Published in final edited form as:

Sex Transm Dis. 2012 September ; 39(9): 659–664. doi:10.1097/OLQ.0b013e31825727cb.

Failure of Serosorting to Protect African American Men Who Have Sex with Men from HIV Infection

Matthew R. Golden, MD, MPH^{1,2}, Julia C. Dombrowski, MD, MPH^{1,2}, Roxanne P. Kerani, PhD^{1,2}, and Joanne D. Stekler, MD, MPH^{1,2}

¹Public Health Seattle-King County

²University of Washington, Center for AIDS and STD

Abstract

Background—Serosorting is the practice of choosing sex partners or selectively using condoms based on a sex partner's perceived HIV status. The extent to which serosorting protects African American (AA) and Hispanic men who have sex with men (MSM) is unknown.

Methods—We analyzed data collected from MSM STD clinic patients in Seattle, WA, 2001–10. Men were asked about the HIV status of their anal sex partners in the prior year and about their condom use with partners by partner HIV status. We defined serosorters as MSM who had unprotected anal intercourse (UAI) only with partners of the same HIV status, and compared the risk of testing HIV positive among serosorters and men who reported having UAI with partners of opposite or unknown HIV status (i.e. nonconcordant UAI). We used generalized estimating equations to evaluate the association of serosorting with testing HIV positive.

Results—A total of 6694 MSM without a prior HIV diagnosis were tested during 13,657 visits; 274 men tested HIV positive. Serosorting was associated with a lower risk of testing HIV positive than nonconcordant UAI among white MSM (2.1 vs. 4.5%, OR 0.45 95% CI 0.34–0.61), but not AA MSM (6.8 vs. 6.0%, OR 1.1 95% CI 0.57–2.2). Among Hispanics, the risk of testing HIV positive was lower among serosorters than men engaging in nonconcordant UAI, though this was not significant (4.1 vs. 6.0%, OR 0.67 95% CI 0.36–1.2).

Conclusions—In at least some AA MSM populations, serosorting does not appear to be protective against HIV infection.

African American men who have sex with men (MSM) experience the highest rate of HIV infection of any large, readily identifiable population in the United States. In 2009, 47% of all newly diagnosed cases of HIV infection in MSM occurred in African Americans; almost 24% of all persons diagnosed with HIV infection in areas of the U.S. with named-based HIV reporting occurred in African American MSM, a group that includes approximately 0.26% of the U.S. population^{1–4}. The reasons African American MSM experience such a disproportionately high risk of HIV infection relative to white MSM are not well defined^{5, 6}.

Serosorting, the practice of choosing partners or selectively using condoms based on a sex partner's perceived HIV status, is common among MSM, including African American MSM^{6–9}. Prior studies suggest that serosorting provides partial protection against HIV acquisition^{7, 10–12}. However, the extent to which serosorting is protective is critically dependant on the population's HIV testing frequency; in a population that tests infrequently, the practice may increase HIV risk^{13–15}. Few data exist on the extent to which serosorting protects African American MSM⁷. We evaluated whether the protective impact of serosorting varies by race. Based on prior reports suggesting that undiagnosed HIV infection is more common among African American than white MSM^{16–18}, we hypothesized that serosorting would be less protective in African American than white MSM.

Methods

Overview

This study is a secondary data analysis of information recorded in the Public Health – Seattle & King County (PHSKC) Sexually Transmitted Disease (STD) Clinic electronic medical record. Clinicians and staff collected all behavioral information used in the study as part of routine clinical risk assessments, and all HIV testing was done as part of standard clinical care. The unit of analysis throughout the study is the clinic visit, meaning that some individuals contributed more than one visit to the analysis. We have previously described our data collection methods^{3, 11}.

