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Patients fifty years and older attending two sexually transmitted disease clinics in Baltimore, Maryland

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Abstract

Many individuals remain sexually active into their eighth decade. Surveillance data suggest that rates of sexually transmitted infections in older patients are increasing. We compared demographics, risk behaviors, and predictors of acute infections in patients 50 years and older versus younger patients attending sexually transmitted disease clinics in Baltimore, Maryland. This was a retrospective study from a large electronic database of visits to two urban sexually transmitted disease clinics between 2005 and 2010. Proportions were compared using the Chi square test. Logistic regression was used to assess predictors of acute sexually transmitted infections in older versus younger groups. It was found that patients over 50 were more likely than younger patients to report never using condoms (32.6% [CI 0.31–0.34] versus 24.1% [CI 0.23–0.25]). The overall prevalence of acute sexually transmitted infections was 18.1% (CI 0.17–0.19) in older and 25.8% (CI 0.25–0.27) in younger patients. Older women were more likely to be diagnosed with trichomoniasis (21.5% [CI 18.6–24.5] versus 13.1% [CI 11.5–14.8]). Black race was predictive of having an acute sexually transmitted infections in younger men (OR 2.2 [CI 1.47–3.35]) and women (OR 2.7 [CI 1.34–5.30]) but not in older men (OR 1.2 [CI 0.79–1.73]) or women (OR 1.2 [CI 0.43–3.15]). Older age was associated with a decreased risk of acute STI diagnosis in younger men and older women only, while having had sex for money or drugs in the past month was predictive only in younger women. Reporting symptoms and increasing numbers of sexual partners in the last six months was predictive of acute sexually transmitted infection diagnosis in all age groups. Older patients seeking care at sexually transmitted disease clinics engage in important risk behaviors. Race, a factor predictive of acute sexually transmitted infections in younger patients is not a significant predictor of sexually transmitted infections in older persons.

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Keywords

Sexually transmitted infection; older patient; sexually transmitted infection clinic

Introduction

Most research on sexually transmitted infections (STIs) has focused on younger patients. However, surveillance data both nationally and internationally demonstrate that rates of STIs in patients aged 50 and over may be increasing.¹ Data from nationwide surveys suggest that many older patients remain sexually active well into their eighth decade of life.² These patients may engage in risky sexual behaviors and may be less likely to use condoms during sex than their younger counterparts.³

This is concerning for several reasons. Rising STI rates may cause significant morbidity in a population that has been shown to delay seeking care for STI-related symptoms.⁴ Additionally, while infertility and poor obstetrical outcomes in women may be less of a concern in patients over 50 years, the ability of infections such as gonorrhea, chlamydia, herpes, trichomonas, and syphilis to increase the risk of HIV acquisition and transmission is well documented.⁵ This is particularly relevant given a concerning increase in incident HIV cases in the older patients both in the US and worldwide.^{6,7} In 2013, the CDC estimated that approximately 21% of the estimated 47,352 new HIV infections in the US were among patients aged 50 and over.⁸ Unfortunately, individuals aged 50 and over with HIV are more likely to be diagnosed late, with lower CD4 counts at diagnosis than younger patients. They also have inferior responses to antiretroviral therapy and more difficulties with concomitant comorbidities.⁹ Finally, STIs among patients who are HIV uninfected not only represent a biological risk factor for HIV acquisition but are also important markers of behaviors which put them at risk for HIV acquisition.

However, the literature examining this important population is relatively sparse: most studies are quite small and very few compare older to younger patients. Reported rates of acute STI diagnoses in older patients vary significantly, though those studies that examine risk behaviors do tend to report some significant risk behaviors in older patients. There is a need to better characterize these older patients, in order to better serve them.

In accordance with the literature suggesting significant HIV risk in patients over 50, as well as with the few larger existing studies on STIs in older patients, in this study we sought to compare demographic factors, reasons for attending sexually transmitted disease (STD) clinics, risk factors, and STI diagnoses between patients 50 and older and those under 50. We also assessed whether factors that predict being diagnosed with an acute STI differed between older and younger patients. Finally, we conducted a literature review on studies examining older patients attending STD clinics.

Methods

Study setting

This is a retrospective study from a large electronic database of all visits to two urban STD clinics in Baltimore between 2005 and 2010. This analysis was granted approval by the Baltimore City Health Department and the institutional review board of the Johns Hopkins Medical Institutions.

Data collection

The standardized clinical assessment at the Baltimore STD clinics includes a structured interview on current symptoms, STI history, behavioral risk factors, a physical examination, clinician impressions, treatment, referrals (gynecology, medicine, emergency room, etc.), and laboratory testing. Patients are asked about the reason for their visit (HIV testing, symptoms, referral for a positive test for HIV or an STI, contact with an infected partner with an STI, or routine checkup), current symptoms (discharge, dysuria, genital odor, genital or oral lesion, genital itching, rash, and/or abdominal pain), as well as about sexual risk behaviors and substance use. A directed physical examination is performed, and all findings on the history and physical are documented on the encounter form and captured in the electronic clinical database.

