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The impact of HIV seroadaptive behaviours on sexually transmissible infections in HIV-negative homosexual men in Sydney, Australia

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Abstract

Background—HIV seroadaptive behaviours such as serosorting and strategic positioning are being increasingly practised by homosexual men, however, their impact on sexually transmissible infections (STIs) is unclear.

Methods—Participants were 1,427 initially HIV-negative men enrolled from 2001 to 2004 and followed to June 2007. Participants were tested annually for anal and urethral gonorrhoea and chlamydia, herpes simplex virus, and syphilis. In addition, they reported diagnoses of these conditions, and of genital and anal warts between annual visits, and sexual risk behaviours.

Results—Compared with men who reported no unprotected anal intercourse (UAI), serosorting was associated with an increased risk of urethral (HR=1.97, 95% CI 1.43–2.72) and anal (HR=1.62, 95% CI 1.11–2.36) chlamydia. Compared with men who reported UAI with HIV non-concordant partners, men who practised serosorting had significantly lower risk of incident syphilis (HR=0.21, 95% CI 0.05–0.81) and urethral gonorrhoea (HR=0.61, 95% CI 0.39–0.96). Compared with men who reported no UAI, strategic positioning was associated with an increased risk of urethral gonorrhoea (HR=1.72, 95% CI 1.05–2.83) and chlamydia (HR=2.22, 95% CI 1.55–3.18). Compared with men who reported receptive UAI, the incidence of anal gonorrhoea (HR=0.38, 0.20–0.74) and chlamydia (HR=0.44, 95% CI 0.27–0.69) was significantly lower in those who practised strategic positioning.

Conclusion—For men who reported seroadaptive behaviours, rates of some bacterial STIs were higher than in men who reported no UAI. However, rates were lower than for men who reported higher HIV risk behaviours.

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Keywords

Cohort study; STI; Homosexuality; male; HIV seroadaptive behaviour; Australia

Introduction

Seroadaptive behaviours such as serosorting and strategic positioning are sexual behaviours employed by homosexual men to reduce the risk of transmitting or acquiring HIV while engaging in unprotected anal intercourse (UAI) [1–3]. For an HIV-negative man, serosorting means restricting any UAI to sexual partners who are also HIV-negative, and strategic positioning means restricting UAI to taking the insertive role only. These risk reduction behaviours are fairly common among homosexual men [4], with recently reported increases in some developed countries [5]. Compared with other forms of UAI, these behaviours have been demonstrated to offer partial protection against HIV transmission [6]. Little has been published on the impact of these behaviours on other sexually transmissible infections (STIs) [7], though there is a suggestion that serosorting among HIV-positive men has resulted in increased STI transmission [1, 8, 9]. To address this issue, we examined the associations between serosorting, strategic positioning and the incidence of a range of STIs in a cohort of HIV-negative homosexual men in Sydney, Australia.

Methods

Participants were from the Health in Men (HIM) study which recruited from a wide range of community settings from June 2001 to December 2004. Participants were followed up to June 2007 at six-monthly intervals [10]. Comprehensive sexual health screening was offered, including syphilis serology, gonorrhoea and chlamydia testing from the urethra and anus using nucleic acid amplification and herpes simplex virus types 1 and 2 (HSV-1 and HSV-2) and syphilis serology. In addition, self reported diagnoses of these conditions between annual visits, and of genital and anal warts in the previous 12 months were collected [11]. Signed informed consent was obtained from all participants. Ethics approval was granted by the Human Research Ethics Committee at the University of New South Wales.

Both serosorting and strategic positioning were defined behaviourally [6]. Participants who reported 1) UAI in the last six months and 2) that all UAI episodes were with partners known to be HIV-negative were defined as practising serosorting. Participants who reported 1) UAI in the last six months and 2) that all UAI episodes were in the insertive position were defined as practising strategic positioning.

Statistical analyses were performed using STATA 10.1 (STATA Corporation, College Station, TX). Univariate Cox regressions were performed to calculate the hazard ratio (HR) of incident STIs in those who fulfilled the definition of practising serosorting compared with men reporting no UAI, and with those reporting non-seroconcordant UAI (UAI with HIV status unknown or HIV-positive partners) in the past 6 months. For men who fulfilled the definition of practising strategic positioning, HRs were calculated comparing STI incidence in this group with men reporting no UAI, and with men reporting at least one or more episodes of receptive UAI in the last 6 months. As the number of sexual partners in the last six months and age were almost universally associated with the range of STIs examined [10–12], these two factors were included in multivariate Cox regressions when the univariate p value was less than 0.10.

