The HIV epidemic among men who have sex with men—behaviour beats science

Science & Society Series on Sex and Science

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The acquired immune deficiency syndrome (AIDS) pandemic that started more than 30 years ago remains one of the greatest public-health concerns worldwide: in 2009, it was estimated that 33.3 million individuals were infected with human immunodeficiency virus (HIV), with 2.6 million new infections globally (see graphic; [1]). Even in the affluent countries of North America, Australia, New Zealand and Western and Central Europe, the numbers of people infected with HIV have grown over the past two decades. Although the availability of efficient diagnostics and highly active antiretroviral therapy (HAART) have drastically improved life expectancy and quality of life—at least in those parts of the world where both are available and affordable—HAART does not cure the disease. Moreover, despite massive research efforts, there is no efficient vaccine on the market to protect against infection with HIV.

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Given the lack of either a vaccine or a cure, the main public-health intervention to halt the pandemic is to prevent viral transmission in the first place. In fact, the transmission of HIV is not as efficient as other, more resistant blood-borne viruses such as hepatitis B and hepatitis C viruses (HBV and HCV), and it requires

direct contact of blood or semen from an infected person with the blood system of the exposed person. This feature puts certain groups at greater risk of transmission: heterosexuals with many sexual partners, including sex workers, men who have sex with men (MSM—a technical term used by health professionals to avoid forcing individuals to define themselves in a specific sexuality), people who inject drugs, newborns of HIV-infected mothers, blood recipients and healthcare workers. Yet, the risk of infection differs for each of these groups. There is also a geographical dimension to the risk, as different parts of the world have unique epidemiological characteristics, reflecting biological, behavioural and socio-economic factors. In many parts of Africa and Asia, for example, the most susceptible groups are heterosexuals and sex workers; in Eastern Europe, people who inject drugs are mainly affected; and in western countries, the most vulnerable population are MSM, followed by heterosexual migrants from areas where HIV is endemic [2].

Public-health programmes intended to prevent the transmission of HIV therefore have to address these groups individually. Such measures require education and the involvement of at-risk populations, and recommendations must be based on a thorough understanding of the social, economic and other factors that determine disease risk among certain groups of people. For instance, one of the most efficient measures to decrease the risk of HIV infection among people who inject drugs is to offer clean syringes and needles, and safe places to use them. One of the

most efficient ways to prevent HIV transmission during sexual intercourse is the use of condoms. But, the answers are not always as simple; human behaviour is complex and even irrational at times. This paper outlines the main causes of the HIV epidemic among MSM in western countries, highlights specific behavioural factors that increase exposure to HIV and discusses how these can be addressed in public-health programmes.

AIDS was first identified and described in the USA in June 1981 [3]. Following reports from Los Angeles and New York City about clusters of otherwise healthy Caucasian MSM who developed Kaposi's sarcoma and fatal *Pneumocystis carinii* (*jirovecii*) pneumonia, the US Centers for Disease Control and Prevention (CDC) conducted an epidemiological investigation and identified a man they referred to as 'patient zero': a flight attendant working for Air Canada named Gaëtan Dugas, who had numerous male sexual partners in North America.

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Sex is the greatest invention of all time: not only has sexual reproduction facilitated the evolution of higher life forms, it has had a profound influence on human history, culture and society. This series explores our attempts to understand the influence of sex in the natural world, and the biological, medical and cultural aspects of sexual reproduction, gender and sexual pleasure.

GLOBAL PREVALENCE OF HIV/AIDS

Although global infection rates are falling, the number of people living with HIV has increased owing to significant reductions in mortality rates (due to the scale-up of antiretroviral therapy).

NORTH AMERICA

Most common pattern of HIV transmission
Men who have sex with men; to a lesser extent drug use and unprotected paid sex. Men outnumber women living with HIV.

CENTRAL & SOUTH AMERICA

Most common pattern of HIV transmission
Men who have sex with men are most at risk. The rates of infection are higher than those observed among men who have sex with men in Europe and North America. 0.5% prevalence in adults

CENTRAL & WESTERN EUROPE

Most common pattern of HIV transmission
Men who have sex with men; to a lesser extent drug use and unprotected paid sex. Men outnumber women living with HIV.