In men, gonococcal urethritis was diagnosed by culture. Non-gonococcal urethritis (NGU) was diagnosed by Gram's stain as testing for *Chlamydia trachomatis* was not generally performed. NGU was defined as a urethral Gram's stain positive for moderate to heavy white blood cells (≥ 5 WBC/hpf) without gram negative diplococci and a negative gonococcal culture. Routine testing for *Trichomonas vaginalis* was not performed in men. All women had gonococcal cultures sent from endocervical swabs. All women under 30 had PCR amplification testing for genital chlamydia. Women over 30 and under 50 who were symptomatic had PCR amplification testing for genital chlamydia. Due to budgetary constraints, women over 50 were treated empirically and did not have PCR testing sent for genital chlamydia. Extragenital gonorrhea in all patients was initially diagnosed through culture until 2007 and then through PCR amplification testing (Amplicor, Roche Diagnostic Systems, Branchburg, New Jersey, USA). Rectal chlamydia was diagnosed by PCR. Bacterial vaginosis was diagnosed using Amsel's clinical criteria, trichomoniasis in women using a wet mount, and vulvovaginal candidiasis based on the finding of yeast on potassium hydroxide, and vulvovaginal edema or erythema. Primary syphilis was diagnosed clinically, and dark-field microscopy was performed for any consistent lesions. Blood samples were also sent for rapid plasma reagin and fluorescent treponemal absorption testing. Syphilis staging followed Centers for Disease Control and Prevention criteria. Early syphilis was defined as primary, secondary, or early latent syphilis. HIV serological testing was performed using a screening enzyme immunoassay, followed by a Western Blot.

Data analyses

Proportions were compared (women under 50 to women 50 and over and men under 50 to men 50 and over) using the Chi square test. *P* values less than 0.05 were assumed to represent statistical significance. We used logistic regression to assess which factors were

most predictive of being diagnosed with an acute STI (including gonorrhea, chlamydia, NGU, and early syphilis in men and gonorrhea, trichomonas, and early syphilis in women) at the visit, stratified by age and sex. Values which reached $p \leq 0.2$ in univariate analyses were included in the multivariate model. Chlamydia was not included in the analysis of acute STI for women because asymptomatic women over age 30 were not routinely screened for chlamydia, and women over age 50 were not tested for chlamydia. In a subsequent sensitivity analysis, we kept chlamydia in the model for women under 50. All multivariate models were checked through a backwards elimination protocol.

Literature review

We searched Pubmed using the major headings ‘aged’ and ‘sexually transmitted diseases/diagnosis’, epidemiology, physiopathology, prevention and control, or therapy, and titles/abstracts for ‘older people’, ‘older adults’, ‘elderly’, sexually transmitted diseases’, ‘sexually transmitted infections’, ‘STI’, and ‘STD’, and placed filters for ‘English’, ‘clinical trial’, ‘journal article’, ‘letter’, ‘meta-analysis’, ‘review’ and ‘systematic review’. The searches resulted in 542 publications, which we narrowed based on relevance. We did not include studies that reported on HIV alone without including other STIs. We then searched the bibliographies of each of the relevant papers to obtain further references.

Results

There were 183,666 patient visits included in the database. We included all patient visits for patients age 50 or older (14,445 visits total) and for comparison took a random sample of patients under 50 and older than age 16 (14,526 visits total). For the purposes of this study, we utilized only the first visit to the STD clinic for each patient during the time period 2005–2010, which included 4893 patient visits for patients under 50 and 4461 visits for patients over 50. There were only two individuals in the entire dataset who self-identified as transgender and these were in the over 50 age group. They were not included in the comparative analyses.

Demographics, behaviors, and reasons for attending the STD clinics are shown in Table 1. Results for proportions were stratified by age (columns 2 and 3) and by age and gender (columns 4–9). Within the over 50 age group, 81.4% were under 60, 15.1% were aged 60–69, and 3.5% were aged 70 and above. Though numbers are small, a higher proportion of older patients cited the reason for their visit as a self-referral for HIV testing. A higher proportion of younger patients reported having genital, oral, and anal sex, but a significant proportion of older men and women also reported exposures at these sites. A significant proportion of older men and women reported having two or more partners in the last six months. Very few patients reported having sex with anonymous sex partners or meeting partners on the internet in the preceding month with no significant differences noted by age (not shown in Table 1). Numbers were small, but a higher proportion of older than younger patients reported using cocaine in the past month. Older patients of both genders were more likely than their younger counterparts to report never using condoms. A relatively low proportion of those under 50 (13.7%) as well as those over 50 (12.5%) reported always using condoms.

The overall prevalence of acute STIs was 18.1% (CI 0.17–0.19) in older patients and 25.8% (CI 0.25–0.27) in younger patients. As previously noted, due to budgetary constraints, women over 50 were not routinely tested for chlamydia. As shown in Table 2, a higher proportion of older women were found to have trichomonas as compared with younger women. Numbers were small, but a higher proportion of older women had a new diagnosis of HIV than younger women. Younger men were more likely to be diagnosed with an acute STI (NGU, gonorrhea, chlamydia, or early syphilis) as compared with older men.

As expected, increasing number of partners and symptoms predicted acute STI (see Table 3) in both older and younger men. However, race, which was a strong predictor of acute STI in younger men, did not predict acute STIs in older men. Similarly, symptoms and increasing numbers of partners were predictive of acute STI in both older and younger women. However, as for men, race, a strong predictor in younger women, was not significant in older women.

Discussion

STIs in older patients appear to be increasing,¹ with data from our study and others suggesting that these older individuals engage in risk behaviors,² but may be less likely to use condoms during sex than their younger counterparts.³ However, the topic of STIs in older adults remains relatively understudied. Through our literature review (see Table 4 for details) of studies on older patients seeking care at STD clinics, we found that most studies were small, and few compared older and younger patients. Differing definitions of ‘older’ or ‘elderly’ patients were utilized, ranging from $\geq$ age 45 to over age 65. However, studies reporting behaviors consistently showed that a large proportion of older patients, especially men, reported sexual risk behaviors. For example, Bourne et al. reported that 17% of men in their study aged 50 and over had sex with a female sex worker in Australia in the last 12 months, and that 21% of men had sex overseas during this time period. In the same study, 13% of women aged 50 and over had sex with a male partner who had multiple partners.¹⁰

