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Comparisons of sexual behaviors and STD prevalence among older and younger individuals with HIV infection

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Abstract

This study was developed to evaluate differences in sexual behaviors and incident bacterial sexually transmitted diseases (STDs) between older HIV-infected individuals and their middle-aged and younger counterparts. We conducted a prospective cohort study of HIV-infected individuals 18 years who had completed an annual standard of care assessment. Analyses were performed to examine differences in sexual behaviors and incident STDs between age groups: (30%) were 18–35 years (younger), (46%) were 36–49 years (middle-aged) and (24%) were 50 years (older). 541 individuals completed the assessment. Older individuals were most likely to be male and Caucasian with longest time since HIV diagnosis, greatest receipt of HAART and highest rates of HIV RNA < 50 copies/mL (all $p < 0.001$). Reports of recent sexual activity decreased with age, (56% younger vs. 43% middle-aged vs. 27% older) ($p < 0.001$), the median number of sex partners was 1 (range 1–25) and 68% overall reported using condoms consistently. The number of sexual partners and consistency of condom use did not differ by age group. The STD incidence rate was 8% (gonorrhea [9], chlamydia [7] and syphilis [20]) and was higher among younger than older individuals (11% younger vs. 7% middle-aged vs. 3% older) ($p = 0.02$). Our results demonstrated that reported sexual activity decreases with advancing age but did not improve consistency of condom use. Regardless of age, STDs continue to be identified and this finding reinforces the need for secondary prevention efforts among all individuals living with HIV/AIDS.

Introduction

At present over 1.2 million Americans are living with HIV/AIDS and it is estimated that 1 in 2 HIV-infected individuals will be 50 years or older within the next decade.¹ This increase is predominantly through improved life expectancy in the era of highly active antiretroviral therapy (HAART),² however, a considerable number represent cases of newly acquired HIV infection among individuals aged 50 years or over (15% of annual cases).¹ Annually, there are an estimated 56,000 new cases of HIV infection,³ and the ongoing domestic epidemic is perpetuated partially by individuals unaware of their HIV serostatus.⁴ Secondary prevention efforts among individuals already established in care are vital.¹ Knowledge of sexual behaviors among individuals with HIV and routine testing for sexually transmitted diseases (STDs) greatly facilitates HIV prevention efforts,^{1, 5} but current data in older individuals is lacking. Among older HIV-infected individuals who reported on high-risk sexual behaviors, 32% to 100% were recently sexually active.^{6, 7, 8} Reports of inconsistent condom use ranged from 20% to 42% and were associated with low sexual power, psychiatric disorders, higher levels of education, use of erectile dysfunction agents and alcohol consumption.^{6, 7, 8} These

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studies, however, have been unable to overcome limitations of a lack of younger comparison cohorts and absent incident STD diagnoses. Furthermore, as these studies have only recruited sexually active older HIV-infected individuals, their results may not reflect actual risk. High risk sexual behaviors are known to occur across all age groups,^{6–11} however, direct comparisons have not been made. Some older individuals report not being sexually active after HIV diagnosis;^{12, 13} and sexual activity has been found to be negatively impacted by comorbidity^{14–16} and other gynecological and urological age-related issues.^{17, 18} Older sexually active HIV-infected individuals may also be more resistant to behavioral changes that reduce their high risk behaviors.¹⁹ This study was conducted to determine rates of recent sexual activity, associations with high risk sexual behaviors and rates of incident STDs among a cohort of unsolicited older individuals living in the current era of HIV-related care and to compare these variables to results from younger and middle-aged HIV-infected counterparts.

Methods

Study population

This was a cross-sectional study of HIV-infected individuals aged 18 years and over, attending an outpatient Infectious Diseases clinic between June and December 2008. Individuals who had completed an annual standard of care assessment on sexual, alcohol and drug use behaviors were included. This study was approved by the Washington University School of Medicine Human Subjects Committee.