EASTERN EUROPE & CENTRAL ASIA

Most common pattern of HIV transmission
Drug users, sex workers and their sexual partners (there is an interplay between sex work and injecting drug use that is accelerating the spread of HIV in the region). Men who have sex with men only account for a very small percentage.

NORTH AFRICA & THE MIDDLE EAST

Most common pattern of HIV transmission
Reliable data are in short supply making it difficult to track recent trends. 0.2% prevalence in adults

ASIA (SOUTH & EAST)

Most common pattern of HIV transmission
Paid sex and drug use. Men who have sex with men in some countries. No country in the region has a generalized epidemic. Between 0.1 and 0.3% prevalence in adults

SUB-SAHARAN AFRICA

Most common pattern of HIV transmission
Unprotected heterosexual intercourse (including paid sex) with multiple partners and onward transmission of HIV to newborns and breastfed babies. About 40% of all adult women with HIV live in southern Africa. 5.0% prevalence in adults

New infections

AIDS-related death

M Million

Data sourced from the UNAIDS Report On The Global AIDS Epidemic, 2010 [1]; statistics derived from Fig 2.2; transmission patterns from country-specific sections of the report.

Dugas might not have been the first person who was infected with HIV, but the first one who was identified with the disease.

It was a combination of a general liberal attitude towards sex that was prevalent among MSM, unprotected anal sex and having multiple sexual partners that allowed HIV to spread quickly among the gay community in the early 1980s. Owing to the overwhelming impact on MSM in the early years of the AIDS epidemic—when many MSM saw close friends, partners and lovers die—gay communities adopted a range of practices to reduce the risk of infection successfully by changing sexual behaviours. Regrettably, these achievements did not last; many other developed countries also recorded a resurgence in the number of MSM newly diagnosed with HIV/AIDS since the mid-1990s [4]. The main reason for the re-emergence of the disease was the come-back of risky sexual behaviours, triggered by wider social and cultural changes, greater social acceptance for gay men and, somehow unpredictably, the introduction of more efficient drugs [5].

The most important risk factor for exposure to HIV among MSM remains sexual practices. As the rectal mucosa is more fragile than the vaginal or oral, anal sex increases the risk for transmitting HIV and other sexually transmitted infections (STIs). The frequency of risky sexual practices between MSM seems to be increasing [6], which would go some way to explaining the resurgence of AIDS.

Another main factor for the resurgence of AIDS among the gay communities in western countries is, ironically, the efficiency of HAART

In addition, gay communities have a relatively liberal attitude towards sex and partnership. The way they form partnerships may differ from many heterosexuals: the sexual contact is more instantaneous and spontaneous, and sexual intercourse may take place early in a relationship [7]. Relationships between some MSM may be more flexible, and concurrent sex with casual partners during a relationship is generally more tolerable [8,9]. Concomitancy and age-mixing of sexual partners has a

strong influence on the dynamic of HIV transmission if an infected man is unaware of his infection owing to the asymptomatic nature during the first years of HIV infection, or because he has not been tested for HIV [10]. Early sexual debut is another reason for greater exposure to HIV, as MSM would have more partners during their lifetime.

...the success of HAART and decades of public-health recommendations to practice safe sex might have led to 'AIDS fatigue'

Social changes have also played a role in increasing the HIV transmission rate among MSM. Since the 1990s, homosexuality and gay lifestyle have become much more accepted in many western societies. This increasing tolerance and acceptance has enabled many MSM 'to get out of the closet', that is to disclose their sexual orientation and have fulfilling lives. It has also encouraged entrepreneurs to tap into this customer base by offering services and establishments specifically for MSM including cafés, bars, clubs, restaurants, hotels and bath houses, all specifically intended for the purpose of meeting other men. This sexually liberal climate, along with the venues to meet other gay men, has amplified the risk of having sex with an HIV-infected partner.

