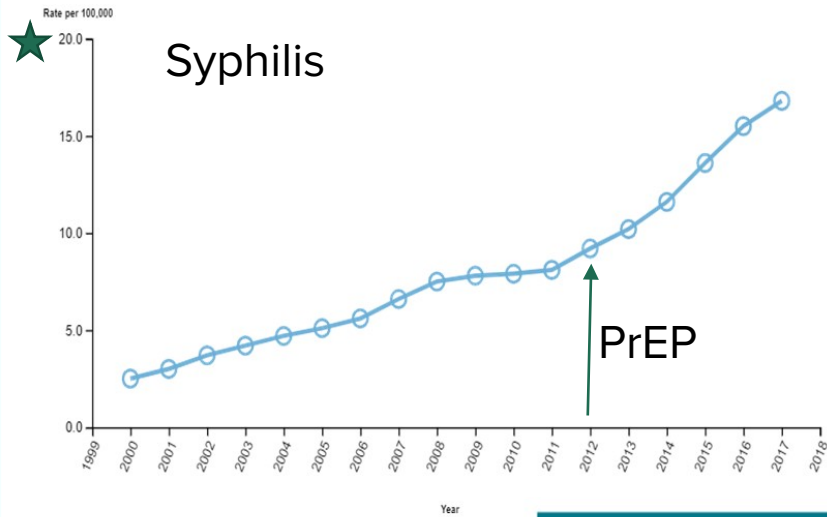


CDC AtlasPlus  
[www.cdc.gov/std](http://www.cdc.gov/std)

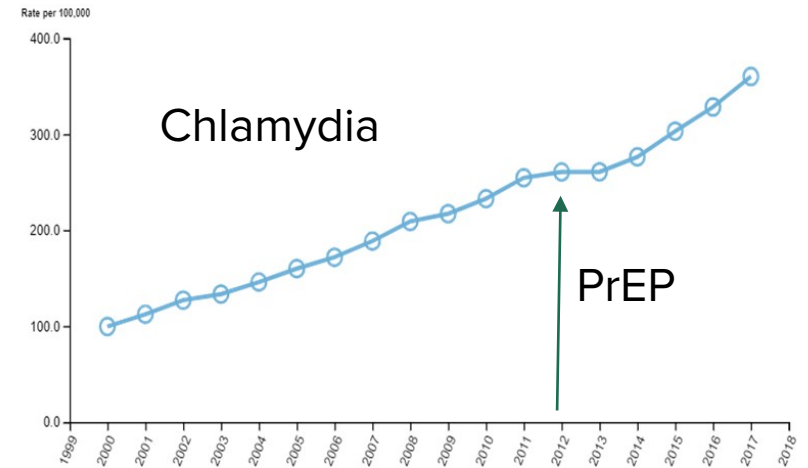


# STI Trends- Men

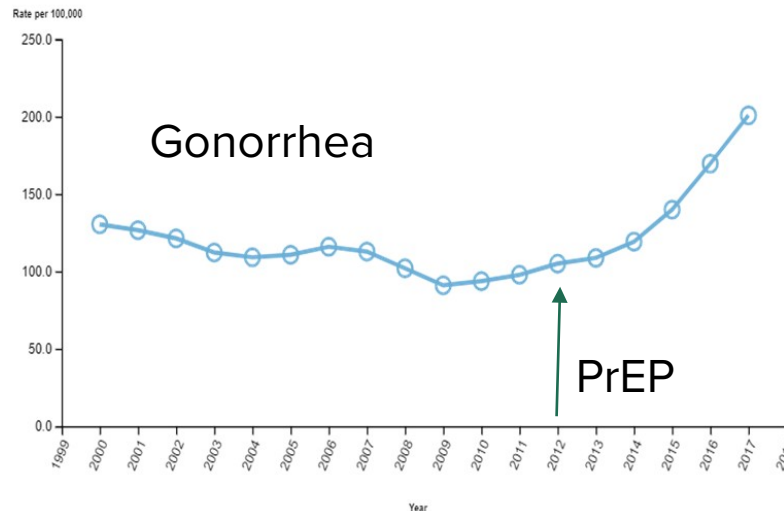
Primary and Secondary Syphilis | 2017 | All age groups | All races/ethnicities | Male | United States



Chlamydia | 2017 | All age groups | All races/ethnicities | Male | United States



Gonorrhea | 2017 | All age groups | All races/ethnicities | Male | United States



Centers for Disease Control and Prevention  
National Center for HIV/AIDS, Viral Hepatitis

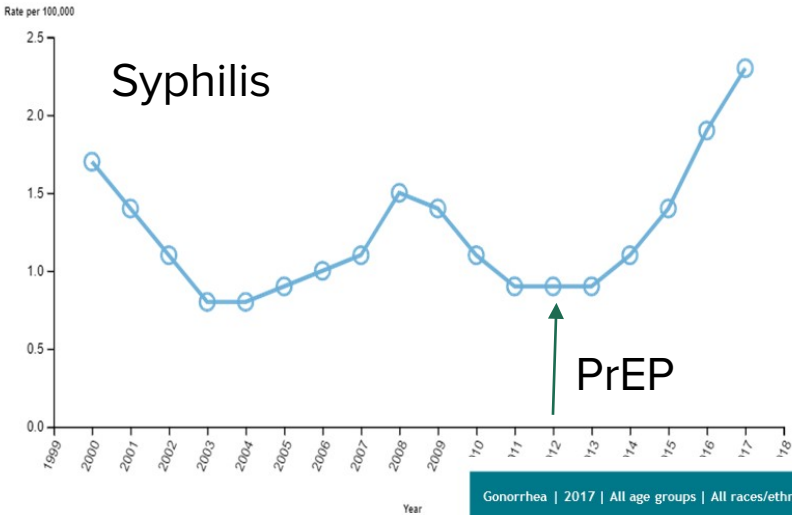
STD, and TB Prevention



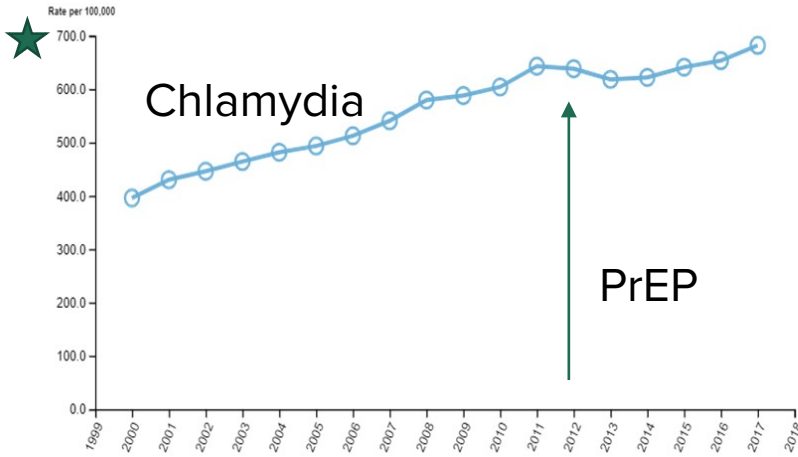
CDC AtlasPlus  
[www.cdc.gov/std](http://www.cdc.gov/std)

# STI Trends— Women

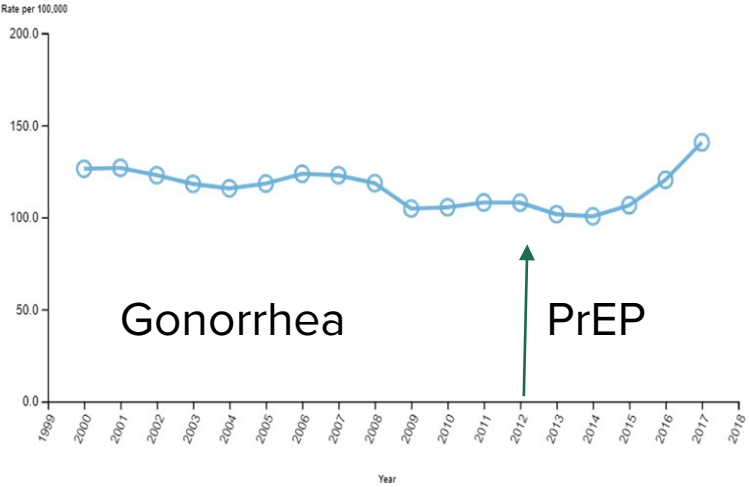
Primary and Secondary Syphilis | 2017 | All age groups | All races/ethnicities | Female | United States



Chlamydia | 2017 | All age groups | All races/ethnicities | Female | United States



Gonorrhea | 2017 | All age groups | All races/ethnicities | Female | United States



Centers for Disease Control and Prevention  
National Center for HIV/AIDS, Viral

vention  
Hepatitis, STD, and TB Prevention

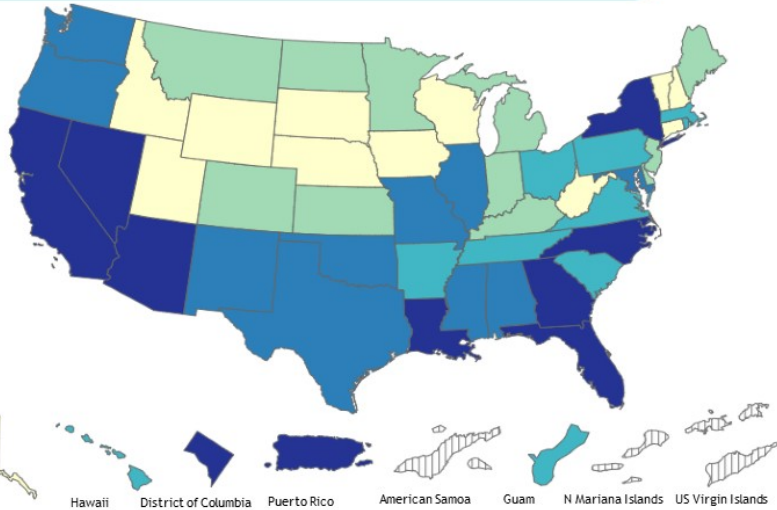


CDC AtlasPlus  
[www.cdc.gov/std](http://www.cdc.gov/std)



# STIs Mapped

Primary and Secondary Syphilis | 2017 | All age groups | All races/ethnicities | Both sexes | US Map-State Level



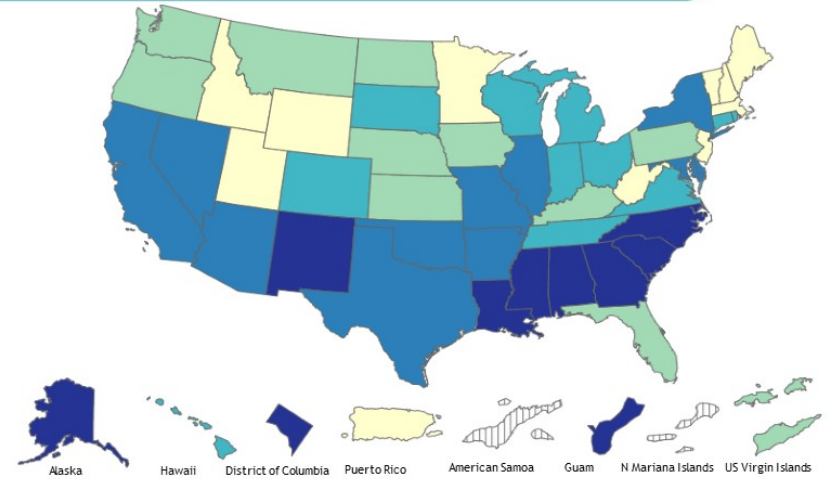
Rate per 100,000 among selected population



Centers for Disease Control and Prevention  
National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention



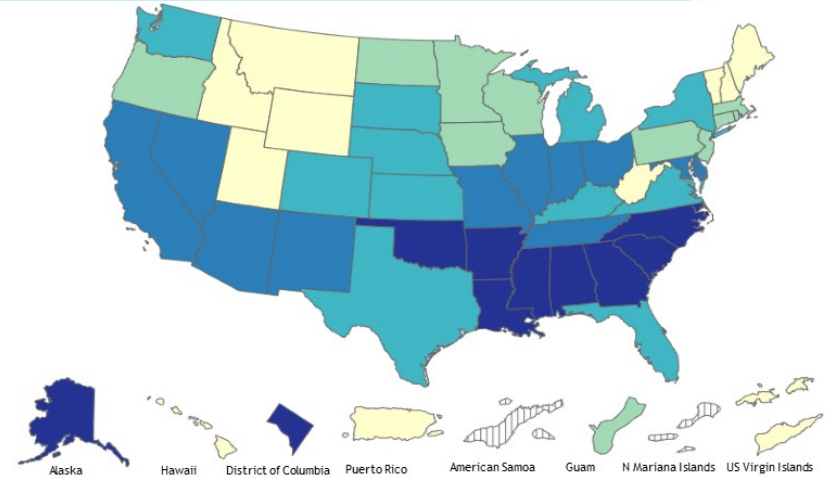
Chlamydia | 2017 | All age groups | All races/ethnicities | Both sexes | US Map-State Level



Rate per 100,000 among selected population



Gonorrhea | 2017 | All age groups | All races/ethnicities | Both sexes | US Map-State Level



Rate per 100,000 among selected population



Centers for Disease Control and Prevention  
National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention

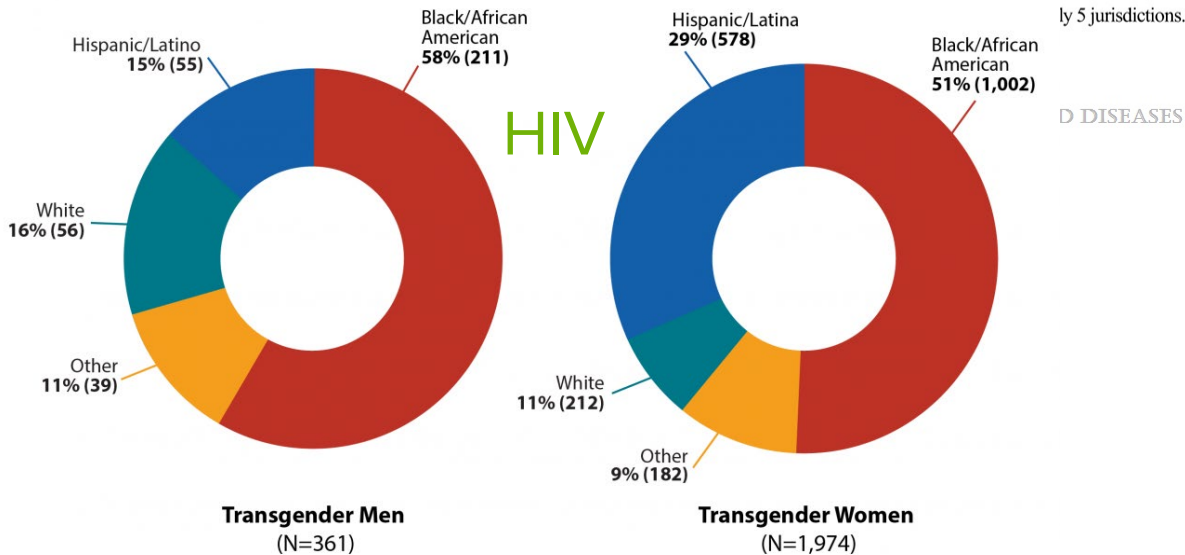


CDC AtlasPlus  
www.cdc.gov/std

# STI – Transgender Individuals

	Transgender Women (n = 506)						Transgender Men (n = 120)					
	Tested			Positive			Tested			Positive		
	n	%	Range <sup>†</sup>	n	% <sup>‡</sup>	Range <sup>†</sup>	n	%	Range <sup>†</sup>	n	% <sup>‡</sup>	Range <sup>†</sup>
<b>Chlamydia</b>												
Overall	405	80.0	40.2–95.5	53	13.1	5.7–19.6	104	86.7	72.7–95.5	8	7.7	0–25.0
Urogenital	383	75.7	38.7–94.6	3	0.8	0–1.9	97	80.8	27.3–95.5	4	4.1	0–6.3
Extragenital <sup>§</sup>	298	58.9	10.3–84.4	50	16.8	11.8–25.0	49	40.8	17.6–72.7	7	14.3	0–33.3
Rectal	285	56.3	9.2–83.9	44	15.4	9.3–36.4	32	26.7	13.0–54.5	5	15.6	0–66.7
Pharyngeal <sup>¶</sup>	112	22.1	0–77.8	6	5.4	0–11.1	34	28.3	0–52.3	4	11.8	0–20.0
<b>Gonorrhea</b>												
Overall	406	80.2	40.2–95.5	51	12.6	5.4–32.1	105	87.5	76.0–95.5	11	10.5	0–33.3
Urogenital	394	77.9	40.2–94.6	11	2.8	1.3–4.5	99	82.5	45.5–95.5	7	7.1	0–11.9
Extragenital <sup>§</sup>	314	62.1	11.5–89.3	47	15.0	6.0–42.9	58	48.3	26.1–81.8	7	12.1	0–33.3
Rectal	288	56.9	9.2–83.9	34	11.8	5.3–40.0	34	28.3	13.0–63.6	5	14.7	0–42.9
Pharyngeal	295	58.3	11.5–86.6	29	9.8	2.5–26.7	51	42.5	21.7–63.6	3	5.9	0–10.0

<sup>†</sup>Patients who were tested for or who tested positive for the same infection of the same anatomic site more than once during the observation period were

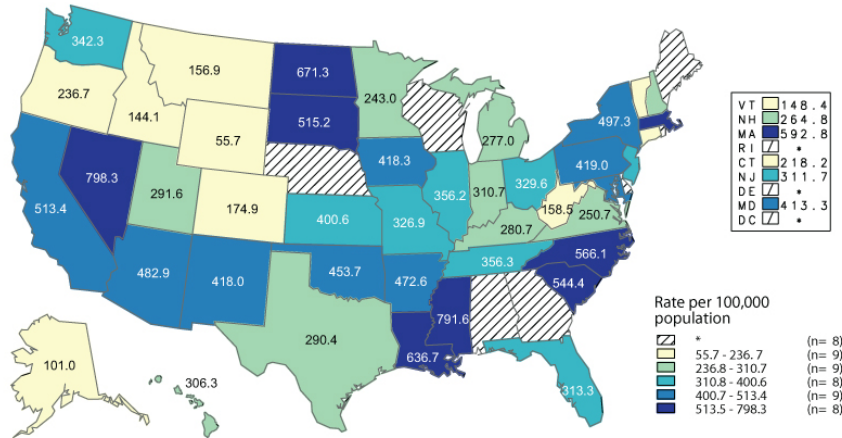


According to current estimates, about **14% of transgender women in the US have HIV.**

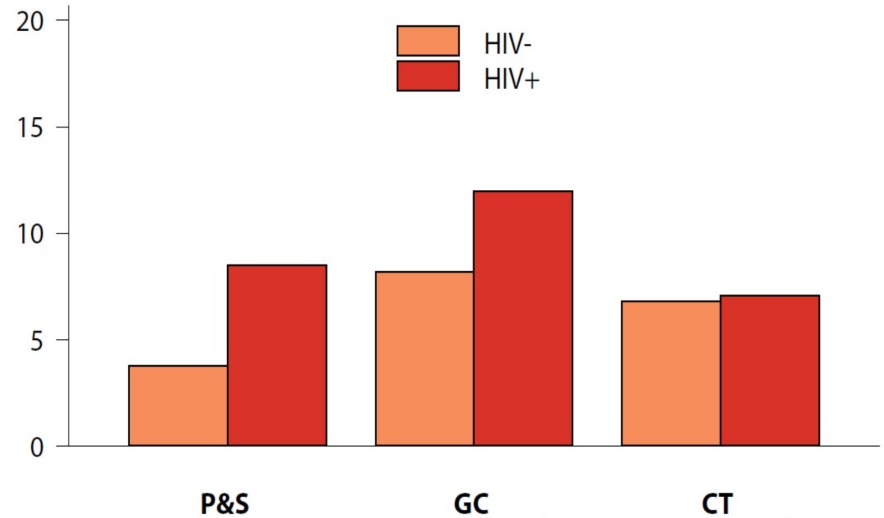
An estimated **44% of black/African American transgender women have HIV—the highest percentage among all transgender women.**<sup>††</sup>

Pitasi, et al. *Sexually Transm Dis* 2019  
[www.cdc.gov/hiv/group/gender/transgender/index.html](http://www.cdc.gov/hiv/group/gender/transgender/index.html)

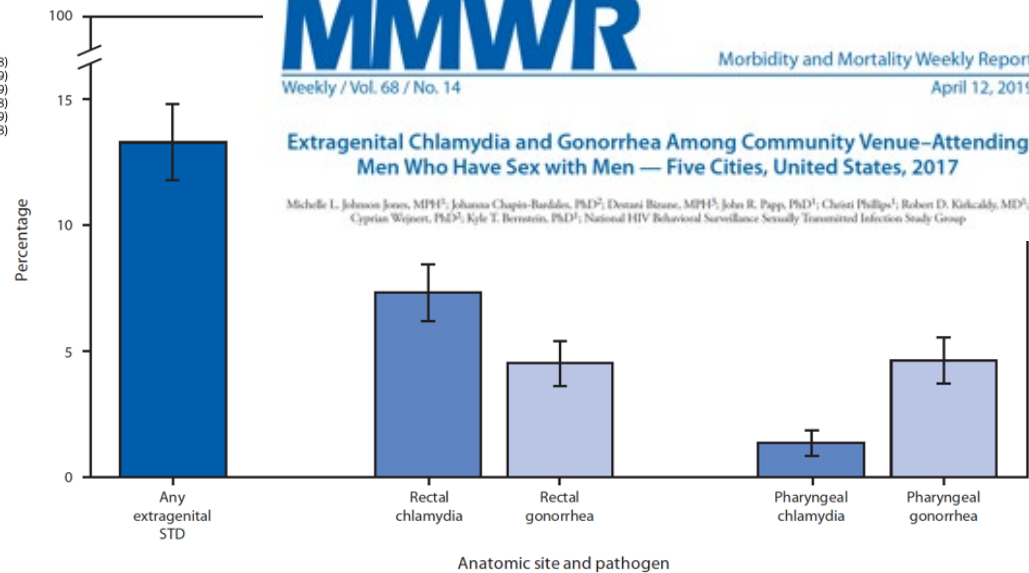
# STI – MSM



## Percentage



RE. Prevalence of extragenital – National HIV Behavioral Sur



Centers for Disease Control and Prevention  
**MMWR**  
 Morbidity and Mortality Weekly Report  
 Weekly / Vol. 68 / No. 14  
 April 12, 2019

### Extragenital Chlamydia and Gonorrhea Among Community Venue-Attending Men Who Have Sex with Men — Five Cities, United States, 2017

Michelle L. Johnson Jones, MPH<sup>1</sup>; Johanna Chapin-Bardales, PhD<sup>2</sup>; Destani Brouse, MPH<sup>3</sup>; John R. Papp, PhD<sup>4</sup>; Christi Phillips<sup>5</sup>; Robert D. Kirkcaldy, MD<sup>6</sup>; Cyprian Wigton, PhD<sup>7</sup>; Kyle T. Berenson, PhD<sup>8</sup>; National HIV Behavioral Surveillance Sexually Transmitted Infection Study Group

Abbreviations: HIV = human immunodeficiency virus; STD = sexually transmitted disease.  
 \* Community venues include bars, clubs, fitness centers, and other locations frequented by men who have sex with men.  
 † Houston, Texas; Miami, Florida; New York City, New York; San Francisco, California; Washington, DC.