Study population, data collection and HIV testing

The study population was comprised of MSM evaluated in the PHSKC STD Clinic between October 1, 2001 and December 31, 2010. We excluded visits from the analysis if data on a patient's sexual behavior was insufficiently complete to allow us to classify the patient as a serosorter or not a serosorter, or if clinicians neglected to record information on the patient's HIV status and testing history. Because clinicians did not routinely obtain complete sexual histories during follow-up visits for specific problems occurring within 60 days of a prior clinic visit, follow-up visit data were likewise excluded from the analysis. Clinicians and HIV testing staff used a structured form to record patient histories. These histories were obtained before HIV testing. Clinicians routinely asked patients if they had sex with men, women or both men and women in the preceding year. We defined MSM to include men who reported any male sex partners in that time frame. Clinicians and staff asked MSM whether they had anal intercourse with partners who were HIV positive, HIV negative or of unknown HIV status, and about how often patients used condoms (always, usually, sometimes, or never) with partners of each HIV status category; these questions used a 12 month timeframe and separately collected aggregate information on insertive and receptive sex partners. All patients in the clinic complete a registration form that asks them to designate their race and whether they are Hispanic; these are separate questions. Patients are able to designate more than one race. We classified white Hispanics and persons who indicated that they were Hispanic but declined to define a race as Hispanic. Because fewer than 30 Asian and Alaska Native/Native American MSM tested HIV positive during the study period, we elected not to present findings on these groups. Similarly, we excluded persons with multiple races because they represent a heterogeneous group.

Clinicians recommended HIV testing to all patients who reported that they had not previously tested HIV positive. Depending on the study year, we tested patients who agreed to a blood draw using three different HIV EIAs (Vironostika HIV-1 Microelisa System [bioMérieux, Durham, NC], Genetic Systems rLAV EIA or Genetic Systems HIV-1/HIV-2 Plus O EIA (both Bio-Rad, Redmond, WA). We offered OraQuick rapid HIV antibody tests (Orasure technologies Inc., Bethlehem, PA) to MSM patients at high risk for HIV infection; the clinic defines MSM without a prior HIV diagnosis to be at high risk for HIV infection if they have one or more of the following risk factors: 1) bacterial STD in the prior year; 2) methamphetamine or popper use in the prior year; 3) 10 sex partners in the prior year; or 4) any unprotected anal sex with an HIV positive partner or partner of unknown HIV status¹⁹. Oraquick tests were performed on fingerstick blood from 2001–07 and from 2008–10; rapid tests were performed on saliva in 2007 and part of 2008. In addition, starting in 2003, we performed pooled HIV RNA testing on all MSM who tested for HIV and who agreed to a venipuncture²⁰. We considered men to have acute HIV if they were HIV RNA positive but tested negative using an EIA.

Data analysis

To assess how effective serosorting might be in preventing HIV, we classified men's visits into four groups: 1) men who reported unprotected anal intercourse (UAI) only with partners of the same HIV status (serosorters); 2) men who reported UAI with partners of discordant HIV status or partners of unknown HIV status (nonconcordant UAI); 3) men who reported only protected anal sex; and 4) men who denied having anal sex. We used generalized estimating equations (GEE) to evaluate the risk of testing HIV positive by serosorting categorization, stratified by race/ethnicity; this analytic approach adjusts for the fact that some subjects contributed >1 visit to the dataset and that not all observations were independent. We also used GEE to evaluate the interaction of race/ethnicity with serosorting in a model using HIV as an endpoint, and to compare the sexual behavior of African American, Hispanic and white MSM, including MSM with a prior HIV diagnosis. These analyses were undertaken to identify factors that might help explain a differential impact of serosorting by race/ethnicity. Analyses comparing medians used the Wilcoxin rank-sum test. We performed all analyses using the SAS system 9.1 (SAS Institute, Cary, N.C.).

The University of Washington Division of Human Subjects approved all study procedures.

Results

Between October 2001 and December 31, 2010, a total of 10,620 non-Hispanic white, African American or Hispanic MSM patients attended the clinic during 22,370 new problem visits. Data were sufficiently complete to classify patients based on serosorting behaviors for 10,074 (95%) different men and 20,735 (93%) clinic visits. This population of visits included 1382 men with a prior HIV diagnosis who attended 2763 visits, and 17,972 visits by 8950 men without a prior HIV diagnosis. (258 men had visits both before and after testing HIV positive.) A total of 6694 MSM without a prior HIV diagnosis tested for HIV during 13,657 separate clinic visits.