Similarly, the rise of internet-dating sites has increased the ease with which new partners can be found. New sexual practices and behavioural norms are quickly diffused between cultures, with possible international importing of HIV and other STIs. The internet, which is affordable, immediate and discrete, has become the most popular way of searching for other MSM. Most gay-related internet sites are free and guarantee anonymity until participants find the preferred fit and disclose their personal details or picture. The discrete nature of the web also allows MSM who are still 'in the closet' or 'on the down low' to search for sexual partners. This electronic meeting place might modify the sexual risk, as it exposes users to a diverse pool of men and increases their ability to search and negotiate for sexual practices [11]. The anonymity also allows MSM to search explicitly for unprotected anal sex [12]. MSM who

originate from low-resource countries and migrate to developed countries might not be familiar with the risk of unprotected sex and may also be excited about the sizeable and versatile MSM community in the host-country [12]. A combination of insufficient knowledge about HIV/AIDS, coupled with their interest in experiencing gay life, may increase the risk for those migrants to become infected with HIV.

Corresponding with the increased number of sexual partners and the greater risk during sexual intercourse, MSM are also exposed to other STIs, especially if they are already infected with HIV. Increasing incidence of syphilis, as well as outbreaks of primary and secondary syphilis among MSM, has been reported during the past decade from developed countries [13,14]. Primary syphilis might manifest in a 'chancre'—a sore—which is a possible port of entry for HIV. Additionally, the immunological reaction to STIs includes the migration of macrophages and lymphocytes to the affected organs. These cells are also the target of HIV, and thus one STI increases the chances of infection with further STIs or HIV. Over the past years, several outbreaks of lymphogranuloma venereum (an uncommon STI), presenting proctitis (inflammation of the rectum), and genital ulcers with inguinal adenopathy (inflammation of the lymph nodes in the groin) have been reported [15]. The asymptomatic nature of some STIs, along with the limited success of the risk-reduction strategies practiced by MSM, might explain the increased incidence of STIs among gay men [16,17]. Among HIV-infected individuals, genital infections with common STI pathogens have been associated with increased HIV viral load in semen, thus negating the benefit of HAART [18].

Another important factor for the resurgence of AIDS among the gay communities in western countries is, ironically, the efficiency of HAART, which has converted AIDS from a death sentence into a manageable chronic medical condition. As the perceived threat of HIV/AIDS diminishes and direct experience with death disappears, some MSM may be more inclined to take higher risks. Before the introduction of HAART in the mid-1990s, most MSM had direct experience of the devastating effects of HIV/AIDS on friends and loved ones. It is important to note that HAART reduces the viral load in HIV-infected

persons to undetectable levels in the blood and thereby decreases the risk of infecting partners. However, studies have documented the persistence of HIV virions and infected cells in semen of HIV-infected MSM treated with HAART [19]. Most physicians, therefore, do not recommend unprotected sex for HAART-treated HIV/AIDS patients, although the risk of HIV transmission has been significantly reduced.

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As such, HAART has profoundly changed the impact of HIV/AIDS: people who live with HIV/AIDS who adhere to their drug regimen are usually asymptomatic and seem healthy. The non-fatal prognosis for AIDS, the large communities of HIV-infected MSM who live apparently healthy lives and the greater social acceptability of the disease have together reduced the perceived threat of HIV/AIDS.

The success of HAART has affected sexual behaviour, a phenomenon called 'AIDS optimism'. First, as HIV-infected MSM feel healthy and their sex-drive is preserved, they have a normal sex life and seek sexual partners, similarly to HIV-negative MSM. Second, before HAART and during its introduction in the 1990s, people living with HIV/AIDS could be recognized either by their cachectic posture or by the lipodystrophic features of their cheekbones and limbs due to loss of subdermal fat—a side-effect of the first generation of protease inhibitors. HIV-negative MSM could therefore decline sexual contact or insist on safer sex practices. However, modern HAART has diminished side-effects and HIV-infected men are usually unrecognizable. MSM may wrongly consider their sexual partners to be HIV-negative and might have unprotected sex. Third, some MSM may be aware of the availability of post-exposure prophylaxis as an additional use of ART, and might have unprotected sex then request the treatment, which is available up to 72 hours after sex [20]. These men may not be aware that post-exposure treatment has not been proven to be efficient in humans in randomized clinical trials. Finally, young

MSM, who have not witnessed the devastation of AIDS, may no longer feel threatened by the disease and might engage in unprotected sex. The advanced manageability of HIV, as portrayed in the media and advertisements sponsored by the pharmaceutical industry, may further disinhibit their sexual behaviour.