# STIs – Trends with PrEP

Clinical Infectious Diseases  
MAJOR ARTICLE



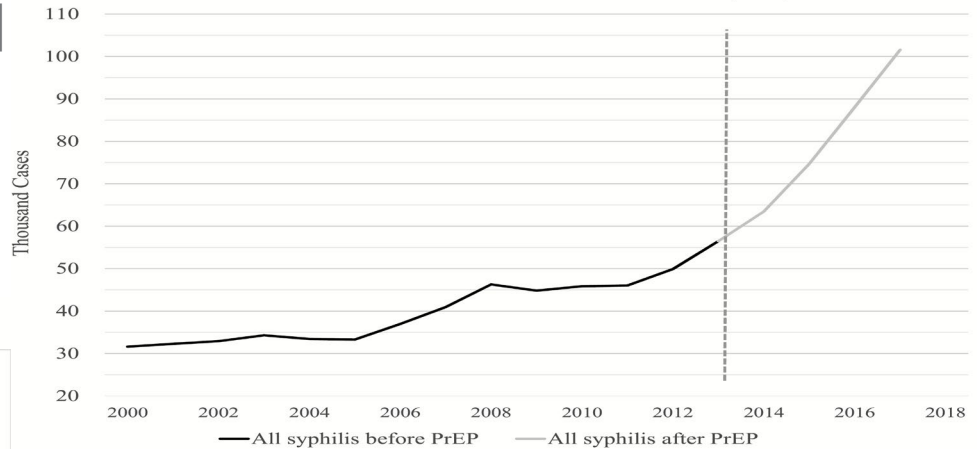
## Human Immunodeficiency Virus Pre-exposure Prophylaxis and Increased Incidence of Sexually Transmitted Infections in the United States

Jose A. Serpa,<sup>1</sup> Gabriel N. Huynh,<sup>2</sup> Julie B. Nickell,<sup>3</sup> and Hongyu Miao<sup>4</sup>

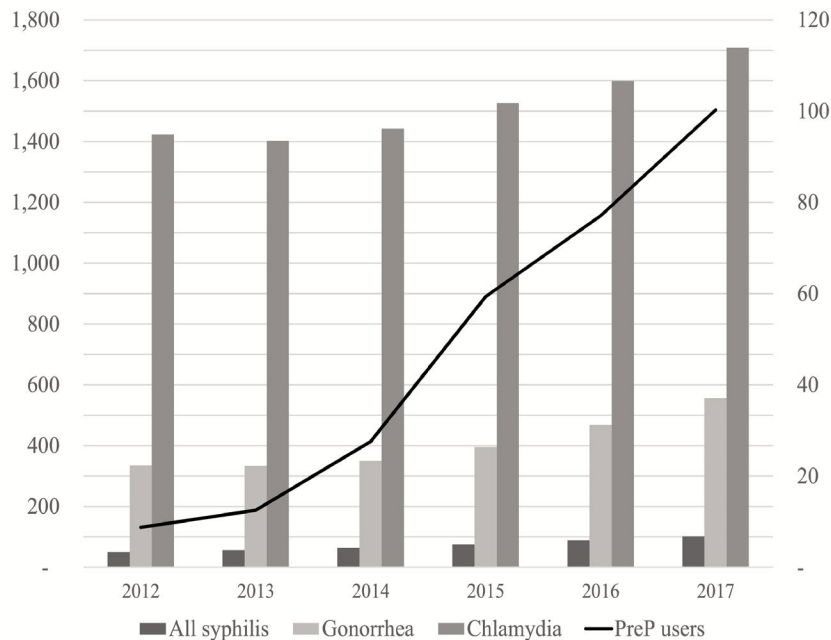
<sup>1</sup>Section of Infectious Diseases, Department of Medicine, Baylor College of Medicine, <sup>2</sup>Department of Managed Care Contracting, Texas Children's Hospital, <sup>3</sup>Department of Finance, Baylor College of Medicine, and <sup>4</sup>Department of Biostatistics and Data Science, University of Texas School of Public Health, Houston

A

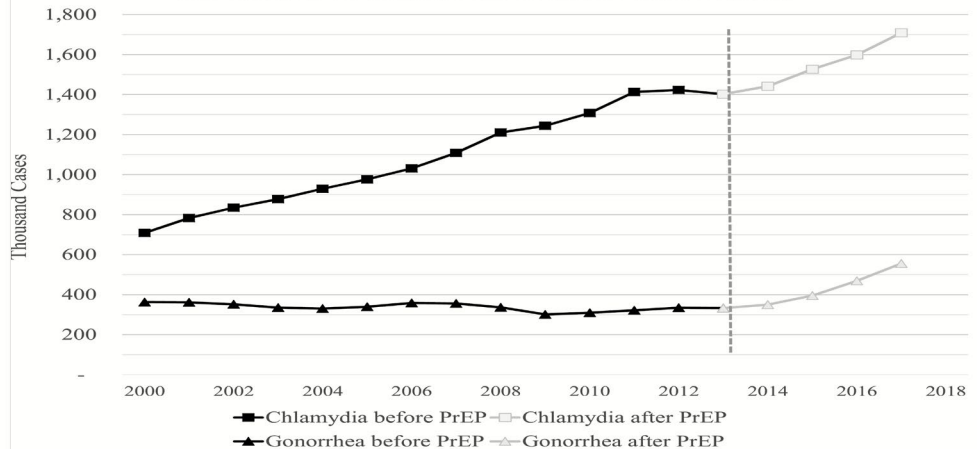
ALL SYPHILIS CASES IN U.S. 2000 - 2017 BEFORE AND AFTER HIV PREP IMPLEMENTATION (2013)



ALL SYPHILIS, CHLAMYDIA, GONORRHEA CASES IN U.S. & HIV PREP USERS 2012 - 2017



CHLAMYDIA AND GONORRHEA CASES IN U.S. 2000 - 2017 BEFORE AND AFTER HIV PREP IMPLEMENTATION (2013)



# STIs – Trends with PrEP

Table 2. Incidence of Sexually Transmitted Infections During Follow-up Among Included Participants (N = 2981)

	No. of Infections	Person-Years of Follow-up (n = 3185.0) <sup>a</sup>	Incidence Rate per 100 Person-Years (95% CI)
All STIs	2928		91.9 (88.7-95.3)
Chlamydia	1434		45.0 (42.7-47.4)
Rectal <sup>b</sup>	1091		34.3 (32.3-36.3)
Urethral <sup>b</sup>	381		12.0 (10.8-13.2)
Pharyngeal <sup>b</sup>	127		4.0 (3.3-4.7)
Gonorrhea	1242		39.0 (36.9-41.2)
Rectal <sup>b</sup>	719		22.6 (21.0-24.3)
Urethral <sup>b</sup>	233		7.3 (6.4-8.3)
Pharyngeal <sup>b</sup>	629		19.7 (18.3-21.3)
Syphilis	252	3140.8	8.0 (7.1-9.0)
Site <sup>b</sup>			
Rectal infections	1810		56.8 (53.4-60.4)
Urethral infections	614		19.3 (17.4-21.3)
Pharyngeal infections	756		23.7 (22.0-25.6)
Age group, <sup>y,c</sup>			
18-24 (n = 307)	161	186.1	86.5 (74.6-101.5)
25-29 (n = 634)	554	536.3	103.3 (94.9-112.1)
30-34 (n = 620)	733	684.4	107.1 (99.8-115.3)
35-39 (n = 482)	495	593.2	83.4 (76.4-91.2)
40-44 (n = 356)	354	432.2	81.9 (73.8-90.9)
45-49 (n = 437)	486	548.0	88.7 (81.2-97.1)
≥50 (n = 145)	145	204.7	70.8 (60.2-83.4)

JAMA | Original Investigation

## Association of HIV Preexposure Prophylaxis With Incidence of Sexually Transmitted Infections Among Individuals at High Risk of HIV Infection

Michael W. Traeger, MSc; Vincent J. Cornelisse, MBBS, PhD; Jason Asselin, BSc; Brian Price, MBA; Norman J. Roth, MBBS; Jeff Willcox, MBBS; Ban Kiem Tee, MBBS; Christopher K. Fairley, MBBS, PhD; Christina C. Chang, MBBS, PhD; Jude Armishaw, BNurs; Olga Vujovic, MBBS; Matthew Penn, MBBS; Pauline Cundill, BM; George Forgan-Smith, MBBS; John Gall, MBBS, PhD; Claire Pickett, MBBS; Luxi Lal, BPharm; Anne Mak, BPharm; Tim D. Spelman, MBBS, MSc; Long Nguyen, MCom; Dean A. Murphy, PhD; Kathleen E. Ryan, PhD; Carol El-Hayek, MBBS; Michael West, BA; Simon Ruth, MSc; Colin Batrouney, BA; John T. Lockwood, BN; Jennifer F. Hoy, MBBS; Margaret E. Hellard, MBBS, PhD; Mark A. Stoové, PhD; Edwina J. Wright, MBBS, PhD; for the PrEPX Study Team

JAMA. 2019 Apr 9;321(14):1380-1390



# STIs – Changes with PrEP

Table 4. Incidence of Sexually Transmitted Infections Before and After Enrollment (n = 1378)<sup>a</sup>

Outcome (No. of Participants) <sup>b</sup>	PrEP-Experienced Participants (n = 541)					PrEP-Naive Participants (n = 837)						
	IR 1 Year Before Enrollment <sup>c</sup>	IR During Follow-up <sup>c</sup>	IRR (95% CI)	P Value	Adjusted IRR (95% CI) <sup>d</sup>	P Value	IR 1 Year Before Enrollment <sup>c</sup>	IR During Follow-up <sup>c</sup>	IRR (95% CI)	P Value	Adjusted IRR (95% CI) <sup>d</sup>	P Value
All STIs (n = 1378)	92.4	104.1	1.13 (0.99-1.28)	.07	1.05 (0.92-1.19)	.49	55.1	94.2	1.71 (1.49-1.96)	<.001	1.21 (1.06-1.39)	.006
Chlamydia (n = 1318)	45.8	52.4	1.14 (0.97-1.35)	.12	1.04 (0.88-1.23)	.66	25.2	46.5	1.84 (1.55-2.20)	<.001	1.38 (1.13-1.66)	.001
Rectal (n = 1240)	36.3	40.5	1.12 (0.92-1.36)	.28	0.98 (0.81-1.18)	.83	19.4	34.4	1.78 (1.44-2.19)	<.001	1.20 (0.95-1.51)	.13
Urethral (n = 1304)	13.1	14.1	1.08 (0.78-1.49)	.65	0.96 (0.69-1.33)	.80	7.6	13.9	1.83 (1.30-2.56)	<.001	1.32 (0.91-1.90)	.14
Pharyngeal (n = 1061)	2.6	4.0	1.52 (0.73-3.18)	.26	1.40 (0.66-2.95)	.38	2.6	5.1	1.99 (1.10-3.62)	.02	1.64 (0.86-3.13)	.13
Gonorrhea (n = 1324)	40.1	43.4	1.08 (0.90-1.30)	.38	0.99 (0.83-1.17)	.87	24.6	41.5	1.69 (1.42-2.01)	<.001	1.11 (0.92-1.34)	.26
Rectal (n = 1241)	24.6	25.6	1.04 (0.82-1.33)	.75	0.93 (0.73-1.19)	.57	15.1	25.2	1.67 (1.33-2.09)	<.001	1.00 (0.78-1.28)	.99
Urethral (n = 1309)	7.4	9.5	1.28 (0.88-1.86)	.20	1.17 (0.80-1.70)	.42	3.6	7.5	2.06 (1.29-3.31)	.002	1.33 (0.84-2.09)	.23
Pharyngeal (n = 1274)	17.5	19.7	1.13 (0.86-1.47)	.38	1.03 (0.79-1.34)	.83	11.6	17.7	1.53 (1.17-1.99)	.002	1.04 (0.78-1.38)	.78
Syphilis (n = 1318)	7.4	9.8	1.32 (0.89-1.95)	.17	1.28 (0.87-1.90)	.21	6.4	7.9	1.24 (0.87-1.78)	.24	0.93 (0.62-1.40)	.74