Data collected and definitions

Baseline socio-demographic, clinical and medication data were collected. For the purpose of analysis race was dichotomized to racial minorities (African or African American, Latino or Hispanic, Biracial or Multiracial, Asian or Asian Americans) vs. Caucasian. Amount of alcohol consumed during a typical week and illicit drug use within the last week were recorded. Comorbidity was a history of two or more chronic diseases or conditions. Comorbid conditions recorded included cardiovascular diseases, diabetes mellitus, psychiatric illnesses, chronic viral hepatitis, chronic renal failure, peripheral neuropathy, respiratory disease and malignancy (both AIDS and non-AIDS defining). Cardiovascular diseases encompassed hypertension, coronary artery disease, myocardial infarction, congestive cardiac failure and cerebrovascular disease. Psychiatric illnesses included depression, anxiety, bipolar disorder and schizophrenia. An antidepressant was any drug used to treat depression. HAART was defined as the use of ≥ 3 antiretroviral drugs that included a protease inhibitor or a non-nucleoside reverse transcriptase inhibitor. Viral suppression was defined as HIV RNA <50 copies/mL.

Current sexual relationship status was dichotomized: no sex partner (not in a current sexual relationship) or one or more partners (in a current sexual relationship). Any sexual activity included vaginal or anal sex. Recent sexual activity was in the last 3 months. Type of sexual encounter was homosexual, heterosexual or bisexual during the last three months (as measured by the number of same sex or opposite sex partners). For the purposes of analysis, type of sexual encounter was stratified by homosexual and bisexual vs. heterosexual categories. Consistent condom use was always using condoms during vaginal or anal sex in the last 3 months and inconsistent condom use was any other response. Condom use was also reported during the last episode of anal or vaginal sex. Results of bacterial STD testing within one year of the standard of care assessment, current CD4+ count and current HIV RNA level were also obtained. A complete bacterial STD screen included results of urine DNA amplification for *N. gonorrhoeae* and *C. trachomatis* and rapid plasma reagin (RPR) in the past year. *T. pallidum* antibody testing was performed for confirmation of newly reactive

RPRs. If an individual had been previously treated for syphilis, a 4 fold increase in RPR defined re-exposure.

Statistical analyses

Participants were divided into age groups: younger (18–35 years), middle-aged (36–49 years) and older (≥ 50 years). Differences between groups were compared using ANOVA. All *p* values were 2-tailed and considered significant at *p* < 0.05. Separate analyses for associations with recent sexual activity, consistent condom use, condom use during the last episode of anal or vaginal sex and incident STDs were performed. Dichotomous groups were compared using Chi-square and Fisher's exact tests, while Student's *t*-test and Mann Whitney U test were used for normally and non-normally distributed, continuous variables, respectively. All *p* values were 2-tailed and considered significant at *p* < 0.05. Based on initial univariate analyses, potential associations were further evaluated using multivariate logistic regression analyses. HIV RNA values were log-transformed for analysis. All analyses were performed using SPSS version 16.0.

Results

Table 1 details socio-demographic, clinical and laboratory characteristics of 541 individuals who completed the survey. 165 (30%), 248 (46%) and 128 (24%) individuals were younger, middle-aged, and older with a mean age of 28 years, 43 years and 55 years, respectively. Older individuals were more often male and Caucasian (both *p* < 0.001). They were also less likely to have recently used illicit drugs than younger individuals and consumed less alcohol than middle aged individuals (both *p* = 0.01). Predictably, overall comorbidity was greatest among older individuals, who had the greatest prevalence of cardiovascular comorbidity (18% younger vs. 40% middle-aged vs. 53% older) and more psychiatric comorbidity (29% younger vs. 37% middle-aged vs. 47% older) and chronic viral hepatitis (1% younger vs. 20% middle-aged vs. 20% older) than younger patients (all *p* < 0.05). A history of malignancy did not differ between groups. Older individuals were also most likely to be on an antidepressant (both *p* < 0.001). Compared to younger and middle-aged individuals, time since HIV diagnosis was longest for older individuals (5 years vs. 9 years vs. 11 years, respectively), who also had the greatest receipt of HAART and highest rates of HIV RNA < 50 copies/mL (all *p* < 0.001). The overall median CD4+ count was 439 cells/mm³ and was similar between groups.