Moreover, the success of HAART and decades of public-health recommendations to practice safe sex may have led to 'AIDS fatigue'. Some MSM may become desensitized to safe-sex messages and might develop a negative emotional response to HIV issues. As the number of newly diagnosed HIV-positive MSM is increasing, some will also remain unaware of their infection and may ignore safe-sex practices. Thus, the chances that an HIV-negative MSM finds himself engaged in sexual contact with an HIV-infected partner are higher than 15 years ago. Some public-health professionals argue that the uptake of HIV tests among MSM has more to do with the increased acceptance of their lifestyle than an increasing infection rate; thus the high HIV rates recorded are no more than epidemiological fallacy. However, even if this assumption is true, it neither explains the rapid dynamic of HIV transmission among MSM communities, nor the increased syphilis infection rates. Additionally, ART-resistant strains of HIV have emerged, which complicates treatment and prolongs the transmission period. The prevalence of primary or transmitted drug-resistant HIV strains in North America and Western Europe is as high as 26% [21].

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Drug abuse is another relevant risk factor. Even if the percentage of intravenous drug users among MSM may not differ compared with the percentage among heterosexuals, it creates a twofold risk of acquiring HIV: by blood-to-blood transmission when sharing needles and syringes, and by semen-to-blood exposure when having sex. Some males who inject drugs may also engage in sex with other males, although they are heterosexuals, to finance their addiction.

MSM are generally aware of their risk of acquiring HIV and of the importance of condom use. Yet, they have developed alternative strategies to prevent possible HIV exposure that involve evaluating their partners and the environment in which they meet more carefully, and then taking calculated risks [22]. One such strategy used is called 'negotiated safety', in which both men disclose to each other their HIV status before they have sexual intercourse and may decide to perform unprotected anal sex if they are both negative. The efficacy of this strategy depends on the time at which they were tested, their honesty and being safe if performing sex outside the primary sexual relationship. The second strategy is 'sero-sorting', when MSM restrict unprotected anal intercourse only to partners they believe to be concordant [23]. MSM negotiate and try to identify signs that might indicate that a partner could be HIV-positive, such as special physical features—being cachectic or lipodystrophic—the venue and context in which they meet, and when visiting the home of a partner, taking a quick look in their drawers or in the bathroom closet to search for HAART tablets ('sero-guessing'). Another strategy is called 'strategic positioning', which is the use of sero-status to determine sexual roles in which MSM may perform only oral sex or take the active role in anal sex. However, these risk reduction strategies, widely used by MSM, offer only limited protection from HIV [24].

The recommended use of condoms during anal sex can fall by the wayside after recreational drug use. Drugs such as alcohol and methamphetamine, which are commonly used at clubs, discos and other venues, lower social barriers and increase sociability. MSM using such drugs are therefore more inclined to have sex with an unknown partner and might not use a condom, as their judgment is impaired. This risky combination of drug use during sexual contact is called 'party and play' on internet sites for MSM who are searching for a partner [25].

The result is that in the post-HAART era, MSM still remain the group most at risk of acquiring HIV, with substantial evidence for continuing HIV transmission. It has been estimated that more than 40% of HIV-positive young MSM are involved in risky sexual behaviour, despite their awareness of their infection [26,27]. Behavioural, emotional, psychological, environmental and epidemiological factors

all act synergistically to increase risk-taking when it comes to sexual practices, thus exacerbating HIV incidence in MSM. These factors might be even more dominant among HIV-positive MSM, driving them to perform unprotected anal sex. They face specific psychosocial factors such as the need to be loved and cared for, a different meaning of sex as an emotional connection and a decreased desire for intimacy after their diagnosis, owing to mixed feelings of shame and guilt [24].

By contrast, HIV-infected MSM who receive HAART and achieve undetectable viral load in their blood usually reduce the risk of transmitting the virus to their sexual contacts, and probably engage less in risky sexual behaviour than those who are not on ART [28]. One explanation is that they frequent HIV clinics more often and are therefore more aware of the need to use condoms, and receive positive self-care advice. Some studies have shown that many HIV-positive men are also engaged in both sero-sorting and strategic positioning, probably to avoid HIV transmission to members of their social and sexual networks [29].

