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Correlates of serodiscordant condomless anal intercourse among virologically detectable HIV-positive young men who have sex with men

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Abstract

Sexual transmission risk occurs in the context of serodiscordant condomless anal intercourse (CAI) where the seropositive partner is virologically detectable (VL+) and/or seronegative partner is not on PrEP. We analyzed correlates of serodiscordant CAI among 688 VL+ young men who have sex with men (YMSM). In multivariable analyses, serodiscordant CAI was associated with a receiving a HIV diagnosis in the past 6 months, greater depressive symptoms, and cocaine use during the past 90 days. Although HIV+ YMSM currently experience disparities across the continuum of care, those new to care may need support adopting risk reduction strategies with their sexual partners.

Keywords

sexual risk behavior; HIV/AIDS; continuum of care; YMSM; serodiscordant

INTRODUCTION

Young men who have sex with men (YMSM) continue to be overrepresented in the HIV epidemic in the U.S., constituting over 1 in 4 of all new infections; in particular, YMSM of color remain disproportionately impacted [1]. Compared to adult populations, young persons living with HIV experience significant disparities at each stage of the HIV care continuum. For instance, young people living with HIV are more likely than adults to have undiagnosed HIV infection and to face greater challenges with linkage and retention in care [2].

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Furthermore, YMSM living with HIV (HIV+ YMSM), especially African American and Latino HIV+ YMSM, are less likely to achieve viral suppression due to drop-offs across every step of the care continuum [3].

Models estimating HIV prevalence, risk behavior, and viral suppression show that current disparities in prevalence and viral suppression will continue to drive the epidemic in MSM populations, with the highest transmission rate attributable to serodiscordant condomless anal intercourse (serodiscordant CAI) among persons who are aware of their status with unsuppressed viral load [4]. Successful antiretroviral treatment (ART) that suppresses the viral load of a person living with HIV is recognized as one strategy to reduce risk of HIV transmission, and has been shown to significantly reduce the risk of HIV transmission in clinical trials [5] and in studies of serodiscordant couples [6]. HIV+ YMSM who demonstrate optimal outcomes at points later in the continuum (being on ART, over 90% adherent to ART, as well as being virally suppressed) are less likely to engage in condomless anal intercourse [7]. At present, however, the degree to which virologically detectable YMSM (VL+YMSM) exhibit sexual risk at earlier continuum points is largely undocumented.

Under a treatment as prevention paradigm, sexual transmission risk occurs in the context of serodiscordant unprotected anal intercourse (i.e., condomless anal sex where the seropositive partner is virologically detectable (VL+) and/or seronegative partner is not on PrEP). To date, little analysis of serodiscordant risk behavior correlates among VL+ YMSM has been conducted. Substance misuse and mental health symptoms may increase the likelihood of engaging in unprotected anal intercourse as well as experiencing challenges with ART adherence. Previous research has found stimulant use (e.g., cocaine, amphetamines) to be associated with serodiscordant CAI among HIV+ adult MSM [8], and alcohol use to be associated with serodiscordant CAI among HIV+ YMSM [9].

Findings by Wilson, et al. [10] reported high rates of serodiscordant CAI associated with problematic substance use and depression among a national clinic-based sample of VL+ YMSM, although particular substances significantly associated with serodiscordant CAI were not identified. In order to target interventions to the specific needs of VL+ YMSM, more research is needed on transmission risk across stages of the HIV care continuum and the psychosocial contexts in which sexual risk occurs among patient populations. We conducted a post-hoc analysis of 688 VL+ YMSM [10] to identify specific substance use patterns and clinical continuum markers associated with serodiscordant CAI among VL+ YMSM. We focused on serodiscordant CAI as an outcome, as PrEP was not widely available at the time of data collection. We hypothesized that serodiscordant CAI would be associated with (1) alcohol use, marijuana use, and other drug use, and (2) an HIV diagnosis in the past 6 months, less retention in care, and not being on ART.

