Sexual risk behaviour for transmission of HIV in men who have sex with men: recent findings and potential interventions

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Current Opinion in HIV and AIDS 2010, 5:311–315

Purpose of review

Men who have sex with men (MSM) remain one of the groups most at risk of HIV, particularly in countries with concentrated epidemics. Here, we review findings from behavioural research with MSM and discuss the potential of behavioural interventions.

Recent findings

Increasing sexual risk behaviour and HIV transmission among MSM is apparent. Although risk reduction strategies, including serosorting and strategic positioning, are being widely reported, these appear to offer limited protection to HIV-negative MSM. There are emerging HIV epidemics among MSM in low-income and middle-income countries, with reported high levels of HIV and sexual risk behaviour. Studies of African MSM report higher HIV prevalence than that in the adult male general population. Evidence of effective behavioural interventions is growing. However, further trials, incorporating biological endpoints, are required.

Summary

Reducing HIV transmission among MSM remains a significant challenge. Risk reduction strategies, other than condom use, could reduce the risk, but their efficacy is questionable, particularly when knowledge of HIV status may be inaccurate. Behaviour change alone is unlikely to produce the sustained reductions in HIV transmission necessary to change the course of the epidemic. 'Combination prevention', which incorporates biomedical, behavioural, social and structural interventions, should be explored further.

Keywords

HIV prevention, men who have sex with men, sexual risk behaviour

Curr Opin HIV AIDS 5:311–315

1746-630X

Introduction

With the exception of male circumcision, biomedical interventions to reduce the sexual transmission of HIV infection have proven largely ineffective [1] and sustained behaviour change remains a necessary goal [2]. Condoms can prevent transmission, if used correctly and consistently [1], but barriers to use remain a challenge to efforts to promote sustained behaviour change. With an estimated 2.7 million new HIV infections in 2008, reducing sexual transmission remains a global priority [3].

Men who have sex with men (MSM) remain one of the groups most at risk of HIV, particularly in countries with concentrated HIV epidemics [3]. Early, successful HIV prevention among MSM has been credited to the collective response of gay communities and their widespread adoption of safer sex behaviours [4]. However, increases in HIV infections and sexual risk behaviours among these populations are apparent [5•,6], and combined with evidence of HIV epidemics among new and emerging populations of MSM [3,7,8•], the reduction of HIV transmission among MSM remains a significant challenge.

In this study, we review recent findings from behavioural research with MSM, with a particular focus on risk factors for HIV transmission and acquisition, the employment of risk reduction strategies and new and emerging populations of MSM. We also discuss the potential of behavioural interventions in future HIV prevention.

Sexual behaviour and associated risk factors among men who have sex with men

There has been resurgence in diagnosed HIV infections noted among MSM populations in North America, western Europe and Australia in recent years [5•]. There does not appear to have been a corresponding increase in HIV incidence [9], and evidence from the UK suggests the increase in HIV diagnoses is the result of increasing HIV testing [10]. However, Sullivan *et al.* [5•] argued that there was not a consistent enough trend of increasing HIV testing to fully account for the increasing infection levels

reporting across the eight countries in their analysis. They concluded that the increases in HIV diagnoses, and in primary and secondary syphilis notifications also reported, could reflect increased sexual risk behaviour.

Increasing sexual risk behaviour among MSM has been commonly reported since the late 1990s [6], and behavioural patterns and risk factors remain a focus for recent research. Variations in risk by partner type and HIV status have been reported [11••,12••], and one United States (US) study recently estimated most HIV transmissions (68%) to be from main rather than casual partners because of a greater frequency of sex acts and receptive anal intercourse, and lower levels of condom use in main partner relationships [13••]. Receptive unprotected anal intercourse (UAI) remains the behaviour with the greatest risk of HIV transmission [12••,13••,14•]. The intentionality of this behaviour among MSM, or the extent to which it can be labelled 'barebacking' as an explicit sexual strategy, is still debated [15,16]. In their qualitative study, Carballo-Diéguez *et al.* [16] found that gay men defined 'barebacking' as condomless anal sex, but did not necessarily immediately label it intentional, and the authors advocate a re-conceptualization of behaviour to distinguish intent and risk for HIV transmission.

Concerns over the association between drug use, sexual risk behaviour and HIV transmission and acquisition remain, with two studies reporting an association between drug use (erectile dysfunction drugs in the Australian Health in Men cohort [17•] and poppers, stimulants and erectile dysfunction drugs in the US Multicenter AIDS Cohort study [14•]) and HIV seroconversion, both controlled for HIV-related sexual risk behaviour. Using data from the EXPLORE study, Mimiaga *et al.* [18] found that use of marijuana, poppers, crack and amphetamines was associated with a history of childhood sexual abuse, which in turn was associated with UAI and HIV infection. The latter effect was mediated by substance use, which the authors argued demonstrated its position on the causal pathway [18]. However, this causal pathway may be complex [19], and one qualitative study suggests that substance-using men's own understanding of their seroconversion did not always situate substance use as central to it, focusing instead on misunderstandings of risk behaviour, psychological problems and trust or disclosure failures [20•].