Table 2 details sexual behavior and bacterial incident STD test result characteristics according to age group. Older individuals were less likely to have disclosed their HIV-infection status to someone and least likely to be in a current sexual relationship (both *p* < 0.05).

Reports of recent sexual activity decreased with age, (56% younger, vs. 43% middle-aged vs. 27% older) (*p* < 0.001). By univariate analysis, associations among individuals who reported sexual activity within the past 3 months, included Caucasian race, female gender, being in a current sexual relationship, disclosure of HIV infection status to someone, current illicit drug use, higher alcohol intake and higher current CD4+ count (all *p* < 0.05). Absence of current OI and absence of comorbidity were associated with reports of recent sexual activity and the latter remained an independent association on multivariate analysis (OR 1.96; 95% CI, 1.16 to 3.23). A further independent association included being in a current sexual relationship (OR 32.1; 95% CI, 19.3 to 53.2). Other HIV-related factors and receipt of antidepressants were not associated with recent sexual activity. Of all who reported recent sexual activity, older individuals reported more homosexual encounters than middle-aged individuals (61% older vs. 35% middle-aged), the most bisexual encounters and the fewest heterosexual encounters (all *p* < 0.05). Among the cohort overall, individuals who reported

bisexual encounters had three times the number of sexual partners than individuals who reported homosexual or heterosexual encounters. There were no differences in the number of sex partners in the last 3 months with age. Condom use during the last episode of anal or vaginal sex was reported by 83% of all individuals, but only 68% reported consistent condom use. Safer sex practices did not differ by age group and there were no significant associations with condom use during the last episode of anal or vaginal sex. Consistent condom use was associated with no history of psychiatric comorbidity and incomplete STD testing on univariate and multivariate analyses; (OR 2.19; 95% CI, 1.22 to 3.92) and (OR 3.21; 95% CI, 1.06 to 9.71).

Results from bacterial STD screens were available for 472 (87%) individuals, in the entire cohort, and were positive in 36 (8%). Among those with incident STDs, 44% had not reported recent sexual activity. Syphilis was the most common incident STD (20 cases), followed by gonorrhea (9 cases) and chlamydia (7 cases). Performance of bacterial STD testing was similar between age groups, while incident STDs were higher among younger individuals compared to older individuals (11% younger vs. 3% older) ($p=0.02$). Risk factors for incident STDs on univariate analysis included, non Caucasian race (31% racial minority vs. 14% Caucasian), higher weekly alcohol intake (5 units vs. 2 units, $p=0.003$) and shorter years since HIV diagnosis (6 years vs. 9 years, $p=0.01$). On multivariate analysis, shorter years since HIV diagnosis remained an independent association (OR 1.10; 95% CI, 1.03 to 1.18, $p=0.01$). Other socio-demographics, disclosure of HIV status, illicit drug use, comorbidity, stage of HIV disease and HAART use were not associated with consistency of condom use or incident STDs. Furthermore, type of sexual encounter was not associated with consistent condom use.

Discussion

Our study illustrates that HIV-infected individuals, much like the general population remain sexually active in later life.¹⁷ Despite ongoing secondary prevention efforts, consistent condom use remains a challenge for all age groups. This latter finding is critical to address as the ramifications of unsafe sexual practices are incident STDs, of which we identified in 8% of participants and the risk of ongoing HIV transmission to sexual partners. Failure to utilize safer sex measures have been associated with a number of risk factors for low sexual power: men who have sex with men sexual orientation,⁷ female gender,⁷ and medical and mental health comorbidity.^{6, 20, 21} Furthermore, entrenched sexual practices,^{13, 19, 22} alcohol and illicit drug use,^{23, 24} and receipt of HAART^{1, 25} may also contribute to inconsistent condom use. The older individuals in our study had a number of factors associated with higher risk sexual behaviors: a predominantly Caucasian MSM population with high rates of comorbidity, high receipt of antidepressants and high receipt of HAART, this did not impact on their rates of inconsistent condom use compared to those < 50 years of age. This implies that utilization of condoms is a result of a complex interplay of a number of factors and that lower rates of sexual activity and lower consumption of alcohol and illicit drug use among our older individuals may have offset the presence of factors associated with higher risk sexual behaviors.

