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*HIV and risk behaviour***Risk compensation: the Achilles' heel of innovations in HIV prevention?**

Michael M Cassell, Daniel T Halperin, James D Shelton, David Stanton

The benefits of new methods of prevention of HIV could be jeopardised if they are not accompanied by efforts to change risky behaviour

The recent finding that circumcision of men substantially reduces the risk of HIV infection is one of the most exciting developments in the history of HIV prevention.^{1 w1 w2} Nevertheless, this finding has quickly been clouded by concerns that risk compensation—increases in risky behaviour sparked by decreases in perceived risk—could undermine circumcision's protective benefits. Similar concerns might also be raised with regard to other promising innovations for HIV prevention. Microbicides, pre-exposure antiretroviral prophylaxis, and vaccines all have the potential to help combat the global spread of HIV but may also inhibit the uptake of safer behaviours by reducing people's perceptions of their risk of infection.

Potential innovations in HIV prevention

New approaches to combat the pandemic are particularly welcome in light of United Nations' estimates that almost five million people become infected with HIV, and more than three million people die of AIDS, each year.^{w3} Innovations in antiretroviral drug treatment have invigorated international efforts to curb the annual burden of AIDS deaths, but preventing new infections remains the key to breaking the back of the epidemic and curtailing the expanding need for treatment.^{w3 w4}

Several innovations show promise for reducing the efficiency of HIV transmission (table).^{w5} However, for any of these approaches to reduce the rate of new infections, they must reach sufficient numbers of people who are likely to transmit or acquire infection, and their protective benefits must not be offset by increased riskier behaviour in the targeted community.^{6 7} Of particular concern is the possibility that the introduction of new methods of prevention could reduce perceptions of risk among a broader set of people who are not directly benefiting from these innovations. Some analysts have argued that an over-reliance on technological approaches to HIV infection may dampen people's perceptions of risk and make it more difficult to get them to adopt fundamental preventive behaviours.⁸⁻¹¹

Perils of risk compensation

Risk compensation has complicated the introduction of other preventive innovations. Although studies show that seatbelts help protect people in a collision, the evidence is less compelling that the diffusion of seatbelts as a public health measure has contributed to overall reductions in deaths from motor vehicle crashes in some settings.¹¹ This may be because people presume that wearing a seatbelt will protect them from their risky driving.¹¹ Similarly, studies have found an association between use of sunscreen and increased risk of melanoma, related to compensatory increases in exposure to the sun.¹²

These and other examples have led researchers to suggest that risk compensation may help explain the limited effect of promoting condoms on HIV rates in highly generalised epidemics, as opposed to its clear successes in epidemics that are primarily fuelled by sex work.^{4 11 13 14 w9} Consistent use of condoms has been shown to reduce the efficiency of transmission of HIV and various other sexually transmitted infections,^{4 15} but the perception that using condoms can reduce the risk of HIV infection may have contributed to increases in inconsistent use, which has minimal protective effect,^{4 13} as well as to a possible neglect of the risks of having multiple sexual partners. Thus, the protective effect of promoting condoms may be attenuated at the population level and could even be offset by aggregate increases in risky sexual behaviour.^{4 11 13 14 w9}

Another potentially sobering case in point relates to the increased availability of antiretroviral therapy in

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Raising risk awareness in San Francisco nightclubs



References w1-w17 are on bmj.com

Analysis and comment

Expected risk reduction associated with techniques to prevent HIV infection

	Expected risk reduction (%)	Behavioural considerations	Availability
Male circumcision ^{1-3 w1 w2 w6 w7}	50-75	One time procedure	Currently exists
Condoms ^{4 5}	80-90	Must be used correctly and consistently	Currently exists
Microbicides ⁵	Up to 50	Must be applied before each sex act	At least 5 years before widely available if current studies show efficacy
Pre-exposure antiretroviral prophylaxis (tenofovir) ^{w8}	Unknown	Must take a pill each day	At least 5 years before widely available if current studies show efficacy
Vaccines ⁶	25-75	Current vaccine candidates are likely to require multiple doses	At least 10 years before widely available if current studies show efficacy

the United States, Europe, and Australia. Studies among men who have sex with men,^{16 w10 w11} injecting drug users,¹⁷ and heterosexuals,^{18 w12} have shown that the mere promise of expanded access to treatment or to post-exposure antiretroviral prophylaxis has been associated with significant increases in risky behaviour.¹⁶ A recent meta-analysis of studies on the effects of treatment on preventive behaviour found that although rates of unprotected sex did not differ significantly among those receiving antiretroviral treatment and those who were not, those who perceived that treatment might reduce the risk of HIV transmission had significantly higher rates of risky sex.¹⁹ Remarkably, this association was observed among people who were HIV positive and HIV negative, as well as among people with unknown HIV serostatus.¹⁹

The notion that people may engage in a kind of unnerving horse trading with respect to their HIV risk has also attracted attention in the popular media. A recent article in the *Los Angeles Times* reports that 7% of uninfected men surveyed at gay pride events in four US cities had taken an HIV drug before engaging in risky behaviour and that tenofovir is being sold under the table—sometimes together with ecstasy and methamphetamines—at some gay clubs and dance parties as an assumed means of reducing the risk of HIV infection.²⁰

Increases in risk behaviour accompanying the expansion of access to antiretroviral therapy may also have grim effects on HIV treatment initiatives.^{w13} Recent surveillance data from the United Kingdom estimate that 27% of those infected with HIV in 2000 acquired drug resistant virus, ostensibly by having unprotected sex with HIV infected individuals who had developed resistance while taking antiretroviral therapy.²¹ As a result, the range of low cost and effective HIV treatment options available to many newly infected individuals may become constrained.