Risk reduction strategies among men who have sex with men

Serosorting (only having UAI with partners of the same HIV status) and strategic positioning (selection of receptive or insertive UAI, depending on HIV status) are risk reduction strategies that have received considerable attention in the literature. Reported rates of serosorting range from 14 to 44% among HIV-positive men and from 25 to 38% among HIV-negative men [11••,12••,21–23,24•]. Rates of strategic positioning range from 14 to 35%, and from 6 to 15%, respectively [11••,12••,22].

In a prospective study of HIV-negative MSM, Jin *et al.* [12••] assessed the risk of HIV transmission associated with these strategies. Overall, the risk of HIV among men reporting risk reduction was higher than that among men reporting no UAI, but lower than that among men reporting no risk reduction [12••]. When compared with men reporting no UAI, the risk of HIV infection was higher for serosorting [hazard ratio = 3.11, 95% confidence interval (CI) 1.09–8.88], but not for strategic positioning (hazard ratio = 1.54, 95% CI 0.45–5.26) [12••], questioning the efficacy of the former as a risk reduction strategy for HIV-negative MSM. Efficacy is also dependent on accurate knowledge of one's own and one's partners' HIV status, particularly among HIV-negative MSM in casual partnerships [12••]. Zablotska *et al.* [24•] found 27% of HIV-positive MSM and 34% of HIV-negative MSM who reported serosorting could be better described as 'seroguessing' because they assumed, rather than knew, their partners' HIV status.

Among diagnosed HIV-positive men in the USA, Crepaz *et al.* [11••] found higher UAI prevalence with HIV-positive (30%) than HIV-negative (16%) or unknown status partners (13%); this is strongly suggestive of the adoption of serosorting as a risk reduction strategy. Similarly, there was evidence of strategic positioning in their meta-analysis, with higher prevalence of receptive than insertive UAI with HIV-negative or unknown status partners [11••]. Although risk reduction among HIV-positive MSM is encouraging and protective, Crepaz *et al.* were unable to explore whether these strategies were being exclusively adopted, and the risk of infection with other HIV strains or other sexually transmitted infections (STIs) remains a possibility and concern [11••,25]. Furthermore, although Crepaz *et al.* [11••] found most diagnosed HIV-positive MSM reported 'safer sex', prevalence of UAI with a partner of unknown or discordant HIV status was 26%. In a UK study, this prevalence was 31% among diagnosed HIV-positive men, a level higher than that among HIV-negative or undiagnosed HIV-positive men [26].

Emerging populations of men who have sex with men

The role of same-sex behaviour in HIV infection in low-income and middle-income countries (LMIC) is receiving growing attention. A review of HIV epidemics among MSM in central and eastern Europe reported rates of HIV prevalence of up to 23% (in Odessa, Ukraine), though the results varied by the sampling method used; prevalence

was around 5% in the cities of four countries with data from respondent-driven sampling surveys (Croatia, Estonia, Georgia and Ukraine) [7]. Recent research from Thailand reports HIV prevalence of 18% among MSM (21% among MSM who only had sex with men and 8% among MSM who also had sex with women) [27]. Studies of African MSM report higher HIV prevalence than that among adult men in the general population, ranging from 8% in a study in Sudan to 34% in Cape Town, South Africa, though again results varied by the sampling method used [8•]. Baral *et al.* [28•] found increasing HIV prevalence with age in a study of MSM in Malawi, Namibia and Botswana, from 8% among MSM aged 18–23 years to 36% among MSM aged at least 30 years. Although HIV in the Caribbean is predominantly attributed to heterosexual transmission [3], Halperin *et al.* [29] argue that, in the Dominican Republic, data suggest 'hidden' transmission between MSM could be a significant element of the epidemic there, making it more akin to neighbouring Latin American countries [3,29].

Using data from the 2008 United Nations General Assembly Special Session on HIV/AIDS (UNGASS) reports, Adam *et al.* [30] estimated 54% of MSM in LMIC used condoms at their last episode of anal intercourse with a man. The mean weighted estimates were 38% in south and south-east Asia, 57% in sub-Saharan Africa, 58% in eastern Europe and central Asia, 74% in the Caribbean and 73% in Latin America [30]. Data on other sexual risk behaviours are limited. The mean number of male partners was 3.2, and 15% reported at least five partners, in the past 6 months in a study of MSM in Malawi, Namibia and Botswana; 54% reported both male and female sexual partners in this timeframe [28•]. In Thailand, behaviourally bisexual MSM reported more sexual partners than other MSM (67 and 27%, respectively reported 6+ sexual partners in the past 3 months) [27]. However, the former were more likely to always use condoms with male partners, and were less likely to be the receptive partner, than the latter [27]. Li *et al.* conclude that these factors could limit the potential for bridging of infection between MSM and heterosexual populations.