Information was sparse on how sexual risk behaviors compared between older and younger groups. Dukers-Muijters et al. reported that older men and women ($\geq$ age 45) in the Netherlands who self-identified as ‘swingers’ (heterosexual couples who practice mate swapping, group sex, or visit sex clubs for couples) were at higher risk for gonorrhea and chlamydia as compared with younger swinger counterparts.¹² In terms of STI diagnoses, most papers found that a large proportion of older patients attending STD clinics were diagnosed with an STI, with some studies suggesting a higher risk for men than women.^{13,21} In papers which compared STI diagnoses in older versus younger patients, rates varied. David et al. reported that 24% of older patients (60 and above) versus 51% of younger patients were diagnosed with an acute STI. On the other hand, Bilenchi et al. reported generally lower (though still significant) proportions of STIs in older versus younger patients, with the exception of pubic pediculosis (8.0% older and 1.6% younger) and scabies (66.8% older and 13.4% younger).^{16,29} Gott et al. reported that 58.4% of older patients and 60.3% of younger patients were diagnosed with an STI.¹⁹ At the same time, they showed that older patients were more likely to delay care seeking for STI symptoms than their younger counterparts.⁴

The most striking finding in our study was that Black race, while a strong predictor of being diagnosed with an acute STI in younger patients, was not a significant predictor in older men or women. The literature is sparse on this topic. A paper by Xu et al. analyzing STI surveillance data from Washington State from 1992 to 1998 found that compared with younger men, older men with STIs were more likely to be White.³⁴ On the other hand, one small study looking at men 60 years and over coming into an STI clinic in the UK reported that Afro-Caribbean men were more likely than men of other ethnicities to have a positive syphilis serology.¹⁴ Another study of women 46 years of age and older in the UK found that Black African and Black Caribbean women were more likely than other ethnic groups to have an acute STI.¹⁵ Neither of these two UK studies controlled for other factors. Finally, one study on social capital and sexual risk taking in adults 60 and over in the United States reported a trend toward White patients being more likely to engage in unprotected sex than other ethnicities (OR 3.61 $p = 0.05$). However, this effect disappeared in another model in which they added a social capital variable.³⁵

The reason why race was not predictive of an acute STI in our older cohort is not clear. We attempted to indirectly explore whether there was an element of acquired immunity that differed within race and age by examining proportions of patients who reported previous STIs. However, independent of age and race, all men with acute STIs were more likely to report a previous history of STI. Among women, a similar trend was observed, but it was not statistically significant in any groups, except for young Black women. In older women, there were no significant differences in risk behaviors between Black and White patients, though a higher proportion of White older men reported anonymous partners in the last month and/or having sex for money or drugs in the last month than Black older men. It is possible that different sexual networks in these age groups may account for race not being predictive of acute STI in older patients. We were unable to identify studies that examined sexual networks in older patients.

Our study has some unique strengths: it involves a very large database of STD clinic patients, including a large number of patients over 50, in one of the highest STI morbidity areas in the US. Furthermore, these patients are well characterized with an efficient and consistent computerized record system. However, our study does have some important limitations. First, it is a retrospective study. As such, selection and information biases are possible. Second, because of budgetary constraints in this public health clinic, women aged 30–50 were tested for genital chlamydia only if symptomatic, and women over 50 were not routinely tested for genital chlamydia. In 2013, the CDC reported a chlamydia rate of 41.4 per 100,000 in women aged 45–54, 11.3 per 100,000 in women aged 55–64, and 2.5 per 100,000 in women 65 and over.³⁶ Because the clinics did not routinely test women over 50 for chlamydia, our point estimates of chlamydia in this population are likely low. To address this issue when comparing older and younger women, we did not include chlamydia in the acute STI variable. However, we performed an additional analysis in which we added chlamydia back into the acute STI outcome variable. When we reran the model using this acute STI variable in younger women, Black race remained a significant predictor of infection in these younger women. Additionally, due to budgetary constraints, nucleic acid amplification testing (NAAT) at urethral sites for gonorrhea and chlamydia was not done in men, and a diagnosis of NGU relied on Gram's stain and gonococcal culture. Causes of

NGU might have differed between older and younger men (e.g. more chlamydia in younger men and more trichomonas in older men), however we could not ascertain this in our study. By dichotomizing age, we may have lost the ability to detect a gradient of risk which may vary within the younger and older age groups. Finally, our study represents the predominantly African-American, inner city population attending STD clinics in Baltimore. Therefore, the findings of this study may not be generalizable to other settings.

This and other studies reinforce that older patients make up a small, but important proportion of patients attending STD clinics. Many of these patients engage in significant risk behaviors and are often diagnosed with STIs. Race, which is a strong predictor of acute STI diagnosis in younger patients, does not predict diagnosis of acute STI in older patients. STD clinic providers must be aware of the significant potential for risk behaviors and infection in this population. Public health officials may need to consider whether current sexual health education and STI prevention messages adequately address the needs of these older patients, or whether campaigns targeted at older patients, or deployed in venues frequented by older patients, need to be developed.

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Patient demographics, behaviors and reasons for attending: first visit to STD clinic during 2005–2010 (% in each category).