Variables	Prior to PrEP (N = 109)		Following PrEP start (N = 109)		Following PEP episode (N = 86)	
	Incident cases	Frequency per 100 person-years	Incident cases	Frequency per 100 person-years	Incident cases	Frequency per 100 person-years
<i>Neisseria gonorrhoeae</i>						
Anal	10	9.17	16	14.68	9	10.47
Oral	12	11.01	13	11.93	13	15.12
Urethral	9	8.26	7	6.42	2	2.33
Any site	23	21.10	31	28.44	22	25.58
<i>Chlamydia trachomatis</i>						
Anal	15	13.76	32	29.36	8	9.30
Oral	3	2.75	3	2.75	1	1.16
Urethral	6	5.50	11	10.09	1	1.16
Any site	21	19.27	44	40.37	8	9.30
Syphilis (new infection)	9	8.26	16	14.68	3	3.49
Hepatitis C virus	0	–	0	–	0	–
Total count of STIs	53	48.62	91	83.5	33	38.4
HIV seroconversion	–	–	2	1.85 (0.46–7.42)	1	1.16 (0.16–8.23)
Total number of STIs per individual, N (%)						
Zero cases	72	66.06%	57	52.29%	60	69.70%
One case	25	22.94%	29	29.61%	19	22.09%
Two cases	8	7.34%	13	11.93%	7	8.14%
At least three cases	4	3.67%	10	9.17%	0	0%

59.6	1.72 (1.44-2.05)	<.001	1.10 (0.91-1.32)	.32
21.3	1.86 (1.40-2.48)	<.001	1.26 (0.94-1.70)	.13
23.1	1.67 (1.31-2.14)	<.001	1.14 (0.88-1.47)	.34

the year prior to enrollment and during follow-up. Participants could contribute 1 year (before enrollment and during follow-up).

n-years.

Individual testing frequency between before enrollment and during follow-up. Adjusted IRR from negative binomial regression with robust standard errors clustered by participant.

Nguyen et al., *AIDS*. 2018 Feb 20;32(4):523-530

Traeger et al., *JAMA*. 2019 Apr 9;321(14):1380-1390

"I'm HIV negative on PrEP, so why should I care about STIs? I'll just get a shot or take a pill. It's not like it will last forever."

# STIs – Increased Risk for HIV

HIV Diagnosis by Rectal Infection Status

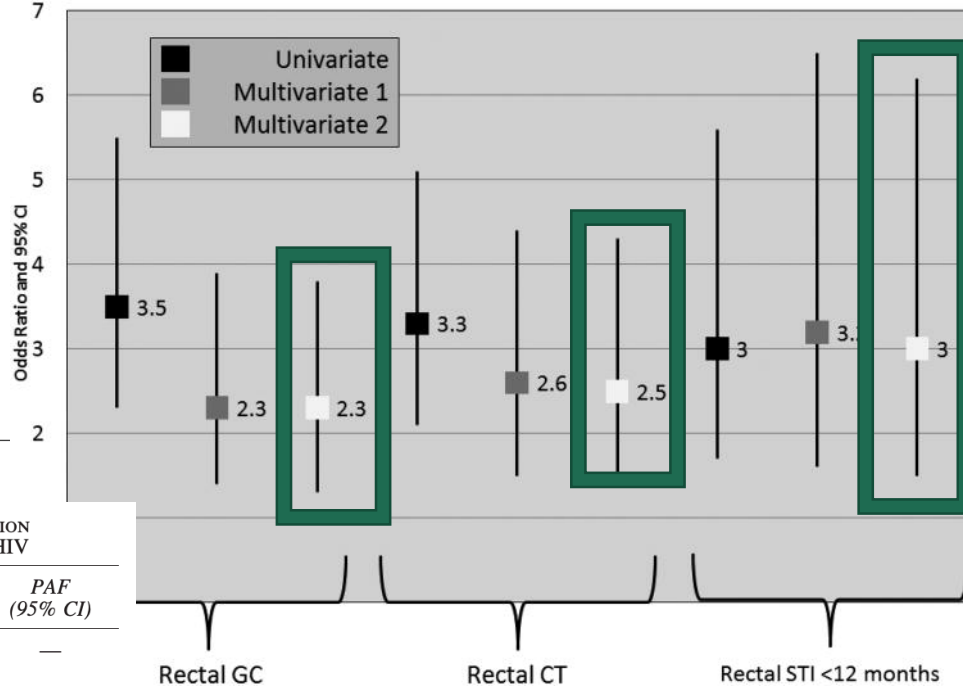
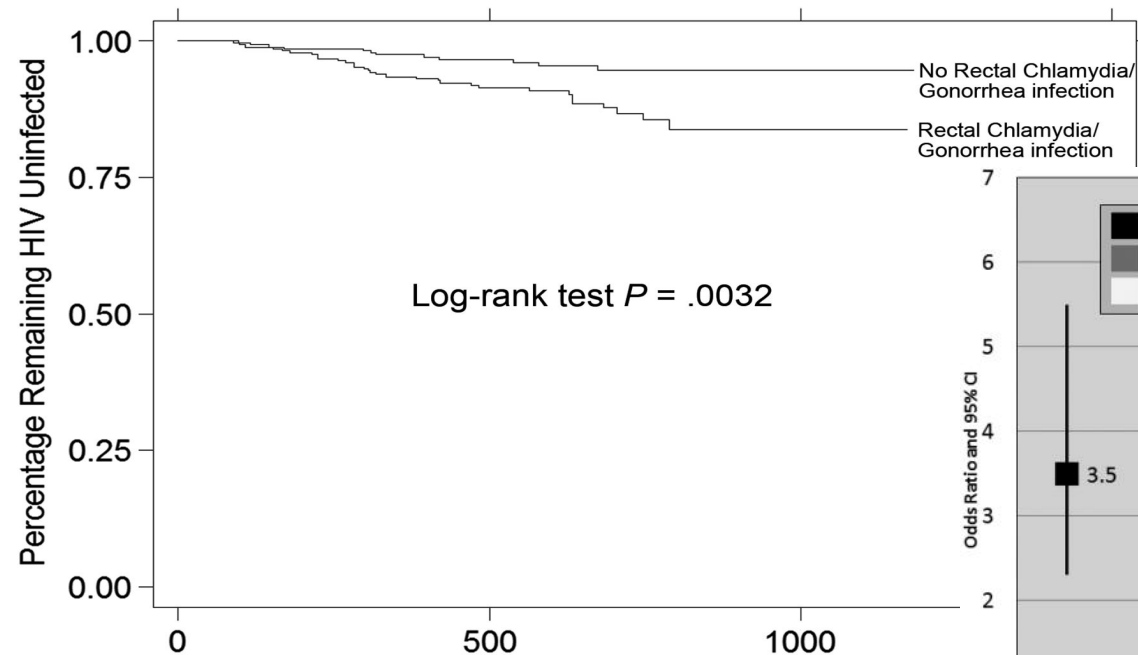


TABLE 3. UNADJUSTED AND ADJUSTED HAZARD RATIOS AND POPULATION ATTRIBUTABLE FRACTION FOR THE ASSOCIATION BETWEEN INCIDENT SEXUALLY TRANSMITTED INFECTION AND INCIDENT HIV

STI	Counts	Crude HR (95% CI)	Standardized differences <0.25 (n)	Adjusted HR (95% CI)	PAF (95% CI)
Urethral STI	STI <sup>+</sup>	—	8/8	—	—
	STI <sup>-</sup>	—			
HIV <sup>+</sup>	0	—	8/8	—	—
	26	—			
HIV <sup>-</sup>	37	—	8/8	—	—
	489	—			
Syphilis	STI <sup>+</sup>	—	3/8	—	—
	STI <sup>-</sup>	—			
HIV <sup>+</sup>	0	—	3/8	—	—
	26	—			
HIV <sup>-</sup>	21	—	3/8	—	—
	505	—			
Rectal STI	STI <sup>+</sup>	3.6 (1.4, 9.2)	8/8	2.7 (1.2, 6.4)	14.6 (6.8, 31.4)
	STI <sup>-</sup>	—			
HIV <sup>+</sup>	6	—	8/8	2.7 (1.2, 6.4)	14.6 (6.8, 31.4)
	20	—			
HIV <sup>-</sup>	73	—	8/8	2.7 (1.2, 6.4)	14.6 (6.8, 31.4)
	453	—			

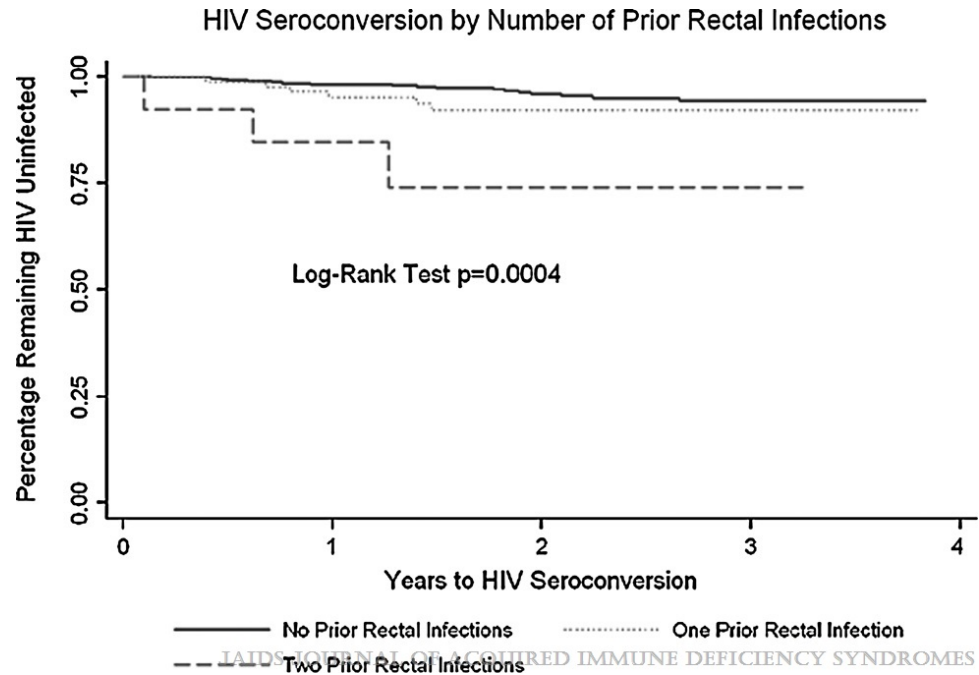
STD Clinic Patients, New York City. Pathela, CID 2013:57; Barbee et al., Sex Transm Dis. 2017 Jul; 44(7): 385–389.

Kelley et al., AIDS Res Hum Retroviruses. 2015 Jun 1; 31(6): 587–592

HR, hazard ratio; PAF, population attributable fraction; STI, sexually transmitted infection.

# STIs – Increased Risk for HIV

Characteristic	Univariate HR	95% CI	Multivariate Model 1 HR	95% CI	Multivariate Model 2 HR	95% CI
Age (yrs)						
<29	1					
30–39	1.01	0.44 to 2.34				
40–49	0.86	0.24 to 3.06				
50+	2.26	0.51 to 10.11				
Sexual identity						
Straight/bisexual	1					
Gay	0.78	0.29 to 2.05				
Race/ethnicity						
White	1					
Black	1.40	0.32 to 6.14				
Hispanic	1.39	0.53 to 3.61				
Asian/Pacific Islander	0.97	0.32 to 2.93				
Other/unknown	4.65	0.61 to 35.46				
Treatment						
Presumptive	1					
Returned	0.97	0.46 to 2.07				
None documented	Undefined					
Number of male sex partners (2 mo)						
0–1	1					
2–3	2.75	0.59 to 12.74				
4+	3.43	0.77 to 15.22				
Missing	3.40	0.57 to 20.36				
Any female sex partners						
Yes	Undefined					
No	1					
Missing	1.23	0.37 to 4.08				
Early syphilis diagnosis in prior 2 yrs						
Yes	3.94	1.18 to 13.10	4.04	1.19 to 13.79	4.17	1.22–14.27
No	1		1		1	
Rectal symptoms						
Yes	0.60	0.08 to 4.45				
No	1					
Number of rectal infections in prior 2 yrs						
0	1		1		1	
1	1.87	0.74 to 4.71	1.69	0.66 to 4.31	1.60	0.61–4.16
2	8.16	2.39 to 27.88	8.85	2.57 to 30.40	8.81	2.48–31.29



Bernstein et al., JAIDS 53(4):537-543.