...it crucially requires the involvement and engagement of the gay community themselves to maintain effective and acceptable interventions

Some HIV-infected MSM therefore prefer to contact sero-concordant HIV-positive partners to experience unprotected anal intercourse, free from the worry of infecting a negative partner, or the embarrassment of having to disclose their HIV status to a negative partner, exposing themselves to the stigma attached to HIV. These perceived benefits seem to outweigh the perceived risks of contracting another strain of HIV, potentially drug-resistant, or STIs.

Lacking an efficient vaccine or cure for AIDS, public-health measures to reduce the prevalence of HIV among MSM should focus on the behavioural and psychosocial factors that increase the risk of infection. Effectively, this means educational and outreach campaigns to address risky sexual behaviour and to promote the use of condoms and other protective strategies. These interventions should involve all relevant parties: non-governmental and

governmental organizations, health providers, public-health experts and gay-related agencies. The message about the continuing risks and dangers of HIV/AIDS should go through multiple routes to address as many men as possible through the internet, media, clubs, bars and public spaces, to reinforce consistent condom use and other risk-reduction strategies, and to promote early diagnosis and treatment.

Such campaigns should address both HIV-negative and HIV-positive men, but with a different focus on the needs of each. HIV-negative MSM should be informed about the possible routes of HIV transmission, the importance of using condoms, improving negotiation skills and other risk-reduction strategies to protect themselves and their partners. Innovative interventions could also attempt to associate the strong motivation of MSM for masculinity with the use of condoms. Additionally, frequent HIV testing in MSM-friendly clinics and community settings should be encouraged to detect new infections as early as possible. HIV-infected MSM should be instructed with safe-sex recommendations and prescribed HAART to reduce seminal viral load. Intervention in this group should address the unique psychological, social and medical status of each patient. As pointed out above, it crucially requires the involvement and engagement of the gay community themselves to maintain effective and acceptable interventions.

Health educators must also respect the needs, wishes and behaviour of MSM when addressing them about the risk of HIV/AIDS, and making recommendations about safe-sex practices. Although condoms are indeed efficient at preventing HIV transmission, they might nonetheless be the 'incorrect' instrument in the 'wrong' place for many people. Condom use breaks the intimacy and spontaneity of sex and reduces the pleasure. Although we hope that we can convince a young, HIV-positive MSM to use condoms, this might not be a realistic goal. As such, addressing the risks requires a sensitive, 'down-to-earth' approach that respects gay culture and the dynamic of finding partners, as well as training physicians to provide counselling for MSM in a friendly and confident way.

Reducing the use of illicit drugs in both HIV-infected and uninfected MSM is another priority, although in some cases drugs are used to cope with the stress

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related to living with HIV. Appropriate interventions for HIV-infected MSM must therefore include stress-reduction techniques, psychological services and counselling about the negative effects of substance use. Another public-health priority is to promote the disclosure of HIV status as part of the ethics related to using gay-dating sites. As the perceived threat of HIV has diminished owing to the success of ART and the non-fatal medical prognosis of HIV/AIDS, noticeable messages should be more positive and reflect contemporary gay life, using gay-related and non-gay-related venues frequented by MSM, such as gyms, airports, shops or tourist resorts.

In conclusion, HIV prevalence among MSM remains high and, given the increase in survival of HIV-infected individuals and the high rate of new infections, this hyper-endemic state is likely to be sustained in developed countries [14]. To address the problem and slow or halt the pandemic requires focused, evidence-based measures that respect biological, emotional and social aspects in a holistic approach [24], taking into account psychological stressors, drug habits, discrimination and the quest for intimacy. It is also important to increase the sensitivity of health providers towards the special needs of MSM, to conduct open and non-judgemental discussions with their patients. A supportive medical environment can encourage MSM to adhere to periodical HIV testing, HBV and hepatitis A virus immunizations and, possibly, to comply with condom use [19]. Finally, due to the similarities in MSM behaviours in industrialized countries, a closer collaboration is required between researchers from countries that have large MSM communities. We are entering the fourth decade of the AIDS epidemic, and despite awareness among MSM of their greater vulnerability to HIV and the introduction of new medical interventions, the rate of new infections continues to rise disproportionately. It is time for new interventions.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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