Effective strategies for HIV prevention in gay men: The next decade

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New Zealand AIDS Foundation

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Science: What is driving HIV spread between gay men?

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Global prevalence of HIV in MSM compared with adult prevalence, UNAIDS 2010

Elevated risk for HIV infection among MSM in low and middle-income countries 2000–2006

MSM have a 140 times higher risk for newly diagnosed HIV and syphilis compared with MSW in New York, 2008

HIV risk for different male-to-male sexual activities relative to receptive anal sex without condoms

High HIV transmission risk through anal intercourse

HIV transmission risk through unprotected receptive anal sex is 18 times higher than during unprotected receptive vaginal sex in developed countries in this major review. The absolute per act transmission risk for unprotected receptive anal intercourse (URAI) is 1.4% (95% CI, 0.2 to 2.5). The same per act transmission risk for URAI (1.43%; 95% CI, 0.48 to 2.85) was recently reported from the Australian HIV cohort study. The absolute per act transmission risk for unprotected receptive vaginal intercourse in developed countries is 0.38% (95% CI, 0.26 to 0.54) in the review.

Note - the per partner transmission risk for unprotected receptive anal intercourse is 40.4% (95% CI, 6.0 to 74.9).


An individual-based computer simulation model for HIV infection in urban MSM in USA and Peru

The greatest reductions were associated with the scenarios that entailed reducing transmission probabilities to those of vaginal intercourse, in all settings, this quickly reduced incidence by greater than 80%, and in some by as much as 96%. This emphasises that biological factors specific to anal sex have a fundamental effect in driving HIV epidemics in MSM worldwide.

Role of acute HIV infection in the sexual transmission of HIV

- People with acute HIV infection often exhibit markedly elevated viral loads, often exceeding one million copies/ml.
- The heightened viral load in infected blood during acute HIV is a risk for heterosexual transmission. In men, the peak viral load is estimated to occur at 17 days in plasma and at 30 days in semen.
- The high concentration of virus during acute HIV infection leads to increased infectivity, possibly as much as 26 times greater than during chronic infection.
- Other biological factors, including concomitant sexually transmitted infections, also contribute to enhanced viral transmissibility.

Proportion of HIV transmission due to acute infectivity

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Enhanced surveillance of infectious syphilis in New Zealand sexual health clinics

“Following a rise in cases of infectious syphilis in New Zealand, enhanced surveillance of sexual health clinics was initiated. All public sexual health clinics reported monthly on the number of cases seen, and completed a coded questionnaire on each case.

- In 2011-2013 years of infectious syphilis were reported. The majority (89%) were among men who have sex with men, who were from overseas. New Zealand and had an ethnic profile similar to that of New Zealanders.

- "Chased." 18% of men who have sex with men were HIV positive. Recommended syphilis in these isolated disproportionately affects men who have sex with men, and infection with HIV is a problem. Men who have sex with men should be aware of the risks and symptoms of syphilis and undergo regular sexual health checks including serology testing. Control of syphilis should be included in the strategy to check HIV spread.

Lymphogranuloma venereum in MSM: Evidence of local transmission in New Zealand

- "The diagnosis of LGV was made in four MSM in Auckland over a 3-month period in 2013 and more recently in one MSM in Wellington. All cases presented with signs and symptoms consistent with rectal LGV, including dysuria, rectal discharge, and pain. Four of the cases did not have a history of recent overseas travel, and were likely to have acquired infection locally.

- The majority of cases in these outbreaks were MSM co-infected with HIV. With high anal sexual activity and a high rate of concurrent sexually transmitted infections. All cases of LGV were reported high anal sexual activity and co-infected with HIV. The majority of cases were HIV co-infected with LGV, and concurrent sexually transmitted infections were noted, with cases 1, 2, 4, 5 and 6 in infection with C. gonorrhea and cases 1, 2 and 3 co-infected with HIV.