Table 1

	Overall		Men		Women		P val	P val
	Age < 50 N = 4893	Age > 50 N = 4461	Age < 50 Men N = 2710	Age > 50 Men N = 3189	Age < 50 Women N = 2183	Age > 50 Women N = 1270		
Age, mean (SD)	28.6 (9.0)	55.8 (6.0)	29.7 (9.0)	56.1 (6.1)	27.2 (8.8)	54.9 (5.4)	N/A	N/A
Race								
Black	88.1	90.1	88.3	89.6	87.9	91.4	<0.01	<0.01
White	6.1	6.5	5.8	7.1	6.4	5.0		
Other	5.8	3.5	5.9	3.4	5.7	3.6		
Symptomatic	49.9	46.7	48.5	46.4	51.8	47.6	0.12	0.02
Reason for visit								
Contact STI (not HIV)	18.8	14.2	21.5	15.4	15.6	11.1	<0.01	<0.01
Contact HIV	0.49	1.5	0.30	1.5	0.7	1.4	<0.01	0.05
Self-referral for HIV test	6.9	13.6	7.2	13.1	6.6	14.9	<0.01	<0.01
Self-referral for checkup	28.0	19.1	26.9	18.7	29.3	20.2	<0.01	<0.01
Risk factors/behaviors								
Sexual orientation								
Straight	83.2	82.3	85.8	83.1	80.0	80.4	<0.01	<0.01
Gay	2.9	1.6	3.1	1.8	2.7	1.2		
Bisexual	3.1	1.4	2.0	1.4	4.5	1.2		
Unknown	10.8	14.7	9.0	13.7	12.9	17.2		
Genital sex	88.5	82.6	90.4	83.9	86.2	79.5	<0.01	<0.01
Anal sex	5.0	2.2	4.0	2.0	6.2	2.8	<0.01	<0.01
Oral sex	38.0	24.7	38.3	26.0	37.5	21.4	<0.01	<0.01
Number of partners in last 6 mos								
0	2.5	10.8	2.4	8.5	2.7	16.5	<0.01	<0.01
1	37.3	44.7	27.8	40.1	49.2	56.2		
2	25.6	17.2	27.5	20.8	23.3	8.2		
> 3	24.1	12.4	33.6	16.4	12.4	2.2		
Unknown	10.4	14.9	8.8	14.2	12.5	16.9		

	Overall		Men		Women		P val
	Age < 50 N = 4893	Age > 50 N = 4461	Age < 50 Men N = 2710	Age > 50 Men N = 3189	Age < 50 Women N = 2183	Age > 50 Women N = 1270	
Condom use							
Never	24.1	32.6	20.2	29.5	28.9	40.3	<0.01
Sometimes	29.5	23.4	31.1	25.6	27.4	17.9	
Often	21.3	13.0	25.5	15.3	16.1	7.2	
Always	13.7	12.5	14.4	13.2	12.9	10.8	
Unknown	11.4	18.5	8.9	16.3	14.7	23.9	
Substance use							
IDU in last mo	0.41	0.9	0.33	0.91	0.5	0.7	0.45
Cocaine past mo	0.90	2.1	0.85	2.2	0.92	1.8	0.02
Sex for drugs or money past mo	0.67	0.8	0.7	0.9	0.6	0.47	0.64
Sex with EtOH/drugs in past mo	6.7	5.0	8.2	5.8	4.8	2.9	0.01
ED drugs in past year			0.33	2.23			<0.01

ED: erectile dysfunction; EtOH: alcohol; IDU: intravenous drug use; mo: month; N/A: not applicable; pos: positive; P val: P value; STD: sexually transmitted disease; STI: sexually transmitted infection.

Table 2

Patient diagnoses: first visit to STD clinic 2005–2010.

	Overall		Men		Women		P val
	Age < 50 N = 4893	Age > 50 N = 4461	Age < 50 Men N = 2710	Age > 50 Men N = 3189	Age < 50 Women N = 2183	Age > 50 Women N = 1270	
NGU	N/A ^a	N/A ^a	752 (36.4) 752/2067	500 (24.7) 500/2024	N/A ^a	N/A ^a	N/A ^a
Genital chlamydia	N/A ^a	N/A ^a	N/A ^a	N/A ^a	208 (14.3) 208/1456	3 (0.85) 3/353	<0.01
Extragenital chlamydia	7 (7.1) 7/99	0 0/35	4 (9.8) 4/41	0 0/21	3 (5.2) 3/58	0 0/14	0.40
Genital gonorrhea	266 (7.2) 266/3710	117 (4.1) 117/2835	194 (9.2) 194/2111	114 (5.5) 114/2087	72 (4.5) 72/1599	3 (0.4) 3/749	<0.01
Extragenital gonorrhea	19 (1.5) 19/1269	4 (0.67) 4/597	13 (2.0) 13/649	4 (0.94) 4/427	6 (0.97) 6/614	0 (0) 0/170	0.20
PID	N/A ^a	N/A ^a	N/A ^a	N/A ^a	45 (2.1) 45/2183	12 (0.94) 12/1270	0.01
Trichomonas	N/A ^a	N/A ^a	N/A ^a	N/A ^a	216 (13.1) 216/1653	163 (21.4) 163/761	<0.01
Early syphilis	29 (0.73) 29/3965	35 (1.0) 35/3465	22 (0.98) 22/2254	30 (1.2) 30/2479	7 (0.41) 7/1711	5 (0.51) 5/985	0.71
Late/unknown stage syphilis	81 (2.0) 81/3966	261 (7.5) 261/3465	50 (2.2) 50/2255	187 (7.5) 187/2479	31 (1.8) 31/1711	74 (7.5) 74/986	<0.01
Previously treated syphilis	7 (0.18) 7/3965	15 (4.3) 15/3465	4 (0.18) 4/2254	12 (0.48) 12/2479	3 (0.18) 3/1711	3 (0.30) 3/985	0.49
Bacterial vaginosis	N/A ^a	N/A ^a	N/A ^a	N/A ^a	726 (33.3) 726/2183	231 (18.2) 231/1270	<0.01
HIV	50 (1.6) 36/3212	85 (3.0) 60/2801	35 (2.0) 23 (1.3)	63 (3.2) 41 (2.1)	15 (1.0) 13 (0.91)	22 (2.6) 19 (2.3)	0.01
New HIV ^b	36 (1.1) 36/3212	60 (2.1) 60/2801	23 (1.3) 23/1778	41 (2.1) 41/1954	15/1436 13/1434	22/849 19/845	0.01
Acute STI (no HIV) ^c			970 (35.8) 970/2710	637 (20.0) 637/3189	290 (13.3) 290/2183	170 (13.4) 170/1270	0.93

^aNot applicable, as NGU was only measured for men, and genital chlamydia, PID, trichomonas, and bacterial vaginosis were only measured for women.^bRemoving those patients with self-reported previous positive HIV test.^cAcute STI for men included gonorrhea, chlamydia, NGU, or early syphilis, acute STI for women included gonorrhea, trichomonas, or early syphilis.