Regardless, the finding of inconsistent condom use among all individuals underlines the importance of routinely discussing individually tailored HIV/ STD prevention strategies¹ and determining causes of higher risk sexual behaviors, if present, among those in care. Referral to appropriate substance abuse services, utilization of age-appropriate safer sex education resources and regular STD testing also facilitate secondary prevention strategies.^{1, 5}

Bacterial STD testing in our study was complete for the majority of individuals, especially for those who reported inconsistent condom use. Incident STD rates were greatest among

younger individuals and associated with non Caucasian race, higher alcohol intake and shorter time since HIV diagnosis. Only the latter variable was an independent risk factor for incident bacterial STD and this may explain, in part, the lower prevalence among our older individuals who had lived the longest with HIV/AIDS. Older HIV-infected individuals may be having less frequent sexual encounters compared to younger counterparts. The finding of incident STD among individuals who had not reported any recent sexual activity may be due to STD acquisition through sexual activity, which occurred more than 3 months prior to assessment and strengthens recommendations for routine, regular STD testing in HIV outpatient clinic settings.

Reports of any recent sexual activity among our cohort overall and our older individuals, in particular, were lower than those reported in other studies.^{6, 7, 26} Differences in our findings may have been due to differences in study design,^{6, 8} lower numbers of individuals in current sexual relationships²⁵ and different study populations.⁷ Our study found sexual activity to decline with age, a well-described phenomenon,¹⁷ which often has multi-factorial etiologies including partner availability,¹⁷ relationship satisfaction,²⁷ social isolation, bereavement plus perceived ageism and stigmatization.^{28, 29} The presence of physical and medical illness can also impact sexual function,^{14–16, 30} and was a factor independently and negatively associated with recent sexual activity. HIV health care providers should be more aware of sexual health issues in individuals and seek to address any concerns or problems.

Our study had a number of limitations. Recall bias is a consistent problem in studies of this nature, which rely on self-report of recent sexual activity. There is a large body of literature that has explored improving validity and reliability of self-reported sexual activity.^{31, 32} Use of 3 month recall of recent sexual activity was used in an attempt to overcome such bias. As our annual assessment was conducted during outpatient clinic attendances, we were constrained by time and did not collect data on perceived stigmatization or levels of knowledge regarding HIV/STD prevention strategies as well as other potentially influential factors related to condom use. We were also limited by absent data on bacterial STD testing on 16% of our cohort.

In summary, older HIV-infected individuals are less sexually active than middle-aged and younger counterparts but share a number of HIV transmission risk behaviors and are demonstrably at risk of acquiring new STDs. Higher rates of viral suppression among this older group, however, may reduce HIV transmission risk in those using condoms inconsistently.³³ There is a continued need for intervention efforts to occur at all ages among individuals living with HIV/AIDS.

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Table 1

Summary of socio-demographic, clinical and laboratory characteristics according to age.