Comparison of White and African American MSM

Comparing data collected during visits by white and African American MSM without a prior HIV diagnosis, African American men were significantly younger and reported having fewer sex partners (Table 1). The anal sexual repertoire of African American and white MSM also differed; African Americans men more often reported that they only engaged in insertive anal sex, and less often indicated that they only had receptive anal sex or were versatile (i.e. engaged in both insertive and receptive anal sex). Serosorting categorization was similar between white and African American MSM, with men of both races reporting behaviors consistent with serosorting during approximately one-third of clinic visits. Men in both groups reported never having previously HIV tested during 5% of clinic visits, and the median time since last HIV test did not differ across groups. Yet despite having lower levels of high risk sexual behavior and similar testing histories, African American MSM were significantly more likely to test HIV positive (4.7% vs. 2.5%, $p<.0001$).

The association of serosorting in the past year with the risk of testing HIV positive differed by race (table 2). Among whites, serosorting was associated with a significantly lower risk of testing HIV positive than having nonconcordant UAI (2.1 vs. 4.5%, $p<.0001$). In contrast, the risk of testing HIV positive among African Americans was similar among serosorters and men who reported having nonconcordant UAI (6.8 vs. 6%, $p=.72$). There was a significant interaction between race and serosorting status in a GEE model ($p=.02$), indicating that serosorting was associated with a significant, approximately 50% reduction in HIV risk among whites, but was not protective among African Americans.

Comparison of White and Hispanic MSM

Hispanic MSM were significantly younger, reported having fewer sex partners, and were less likely to report not having any anal sex than white MSM (table 1). They more often reported never having previously tested for HIV infection, and were more likely to newly test HIV positive. We did not observe differences between Hispanic and white non-Hispanics in anal sexual repertoire or disclosure of HIV status. The overall pattern of association between serosorting behaviors and HIV test results in Hispanic men paralleled those observed in whites; serosorting men experienced an intermediate level of risk between having only protected anal sex and nonconcordant UAI. There was no significant interaction between ethnicity and serosorting in a GEE model using HIV test results as an outcome.

Restricting the analysis to men who reported testing HIV negative in the year prior to clinic visit did not affect the overall pattern of association between serosorting and HIV risk for any racial or ethnic group (data not shown).

Differences in risk behavior and HIV testing and care by race/ethnicity among men who newly diagnosed HIV and previously diagnosed HIV

We compared sexual risk behaviors, serostatus disclosure frequency, HIV testing histories and HIV treatment histories among men of different races and ethnicities in order to identify possible explanations for why serosorting might have a differential impact on HIV risk among men of different races and ethnicities. Compared to white MSM, African American MSM with newly diagnosed HIV were younger, reported having fewer sex partners, more often had only insertive anal sex, less often engaged in unprotected receptive anal intercourse with a partner of unknown discordant HIV status, and had similar HIV testing histories (table 3). African American MSM with newly diagnosed HIV infection were also significantly more likely than white MSM to be classified as serosorters (42 vs. 26%). Among men with previously diagnosed HIV infection, African American MSM reported having significantly fewer sex partners than white MSM, and less often reported having nonconcordant UAI (table 4). Although African American MSM with a prior HIV diagnosis reported taking antiretroviral therapy and always telling partners about their status during a smaller proportion of their visits than white MSM, these differences were not statistically significant.

Hispanic MSM with newly diagnosed HIV infection were younger than white MSM with newly diagnosed HIV, but were otherwise similar with respect to characteristics and behaviors reported in table 3. Among MSM with a prior HIV diagnosis, Hispanics were younger, had fewer partners, less often reported serosorting, and more often reported always using condoms than white MSM.

Discussion

We found that serosorting was common among white, African American and Hispanic MSM in our STD clinic, but that compared to nonconcordant UAI, it was only clearly associated with a lower risk of HIV infection among whites. Among African Americans, the risk of testing HIV positive among MSM classified as serosorters was slightly higher than it was among men who reported having nonconcordant UAI, and 42% of all African American MSM with newly diagnosed HIV infection in our clinic were classified as serosorters.