METHODS

Study Procedures

From December 2009 to June 2012, 2,225 youth and young adults living with HIV/AIDS receiving primary care at clinics within the Adolescent Medicine Trials Network for HIV/

AIDS Interventions (ATN) were recruited to participate in a cross-sectional survey. The 20 clinics were geographically representative of the HIV epidemic in the U.S. and Puerto Rico (see Acknowledgements for cities represented). To be eligible, youth had to be: 1) between 12 and 26 years of age (inclusive); 2) living with HIV/AIDS; 3) aware they were HIV-infected; 4) engaged in care in one of the ATN's clinical sites or affiliates; and 5) able to understand English or Spanish. The study was approved by the Institutional Review Boards at each participating site as well as those from the members of the protocol team.

Research staff at the sites approached all youth meeting eligibility criteria during one of their scheduled clinic visits. After a thorough explanation of the study, staff obtained signed informed consent or assent from youth agreeing to participate. Participants completed audio-computer assisted self-interviews (ACASI) which took approximately 45 to 90 minutes. The ACASI included demographic information and several psychosocial domains, including substance use, mental health, sexual behavior and other behavioral health data. Participants were given a small incentive determined by the sites' IRB as compensation for their time.

Medical charts of participants were abstracted by research staff at each site to extract ART regimen data and viral load (Plasma HIV-1 RNA) assay results obtained within the prior six months of study consent. Using the corresponding assay cutoff for the lower limit of HIV RNA detection (<200 copies/mL), we created a dichotomous variable to differentiate virally suppressed and unsuppressed participants. The current study focuses on a subsample of 688 participants ages 16–24 who identified their birth sex as male, reported sexual behavior with another male in the past 90 days, and were virologically detectable at time of study consent.

Measures

Sexual Behavior—Serodiscordant CAI during the past 90 days was assessed across (1) any insertive CAI with male HIV-negative partner(s) or partner(s) of unknown status, and (2) any receptive CAI with male HIV-negative partner(s) or partner(s) of unknown status. We transformed the two types of serodiscordant CAI into a combined “any serodiscordant CAI” variable.

Mental Health—Mental health symptoms were assessed with the Brief Symptom Inventory (BSI) which yields nine primary symptom scales, and a global severity index (GSI). For the purposes of descriptive and multivariate analyses, mean scores were calculated for the anxiety ($\alpha = .86$; 6 items) and depression ($\alpha = .87$; 6 items) subscales.

Substance Use—The Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST) was used to measure substance use behaviors. Frequency of alcohol, marijuana and other drug use (e.g., cocaine, heroin, hallucinogens, methamphetamine/amphetamines,) was assessed during the past 90 days.

HIV Continuum Indicators—Participants who reported confirmatory HIV diagnosis within the past 6 months were classified as “recently diagnosed.” We assessed retention in care by self-reported number of missed visits with an HIV care provider over the past 12 months, dichotomized as <1 vs. >1 missed appointments. Participants who self-reported

being on ART and had a current regimen identified during medical chart review were classified as “currently on ART.”

Data Analysis

Serodiscordant CAI was modeled as the outcome in our regression analyses. We conducted bivariate logistic regression analysis of possible correlates of serodiscordant CAI, including demographic, mental health, substance use, and HIV continuum variables. Given the potential for site-level clustering, we examined the variance at Level 2 in a null hierarchical generalized linear model for our outcome yet found the Level 2 variance to be non-significant ($p=.28$). Mental health, substance use, and HIV continuum variables that approached statistical significance with the CAI variables in the bivariate analyses ($p < .10$) were entered into multivariate stepwise logistic regression equations to determine significant correlates of serodiscordant CAI while controlling for demographic factors. The BSI-anxiety score ($p < .10$ in the bivariate analysis) was not entered into the multivariate model due to its multicollinearity with the BSI-depression score.