Investigation of an HIV transmission cluster in MSM centred in South Wales, United Kingdom

- In February 2007 a MSM, diagnosed HIV positive at Cardiff Royal Infirmary, reported 82 sexual contacts in the previous 3 months. Of the 82 cases contacted, 12 were HIV positive.

- Of the 123 individuals in the sexual network of these men who had sex with men (MSM) and heterosexual female partners, 113 individuals (91.7%) were male, and 10 (8.3%) were female. Of the 113 male contacts, 106 (93.5%) were MSM, and 7 (6.5%) were female heterosexual women. Fifteen new cases of HIV were diagnosed, all were men.

- The sexual network was distributed in South and West Wales extending into England, with high rates of unprotected and unprotected, previous HIV tests and concurrent sexually transmitted infections.

- Partner notification revealed a relatively young, well-educated HIV network with high risk behaviour and ongoing transmission. Despite previous knowledge and awareness of HIV, this analysis added to the evidence supporting HIV partner notification in MSM.

The increase in global HIV epidemics in MSM

- Evidence of HIV in men who have sex with men (MSM) continues to expand in most low, middle, and upper income countries in 2013 and rates of new infection have been consistently high among young MSM.

- "High per act transmission probability of receptive and insertive, naso oropharyngeal, and rectal) transmission among MSM, network level affects, and social and structural determinants play central roles in disproportionate disease burdens. HIV can be transmitted through larger MSM networks at great speed. Molecular epidemiology data show marked clustering of HIV in MSM networks, and high proportions of infections due to transmission from recent infections."

- "Addressing the expanding epidemics of HIV in MSM will require continued expansion of network level prevention, including enhanced partner notification, of vaccinations, political will, policy change, structural reform, community engagement, and preventive planning and programming, but it can and must be done."

Protective effect of condoms for HIV and STI prevention

<table>
<thead>
<tr>
<th>Sexually Transmitted Infection</th>
<th>Protective effect of condoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV</td>
<td>High (unless pharyngeal)</td>
</tr>
<tr>
<td>Gonorrhoea</td>
<td>High</td>
</tr>
<tr>
<td>Chlamydia</td>
<td>High</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>High</td>
</tr>
<tr>
<td>Syphilis</td>
<td>High (if lesions covered by condom)</td>
</tr>
<tr>
<td>Epididymis</td>
<td>High (unprotected transmitted)</td>
</tr>
<tr>
<td>Chancroid</td>
<td>Probably high</td>
</tr>
<tr>
<td>Lymphogranuloma venereum</td>
<td>Probably high</td>
</tr>
<tr>
<td>Mycoplasma genitalium</td>
<td>Probably high</td>
</tr>
<tr>
<td>Trichomonasias</td>
<td>Probably high</td>
</tr>
<tr>
<td>Herpes</td>
<td>Moderate (depends on lesion site)</td>
</tr>
<tr>
<td>Warts</td>
<td>Moderate</td>
</tr>
<tr>
<td>Herpes C</td>
<td>Unknown</td>
</tr>
<tr>
<td>Donovanasia</td>
<td>Very low (transmission is faecal-oral)</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>Low</td>
</tr>
</tbody>
</table>

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It is extremely important to recognize that everyone who transmits HIV or STIs increases the future infection risk for other gay and bisexual men. Over time, one single episode of unprotected anal sex can be the direct cause of a large network of new infections.

The corollary also applies. A significant reduction in HIV and STI transmission will spark a self-propagating decrease in spread over time because there will be less people who can pass these infections on to others.

**Strategy: What will work best to control HIV spread?**

"Strategy... starts with an existing state of affairs and only gains meaning by an awareness of how far better or worse it could be different. This view is quite different from those that assume strategy must be about reaching some prior objective."

"This is why as a practical matter strategy is best understood modestly, as moving to the next stage rather than to a definitive and permanent conclusion. The next stage is a place that can be realistically reached from the current stage."

Prof Lawrence Freedman, Kings College, London.