# STIs – Increased Risk for HIV in MSM

Rectal GC  
or CT



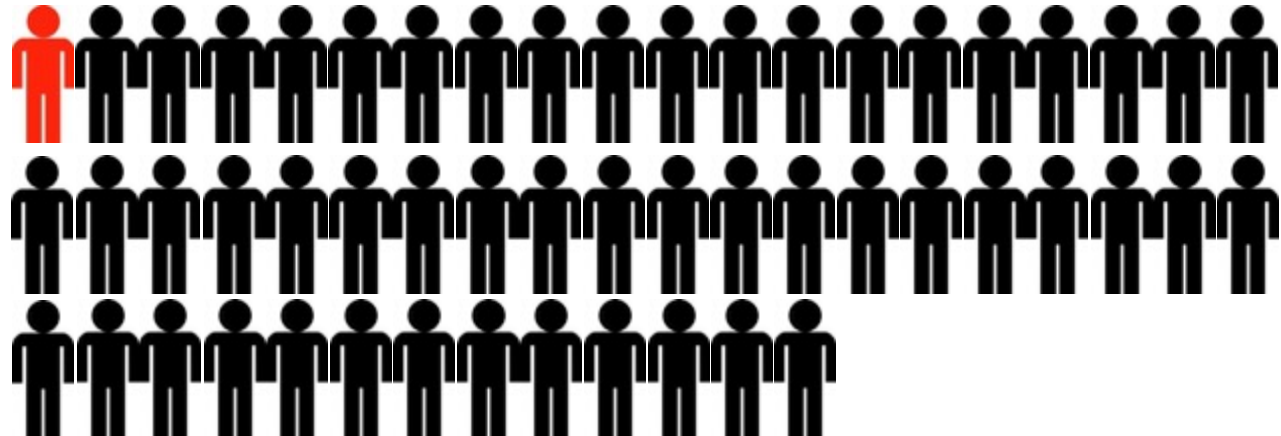
1 in 15 MSM were diagnosed with HIV within 1 year.\*

Primary or  
Secondary  
Syphilis



1 in 18 MSM were diagnosed with HIV within 1 year.\*\*

No rectal STD  
or syphilis  
infection



1 in 53 MSM were diagnosed with HIV within 1 year.\*

\*STD Clinic Patients, New York City. Pathela, CID 2013:57;

\*\*Matched STD/HIV Surveillance Data, New York City. Pathela, CID 2015:61

Chen R4P 2018  
Slide courtesy Jeanne Marrazzo, MD

# STIs – Increased Risk for HIV in Women

HIV/AIDS

MAJOR ARTICLE

STIs led to inflammation even if there are no symptoms

Inflammation increases risk for HIV acquisition

## Genital Inflammation and the Risk of HIV Acquisition in Women

Lindi Masson,<sup>1,2,a</sup> Jo-Ann S. Passmore,<sup>1,2,3,a</sup> Lenine J. Liebenberg,<sup>1,2</sup> Lise Werner,<sup>1</sup> Cheryl Baxter,<sup>1</sup> Kelly B. Arnold,<sup>4</sup> Carolyn Williamson,<sup>1,2</sup> Francesca Little,<sup>5</sup> Leila E. Mansoor,<sup>1</sup> Vivek Naranbhai,<sup>1</sup> Douglas A. Lauffenburger,<sup>4</sup> Katharina Ronacher,<sup>6</sup> Gerhard Walzl,<sup>6</sup> Nigel J. Garrett,<sup>1</sup> Brent L. Williams,<sup>7</sup> Mara Couto-Rodriguez,<sup>7</sup> Mady Hornig,<sup>7</sup> W. Ian Linton,<sup>7</sup> Anneke Grobler,<sup>1</sup> Quarraisha Abdool Karim,<sup>1,8</sup> and Salim S. Abdool Karim<sup>1,8</sup>

## Inflammatory cytokine biomarkers of asymptomatic sexually transmitted infections and vaginal dysbiosis: a multicentre validation study

Mwaleh R et al. *Journal of the International AIDS Society* 2019, **22**(S6):e25346  
<http://onlinelibrary.wiley.com/doi/10.1002/jia2.25346/full> | <https://doi.org/10.1002/jia2.25346>



Lindi Masson,<sup>1,2</sup> Shaun Barnabas,<sup>1,3</sup> Jennifer Dee,<sup>1</sup> Hoyam Gamielien,<sup>1</sup> Shameem Z Jaumdally,<sup>1</sup> Anr Lut Van Damme,<sup>7</sup> Khatija Ahmed,<sup>8</sup> Tania Crucitti,<sup>9</sup> Glenda Gray,<sup>10,11</sup> Janan Dietrich,<sup>10</sup> Heather Jaspa

COMMENTARY

## Mechanisms of sexually transmitted infection-induced inflammation in women: implications for HIV risk

Ruth Mwaleh<sup>1\*</sup>, Lyle R McKinnon<sup>1,2\*</sup>, Cheryl Baxter<sup>2</sup>, Quarraisha Abdool Karim<sup>2,3</sup> and Salim S Abdool Karim<sup>2,3§</sup>

<sup>§</sup>Corresponding author: Salim S Abdool Karim, Centre for the AIDS Programme of Research in South Africa (CAPRISA), Private Bag X7, Congella, 4013 Durban, South Africa. Tel: +2731 260 4550. ([salim.abdoolkarim@caprisa.org](mailto:salim.abdoolkarim@caprisa.org))

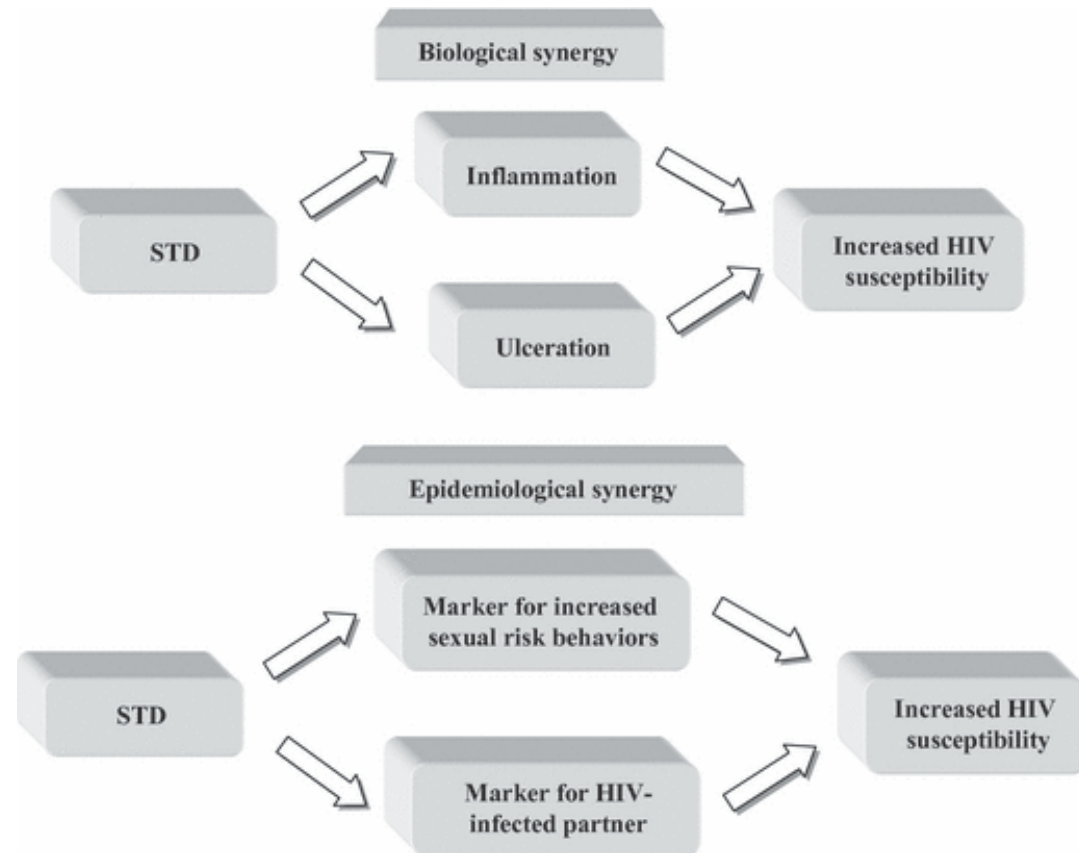
\*These authors have contributed equally to the work.

Masson et al., *CID* 2015;61

Passmore et al., *Curr Opin HIV AIDS*. 2016 Mar;11(2):156-62

# STIs and HIV – Bad Synergy

- Increased levels of HIV RNA in genital secretions in those with STI
- No convincing clinical data *yet* to say that population based STI treatment will reduce HIV acquisition



Mayer K, Venkatesh KK, Am J Reprod Immunol. 2011 Mar;65(3):308-1  
Rotchford et al., Sex Transm Dis. 2000 May;27(5):243-8

# HIV Acquisition on PrEP

## Acquisition of tenofovir-susceptible, emtricitabine-resistant HIV despite high adherence to daily pre-exposure prophylaxis: a case report

Stephanie E Cohen, Darpun Sachdev, Sulggi A Lee, Susan Scheer, Oliver Bacon, Miao-Jung Chen, Hideaki Okochi, Peter L Anderson, Mary F Kearney, Susa Coffey, Hyman Scott, Robert M Grant, Diane Havlir, Monica Gandhi

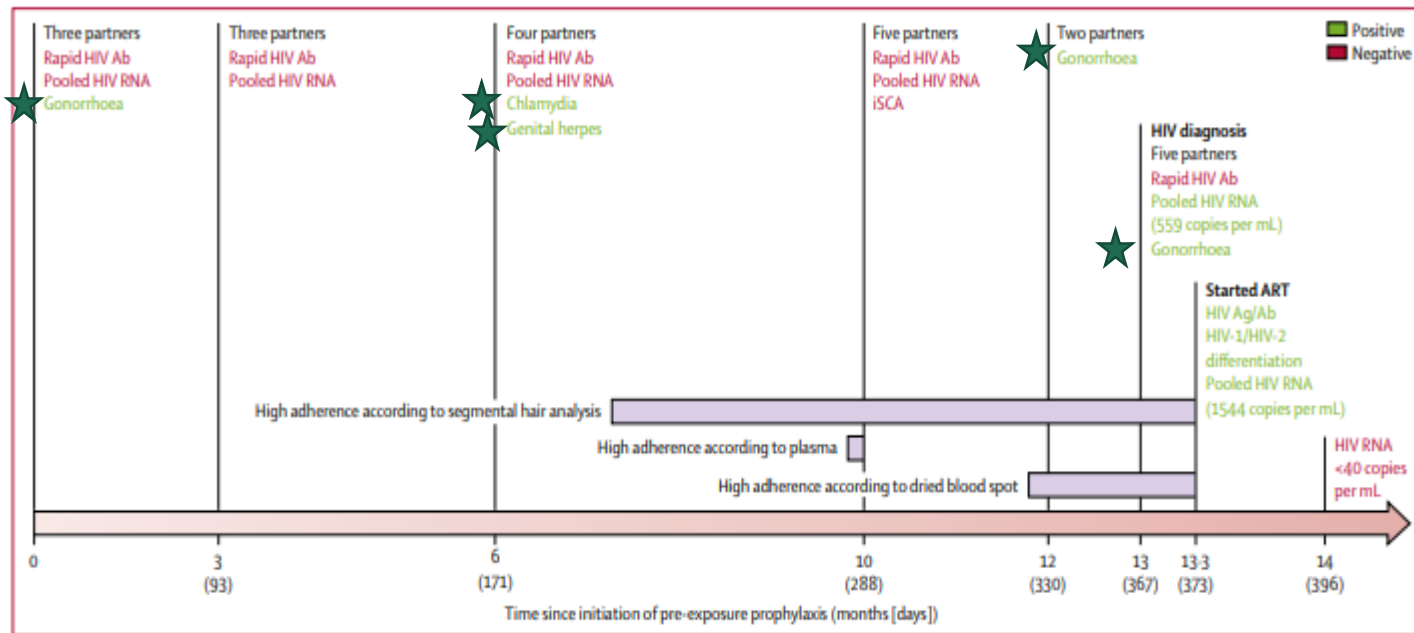


Figure 1: Timeline of HIV and sexually transmitted disease screening results since initiation of pre-exposure prophylaxis

Total number of sexual partners are self-reported from the previous 3 months. The time covered by specific measures of adherence to pre-exposure prophylaxis is shown in horizontal bars (purple).  
Ab=antibody. iSCA=integrase single-copy assay. ART=antiretroviral therapy. Ag=antigen.