RESULTS

Sample Characteristics

Demographic, biomedical, and psychosocial/behavioral variable frequencies for participants appear in Table 1. Slightly more than half of participants reported missing 2 appointments during the past 12 months, one-third were currently on ART, and 39.8% were diagnosed within the past 6 months. Slightly more than one-third reported serodiscordant CAI.

Bivariate analyses indicated serodiscordant CAI was associated with having received an HIV diagnosis in the past 6 months (OR=1.44, 95% CI: 1.04–1.98), greater depressive symptoms (OR=1.04, 95% CI: 1.01–1.07), and past 90 day use of alcohol (OR=2.11, 95% CI: 1.22–3.65), cocaine (OR=2.15, 95% CI: 1.38–3.36), or methamphetamine (OR=1.80, 95% CI: 1.23–2.62). Black VL+ YMSM were less likely to engage in serodiscordant UAI (OR=.58, 95% CI: .37–.90). In multivariable analyses, serodiscordant CAI was associated with having received an HIV diagnosis in the past 6 months (OR=1.56, 95% CI: 1.11–2.19), greater depressive symptoms (OR= 1.03, 95% CI: 1.01–1.06) and cocaine use (OR=1.68, 95% CI: 1.02–2.81). We found no association between serodiscordant CAI and other HIV continuum of care stages or with other demographic or behavioral in the multivariable analysis.

DISCUSSION

This post-hoc analysis of a national sample of VL+ YMSM identified recent HIV diagnosis, cocaine use, and depressive symptomology as significant correlates of serodiscordant CAI. We found no significant associations between serodiscordant CAI and missed appointments or being on ART. Our findings point to the period immediately post-diagnosis as a period of heightened transmission risk among groups of VL+ YMSM compared to points later in the continuum of care. Youth newly diagnosed with HIV experience multiple stressors and are in need of developmentally appropriate health services to reduce risk and promote health [11]. While previous studies have shown reductions in mental health symptomology and sexual risk behavior over time among persons in HIV care [12], the period immediately

post-diagnosis may involve challenges to adjustment among subsets of YMSM. These findings collectively highlight the importance of providing targeted interventions and support services at the initial stage of the care continuum.

Although alcohol, methamphetamine, and cocaine use were all associated with serodiscordant CAI in the bivariate analyses, participants reporting cocaine use during the past 90 days were more likely to report serodiscordant CAI than other VL+ YMSM in care in the multivariate analysis. While much of the research on stimulant use and CAI among HIV-positive MSM has focused on methamphetamine use, cocaine use among HIV-positive adult MSM has been found previously to be associated with CAI in conjunction with higher sexual compulsivity [13] and other stimulant use [14]. Among HIV-negative YMSM, cocaine use has also been associated with CAI in the context of other stimulant use [15–16]. Screening and interventions that contextualize stimulant use and sexual behavior among VL+YMSM are urgently needed.

Our study has several limitations deserving mention. We used a convenience sample of VL+ YMSM currently in care; therefore, rates of serodiscordant CAI among the VL+ YMSM population may be underestimated. We did not utilize a probability sample, which limits generalizability; however, our sample roughly mirrors the current HIV epidemic in the U.S. among YMSM proportionally in terms of racial/ethnic groups represented. Our cross-sectional design of this study does not allow for any establishment of causality. All data in the study were self-reported and as such potentially subject to social desirability or recall bias, but the use of ACASI may mitigate the perceived need to report socially desirable answers to potentially sensitive or stigmatizing questions.

Despite these limitations, these findings add to the emergent literature of sexual risk behavior among VL+ YMSM engaged in care, and they point to the importance of behavioral interventions that address adjustment to diagnosis. Although HIV+ YMSM currently experience disparities across the continuum of care, those new to care may be particularly in need of support for risk reduction strategies. Interventions are needed for recently diagnosed YMSM to support risk reduction strategies with sexual partners, and to address stimulant use and depressive symptomology to reduce the likelihood of transmission behaviors among VL+MSM.