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HIV: human immunodeficiency virus; N/A: not applicable; NGU: non-gonococcal urethritis; PID: pelvic inflammatory disease; P val: P value; STI: sexually transmitted infection.

Table 3

Predictors of acute sexually transmitted infection diagnosis at STD clinic visit.

	< 50 men N = 2710			>= 50 men N = 3189			< 50 women N = 2183			>= 50 women N = 1270		
	Single OR (p val)	Adjusted OR ^a (p val)		Single OR (p val)	Adjusted OR ^a (p val)		Single OR (p val)	Adjusted OR ^a (p val)		Single OR (p val)	Adjusted OR ^a (p val)	
Age	0.97 (0.00)	0.98 (0.00)		0.99 (0.05)	0.99 (0.36)		1.01 (0.41)	1.01 (0.16)		0.91 (<0.01)	0.94 (<0.01)	
Race (ref White)												
Black	2.30 (<0.01)	2.22 (<0.01)		1.28 (0.17)	1.20 (0.42)		1.76 (0.07)	2.67 (0.01)		1.91 (0.17)	1.16 (0.77)	
Other	0.80 (0.43)	1.0 (0.98)		0.39 (0.02)	0.59 (0.22)		0.63 (0.35)	1.01 (0.98)		0.26 (0.22)	0.24 (0.22)	
Sexual Identity												
Gay	0.72 (0.16)	0.80 (0.37)		1.14 (0.67)	1.14 (0.69)		0.92 (0.83)	0.89 (0.77)		0.81 (0.78)	1.6 (0.60)	
Bisexual	0.91 (0.73)	0.97 (0.92)		1.21 (0.57)	1.13 (0.72)		1.46 (0.15)	1.08 (0.78)		N/A ^b	N/A ^b	
Unknown	0.05 (<0.01)	0.36 (0.02)		0.11 (<0.01)	0.49 (0.07)		0.08 (<0.01)	0.43 (0.18)		0.12 (<0.01)	0.80 (0.69)	
Condom use (ref never)												
Sometimes	1.60 (<0.01)	1.21 (0.13)		1.60 (<0.01)	1.35 (0.01)		0.98 (0.88)	0.85 (0.33)		0.77 (0.23)	0.68 (0.12)	
Often	1.71 (<0.01)	1.13 (0.38)		1.31 (0.045)	0.99 (0.96)		0.87 (0.46)	0.81 (0.29)		1.70 (0.05)	1.14 (0.66)	
Always	0.97 (0.84)	0.76 (0.08)		0.88 (0.40)	0.80 (0.15)		0.74 (0.16)	0.72 (0.13)		0.96 (0.87)	0.85 (0.56)	
Unknown	0.03 (<0.01)	0.12 (<0.01)		0.16 (<0.01)	0.71 (0.30)		0.17 (<0.01)	0.82 (0.61)		0.17 (<0.01)	0.70 (0.38)	
Partners last 6 mo (0 is ref)												
1	9.39 (<0.01)	6.7 (<0.01)		3.32 (<0.01)	2.9 (<0.01)		4.21 (0.048)	3.6 (0.08)		2.8 (<0.01)	1.85 (0.06)	
2	15.09 (<0.01)	8.5 (<0.01)		4.00 (<0.01)	2.8 (<0.01)		5.55 (0.02)	5.0 (0.03)		5.68 (<0.01)	3.8 (<0.01)	
>= 3	16.99 (<0.01)	9.0 (<0.01)		5.06 (<0.01)	3.6 (<0.01)		9.04 (<0.01)	8.2 (0.01)		3.04 (0.05)	2.18 (0.20)	
Unknown	0.63 (0.51)	3.6 (0.09)		0.38 (0.01)	1.2 (0.66)		0.21 (0.12)	0.46 (0.49)		0.13 (<0.01)	0.31 (0.18)	
Sex for money or drugs in past mo	0.31 (0.07)	0.33 (0.10)		1.22 (0.64)	N/A ^c		10.7 (<0.01)	7.1 (0.01)		N/A ^b	N/A ^b	
Any symptoms	3.2 (<0.01)	2.55 (<0.01)		5.0 (<0.01)	3.8 (<0.01)		2.1 (<0.01)	1.5 (0.01)		5.9 (<0.01)	4.04 (<0.01)	

^aWhere appropriate, we also controlled for sexual identity, partners met on the internet in the last month, anonymous partners in the last year, IDU in the past month, and sex with alcohol/drugs in the last month.

^bInsufficient numbers.

^cDid not meet p value <= 0.2 in unadjusted analysis.

mo: month; OR: odds ratio; p val: p value; ref: reference.

Table 4

Literature review of older patients attending STD clinic.