Cohen et al., Lancet HIV 2019; 6: e43–50

Multiple STIs

Condomless anal intercourse and methamphetamine use.



“I literally never use condoms. I just don’t like the way they feel, and I feel less close to my partner. I’m not sure I need them on PrEP”

For some individuals, condoms may represent not only a physical barrier but also an intimacy barrier.

Less about risk and more about intimacy and pleasure.

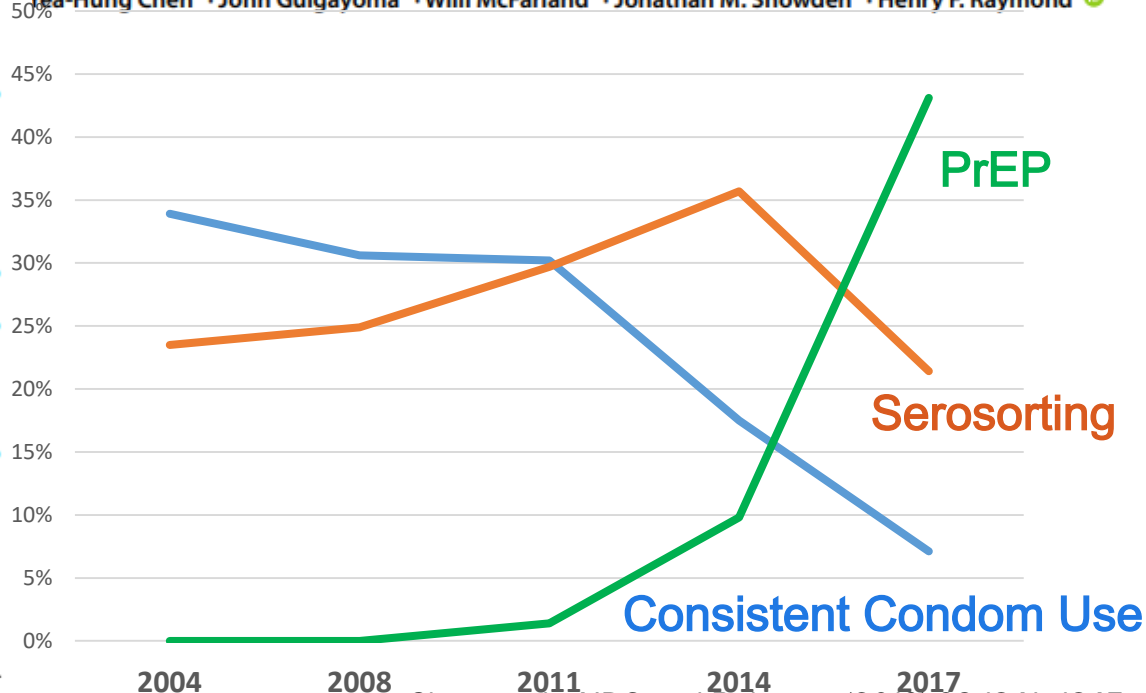
# Condom Use among MSM

AIDS and Behavior (2019) 23:1841–1845  
<https://doi.org/10.1007/s10461-018-2299-7>

ORIGINAL PAPER

## Increases in Pre-exposure Prophylaxis Use and Decreases in Condom Use: Behavioral Patterns Among HIV-Negative San Francisco Men Who have Sex with Men, 2004–2017

Yea-Hung Chen<sup>1</sup> · John Guigayoma<sup>1</sup> · Willi McFarland<sup>1</sup> · Jonathan M. Snowden<sup>2</sup> · Henry F. Raymond<sup>3</sup> 



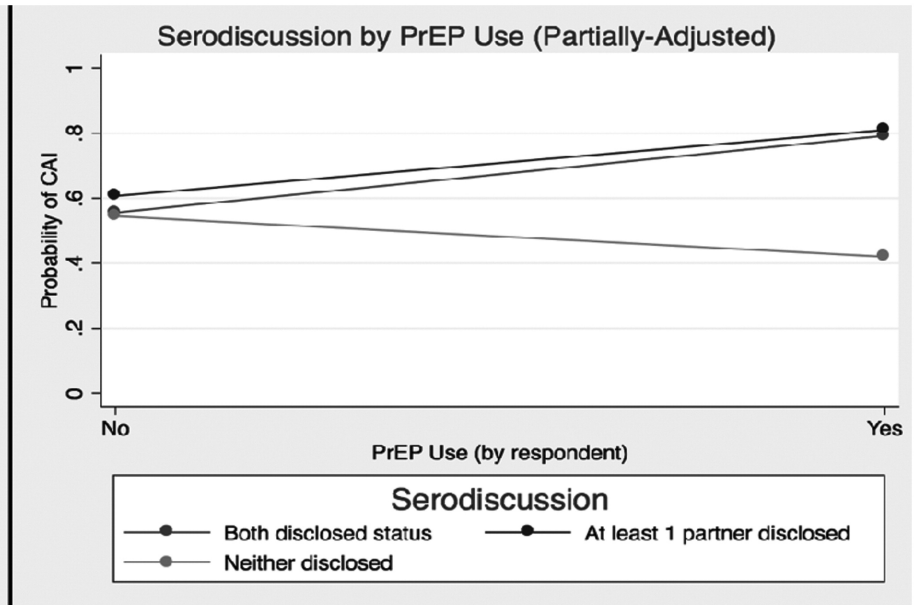
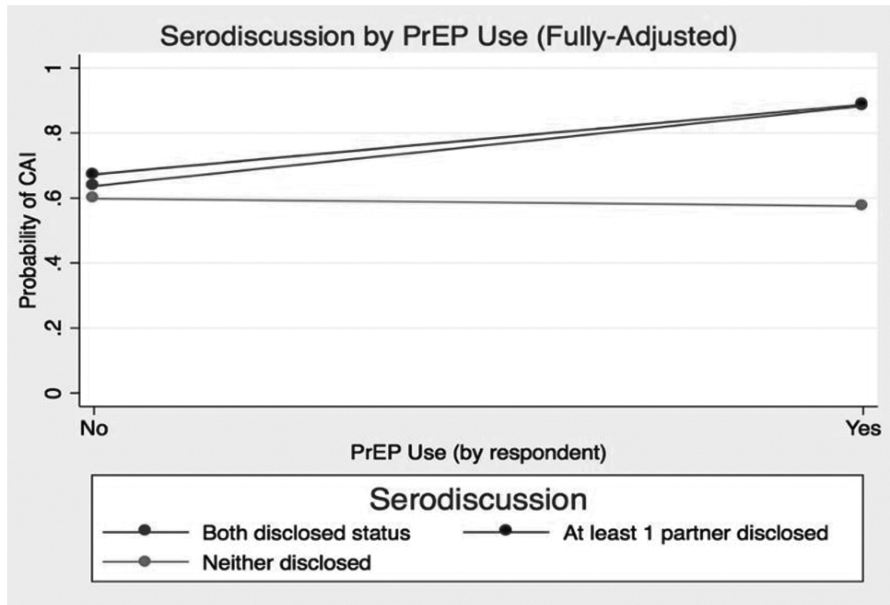
Chen et al., AIDS and Behavior (2019) 23:1841–1845

Chart courtesy of Jeanne Mrazzoz, MD

	2004	2008	2011	2014	2017	$\chi^2, P$
<b>Behavioral classification, last 6 months</b>						
No anal intercourse	287 (23.8)	114 (28.4)	84 (22.9)	62 (20.9)	84 (21.4)	1.8, 0.18
PrEP use <sup>a</sup>	0 (0.0)	0 (0.0)	5 (1.4)	29 (9.8)	169 (43.1)	559.4, 0.00
Consistent condom use	444 (36.8)	123 (30.6)	111 (30.2)	52 (17.5)	28 (7.1)	136.0, 0.00
Pure serosorting	283 (23.5)	100 (24.9)	109 (29.7)	106 (35.7)	84 (21.4)	2.6, 0.10
Condom serosorting	67 (5.6)	16 (4.0)	24 (6.5)	15 (5.1)	5 (1.3)	6.4, 0.01
Seropositioning	61 (5.1)	19 (4.7)	23 (6.3)	16 (5.4)	10 (2.6)	1.5, 0.22
Condom seropositioning	10 (0.8)	5 (1.2)	2 (0.5)	2 (0.7)	1 (0.3)	1.3, 0.25
No discernible strategy	53 (4.4)	25 (6.2)	9 (2.5)	15 (5.1)	11 (2.8)	1.5, 0.21
<b>Behavioral classification without PrEP use, last 6 months</b>						
No anal intercourse	287 (23.8)	114 (28.4)	84 (22.9)	62 (20.9)	84 (21.4)	1.8, 0.18
Consistent condom use	444 (36.8)	123 (30.6)	113 (30.8)	55 (18.5)	37 (9.4)	115.7, 0.00
Pure serosorting	283 (23.5)	100 (24.9)	110 (30.0)	120 (40.4)	169 (43.1)	71.1, 0.00
Condom serosorting	67 (5.6)	16 (4.0)	24 (6.5)	16 (5.4)	21 (5.4)	0.0, 0.96
Seropositioning	61 (5.1)	19 (4.7)	25 (6.8)	21 (7.1)	36 (9.2)	9.3, 0.00
Condom seropositioning	10 (0.8)	5 (1.2)	2 (0.5)	2 (0.7)	3 (0.8)	0.1, 0.72
No discernible strategy	53 (4.4)	25 (6.2)	9 (2.5)	21 (7.1)	42 (10.7)	15.4, 0.00
<b>PrEP use, last 12 months</b>						
PrEP use	0 (0.0)	0 (0.0)	5 (1.4)	29 (9.8)	176 (44.9)	583.2, 0.00
<b>Number of condomless anal intercourse partners, last 6 months</b>						
0	731 (60.7)	237 (59.0)	197 (53.7)	117 (39.4)	121 (30.9)	119.3, 0.00
1	339 (28.1)	116 (28.9)	110 (30.0)	94 (31.6)	101 (25.8)	0.0, 0.95
2	82 (6.8)	32 (8.0)	28 (7.6)	29 (9.8)	52 (13.3)	14.3, 0.00
3	28 (2.3)	10 (2.5)	17 (4.6)	27 (9.1)	38 (9.7)	50.0, 0.00
4	12 (1.0)	4 (1.0)	9 (2.5)	14 (4.7)	30 (7.7)	52.6, 0.00
5+	13 (1.1)	3 (0.7)	6 (1.6)	16 (5.4)	50 (12.8)	103.1, 0.00
<b>Number of HIV-infected partners, last 6 months</b>						
0	1103 (91.5)	357 (88.8)	313 (85.3)	255 (85.9)	321 (81.9)	31.4, 0.00
1	86 (7.1)	39 (9.7)	45 (12.3)	34 (11.4)	61 (15.6)	25.9, 0.00
2+	16 (1.3)	6 (1.5)	9 (2.5)	8 (2.7)	10 (2.6)	4.4, 0.04
<b>Number of unknown-status partners, last 6 months</b>						
0	813 (67.5)	284 (70.6)	297 (80.9)	245 (82.5)	317 (80.9)	50.4, 0.00
1	182 (15.1)	60 (14.9)	34 (9.3)	26 (8.8)	38 (9.7)	15.4, 0.00
2+	210 (17.4)	58 (14.4)	36 (9.8)	26 (8.8)	37 (9.4)	28.1, 0.00