Our data did not identify reasons for why serosorting might be less effective in African Americans. Like several previously published studies²¹, we found that African American MSM had fewer sex partners than white MSM. African Americans were also less likely to have a versatile anal sexual repertoire, a pattern of behavior that mathematical models suggest should be protective at a population level^{22, 23}. Some, but not all, prior studies have

suggested that African American MSM may less frequently disclose their HIV status or know a partner's HIV status^{6, 24, 25}. We observed somewhat lower levels of HIV status disclosure among African American than white MSM, though African American MSM in our study were not more likely than white MSM to report having UAI with partners of unknown status. Finally, we did not observe lower levels of HIV testing among African American MSM. However, our study, which was conducted in a clinic that performs HIV tests, may not provide an accurate picture of HIV testing in the wider population. Prior reports, including studies conducted in Seattle, have found that late HIV diagnoses and undiagnosed HIV infection are more common in African American than white MSM^{16–18}. We suspect that inadequate knowledge of HIV status in a population with race assortative sexual mixing^{26, 27} is the primary explanation for why serosorting was not protective among African American MSM in our clinic. If that is correct, serosorting could be made safer through increased HIV testing. The U.S. Centers for Disease Control and Prevention is currently attempting to increase HIV testing among African American MSM through the Expanded Testing Initiative²⁸.

Our findings are somewhat at odds with a study by Marks and colleagues which observed a lower level of HIV infection among African American MSM who reported limiting UAI to partners they believed to be HIV negative compared to men who engaged in nonconcordant UAI⁷. That study employed audio computer-assisted self-interviews to collect sexually history data, while our data were collected by clinicians as part of routine care. Our clinicians did not ask patients questions using a consistent script, which may have led to confusion among patients, diminishing our ability to observe an association between serosorting and the risk of testing HIV positive. On the other hand, the protective effect of serosorting was evident among whites and perhaps Hispanics, suggesting that if inconsistencies in how questions were asked resulted in error, that error affected African Americans differentially. Alternatively, disparate findings between the two studies may reflect true differences in the populations studied, or imprecision in findings resulting from the relatively small number of HIV diagnoses in both studies.

Our study has several important limitations. First, although our analysis included data from over 2500 clinic visits and HIV tests in African American and Hispanic MSM, the number of new HIV diagnoses was relatively small, limiting our power to assess the association of serosorting behavior with HIV. Second, our study evaluated the association of sexual behavior with HIV risk, and did not measure participants' purposeful decision to serosort. Third, as mentioned above, our data were collected as part of routine medical care, not a research study, and variability in how clinicians asked questions may have introduced error into our measurements of behavior. Fourth, our behavioral data are based on self-report and may be subject to social desirability bias, which may affect men of different races and ethnicities in different ways. Finally, our findings may not be generalizable to other populations.

We found that serosorting behaviors, which are associated with a significant decrease in the risk of HIV infection among white MSM in our clinic, may not be protective against HIV among African American MSM. Although our findings are not definitive, we believe that they should prompt additional caution related to the promotion of serosorting among African American MSM, and highlight the need to increase HIV testing coverage and frequency in this critically important population.

References

1. CDC. HIV/AIDS Surveillance Report, 2009. Vol. 2011. Atlanta: Department of Health and Human Services, Centers for Disease Control and Prevention; 2011.