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References

- Centers for Disease Control and Prevention. Diagnoses of HIV infection in the United States and dependent areas, 2015. HIV surveillance report 2016. 27Nov.2016
- Zanoni BC, Mayer KH. The adolescent and young adult HIV cascade of care in the United States: exaggerated health disparities. *AIDS Pat Care STDs*. 2014; 28(3):128–135.
- Singh S, Bradley H, Hu X, Skarbinski J, Hall HI, Lansky A. Men living with diagnosed HIV who have sex with men: progress along the continuum of HIV Care. *MMWR*. 2014; 63(38):829–833. [PubMed: 25254559]
- Hall HI, Holtgrave DR, Tang T, Rhodes P. HIV transmission in the United States: Considerations of viral load, risk behavior, and health disparities. *AIDS Behav*. 2013; 17:1632–1636. [PubMed: 23456577]
- Cohen MS, Chen YQ, McCauley M, et al. Prevention of HIV-1 infection with antiretroviral therapy. *NEJM*. 2011; 365:493–505. [PubMed: 21767103]
- Rodger A, Cambiano V, Bruun T, et al. Sexual activity without condoms and risk of HIV transmission in serodifferent couples when the HIV-positive partner is using suppressive antiretroviral therapy. *JAMA*. 2016; 316(2):171–181. [PubMed: 27404185]
- Crepaz N, Marks G, Liao A, et al. Prevalence of unprotected anal intercourse among HIV-diagnosed MSM in the United States: a meta-analysis. *AIDS*. 2009; 23(13):1617–1629. [PubMed: 19584704]
- Purcell DW, Moss S, Remien RH, Woods WJ, Parsons JT. Illicit substance use, sexual risk, and HIV-positive gay and bisexual men: differences by serostatus of casual partners. *AIDS*. 2005; 19(Suppl 1):S37–47.
- Bruce D, Kahana SY, Fernández MI, Harper GW. Alcohol use predicts sexual risk behavior with HIV-negative or partners of unknown status among young HIV-positive men who have sex with men. *AIDS Care*. 2013; 25(5):559–65. [PubMed: 22971018]
- Wilson PA, Kahana SY, Fernández MI, et al. Sexual risk behavior among virologically detectable HIV-infected young men who have sex with men. *JAMA Pediatr*. 2016; 170(2):125–131. [PubMed: 26641367]
- Hosek SG, Harper GW, Lemos D, Martinez J. An ecological model of stressors experienced by youth newly diagnosed with HIV. *J HIV/AIDS Prev Child Youth*. 2008; 9(2):192–218.
- Comulada WS, Rotheram-Borus MJ, Pequegnat W, et al. Relationships over time between mental health symptoms and transmission risk among persons living with HIV. *Psychol Addict Behav*. 2010; 24(1):109–118. [PubMed: 20307117]
- Benotsch EG, Kalichman SC, Kelly JA. Sexual compulsivity and substance use in HIV-seropositive men who have sex with men: prevalence and predictors of high-risk behaviors. *Addict Behav*. 1999; 24(6):857–868. [PubMed: 10628518]

14. Boone MR, Cook SH, Wilson P. Substance use and sexual risk behavior in HIV-positive men who have sex with men: An episode-level analysis. *AIDS Behav.* 2013; 17(5):1883–1887. [PubMed: 22392156]
15. McNall M, Remafedi G. Relationship of amphetamine and other substance use to unprotected intercourse among young men who have sex with men. *Arch Pediatr Adolesc Med.* 1999; 153(11): 1130–1135. [PubMed: 10555713]
16. Celentano DD, Valleroy LA, Sifakis F, et al. Associations between substance use and sexual risk behavior among very young men who have sex with men. *Sex Transm Dis.* 2006; 33(4):265–271. [PubMed: 16434886]