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**Ongoing HIV-1 transmission among men who have sex in Amsterdam: A 25 year prospective cohort study**

- "Of 1642 HIV-negative individuals, 177 (10.9%) seroconverted during follow-up. HIV-1 incidence rates strongly decreased from 8.1/100 person-years in 1992 to 1.5/100 person-years in 1995. The relatively stable rates of 1.5-2.0/100 person-years between 1995 and 1996, and slowly increased to 2.8-10/100 person-years in 2005 [full 14 linear trend 1996-2009]."

- "Reports of unprotected anal intercourse (UAI) increased significantly from 1992 onwards. HIV-1 transmission was associated with partners, casual partners, more than five sexual partners, a history of gonorrhea (all in the preceding 6 months), and a lower educational level."

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**A resurgent HIV-1 epidemic among MSM in the era of potent antiretroviral therapy in the Netherlands**

- "The joint effect of HAART and risk behaviour on HIV incidence has been previously studied using mathematical models and empirical data. Although based on different assumptions, all these studies come to the same conclusion regarding the potential for an increase in risk behaviour to offset the benefits of HAART in reducing transmission."

- "Since 1996, when HAART became widely used in the Netherlands, the risk behaviour rate has increased by 66% in MSM."

- "In conclusion, there is an increase in HIV transmission among MSM in the Netherlands, in spite of earlier diagnosis and subsequent effective treatment. The most effective intervention is to bring risk behaviour back to pre-HAART levels."
Maximising the effectiveness of HIV prevention for MSM

“Basic prevention tools are still and will always be the first step and most effective if used. For sexually active gay and bisexual men who are HIV-negative, that means getting tested for HIV and sexually transmitted infections at least once a year and using condoms correctly and consistently.

“For sexually active gay and bisexual men who are living with HIV, that means using condoms correctly and consistently and being on effective antiretroviral therapy to stay healthy and reduce the risk of spreading HIV to partners.”

“We must reach all people at risk ... with these proven HIV education, testing, and prevention strategies. Today, many young MSM don’t realise HIV remains common, serious, and deadly. They may underestimate their personal risk or minimize the difficulty of managing a lifelong chronic disease.”

Dr. Jonathan Mermin, Director, National Centre For HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, Centres for Disease Control and Prevention.

Are HIV prevention campaigns being delivered at the level required to ensure impact?

"They are not sufficient. Every five years comes a new generation and they need to hear the prevention messages with as much passion as previous generations. How can we expect people to change such a powerful behavior – sex – without a societal commitment to change?"

"Does anyone on the planet not know what Coca Cola is? Yet they market their product with million-dollar campaigns each year for just a few points of market share, while we do virtually nothing to market prevention."

Dr Donna Futterman, Director of the Adolescent AIDS Programme, Children’s Hospital at Montefiori, the Bronx, New York.

Canadian consensus statement on HIV and its transmission in the context of criminal law, May/June 2014

- "Condoms are a cornerstone of HIV prevention. Latex and polyurethane condoms act as an impermeable physical barrier through which HIV cannot pass. When used correctly and no breakage occurs, condoms are 100% effective in stopping the transmission of HIV because they prevent the contact between HIV-containing bodily fluid and the target cells of an HIV-negative individual."

- "Studies at a population level have also shown that even when factoring in possible instances of incorrect use or breakage, the consistent use of condoms dramatically reduces the possibility of HIV transmission."

- "Where a condom is used, anal–penile intercourse poses a negligible possibility of transmitting HIV regardless of the HIV-positive individual being on effective antiretroviral therapy."

Effective Simple Verifiable Safe Manageable Sustainable Inexpensive Marketable Empowering Acceptable

Ten reasons to promote universal condom use by gay men for anal sex

Primary prevention of HIV infection is as important as treatment

"Have we come to depend so much on the panacea of the antimicrobial that we have forgotten the lessons of Semmelweis, Pasteur and Lister? Prevention of infection must be as important as treatment, and this will require effort on a global scale."

"It may yet be the simplest preventive measures that have the greatest effect for the least cost."