2. Glick SN, Golden MR. Persistence of racial differences in attitudes toward homosexuality in the United States. *J Acquir Immune Defic Syndr*. Dec 1; 2010 55(4):516–523. [PubMed: 20838226]
3. Anderson JE, Mosher WD, Chandra A. Measuring HIV risk in the U.S. population aged 15–44: results from Cycle 6 of the National Survey of Family Growth. *Adv Data*. Oct 23.2006 (377):1–27. [PubMed: 17094643]
4. Laumann, EO.; Gagnon, JH.; Michael, RT.; Michaels, S. *The Social Organization of Sexuality: Sexual Practices in the United States*. Chicago: University of Chicago Press; 1994.
5. Liao A, Millett G, Marks G. Meta-analytic Examination of Online Sex-Seeking and Sexual Risk Behavior Among Men Who Have Sex With Men. *Sex Transm Dis*. Mar 8.2006 Publish Ahead of Print.
6. Oster AM, Wiegand RE, Sionean C, et al. Understanding disparities in HIV infection between black and white MSM in the United States. *Aids*. May 15; 2011 25(8):1103–1112. [PubMed: 21505305]
7. Marks G, Millett GA, Bingham T, Lauby J, Murrill CS, Stueve A. Prevalence and protective value of serosorting and strategic positioning among Black and Latino men who have sex with men. *Sex Transm Dis*. May; 2010 37(5):325–327. [PubMed: 20081556]
8. McFarland W, Chen YH, Raymond HF, et al. HIV seroadaptation among individuals, within sexual dyads, and by sexual episodes, men who have sex with men, San Francisco, 2008. *AIDS Care*. Mar; 2011 23(3):261–268. [PubMed: 21347888]
9. Lattimore S, Thornton A, Delpech V, Elford J. Changing patterns of sexual risk behavior among London gay men: 1998–2008. *Sex Transm Dis*. Mar; 2011 38(3):221–229. [PubMed: 20921930]
10. Golden MR, Stekler J, Hughes JP, Wood RW. HIV serosorting in men who have sex with men: is it safe? *J Acquir Immune Defic Syndr*. Oct 1; 2008 49(2):212–218. [PubMed: 18769346]
11. Jin F, Crawford J, Prestage GP, et al. Unprotected anal intercourse, risk reduction behaviours, and subsequent HIV infection in a cohort of homosexual men. *Aids*. Jan 14; 2009 23(2):243–252. [PubMed: 19098494]
12. Philip SS, Yu X, Donnell D, Vittinghoff E, Buchbinder S. Serosorting is associated with a decreased risk of HIV seroconversion in the EXPLORE Study Cohort. *PLoS One*. 2010; 5(9)
13. Cassels S, Menza TW, Goodreau SM, Golden MR. HIV serosorting as a harm reduction strategy: evidence from Seattle, Washington. *Aids*. Nov 27; 2009 23(18):2497–2506. [PubMed: 19834319]
14. Wilson DP, Regan DG, Heymer KJ, Jin F, Prestage GP, Grulich AE. Serosorting may increase the risk of HIV acquisition among men who have sex with men. *Sex Transm Dis*. Jan; 2010 37(1):13–17. [PubMed: 20118674]
15. Heymer KJ, Wilson DP. Available evidence does not support serosorting as an HIV risk reduction strategy. *Aids*. Mar 27; 2010 24(6):935–936. author reply 936–938. [PubMed: 20234196]
16. Nelson KM, Thiede H, Hawes SE, et al. Why the wait? Delayed HIV diagnosis among men who have sex with men. *J Urban Health*. Jul; 2010 87(4):642–655. [PubMed: 20186493]
17. MacKellar DA, Valleroy LA, Secura GM, et al. Unrecognized HIV infection, risk behaviors, and perceptions of risk among young men who have sex with men: opportunities for advancing HIV prevention in the third decade of HIV/AIDS. *J Acquir Immune Defic Syndr*. Apr 15; 2005 38(5): 603–614. [PubMed: 15793373]
18. Prevalence and awareness of HIV infection among men who have sex with men --- 21 cities, United States, 2008. *MMWR Morb Mortal Wkly Rep*. Sep 24; 2010 59(37):1201–1207. [PubMed: 20864920]
19. Menza TW, Hughes JP, Celum CL, Golden MR. Prediction of HIV acquisition among men who have sex with men. *Sex Transm Dis*. Sep; 2009 36(9):547–555. [PubMed: 19707108]
20. Stekler JD, Swenson PD, Coombs RW, et al. HIV testing in a high-incidence population: is antibody testing alone good enough? *Clin Infect Dis*. Aug 1; 2009 49(3):444–453. [PubMed: 19538088]
21. Millett GA, Flores SA, Peterson JL, Bakeman R. Explaining disparities in HIV infection among black and white men who have sex with men: a meta-analysis of HIV risk behaviors. *Aids*. Oct 1; 2007 21(15):2083–2091. [PubMed: 17885299]
22. Goodreau SM, Goicochea LP, Sanchez J. Sexual role and transmission of HIV Type 1 among men who have sex with men, in Peru. *J Infect Dis*. Feb 1; 2005 191(Suppl 1):S147–158. [PubMed: 15627225]