Results

Between June 2001 and December 2004, 1427 initially HIV-negative men were recruited, and they were followed to June 2007. The median age at enrolment was 35 years (range: 18–75).

Serosorting

In comparison with men who did not report UAI, serosorting was associated with an increased risk of urethral chlamydia (HR=1.75, 95% CI 1.27–2.41). There were also borderline elevated risks of anal chlamydia (HR=1.41, 95% CI 0.97–2.05) and of incident HSV-1 infection (HR=1.68, 95% CI 0.99–2.86). After adjustment for age and number of sexual partners, the increased risk remained significant for both urethral (adjusted HR=1.97, 95% CI 1.43–2.72) and anal (adjusted HR=1.62, 95% CI 1.11–2.36, Table 1) chlamydia.

In comparison with men who reported non-seroconcordant UAI, the risk of all bacterial STIs examined was significantly reduced in those who practised serosorting, including syphilis (HR=0.19, 95% CI 0.05–0.68), urethral gonorrhoea (HR=0.41, 95% CI 0.27–0.63), anal gonorrhoea (HR=0.54, 95% CI 0.35–0.82), urethral chlamydia (HR=0.55, 95% CI 0.42–0.72), and anal chlamydia (HR=0.51, 95% CI 0.37–0.71). After adjustment for age and number of sexual partners, the association remained significant for syphilis (adjusted HR=0.21, 95% CI 0.05–0.81) and urethral gonorrhoea (adjusted HR=0.61, 95% CI 0.39–0.96) and was of borderline significance for anal gonorrhoea (adjusted HR=0.67, 95% CI 0.43–1.06, Table 1).

Strategic positioning

In comparison with men who did not report UAI, the risk of urethral bacterial STIs including gonorrhoea (HR=1.95, 95% CI 1.19–3.20) and chlamydia (HR=2.46, 95% CI 1.72–3.52) was significantly increased in those who practised strategic positioning. Risk of viral STIs was not increased. After adjustment for age and number of sexual partners, the increased risk of urethral gonorrhoea (adjusted HR=1.72, 95% CI 1.05–2.83) and urethral chlamydia (adjusted HR=2.22, 95% CI 1.55–3.18, Table 1) remained significant.

In comparison with men who engaged in receptive UAI, the risk of anal bacterial STIs was significantly reduced in those who practised strategic positioning, including anal gonorrhoea (HR=0.39, 95% CI 0.20–0.75) and anal chlamydia (HR=0.49, 95% CI 0.31–0.78). Strategic positioning had no impact on the risk of viral STIs. After adjustment for age and number of sexual partners, the reduced risk of anal gonorrhoea (adjusted HR=0.38, 95% CI 0.20–0.74) and anal chlamydia (adjusted HR=0.44, 95% CI 0.27–0.69, Table 1) remained significant.

Discussion

Seroadaptive behaviours were associated with STI risk that was generally intermediate between the lower risk associated with no UAI, and the higher risk associated with higher HIV risk forms of UAI. Compared with men who reported no UAI, serosorting was associated with a significantly increased risk of chlamydia, and, unsurprisingly, strategic positioning was associated with a significantly increased risk of urethral bacterial infections. Conversely, compared with men who reported higher HIV risk UAI, serosorters were at a significantly lower risk of syphilis and gonorrhoea, and those who practised strategic positioning had a reduced risk of both anal gonorrhoea and anal chlamydia.

For an HIV-negative gay man, serosorting means having UAI only with other HIV-negative men. Among homosexual men, most STIs are more prevalent in HIV-positive men [13]. Thus it is not surprising that HIV-negative serosorters have STI rates that are lower than

men who report UAI with HIV-positive partners. The difference in rates of STIs between HIV-positive and HIV-negative men is most marked for syphilis [14]. While serosorting among HIV-negative men appears to offer some protection against syphilis, serosorting among HIV-positive men is likely to be particularly high risk for transmission of syphilis [15].