Author/Journal/yr	Age/number/gender/race	Reason for visit	Risk factors	Diagnoses	Further description
Bourne and Minichiello/ <i>Aust J Aging</i> /2009 ¹⁰	50 and over, N= 2438, 81% men, No information on race.	40%: Symptoms 23%: STI testing 13%: HIV testing or care 12%: Hepatitis tests or vaccination 4%: Sexual function problems	25% men identified as MSM, with 40 median lifetime partners. Seventeen percent men reported sex with a female sex worker; 21% men had sex overseas; 13% women reported sex with a male partner with multiple partners Of those reporting sex in previous three months, 54% men and 19% women reported any condom use.	14% men and 6.3% women had a bacterial STI (GC, CT, trichomonas, NGU, PID, epididymitis). Four percent of women had syphilis. 9.2% men and 11% women had a viral STI (herpes, warts, hepatitis B, HIV) 32% of women and 16% of men had non-sexual health issues.	Included all pts aged >= 50 attending Sydney Sexual Health center in Australia for the first time between 1992 and 2003 The authors found low rates of condom use. Previous HIV testing rates were >50% in men and 40% in women. Relatively few people presented for or were diagnosed with sexual function difficulties.
Chuah et al./ <i>Venerology</i> /1996 ¹¹	60 and older, N= 85, 87% male; 'Most' of Caucasian descent	25% HIV testing 46% checkup	Not given	Not given	Patients aged 60 and older accessing a Gold Coast sexual health clinic in Australia
Dukers-Muijters et al./ <i>Sex Transm Infect</i> /2010 ¹²	Analyzed all age groups, N= 8965, 11.7% were aged > 45 yrs No information on race. By nationality: 89.1% Dutch, 1.6% German, 4.2% Belgian	Not given	11.6% were swingers (heterosexual couples who practice mate swapping, group sex, or visit sex clubs for couples). 9.6% MSM, 4% female prostitutes	Only analyzed GC and CT for acute STIs. Men: Lower STI prevalence in heterosexual men over 45 as compared with younger (2.4% versus 10.0%). Equal prevalence in MSM in both age groups 14.1–14.6%. Higher prevalence in older male swingers as compared with younger (10.4% versus 8.5%). In multivariate analysis in the over 45 age group, MSM (OR 6.96) and being a swinger (OR 4.74) was a significant predictor of having an STI. In younger men, only MSM was statistically significant Women: Lower STI prevalence in heterosexual women over 45 as compared with younger (4.0 versus 10.9%), 2.9% in older prostitutes as compared with 5.2% in younger, but increased prevalence 17.9% in women > 45 who were swingers as compared to women <= 45 who were swingers (8.3%). In multivariate analysis, being a swinger (OR 5.3)	Analyzed all attendees at an STI clinic in the Netherlands 2007– 2008. Stratified by age < 45 = and > 45, and gender. Within men, compared MSM and swingers to heterosexuals. Within women, compared prostitutes and swingers to heterosexuals The authors conclude that older swingers are a high-risk patient category for acute STIs.

Author/Journal/yr	Age/number/gender/race	Reason for visit	Risk factors	Diagnoses	Further description
Tobin and Harindra/ <i>Sex Transm Infect</i> /2001 ¹³	50 and over, N = 219, 95 men and 124 women No information on race	Men: 25% genital soreness, 20% symptoms, 13% checkup, 10% HIV test, 12% known HIV pos, 4% STI contact, 3% Sharps hotline, 13% other Women: 68% genital soreness, 10% symptoms, 2% checkup, 11% menopausal problems 1.5% sharps hotline 5% other, <1% HIV test, known HIV-positive, or STI contact	12% men: extramarital contact 2% women: extramarital contact One woman: sexually assaulted 15 years before.	was a statistically significant predictor of acute STI in older women but not in younger women. 18% men found to have an STI (NSU, chlamydia, warts, herpes, HIV) 2% women found to have STI (warts, herpes) 42% of men had no diagnoses and the remainder had a non-STI diagnosis including balanitis, lichen sclerosis, zoon's balanitis 11.3% of women had no diagnosis and the remainder had a non-STI diagnosis including atrophic vulvovaginitis, vulval eczema, candidiasis, or lichen sclerosis	Included all pts aged 50 and over attending the Portsmouth GUM department in the UK as new or rebooked patients from 1999 to March 1999, representing 8% of total attendees The authors concluded that most women were coming for accurate diagnosis of genital problems causing difficulties with sex in long-term relationships, whereas many men were attending because of concerns following casual sex or extra-marital contact and had a higher risk of STI
Opaneye/ <i>J R Soc Health</i> /1991 ¹⁴	60 and over, N = 87, Men only. 67.8% Caucasian, 20.7% Afro-Caribbean, 11.5% Asian	Not given	11.5% had multiple sexual partners	One GC, 13 NGU, two herpes, two warts 21 positive serology for syphilis. Six balanitis, three uti, two impotence, one carcinoma of penis, one perineal abscess	Eighty-seven men attending the GUM clinic in Birmingham, UK in 1989 Afro-Caribbean men had OR of 4.68 as compared with Caucasian for having a positive syphilis serology
Fish et al./ <i>Int J STD AIDS</i> /2012 ¹⁵	46 years and over, N = 3457 Women only. (5912 visits) Clinic 1: 75% white, 7% black-Caribbean, 6% black-African, 5% Asian and 7% other. Clinic 2: 66% white, 15% black-Caribbean, 7% black-African, 5% Asian, 7% other	8–12% came in for acute STI, 15–20% for non-STI infection, 19–25% for 'other reason,' 29–45% for 'STI screen include HIV,' 10–19% for 'STI screen exclude HIV'	Detailed review of 120 randomly selected women from clinic 2: 70% sexually active in last three mos with 0–6 partners (66% one partner), 59% never used condoms	See 'reason for visit' In detailed analysis of 120 women, 25% had an acute STI, 12 warts, four herpes, three chlamydia, three trichomonas, two PID, one late latent syphilis	Analyzed reasons for attendance of older women to GU medicine services at two UK clinics The total number of new attendees quadrupled over the 10 yr period 1998–2008 Black-African and black-Caribbean women were more likely to have an acute STI ($p < 0.0001$)
David et al./ <i>Sex Transm Infect</i> /2000 ¹⁶	60 and above, N = 68, 90% male Also included randomly selected sex-matched people aged 20–35 for comparison No information on race	Older: 60% came in for 'STI screening' (not clear if they had symptoms, though 16 older patients had 'suspected STIs'). Forty percent came for non-STI reasons. Younger: 88% came in for STI screening, 12% for non-STI management	68% of older patients with STIs waited over two weeks between symptom recognition and clinic attendance, while only 32% of younger patients waited over two weeks	24% of older patients had an STI, 51% of younger patients had an STI	A review of patients $> = 60$ coming into a GUM clinic at Royal Berkshire Hospital, Reading, UK, between Jan 1998 and Dec 1998, and a randomly selected equivalent number of patients aged 20–35 to compare Older patients seemed to wait longer to attend the STI clinic after developing symptoms