23. Goodreau SM, Golden MR. Biological and demographic causes of high HIV and sexually transmitted disease prevalence in men who have sex with men. *Sex Transm Infect.* Oct; 2007 83(6):458–462. [PubMed: 17855487]
24. Wei C, Raymond HF, Guadamuz TE, et al. Racial/Ethnic differences in seroadaptive and serodisclosure behaviors among men who have sex with men. *AIDS Behav.* Jan; 2011 15(1):22–29. [PubMed: 20217468]
25. Bird JD, Fingerhut DD, McKirnan DJ. Ethnic differences in HIV-disclosure and sexual risk. *AIDS Care.* Apr; 2011 23(4):444–448. [PubMed: 21271405]
26. Raymond HF, McFarland W. Racial mixing and HIV risk among men who have sex with men. *AIDS Behav.* Aug; 2009 13(4):630–637. [PubMed: 19479369]
27. Berry M, Raymond HF, McFarland W. Same race and older partner selection may explain higher HIV prevalence among black men who have sex with men. *Aids.* Nov 12; 2007 21(17):2349–2350. [PubMed: 18090287]
28. CDC. HIV among African Americans. 2012. <http://www.cdc.gov/hiv/topics/aa/index.htm>

Summary

Serosorting appears to protect white, but not African American, men who have sex with men from HIV infection.

Table 1

Age, sexual behaviors, and HIV testing history and results among MSM STD clinic patient visits without a prior HIV diagnosis, by race/ethnicity

	Total	White MSM	African American MSM	AA vs. White OR (95% CI) or p-values *	Hispanic MSM	Hispanic vs. White OR (95% CI) or p-values *
Total Visits	17,972	14,701	1409		1862	
Total persons	8,950	7,366	703		881	
Median Age	33 (26–42)	34 (26–43)	31 (26–39)	p<.0001	30 (24–37)	p<.0001
Median (IQR) number male sex partners prior 12 months	5 (3–10)	5 (3–12)	4 (2–9)	p<.0001	5 (2–10)	p<.0001
Sexual repertoire 2 months *						
Versatile	10,564 (60)	8728 (60)	678 (49)	0.63 (.52–.76)	1158 (63)	1.1 (.96–1.3)
Insertive only	3546 (20)	2742 (19)	459 (33)	2.1 (1.7–2.7)	345 (19)	1.0 (.81–1.2)
Receptive only	1537 (9)	1262 (9)	84 (6)	0.68 (.50–.92)	191 (10)	1.2 (.96–1.6)
No anal sex	2077 (12)	1778 (12)	164 (12)	0.96 (.73–1.3)	135 (7)	0.57 (.91–1.4)
UAI by HIV status						
Any UAI HIV negative partner	8466 (47)	6975 (47)	624 (44)	0.88 (.74–1.0)	867 (47)	0.97 (.83–1.1)
Any UAI HIV positive partner	1256 (7)	1073 (7)	90 (6)	0.87 (.60–1.3)	93 (5)	0.67 (.51–.87)
Any UAI partner unknown HIV status	4097 (23)	3293 (22)	346 (25)	1.1 (.94–1.3)	458 (25)	1.1 (.98–1.3)
Serosorting						
No anal sex	2077 (12)	1778 (12)	164 (12)	0.96 (.72–1.3)	135 (7)	0.57 (.44–.73)
Anal sex only with condoms	5915 (33)	4779 (32)	460 (33)	1.0 (.85–1.2)	676 (36)	1.2 (1.0–1.4)
Serosorting	5368 (30)	4409 (30)	406 (29)	0.94 (.80–1.1)	553 (30)	0.99 (.86–1.1)
Nonconcordant UAI	4612 (26)	3735 (25)	379 (27)	1.1 (.90–1.3)	498 (27)	1.1 (.93–1.2)
Never previously HIV tested	999 (6)	785 (5)	77 (5)	1.02 (.79–1.3)	137 (7)	1.4 (1.2–1.7)
Days since last HIV negative test	190 (95–379)	188 (91–370)	188 (91–370)	p=0.12	197 (96–376)	p=.69
Always tell partners HIV status	5501/8283 (66)	4482/6678 (67)	429/677 (63)	0.85 (.69–1.0)	590/928 (64)	0.86 (.71–1.0)
New HIV diagnosis	379/13,657 (2.8)	274/11,145 (2.5)	48/1024 (4.7)	2.0 (1.4–2.7)	57/1488 (3.8)	1.6 (1.2–2.1)
Acute HIV diagnosis	41/13,166 (.31)	33/10,752 (.31)	2/975 (.21)	0.67 (.16–2.8)	6/1439 (.42)	1.4 (.57–3.3)