<sup>a</sup>Within the last 12 months

# Condoms and The “New” Serosorting



“Biomed Matching” – Where PrEP and U=U meet

Newcomb et al., JAIDS 2016  
 Prescott et al., AIDS Pt Care STDS 2019

# Apps and STIs

## Trends in Internet Use Among Men Who Have Sex With Men in the United States

Gabriela Paz-Bailey, MD, PhD, MSc,\* Brooke E. Hoots, PhD, MSPH,\* Mingjing Xia, MD,†  
Teresa Finlayson, PhD, MPH,\* Joseph Prejean, PhD,\* and David W. Purcell, JD, PhD,\*  
for the NHBS Study Group

Epidemiology  
Original article

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

Matthew R Beymer<sup>1,2</sup>, Robert E Weiss<sup>2</sup>, Robert K Bolan<sup>1</sup>, Ellen T Rudy<sup>3</sup>, Linda B Bourque<sup>2</sup>, Jeffrey P Rodriguez<sup>1</sup>, Donald E Mor...

Internet use to meet partners increased 21% to 44% from 2008-2014.

App use may be associated with incident STI but less clear












**TABLE 3.** Generalized Linear Mixed Modeling Outcomes: ORs and 95% CIs of Testing Positive for Gonorrhea, Chlamydia, Syphilis, or HIV by GSN App Use (Including Repeated Visits), August 2015 to July 2016 (n = 9499, Number of Visits = 11,265)

	Met Partners Via GSN App in the Last 3 mo (Reference = No)		Met Most Recent Partner Via GSN App (Reference = No)	
Gonorrhea	<b>1.23 (1.09–1.39)</b>	<b>P = 0.0008</b>	1.00 (0.85–1.18)	P = 0.98
Chlamydia	1.14 (1.00–1.29)	P = 0.06	1.08 (0.90–1.28)	P = 0.41
Syphilis	0.74 (0.50–1.10)	P = 0.14	0.97 (0.56–1.69)	P = 0.92
HIV	1.06 (0.68–1.64)	P = 0.81	1.44 (0.82–2.54)	P = 0.20
Any STI	<b>1.24 (1.12–1.37)</b>	<b>P &lt; 0.0001</b>	1.08 (0.94–1.23)	P = 0.27














Bold text indicates statistical significance.  
OR indicates odds ratio.

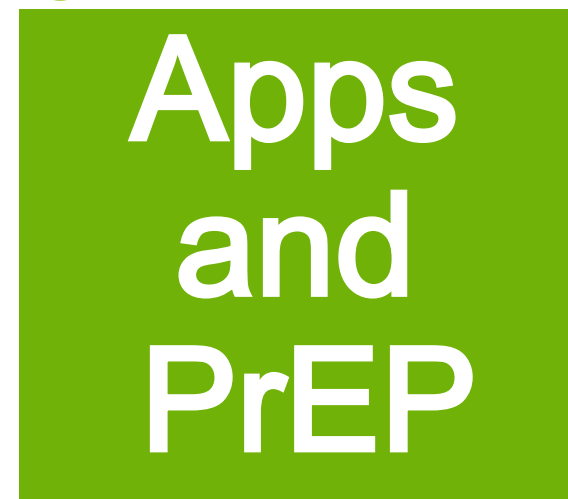
Beymer et al., *Sexually Transmitted Infections* 2014;90:567-572  
DeVost et al., *Sexually Transmitted Diseases* 2018;45(6)

# An Electronic Pre-Exposure Prophylaxis Initiation and Maintenance Home Care System for Nonurban Young Men Who Have Sex With Men: Protocol for a Randomized Controlled Trial

Aaron J Siegler<sup>1</sup>, PhD  ; James B Brock<sup>2</sup>, MD, MSc  ; Christopher B Hurt<sup>3</sup>, MD  ; Lauren Ahlschlager<sup>4</sup>, MPH  ;  
Karen Dominguez<sup>1</sup>, MPH  ; Colleen F Kelley<sup>5</sup>, MD  ; Samuel M Jenness<sup>4</sup>, PhD  ; Gretchen Wilde<sup>1</sup>, MPH  ;  
Samuel B Jameson<sup>6</sup>, PhD  ; Gina Bailey-Herring<sup>1</sup>, APRN  ; Leandro A Mena<sup>2,6</sup>, MD, MPH 

## Developing a Mobile App (LYNX) to Support Linkage to HIV/Sexually Transmitted Infection Testing and Pre-Exposure Prophylaxis for Young Men Who Have Sex With Men: Protocol for a Randomized Controlled Trial

Albert Liu<sup>1,2</sup>, MD, MPH  ; Kenneth Coleman<sup>1</sup>, MPH  ; Kelly Bojan<sup>3,4</sup>, DNP  ; Pedro Alonso Serrano<sup>3,4</sup>, MPH  ;  
Temitope Oyedele<sup>3,4</sup>, MD  ; Amayvis Garcia<sup>5</sup>  ; Elizabeth Enriquez-Bruce<sup>5</sup>, MD  ; Patricia Emmanuel<sup>5</sup>, MD  ;  
Jeb Jones<sup>6</sup>, MS, MPH, PhD  ; Patrick Sullivan<sup>6</sup>, DVM, PhD  ; Lisa Hightow-Weidman<sup>7</sup>, MD, MPH  ;  
Susan Buchbinder<sup>1,2</sup>, MD  ; Hyman Scott<sup>1,2</sup>, MD, MPH 



## A Mobile-Based App (MyChoices) to Increase Uptake of HIV Testing and Pre-Exposure Prophylaxis by Young Men Who Have Sex With Men: Protocol for a Pilot Randomized Controlled Trial

Katie B Biello<sup>1,2,3,4</sup>, PhD, MPH  ; Elliot Marrow<sup>3</sup>, BA  ; Matthew J Mimiaga<sup>1,2,3,4</sup>, ScD, MPH  ; Patrick Sullivan<sup>5</sup>, DVM, PhD  ;  
Lisa Hightow-Weidman<sup>6</sup>, MD, MPH  ; Kenneth H Mayer<sup>3,7,8</sup>, MD 

# Extragenital Testing

FDA NEWS RELEASE

## FDA clears first diagnostic tests for extragenital testing for chlamydia and gonorrhea

*FDA clears first diagnostic tests for extragenital testing for chlamydia and gonorrhea*

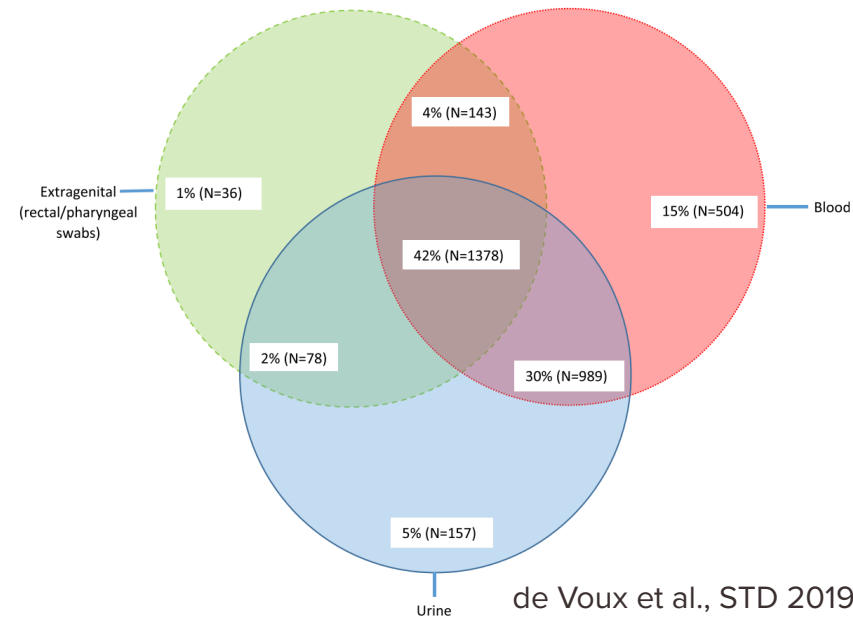
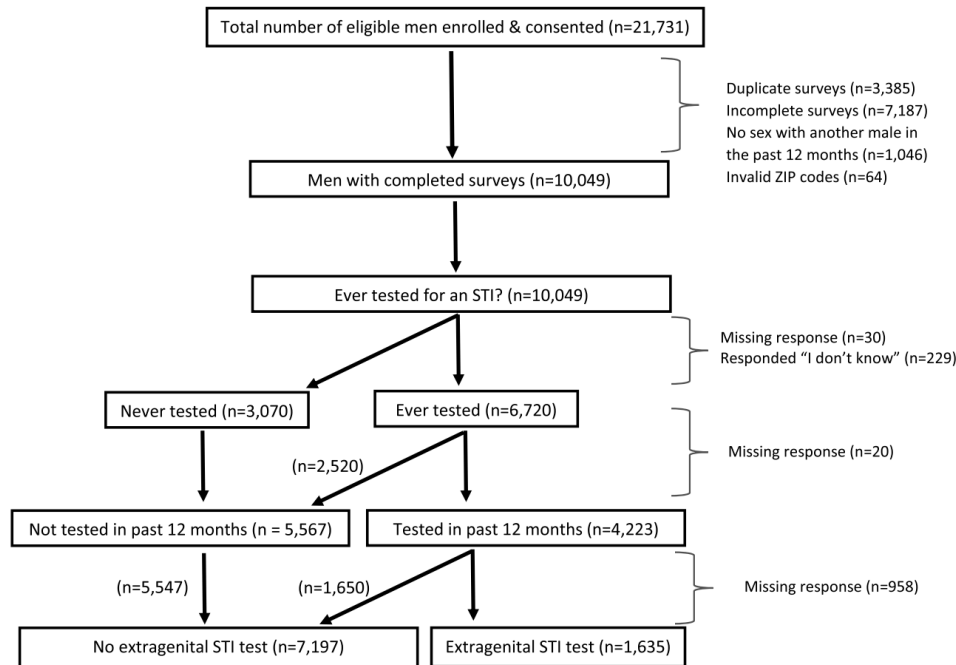


Figure 1. Flowchart outlining participants included in the analytical sample—American Men's Internet Survey, 2017.