Author/Journal/yr	Age/number/gender/race	Reason for visit	Risk factors	Diagnoses	Further description
Bodley-Tickell et al./ <i>Sex Transm Infect</i> /2008 ¹⁷	Examined all STI diagnoses reported from GUM clinics in the UK, 1996–2003. (<i>N</i> = 4445) in patients 45 and older	N/A	N/A	Rates of STIs per 100,000 were higher for all five diagnoses in this age group in 2003 as compared with 1996. Males and those 55–59 were most significantly affected. GC and CT increased the most. In 1996, 3.7% of the total STI diagnoses were > = age 45, in 2003 4.3% were > = age 45	Examined all STI diagnoses reported from GUM clinics in the UK, 1996–2003, including chlamydia, herpes, warts, gonorrhea, syphilis >4445 total episodes reported in patients > = 45 years of age. Rates for STIs increased in the older age group over time at a higher rate than in the younger population
Jaleel et al./ <i>Sex Transm Infect</i> /1999 ¹⁸	Over 60, <i>N</i> = 239, 187 men, 85% white, 8% Afro-Caribbean	15 pts came in for HIV testing	45 pts had sex with casual partners, 14 had sex outside of the UK, three with prostitutes in Thailand, 21 had more than one sexual partner. Only seven pts had 'protected sex'	31% diagnosed with an STI 40% diagnosed with other conditions	Examined patients over 60 coming in to a GUM clinic in the UK. They found a significant number of STIs as well as sexual risk factors
Gott et al./ <i>Health Care Later Life</i> /1998 ¹⁹	All ages, <i>N</i> = 25,508, 1003 were age 50 and over 75–82% white	Not given	Not given (see below)	58.4% of older patients and 60.3% of younger patients were diagnosed with an STI. 44.7% of older patients and 30.8% of younger patients were diagnosed with 'non-STDs and conditions not requiring treatment.' 4.8% of older patients and 9.9% of younger patients had HIV testing	Patients 50 and over as compared with younger patients attending three GUM clinics in the UK. STI diagnoses were comparable in these two populations
Gott et al./ <i>Int J STD AIDS</i> /2000 ²⁰	50 and over <i>N</i> = 224 120 men No information on race	64.7% suspected they had an STI or had previously been diagnosed with one, of these 83.4% were symptomatic. 42% had attended another GUM clinic on a previous occasion	Of the 84 patients for whom information was available, 70.2% reported one sexual partner in past three months, 9.5% reported two and 2.4% reported having more than 10 sexual partner in past 12 mos	Six patients who thought they did not have a sexually acquired condition or infection were diagnosed with an acute STI. No associations between history of STD clinic attendance and gender, age, or acute STI diagnosis	Of patients aged 50 and older attending the same GUM clinics as above between 1997 and 1998. Sixty-five percent were attending suspected STD. A significant minority had multiple partners, including those classified as 'higher risk' for STI acquisition (MSM, IDU, HIV-positive, commercial sex worker)
Gott et al./ <i>Int J STD AIDS</i> /1999 ⁴	50 and over, <i>N</i> = 121 of the patients above who were symptomatic, other factors as above	Symptoms, 43.8% had waited over two weeks between symptom recognition and clinic attendance. 18.9% cited 'wait and see', 13.2% embarrassment as reasons for delay	N/A	N/A	Analyzed the subset of those above who were symptomatic. Found that 43.8% of them had waited over two wks between symptom recognition and clinic attendance