* Univariate OR

Table 2

Association of serosorting in the prior year with new HIV diagnoses, by race/ethnicity

	White			African American			Hispanic		
	Number HIV +/Total Tested	Percent (95% CI)	OR (95% CI)*	Number HIV +/Total Tested	Percent (95% CI)	OR (95% CI)*	Number HIV +/Total Tested	Percent (95% CI)	OR (95% CI)*
Total	274/11,151	2.5 (2.2–2.7)		48/1024	4.7 (3.4–6.0)		57/1489	3.8 (2.8–4.7)	
No anal sex	11/1256	0.88 (.36–1.4)	Ref	0/11	0	Ref	0/92	0	Ref
No UAI	61/3568	1.7 (1.3–2.1)	.40 (0.27–0.50)	11/332	3.3 (1.4–5.2)	0.53 (0.24–1.2)	14/547	2.6 (1.2–3.9)	0.41 (0.21–.080)
Serosorting	72/3434	2.1 (1.6–2.6)	.45 (0.34–0.61)	20/295	6.8 (3.9–9.6)	1.1 (0.57–2.2)	18/437	4.1 (2.3–6.0)	0.67 (0.36–1.2)
Nonconcordant UAI	130/2893	4.5 (3.7–5.2)	1.0	17/282	6.0 (3.2–8.8)	1.0	25/413	6.0 (3.8–8.4)	1.0

* Univariate OR

Table 3

Age, sexual behaviors, and HIV testing history among MSM STD clinic patients with newly diagnosed HIV infection, by race/ethnicity

	Total	White MSM	African American MSM	AA vs. White OR (95% CI) or p-values *	Hispanic MSM	Hispanic vs. White OR (95% CI) or p-values *
Number of persons	379	274	48		57	
Median Age	32 (25–39)	32 (25–40)	28 (23–39)	P=.05	29 (25–34)	P=.02
Median (IQR) number male sex partners prior 12 months	6 (3–20)	7 (3–20)	3 (2–9)	P=.0007	6 (3–16)	P=.34
Sexual repertoire prior 2 months						
Versatile	274 (73)	198 (73)	33 (72)	0.84 (0.43–1.6)	43 (75)	1.2 (0.61–2.3)
Insertive only	47 (12)	29 (11)	10 (22)	2.3 (1.0–5.2)	8 (14)	1.4 (0.59–3.2)
Receptive only	43 (12)	34 (12)	3 (6)	0.49 (0.14–1.7)	6 (10)	0.82 (0.33–2.1)
No anal sex	11 (3)	11 (4)	0	NA	0	NA
UAI by HIV status						
Any UAI HIV negative partner	237 (62)	173 (63)	29 (60)	0.89 (0.48–1.7)	35 (61)	0.93 (0.52–1.7)
Any UAI HIV positive partner	56 (15)	45 (16)	5 (10)	0.59 (0.22–1.6)	6 (10)	0.60 (0.24–1.5)
Any UAI partner unknown HIV status	150 (40)	114 (42)	15 (31)	0.64 (0.32–1.2)	21 (37)	0.80 (0.45–1.5)
Serosorting						
No anal sex	11 (2.9)	11 (4)	0	NA	0	NA
Anal sex only with condoms	86 (23)	61 (22)	11 (23)	1.0 (0.50–2.2)	14 (25)	1.1 (0.58–2.2)
Serosorting	110 (29)	72 (26)	20 (42)	2.0 (1.1–3.8)	18 (32)	1.3 (0.70–2.4)
Nonconcordant UAI	172 (45)	130 (47)	17 (35)	.61 (0.32–1.1)	25 (44)	0.86 (0.49–1.5)
Unprotected insertive anal sex with HIV negative or unknown status partner	249 (66)	180 (66)	32 (67)	1.0 (0.54–2.0)	37 (65)	0.97 (0.53–1.8)
Unprotected receptive anal sex with HIV positive or unknown status partner	158 (42)	120 (44)	13 (27)	0.48 (0.24–0.94)	25 (44)	1.0 (0.56–1.8)
Never Previously tested for HIV	22 (6)	16 (6)	4 (8)	1.5 (0.47–4.6)	2 (4)	0.59 (0.13–2.6)
Days since last HIV negative test	286 (148–616)	279 (141–628)	287 (168–641)	P=.64	305 (176–563)	P=.66
Always tell partners HIV status	122 (64)	90 (65)	19 (73)	1.4 (0.57–3.7)	13 (48)	0.50 (0.21–1.1)
Diagnosed with acute HIV ⁺	41 (11)	33 (12)	2 (4)	0.31 (0.07–1.3)	6 (10)	0.84 (0.33–2.1)