Tackling risk compensation

The prospect of risk compensation should not deter us from pursuing promising methods of prevention or treatment, but it is imperative that we plan ahead to ensure that the benefits will significantly exceed any potentially offsetting limitations. Although microbicides and pre-exposure prophylaxis have already garnered global attention, a relatively small minority of those at risk of infection are likely to benefit from them if and when they are first introduced as it will take some time to achieve widespread distribution. Given that awareness of these new methods may be high while

coverage may initially be low, and that risk will not be eliminated even among those receiving the interventions, we must begin to work with service providers, and the communities they serve, to address two basic issues.

Firstly, it is vital to manage potential optimism about innovations in HIV prevention by communicating clearly and broadly that they will not eliminate the risk of HIV infection.^{w14} Perceptions of personal risk seem to be strongly associated with motivation to adopt behaviour change.^{22 23} Service providers should therefore promote behaviour change as an integral foundation of their service. Efforts to promote emerging prevention innovations at the community level should clearly identify the limitations of these approaches and should place a strong emphasis on the adoption of safer behaviours.

Secondly, we must build on the successes of Thailand, Cambodia, Uganda, Kenya, Zimbabwe, and other settings to cultivate a deeper appreciation of the fact that behaviour change is a feasible and effective approach to preventing new HIV infections. The continued spread of HIV has resulted in pessimism about changing behaviour, and it is perhaps little appreciated that some existing prevention approaches have been successful in slowing the spread of HIV in some settings.^{w3 w15 w16} Promotion of condoms seems to have had a key role in reducing infections in high risk groups, and a remarkably consistent element of success across all of these settings seems to have been reductions in sexual partnerships.^{8 10 15 23 24 w3 w15-w17}

A key aspect of Uganda's early success was the collaborative development of a widespread perception that all sexually active people were personally at risk and that changing sexual behaviour was the best way to reduce this risk (box).^{8 10 23} The experience of Uganda suggests that by working with individuals, leaders, and institutions throughout communities, we can help foster and reinforce shared perceptions that certain risk behaviours are both personally unwise and raise the burden and effects of disease for all. Other settings in which community norms have been changed—for example, regarding the issues of drinking and driving and smoking in public places—may provide useful inspiration.

Conclusion

Emerging innovations may soon supply us with some promising new tools to prevent the spread of HIV. Nevertheless, the complex nature of the HIV

Seven lessons from Uganda's early response to HIV

- Foster a personalisation of risk
- Use clear, consistent messages
- Combat stigma
- Seek out and support indigenous approaches and solutions
- Use multiple communication channels
- Secure the participation of individuals and organisations throughout society
- Reach out to male populations

Summary points

Innovations such as vaccines, microbicides, and male circumcision hold promise to reduce the risk of HIV infection

The perceived reduced risk from such innovations could be compensated for by an increase in risky behaviour

New and existing methods of prevention and treatment must be accompanied by measures to reinforce individuals' perceptions of HIV risk

Programming to change the sexual behaviour will remain fundamental to preventing the spread of HIV

pandemic presents us with a challenge that far exceeds the promise of any single prevention approach. The potential for risk compensation highlights the need for a renewed prioritisation and coordination of approaches to change sexual behaviour. From a practical perspective, efforts to maximise the benefits of new and existing risk reducing technologies should also seek to minimise the possibility of risk compensation by sustaining high levels of personal risk perception throughout the communities served. Furthermore, successful approaches to change behaviour must be studied, adapted, and applied with at least the same vigour as the promising host of technological innovations under development.

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Tinnitus, listening, and learning why telephone consultations can be useful

After six weeks, the patient could no longer bear the ringing in her ears. "It is an intermittent short, loud ringing and can be heard by other people," she explained to the consultant she was attending (for an unrelated problem), and it was driving her mad. He was concerned and suggested that he should refer her directly to the ENT consultant.

The local accident and emergency staff were also unable to determine the cause (after a six hour wait) but suggested she sought help from her general practitioner. NHS 24 also referred her back to me, her general practitioner.

When she telephoned the surgery the next morning the receptionist heard the ringing sound six times during their telephone conversation and commented how distressing it must be for the patient. Before returning the patient's call, I thought about the possibilities: intermittent tinnitus that was audible to others? No obvious cause came to mind.

During our telephone consultation she repeated that other people could hear it. I had been unable to hear anything, so I suggested that she turn the telephone handset upside down—to bring the mouthpiece nearer to her ear so I could hear it... still nothing. Then I heard it. She agreed to attend the surgery for an examination but was concerned that travelling in the car must "do something to the fluid in my ears, and it seems to go away."

Had she heard the sound anywhere outside her home, I asked. "Oh, yes, when I went to a hotel the other day." The diagnosis suddenly became obvious. I gave her my suggested treatment and, if it was unsuccessful, asked her to visit the next day.

On the following day I was crestfallen to see her sitting in the waiting room, but she had simply come to thank me for diagnosing the battery failure in her smoke alarm.

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