Table 1

Sample Characteristics, Univariate and Multivariate Results

	Virally unsuppressed HIV+ YMSM (n=688)		Virally suppressed HIV+ YMSM (N=288)		p-value	Univariate analysis of serodiscordant CAI among VL+ YMSM		Final multivariate model of serodiscordant CAI among VL+ YMSM	
	M	SD	M	SD		OR	95% CI	OR	95% CI
BSI Depression Score	7.39	6.24	6.17	5.80	<.05	1.04**	1.01– 1.07	1.03*	1.00– 1.06
BSI Anxiety Score	5.73	5.45	4.65	5.13	<.05	1.02	.99– 1.05		
Age	21.0	1.99	21.7	1.93	N/S	1.00	.99– 1.01	1.00	.99– 1.01
	n	%	n	%					
HIV diagnosis within past 6 mos.	272	39.8	20	7.0	<.001	1.44*	1.04– 1.98	1.56*	1.11– 2.19
2 Missed appointments, past 12 mos.	355	51.6	90	31.5	N/S	.92	.67– 1.27		
Currently on ART	232	33.7	281	98.2	<.001	.94	.67– 1.31		
Any alcohol use, past 90 days	599	87.6	248	86.1	N/S	2.11**	1.22– 3.65	1.70	.96– 3.01
Any marijuana use, past 90 days	429	62.7	168	58.3	N/S	1.14	.82– 1.58		
Any cocaine use, past 90 days	92	13.4	37	12.8	N/S	2.15**	1.38– 3.36	1.68*	1.02– 2.81
Any amphetamine use, past 90 days	142	20.6	40	13.9	<.05	1.80**	1.23– 2.62	1.24	.79– 1.95
Any opioid use, past 90 days	24	3.5	6	2.1	N/S	1.39	.61– 3.19		
Any hallucinogen use, past 90 days	43	6.3	8	2.8	<.05	1.03	.54– 1.98		
White/Caucasian	99	14.5	39	13.6	N/S	Ref.		Ref.	
Black/African American	437	63.9	179	62.6	N/S	.58*	.37– .90	.67	.41– 1.10
Mixed Race/Biracial/Other	131	19.1	58	20.3	N/S	.64	.52– 1.45	.17	.02– 1.56
Asian American/Pacific Islander	8	1.2	5	1.7	N/S	.73	.17– 3.39	.87	.48– 1.60
Native American/American Indian	7	1.0	3	1.0	N/S	.22	.03– 2.27	.69	.14– 3.39
Hispanic/Latino	147	21.5	67	23.4	N/S	1.14	.92– 1.40	1.03	.79– 1.33
Gay	514	75.1	219	76.6	N/S	Ref.			
Bisexual	114	16.7	43	15.0	N/S	1.50	.98– 2.28	1.52	.98– 2.35
Other sexual orientation	55	7.3	23	8.0	N/S	1.06	.59– 1.90	1.18	.63– 2.21
Transgender	34	4.9	11	3.8	N/S	.47	.20– 1.09	.44	.18– 1.10
Post High School education	251	36.7	146	51.0	<.001	1.27	.92– 1.76	1.28	.89– 1.83

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	Virally unsuppressed HIV+ YMSM (n=688)		Virally suppressed HIV+ YMSM (N=288)		p-value	Univariate analysis of serodiscordant CAI among VL+ YMSM		Final multivariate model of serodiscordant CAI among VL+ YMSM	
	M	SD	M	SD		OR	95% CI	OR	95% CI
Current employment	281	41.1	146	51.0	<.01	.94	.70– 1.24	.84	.61– 1.15
Current unstable housing	43	6.3	9	3.1	<.05	1.56	.83– 2.91	1.30	.66– 2.56
Ever incarcerated	262	38.3	90	31.5	<.05	1.18	.89– 1.55	1.21	.88– 1.64
Any serodiscordant CAI, past 90 days	235	34.4	71	24.8	<.01	---	---	---	---

* p<.05

** p<.01