de Voux et al., STD 2019

# STI Testing on PrEP

PrEP uptake leads to increased STI screening and treatment

Prevent 42% NG and 40% CT in 10y

*PrEP "as a combination STI/HIV prevention package"*

Clinical Infectious Diseases

MAJOR ARTICLE

 IDSA  
Infectious Diseases Society of America

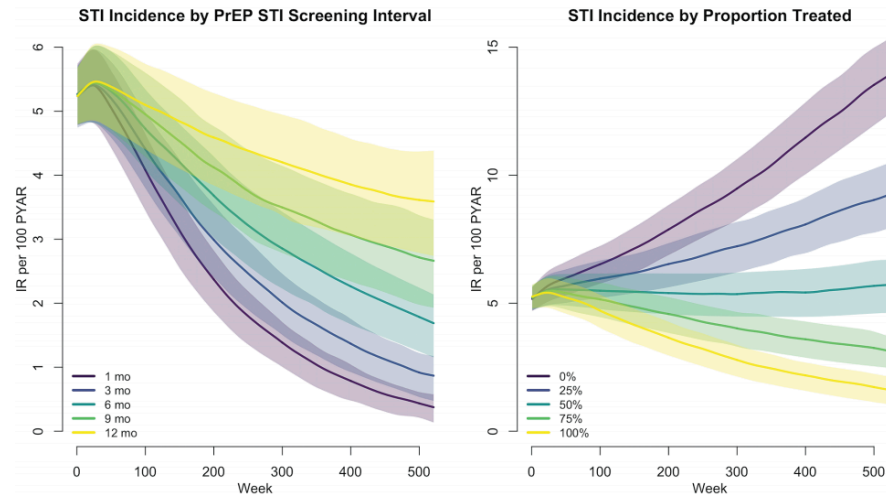
 hivma  
hiv medicine association

 OXFORD

## Incidence of Gonorrhea and Chlamydia Following Human Immunodeficiency Virus Preexposure Prophylaxis Among Men Who Have Sex With Men: A Modeling Study

Samuel M. Jenness,<sup>1</sup> Kevin M. Weiss,<sup>1</sup> Steven M. Goodreau,<sup>2</sup> Thomas Gift,<sup>3</sup> Harrell Chesson,<sup>3</sup> Karen W. Hoover,<sup>4</sup> Dawn K. Smith,<sup>4</sup> Albert Y. Liu,<sup>5</sup> Patrick S. Sullivan,<sup>1</sup> and Eli S. Rosenberg<sup>1</sup>

<sup>1</sup>Department of Epidemiology, Emory University, Atlanta, Georgia; <sup>2</sup>Department of Anthropology, University of Washington, Seattle; <sup>3</sup>Division of STD Prevention, and <sup>4</sup>Division of HIV/AIDS Prevention, Centers for Disease Control and Prevention, Atlanta, Georgia; and <sup>5</sup>San Francisco Department of Public Health, California



**Figure 2.** Incidence rates, per 100 person-years at risk, of combined gonorrhea and chlamydia infections under varying preexposure prophylaxis (PrEP)-associated sexually transmitted infection screening intervals and proportion of PrEP users screened and treated among men who have sex with men in the United States over 10 years of 250 simulations. Abbreviations: IR, incidence rate; PrEP, preexposure prophylaxis; PYAR, person-years at risk; STI, sexually transmitted infection.

Jenness et al., CID 2017

# Stigma

## THE CYCLE

# Why Sexually Transmitted Infections Can't Shake Their Stigma

We live in an era of sex positivity — until we get positive test results. And that's unfortunate, because S.T.I.s are on the rise.

TABLE 3. ADJUSTED ODDS RATIOS (ORs) AND 95% CONFIDENCE INTERVALS (95% CI) OF EVER BEING STI TESTED, SELF-NOTIFYING PARTNERS OF STI (MAIN AND NON-MAIN), AND BRINGING MEDICATION TO PARTNERS, BY STI-RELATED STIGMA AND SHAME

<i>Variable</i>	<i>Ever STI tested Adjusted OR (95% CI)</i>	<i>Would self-notify main partner of STI Adjusted OR (95% CI)</i>	<i>Would self-notify other partner of STI Adjusted OR (95% CI)</i>	<i>Would bring medication to partners Adjusted OR (95% CI)</i>
STI-related stigma	0.62 (0.38–1.00)	0.65 (0.41–1.03)	0.64 (0.41–0.99)	0.57 (0.37–0.88)
STI-related shame	0.74 (0.46–1.19)	0.67 (0.43–1.05)	0.71 (0.47–1.08)	0.53 (0.34–0.83)

All estimates adjusted for age.

Jen Gunter, MD, *The New York Times* Aug 13, 2019  
Morris et al., *AIDS Pt Care STDs* 2014



DEBATE

## Give PrEP a chance: moving on from the “risk compensation” concept

Daniela Rojas Castro<sup>1,2§</sup> , Rosemary M Delabre<sup>1</sup>  and Jean-Michel Molina<sup>3,4</sup>

§ **Corresponding author:** Daniela Rojas Castro, Coalition PLUS, Community-based Research Laboratory, 14 rue Scandicci, 93500 Pantin, France. Tel: +33699176940. ([drojascastro@coalitionplus.org](mailto:drojascastro@coalitionplus.org))

Risk compensation should not be used to exclude vulnerable populations from HIV prevention services

# STI Prevention

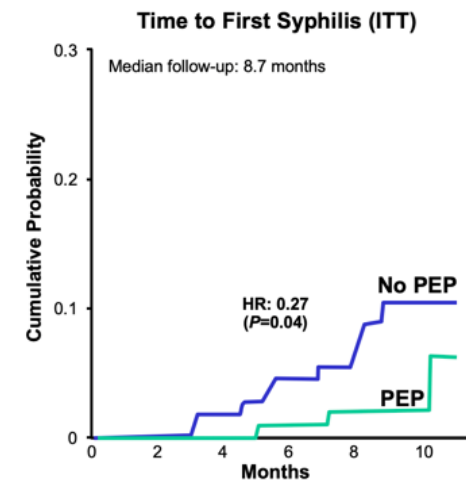
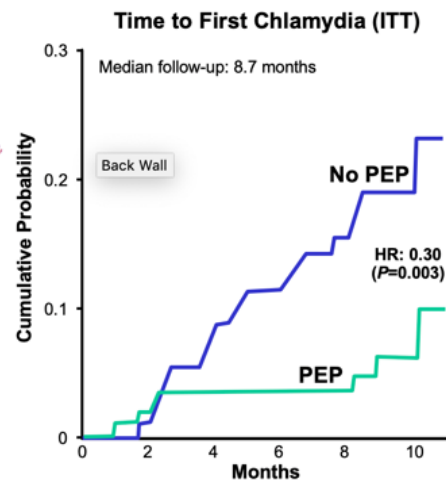
## Efficacy of a Clinic-Based Safer Sex Program for Human Immunodeficiency Virus–Uninfected and Human Immunodeficiency Virus–Infected Young Black Men Who Have Sex With Men: A Randomized Controlled Trial

Richard A. Crosby, PhD,\*†‡ Leandro Mena, MD,‡§ Laura F. Salazar, PhD,¶ James W. Hardin, PhD,|| Tim Brown, MPH,\* and Rachel Vickers Smith, PhD\*\*

### Time to First Chlamydia and Syphilis With On-Demand PEP With Doxycycline for MSM

Post-exposure prophylaxis with doxycycline to prevent sexually transmitted infections in men who have sex with men: an open-label randomised substudy of the ANRS IPERGAY trial

Jean-Michel Molina, Isabelle Charreau, Christian Chidiac, Gilles Pialoux, Eric Cua, Constance Delaugerre, Catherine Capitant, Daniela Rojas-Castro, Julien Fonsart, Béatrice Bercot, Cécile Bébéar, Laurent Cotte, Olivier Robineau, François Raffi, Pierre Charbonneau, Alexandre Aslan, Julie Chas, Laurence Niedbalski, Bruno Spire, Luis Sagaon-Teyssier, Diane Carette, Soizic Le Mestre, Veronique Doré, Laurence Meyer, for the ANRS IPERGAY Study Group\*



Crosby et al., [Sex Transm Dis.](#) 2018 Mar;45(3):169-176

Molina et al., [Lancet ID](#) 2018 Mar;18(3):308-317

# PrEP and Pregnancy

## Pregnancy outcomes and infant growth among babies with in utero exposure to tenofovir-based pre-exposure prophylaxis for HIV prevention

Renee Heffron, Nelly Mugo, Ting Hong, Connie Celum, Mark A. Marzinke, Kenneth Ngunjiri, Stephen Asiimwe, Elly Katabira, Elizabeth Bukusi, Josephine Odoyo, Edna Tindimwebwa, Nulu Bulya, Jared M. Baeten, and Partners Demonstration Project and the Partners PrEP Study Teams\*

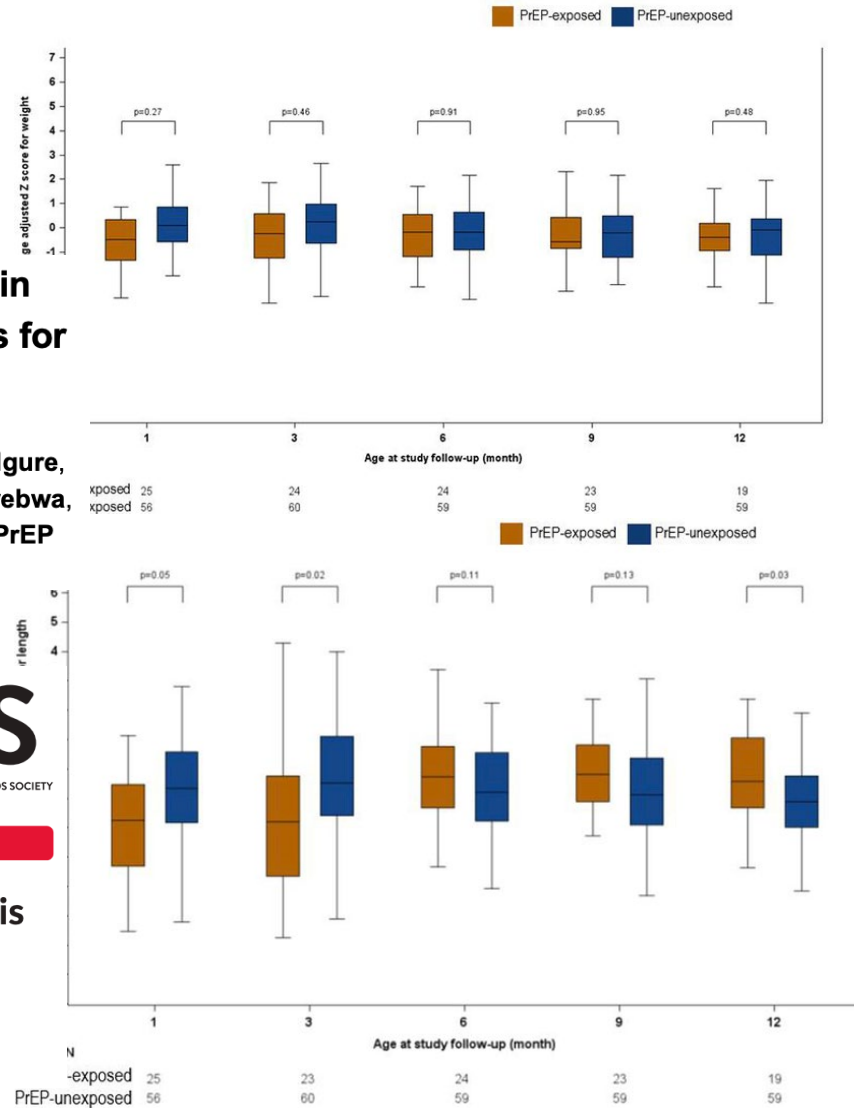
Dettinger JC et al. *Journal of the International AIDS Society* 2019, 22:e25378  
<http://onlinelibrary.wiley.com/doi/10.1002/jia2.25378/full> | <https://doi.org/10.1002/jia2.25378>



### RESEARCH ARTICLE

## Perinatal outcomes following maternal pre-exposure prophylaxis (PrEP) use during pregnancy: results from a large PrEP implementation program in Kenya

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No difference in birth outcomes by PrEP exposure

Dettinger JC et al. *JIAS* 2019, 22:e25378  
 Heffron et al., *AIDS*. 2018 Jul; 32(12): 1707–1713

PrEP is an empowerment tool to enable persons to take charge of their sexual health.

We should promote healthy sex through engaging counseling, accessible testing, and prompt treatment.

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SCHOOL OF MEDICINE



# Thank you!

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