Characteristics	All (n=541)	Younger (n=165)	Middle-aged (n=248)	Older (n=128)	p
Male gender	369 (68.2%)	89 (53.9%)	174 (70.2%)	106 (82.8%)	<0.001
Race					<0.001
African American	360 (66.5%)	124 (75.2%)	177 (71.4%)	59 (46.1%)	-
Caucasian	163 (30.1%)	34 (21.2%)	64 (25.8%)	65 (50.8%)	-
Latino/Hispanic	10 (1.8%)	3 (1.8%)	4 (1.6%)	3 (2.3%)	-
Other ^a	8 (1.5%)	4 (2.4%)	3 (1.2%)	1 (1.0%)	-
Drank alcohol in last week	124 (22.9%)	36 (21.8%)	59 (23.8%)	29 (22.7%)	0.9
Units of alcohol consumed ^a	2 (1–6)	2 (1–6)	3 (1–8)	2 (0–6)	-
Illicit drug use in past week	127 (23.5%)	49 (29.7%)	59 (23.8%)	19 (14.8%)	0.01
Cocaine	10	0	9	1	-
Marijuana	118	47	54	17	-
Opiates	7	3	1	3	-
Presence of comorbidity	205 (37.9%)	28 (17.0%)	103 (41.5%)	74 (57.8%)	<0.001
Receipt of an antidepressant	115 (21.3%)	21 (12.7%)	54 (21.8%)	40 (31.2%)	<0.001
Years since HIV diagnosis ^b	8.4 ± 0.3	5.0 ± 0.3	9.4 ± 0.3	10.9 ± 0.5	<0.001
Current HIV disease status					
OI present	17 (3.2%)	7 (4.3%)	8 (3.2%)	2 (1.6%)	0.42
CD4+ (cells/mm ³) ^a	439 (249–628)	455 (252–601)	407 (213–618)	483 (287–670)	0.15
HAART use	401 (74.1%)	97 (58.8%)	186 (75.0%)	118 (92.2%)	<0.001
viral suppression, (%)	69.10%	55.70%	68.80%	80.50%	<0.001

Abbreviations,

^a median (interquartile range).

b mean $\pm$ S.E.M.

* Other= African, Biracial/multiracial, Asian or Asian American, American Indian, HAART= highly active antiretroviral therapy, OI= opportunistic infection.

Table 2

Sexual behavior and bacterial STD test result characteristics according to age group.

Characteristics	All (n=541)	Younger (n=165)	Middle-aged (n=248)	Older (n=128)	p
Disclosure of HIV status to someone [*]	509 (94.1%)	162 (98.2%)	230 (92.7%)	117 (91.4%)	0.02
Current sexual relationship status					
One partner (%)	246 (45.5%)	85 (51.5%)	121 (48.8%)	40 (31.3%)	<0.001
Multiple partners (%)	93.50%	94.20%	92.60%	95.00%	0.54
	6.50%	5.80%	7.40%	5.00%	-
Disclosure of HIV status to sex partner(s)	219 (89%)	73 (85.9%)	110 (90.9%)	36 (90.0%)	0.52
Any recent sexual activity	234 (43.3%)	93 (56.4%)	106 (42.7%)	35 (27.3%)	<0.001
Type of encounter(s) ^a					0.02
Heterosexual	115 (53.5%)	47 (54.7%)	58 (60.4%)	10 (32.3%)	0.02
Homosexual	91 (42.3%)	38 (44.2%)	34 (35.4%)	19 (61.3%)	0.04
Bisexual	7 (3.3%)	1 (1.2%)	4 (4.2%)	2 (6.5%)	0.02
Total no. of sex partners ^b	1 (1-25)	1 (1-25)	1 (1-11)	1 (1-5)	0.36
Heterosexual partner	1 (1-10)	1 (1-10)	1 (1-5)	1 (1-2)	-
Homosexual partner	1 (1-25)	1 (1-25)	1 (1-11)	1 (1-2)	-
Bisexual partners	3 (2-5)	3 (3-3)	3 (2-5)	4 (2-5)	-
Condom used last sex	192 (82.8%)	81 (88.0%)	83 (78.3%)	28 (82.4%)	0.2
Consistent condom use ^c	150 (67.8%)	64 (70.3%)	62 (63.3%)	24 (75.0%)	0.38
Complete STD screen	454 (83.9%)	138 (83.6%)	202 (81.5%)	114 (89.1%)	0.19
Positive result ^d	36 (7.6%)	18 (10.9%)	14 (6.6%)	4 (3.4%)	0.02

Abbreviations, MSM= men who have sex with men, STD=sexually transmitted disease.

^{*} disclosure to sex partner/family/friends/others.

^a n=215 answered,

^b median (range), n=169 answered

^c n=221 answered,

^d_{n=472} test results available.