For an HIV-negative gay man, strategic positioning means only adopting the insertive position in UAI. Thus our finding of increased incidence of certain urethral STIs compared with those who report no UAI, but decreased incidence of anal STIs compared with those who report receptive UAI makes intuitive sense.

In summary, among HIV negative men who reported UAI, serosorting and strategic positioning appeared to have some protective effect against certain STIs, but they were associated with higher risk of STIs than men who reported no UAI. Our findings need to be interpreted in the context of the high levels of HIV and STI testing among homosexual men in Sydney [16, 17]. In settings where HIV and STI testing are less frequent the protective effect against some STIs reported here may not be demonstrated. These results show that HIV risk reduction behaviours may offer limited protection against some STIs among men who report UAI, but that consistent condom use provides more reliable protection.

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Short summary

HIV seroadaptive behaviours were associated with increased rates of sexually transmissible infections compared with men who reported no unprotected anal intercourse in a cohort of HIV-negative homosexual men in Sydney.

Table 1
The impact of serosorting and strategic positioning on sexually transmissible infections in the Health in Men study

	n	Incidence Per 100 PY	Univariate analysis			Multivariate analysis ¹		
			HR	95% CI	P value	Adjusted HR	95% CI	P value
Serosorting								
<i>vs. No UAI</i>								
Bacterial STIs								
Urethral chlamydia					0.001			<0.001
Serosorting	99	6.06	1.75	1.27–2.41		1.97	1.43–2.72	
No UAI	61	3.56	1	---		1	---	
Anal chlamydia					0.072			0.013
Serosorting	64	3.95	1.41	0.97–2.05		1.62	1.11–2.36	
No UAI	48	2.80	1	---		1	---	
Viral STIs								
HSV-1					0.057			0.059
Serosorting	31	9.09	1.68	0.99–2.86		1.68	0.98–2.87	
No UAI	24	5.51	1	---		1	---	
<i>vs. Non-concordant UAI (Non SS)</i>								
Bacterial STIs								
Syphilis					0.011			0.023
Serosorting	3	0.18	0.19	0.05–0.68		0.21	0.05–0.81	
Non SS	10	1.00	1	---		1	---	
Urethral gonorrhoea					<0.001			0.033
Serosorting	35	2.15	0.41	0.27–0.63		0.61	0.39–0.96	
Non SS	56	5.52	1	---		1	---	
Anal gonorrhoea					0.004			0.090
Serosorting	39	2.40	0.54	0.35–0.82		0.67	0.43–1.06	
Non SS	46	4.55	1	---		1	---	
Urethral chlamydia					<0.001			0.136
Serosorting	99	6.06	0.55	0.42–0.72		0.80	0.60–1.07	
Non SS	114	11.34	1	---		1	---	

	n	Incidence Per 100 PY	Univariate analysis			Multivariate analysis ^I		
			HR	95% CI	P value	Adjusted HR	95% CI	P value
Anal chlamydia					<0.001			0.109
Serosorting	64	3.95	0.51	0.37–0.71		0.75	0.53–1.07	
Non SS	80	7.93	1	---		1	---	
Strategic positioning								
vs. No UAI								
<u>Bacterial STIs</u>								
Urethral gonorrhoea					0.008			0.032
Strategic positioning	28	4.11	1.95	1.19–3.20		1.72	1.05–2.83	
No UAI	36	2.10	1	---		1	---	
Urethral chlamydia					<0.001			<0.001
Strategic positioning	59	8.71	2.46	1.72–3.53		2.22	1.55–3.18	
No UAI	61	3.56	1	---		1	---	
vs. Receptive UAI								
<u>Bacterial STIs</u>								
Anal gonorrhoea					0.005			0.004
Strategic positioning	10	1.48	0.39	0.20–0.75		0.38	0.20–0.74	
Receptive UAI	75	3.83	1	---		1	---	
Anal chlamydia					0.003			<0.001
Strategic positioning	21	3.10	0.49	0.31–0.78		0.44	0.27–0.69	
Receptive UAI	123	6.30	1	---		1	---	

UAI: unprotected anal intercourse; STI: sexually transmissible infection;

Bacterial STIs examined included syphilis, gonorrhoea (urethral and anal) and chlamydia (urethral and anal); Viral STIs examined included herpes simplex virus types 1 and 2, genital and anal warts.

^I adjusted for age and number of sexual partners reported in the last 6 months.