Dr Susan Maddocks, Deputy Editor, "Antimicrobial resistance: Global problems need global solutions" Medical Journal of Australia, 13 March 2013

Forgetting our HIV history is a critical mistake

"At entry, June 1984 through January 1985, the seropositivity rate for human immunodeficiency virus (HIV) infection among homosexual/bisexual study participants was 48.5%. No heterosexual participants were HIV seropositive."

"Among homosexual/bisexual men reporting no male sexual partners in the two years before entry to the study, seropositivity was 17.6%. For those reporting more than 50 partners, seropositivity was 78.5%. Only receptive anal/rectal contact had a significantly elevated risk of HIV infection."

Winkelstein, W. et al. JAMA 1987; 257: 321-325. Note: The study population was aged 25-54 years.

Sexual practices and risk of infection by HIV, San Francisco Men's Health Study, 1984-1985
Annual incidence of HIV infection among 320 Hepatitis B vaccine trial participants, San Francisco, 1978-1988

0.3 3.8 10.1 16.6 7.4 3.3 0.7 1.5 2.6

Many places are not retaining nearly enough freeboard in HIV prevention for gay men

Could concentrated HIV epidemics make AIDS unbeatable?

"I'm really concerned about the future of the AIDS epidemic, especially if things go as well as we have hoped because of the huge progress we are making from a technological and scientific perspective."

"As we celebrate the extraordinary progress, we should also be conscious that we will not stop HIV and AIDS by just having more and more drugs. We need to think about the global epidemic and not focusing enough on the complexities of the concentrated epidemics."

The virus will return to being a disease that affects certain groups, and the political will to overcome it may fade. From the AIDS epidemic will become more and more a sum of these concentrated epidemics.

"In MSM populations, there is no sign that the HIV epidemic has decreased. It has either been a stable number of new infections every year for 15 years, or is an increasing trend. And this, in western Europe at least, is in the context of relatively free and easy access to therapy and services."

"We are a bit in disarray. We don't know quite what it is that we should do. Here we are, we have all the technology, we have extraordinary scientific progress, and we just cannot translate that into making a difference in these populations."

"If we do not deliver the right response, we will fail to deliver an end to AIDS."


Actual HIV prevalence in a community sample of MSM in Auckland, New Zealand

6%
94%

"There's nothing you should crowdfund more than an epidemic. It has [an] urgency where we need every person working on it."

In New Zealand our HIV prevention programme is evolving year by year and building on what has gone before. Our strategy is to use all of the prevention tools at our disposal to the maximum extent possible, in the particular circumstances that apply in this country, without allowing them to undermine each other.

Our primary prevention programme for sexually active gay and bisexual men is universal condom use for anal sex. That is not negotiable because HIV and STI rates in gay men will be many times higher if condom use is not maintained.

Universal condom use for anal sex is still by far the most effective population level strategy that we have to ensure that sexually active HIV negative gay and bisexual men remain negative.

Key strategic insights for effective HIV prevention in gay men

1. Accepting that sexually active gay men are the population group at highest risk from HIV and STIs.
2. Understanding that almost all HIV transmission between gay men occurs through unprotected anal sex.
3. Recognising that the primary “outcome target” for HIV prevention is the goal of keeping HIV negative gay men from becoming infected in the first place.
4. Understanding that “primary prevention” – prevention for negatives – must therefore be prioritised at the highest possible level.
5. Recognising that condom use is not just a matter of individual choice but a critical issue of collective responsibility for the health of all other sexually active gay men.

Conclusion: A comprehensive HIV prevention strategy for gay and bisexual men

1. Promote universal condom use for anal sex to prevent HIV and STI spread in the MSM population.
2. Encourage frequent testing and ongoing linkage to care for HIV and STIs in the MSM population.
3. Facilitate immediate HIV and STI treatment in the MSM population.
4. Implement across the board vaccination for STIs in the MSM population.
5. Support specialist provision of PrEP for high risk HIV negative MSM where clinically indicated.