Author/journal/yr	Age/number/gender/race	Reason for visit	Risk factors	Diagnoses	Further description
Griffiths and David/ <i>Int J STD/AIDS</i> /2013 ²¹	Over 60, N = 98, 67 men, 31 women No information on race	N/A	Mean number sex partners in last six mos was 1.45, 57/98 did not use condoms with new partner	28% acute STIs in men, 19% in women Non-STI diagnoses included lichen sclerosis, balanitis, candida vaginitis, BV, vaginal eczema, UTI, varicella zoster, hepatitis B vaccine, psychological assessment	Reviewed case notes of all pts above age 60 who attended a GUM clinic in UK from Jan 2011 to Jun 2011
Cranston and Thin/ <i>Sex Transm Infect</i> /1998 ^{22,23}	65 and older, N = 74 57 male, 17 female 38 white, 25 Afro-Caribbean, two Asian, two other	N/A	Six homosexual, one bisexual, 31 were sexually active with at least one episode intercourse in past three months	Twenty sexually transmitted infections diagnosed: 13 late treponemal infection, three genital warts, three genital herpes, one chlamydia negative non-specific urethritis, one bacterial vaginosis. Thirty had no abnormality	Patients 65 and over attending GUM clinic in the UK in 1996
Rogstad and Bignell/ <i>Age Ageing</i> /1991 ²⁴	60 and over, N = 242, 191 men, 51 women	73% self-referred 26/242 (10.7%) coming for HIV testing, though none were positive	28.1% had 'casual' sexual relations with 1–30 partners, 2.1% paid for sex abroad, six MSM had participated in casual anoreceptive intercourse without a condom, 7.8% of men were participating concurrently in both marital and extramarital sexual relationships	58/242 (23.9%) diagnosed with STI: four gonorrhea, 20 NGU, 16 warts, nine HSV, four trichomoniasis, one acute hepatitis B, 37 with positive serology for previous treponemal diseases	Patients over the age of 60 attending two GUM clinics in the UK (1988–1989)
Kohiyar/ <i>Geriatr Med</i> /1983 ²⁵	65 and older, 51 men and 14 women 80% Caucasian, 18.5% West Indian and 1.5% Arab	61.5% self-referred, 3.1% came with a 'contact slip'	64.6% of those 60–69 were sexually active, 27.7% of those age 70–79 and 7.7% of those age 80–89 32.2% of those sexually active had one partner, 3.1% had three	Thirty patients found to have some sort of STI Twenty-nine patients reported a previous STI	An analysis of patients age 65 and older coming into an STD clinic in the UK
Bergin et al./ <i>JEADV</i> /2006 ²⁶	Over 65, N = 81, predominantly male (only three women) No information on race	20% referral for positive syphilis serology, 11 pts self-requested HIV testing	Of 61 pts for whom sexual history was available, seven admitted to unprotected sex with prostitutes	6% with urethritis, 5% genital warts, 2% pediculosis pubis, 2% genital herpes, 1% scabies, the remainder had non-STI diagnoses	Patients over age 65 attending a GUM clinic in Dublin, Ireland 1987–1993
Vasconcelos et al./ <i>Eur J Dermatol</i> /2000 ²⁷	Over 65, N = 28, 21 men, seven women, No information on race	Not given	Ten men reported 2–6 partners, all of these admitted contact with prostitutes, eight of those used no condom and two only occasionally	53.6% late latent syphilis, 21.4% genital warts, 10.7% primary syphilis, 7.1% had either gonococcal urethritis, secondary syphilis, or genital herpes, one patient had chancroid and one had hepatitis B, 10.7% candida balanitis	Twenty-eight patients over age 65 attending a hospital unit for STDs in Portugal between 1991 and 1999
Nunes et al./ <i>JEADV</i> /2015 ²⁸	60 and over, N = 263, 209 men, 54 women	Not given	See 'Further description'	Of those 167/263 diagnosed with an STI, 70/167 had late	Included 263 patients aged 60 and over attending an STI clinic in

Author/journal/yr	Age/number/gender/race	Reason for visit	Risk factors	Diagnoses	Further description
	No information on race			syphilis, 14 had HIV, 56 had warts, 31 had genital herpes, five had early syphilis, and 21 had other diagnoses. 16.3% had more than one STI diagnosis	Portugal. Chi square test or Mann-Whitney test used to assess risk factors between those with and without an STI. A statistically significant higher proportion of those who were MSM had a past history of STI and had two or more partners in the previous year had an STI
Bilenchi et al./ <i>J Am Geriatr Soc</i> 2009 ²⁹ , Poggiali et al./ <i>JEADV</i> 2006 ³⁰	7014 pts, 1230 patients aged 65 and older, 563 men, 667 women, no information on race	Not given	79% sexually active, 70.1% married 41.8% of sexually active men admitted 'risky sexual behavior'	66.8% of the older pts with 'STD diagnoses' had scabies (13.4% of younger), 13.5% had warts (27.3% of younger), 8.0% had pubic pediculosis (1.6% of younger), 6.0% had genital herpes (11.0% of younger), 1.6% with early syphilis (5.2% of younger), 2.0% had gonorrhea (3.2% of younger)	7014 patients attending an STD unit from Jan 1994 to Dec 2007 in Italy who were diagnosed with an STD *Note also published a paper in 2006 on sexually transmitted scabies in the elderly which mentions 1652 elderly patients seen in STD clinic from 1990 to 2004 with similar distribution of STIs
Bernstein and DeHertogh/ <i>Arch Intern Med</i> 1992 ³¹	60 and older, N = 30 diagnosed with early syphilis, two women 25 Black, five White, five Hispanic	Not given	Ten male pts had >1 sexual partner within two months of diagnosis, five had sexual contact with a prostitute. Five alcoholics, two IDU 19 had a prior STD	All had early syphilis. Four had concomitant GC and two had CT as well	Patients age 60 and over diagnosed with early syphilis as inpatients at Mount Sinai Hospital or at the STD clinic of the Hartford Health Department, USA, 1985–1990
Pearline et al./ <i>AIDS Patient Care STDs</i> 2010, ³² Wong et al./ <i>Sex Transm Infect</i> 2007 ³³	50 and over N = 944, Chinese	Not given	46% purchased commercial sex (only 8% of these reported condom use at last sexual encounter), 24% multiple sexual partners, < 4% condom use	12.7% syphilis infection (stage not given) 1.4% HIV infection	Pearline et al. reported previously unreported data from Wong et al.'s cross-sectional serologic study for HIV and syphilis in 11,461 STI clinic patients from eight cities in Guangxi Province, China

CT: chlamydia; GC: gonorrhea; PID: pelvic inflammatory disease; STD: sexually transmitted disease; STI: sexually transmitted infection.