Potential interventions to reduce sexual risk behaviour

The potential of risk reduction strategies among MSM such as serosorting and strategic positioning to reduce sexual risk behaviour and HIV transmission deserves further attention. One intervention evaluation, which reported reductions in unprotected sex with partners of unknown or discordant HIV status among HIV-positive MSM, found this was partly due to sustained serosorting in the intervention group [31]. However, these strategies should be promoted with caution, particularly among HIV-negative MSM, in areas with low levels of HIV testing (or suspected high levels of undiagnosed HIV) and when status disclosure may be problematic, given that efficacy is dependent on accurate knowledge of one's own and one's partners' HIV status. Potentially greater HIV transmission in regular partnerships also deserves further attention, with accurate knowledge of (own and partners') HIV status, the transmission dynamics of different sex acts and risk reduction strategies advocated [13••]. Associations between drug use and HIV seroconversion signify the need for interventions targeted at drug using behaviour [14•], and one small randomized controlled trial of motivational interviewing has reported a reduction in club drug use among participants with low levels of drug dependency (but no effect on sexual risk behaviour) [32]. Prestage *et al.* [17•] note the need to further understand the connection between sexual behaviour and drug use within particular gay community subcultures.

Understanding the risks for HIV transmission among MSM in LMIC and the role of MSM in the HIV epidemics of these countries requires improved collection of reliable data (only 58 of the 147 LMIC UN Member States reported on condom use among MSM to the 2008 UNGASS; only 44 provided eligible data that were consistent with the UNGASS guidelines on the use of valid questions and survey method, and included an adequate sample size) [8•,30]. Although stigma, discrimination and criminalization remain significant barriers to HIV prevention among MSM in LMIC [7,8•,29], the development and implementation of appropriate interventions should be a priority [8•]. Almost half of MSM (45%) in a study in Malawi, Namibia and Botswana reported finding male partners on the Internet [28•], and this could be a means of intervention worth exploring further. One recent online video intervention reported positive results on HIV-risk behaviours, but the pretest/posttest design did not employ a comparison control group, so must be interpreted with caution [33]. Elsewhere, only one of three Internet interventions in a meta-analysis of computer-based interventions had a significant effect on condom use [34].

Evidence of the potential effectiveness of behavioural HIV prevention interventions is growing, with a number of systematic reviews and meta-analyses published recently [34–37]. A 2008 Cochrane review demonstrated the effectiveness of individual, group and community-level interventions in reducing high-risk sexual behaviour among MSM and found greater effectiveness for interventions that included the promotion of personal skills (e.g. having condoms available and avoiding excess alcohol or drug use) and the self-regulation of behaviour change [35]. However, too few studies included biological endpoints to measure HIV or STI transmission [35]. The authors concluded more evaluations of interventions were needed in particular for African–American and Hispanic MSM,

and for MSM in LMIC [35]. However, one recent US evaluation of an HIV prevention intervention for black MSM reported positive reductions in UAI with casual partners [38•], and Johnson *et al.* [36] reported increased intervention effectiveness on condom use in the studies that included a greater proportion of MSM in their samples in their meta-analysis of behavioural interventions for African–Americans. Further trials, which include biological endpoints, are required. Behavioural interventions should also target those most at risk of HIV transmission and in the settings in which risk behaviour occurs.

Conclusion

Increasing sexual risk behaviour and HIV transmission among MSM is apparent, although risk reduction strategies such as serosorting and strategic positioning are being reported more often. However, their efficacy is questionable, particularly when knowledge of HIV status may be inaccurate. The risk for HIV transmission among MSM in LMIC, and the role of MSM in the HIV epidemics of these countries, is of special concern, particularly when HIV prevalence among African MSM is reportedly higher than among the adult male general population.

These findings should inform future HIV prevention efforts and evidence of effective behavioural interventions is growing. Nonetheless, behaviour change alone is unlikely to result in the sustained reductions in HIV transmission necessary to change the course of the HIV epidemic, and it has been argued that 'combination prevention', which incorporates biomedical and behavioural, as well as social and structural, interventions should be the way forward [2]. In terms of addressing transmission of HIV, this may be particularly appropriate for HIV-positive MSM [39]; to date, few exclusively behavioural interventions with HIV-positive MSM have been demonstrated to be effective [40]. In relation to the acquisition of HIV in MSM, one study has estimated that all that is required to offset the number of HIV infections potentially prevented by use of preexposure chemoprophylaxis is a small (4%) increase in the annual number of new sexual partners [41].

Biomedical interventions necessarily include behavioural components (information, education, community mobilization and adherence to regimens and/or recommended risk reduction), and this is particularly important if we are to counter possible disinhibition and risk compensation [42]. There remains an urgent need in an era of highly effective and successful antiretroviral treatment to identify successful HIV prevention interventions, to keep HIV-negative MSM negative, preventing acquisition, and to support and strengthen HIV-positive men's resolve not to pass on HIV infection, and in so doing halt transmission.

Acknowledgements

The UK Medical Research Council funds Dr L.M.McD. as part of the Sexual and Reproductive Health Programme (WBS U.1300.00.005) at the Social and Public Health Sciences Unit.

References and recommended reading

Papers of particular interest, published within the annual period of review, have been highlighted as:

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- •• of outstanding interest

Additional references related to this topic can also be found in the Current World Literature section in this issue (p. 352).

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