Comprehensive HIV prevention for gay and bisexual men: The next decade

- Universal condom use for anal sex
- Test and treat for HIV
- Set and treat for STIs
- Primary HIV prevention
- Secondary HIV prevention
- Tertiary HIV prevention
- Vaccination to prevent STIs

Specialist provision of PrEP for high risk HIV negative MSM where clinically indicated.

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Syphilis among MSM by HIV serostatus in San Francisco, 2003-2012

Rectal gonorrhea cases in MSM by HIV serostatus in San Francisco, 2003-2012

Rectal gonorrhoea cases in males in San Francisco, 1974-1995

Pre-exposure prophylaxis (PrEP) stops 86% of HIV infections in PROUD study

Forty five percent of PrEP users at a San Francisco clinic report using condoms less often
Projected burden of HIV disease among MSM:
HIV incidence rate of 1.9%
**Unfolding chronology of a harm**

“Any intervention after the fact we term reactive. And virtually anything before it is broadly labelled preventive. This is a somewhat artificial distinction intended to make the impact of choices visible within the preventive category. Not only can we choose which pre-cursor if X is to focus upon; we can also choose to intervene at many different moments in the unfolding chronology.”

**What is the ‘gold standard’ in public health?**

“Does it work is always a question context - the clinical medicine paradigm – assumes that one strength or weakness is to answer definitively, ‘Does it work?’ But for the kinds of complex programs public health must review, there is generally no absolute answer to the question on its component questions. How does it work? Often the answer much depends on how and in what situation ‘it’ is done.”

“HIV is a high-impact, high-cost public health issue. In any unfolding chronology there may be wish, we need to use methodologies. Ultimately, some of the ‘best available standard’ comes from programs already operating successfully on scale. For public health programs, there is no absolute methodological hierarchy. We need to respect and use all legitimate methodologies.”

Dr James D. Shelton, Editor in Chief, Global Health: Science and Practice.

**Primary prevention is essential to control HIV and STI transmission in the MSM population**

“At present, the priority given to prevention at national and local levels is worryingly inadequate. This is demonstrated by the disparity in spending between HIV treatment and prevention. £2.3bn will be spent on national prevention programmes in 2011/12. This spending has been static since 2009/10, and is less than half a percent of the £762m spent on treatment and care in England that year.”

“This failure to invest persists, despite evidence that savings that prevention work could yield. The Health Protection Agency indicated that each infection could yield. The Health Protection Agency indicated that each infection avoided would cost £2.9m.”


**Drug-resistant HIV pandemic is a ‘real possibility’**

“A new HIV pandemic is a ‘real possibility’, one of the world’s leading virologists has warned. A rise of drug-resistant forms of the virus in countries where drugs have been used for decades, has caused a new wave of drug-resistant forms to emerge. The warning comes as new drugs are developed to combat the virus.”

“Professor Jeremy Farrar said that the emergence of drug-resistant HIV threatens to have a huge impact on the world. The new drugs have made vast improvements to the life expectancy of patients since the 1990s, but not effective. While hailed as ‘the miracle drugs’, since they were introduced in the 1980s, no one expected the virus to become resistant.”

“While holding the ‘miracle’ drugs made since the 1980s in treating HIV, Professor Farrar said that resistance to first resort drugs, and also to some second and third resort drugs that had already occurred, and that drug options for the virus were not limitless.”

**Stopping HIV with an artificial protein**

“HIV: Tied down by its own receptor...Expressed eCD4lg provides durable protection from multiple SHIV challenges.”

Professor Nahid Farzan, Associate Professor of Medicine, University of California, San Francisco. Nature 37(05 March 2015).

[The benefits and challenges of using viral transmission inhibitors (VTIs) to control HIV have been discussed in various contexts. These VTIs work by blocking the entry of HIV into cells, thereby preventing the virus from reproducing. One such VTI, expressed eCD4lg, has been shown to provide durable protection from multiple SHIV challenges, demonstrating its potential as a promising strategy in the fight against HIV.]