* Univariate OR

Table 4

Age, sexual behaviors, and HIV treatment history among MSM STD clinic patients with previously diagnosed HIV infection, by race/ethnicity

	Total	White MSM	African American MSM	White vs. AA OR (95% CI) or p-values**	Hispanic MSM	White vs. Hispanic OR (95% CI) or p-values**
Total Visits	2763	2181	326		256	
Number of men	1382	1095	143		144	
Median age	40 (33–46)	41 (34–46)	40 (33–46)	P=.07	34 (30–40)	P<.0001
Median (IQR) number male sex partners prior 12 months	7 (3–20)	8 (4–20)	4 (2–10)	P<.0001	6 (3–20)	P=.01
Sexual repertoire prior 2 months						
Versatile	1910 (70)	1542 (72)	204 (64)	0.68 (0.44–1.0)	164 (66)	.77 (0.49–1.2)
Insertive only	328 (12)	233 (11)	61 (19)	1.9 (1.1–3.3)	34 (14)	1.3 (0.67–2.5)
Receptive only	309 (11)	240 (11)	30 (9)	0.82 (0.41–1.6)	39 (16)	1.5 (0.87–2.5)
No anal sex	161 (6)	126 (6)	24 (8)	1.3 (0.78–2.2)	11 (4)	.74 (0.36–1.5)
UAI by HIV status						
Any UAI HIV negative partner	660 (24)	538 (25)	61 (19)	0.70 (0.49–1.0)	61 (24)	0.96 (0.68–1.3)
Any UAI HIV positive partner	1461 (53)	1199 (55)	171 (52)	0.90 (0.61–1.3)	91 (36)	0.45 (0.31–.66)
Any UAI partner unknown HIV status	779 (28)	638 (29)	79 (24)	0.77 (0.56–1.1)	62 (24)	0.77 (0.55–1.1)
Serosorting						
No anal sex	161 (6)	126 (6)	24 (7)	1.3 (0.77–2.2)	11 (4)	.70 (0.36–1.5)
Anal sex only with condoms	698 (25)	514 (24)	81 (25)	1.1 (0.71–1.6)	103 (40)	2.2 (1.6–3.0)
Serosorting	849 (31)	680 (31)	120 (37)	1.3 (0.90–1.8)	49 (19)	.52 (0.35–.77)
Nonconcordant UAI	1055 (38)	861 (40)	101 (31)	0.69 (0.50–.94)	93 (36)	.87 (0.63–1.2)
Taking antiretroviral therapy	1139/1995 (57)	914/1586 (58)	122/239 (51)	0.77 (0.49–1.2)	103/170 (61)	1.1 (0.74–1.7)
Always tell partners HIV status	958/1242 (77)	765/980 (78)	100/140 (71)	0.70 (0.44–1.1)	93/122 (76)	0.90 (0.54–1.5)

* Univariate OR