

Sexual transmission

Anal sex and the risk of HIV transmission

A research briefing

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Key points

- For unprotected anal intercourse with an HIV-positive partner with a fully suppressed viral load, the estimated risk of infection is zero.
- If HIV is not fully suppressed by effective treatment, anal intercourse without condoms is a high-risk route of sexual HIV transmission for both the insertive and receptive partner.
- Sexually transmitted infections and the HIV-positive partner being recently infected increase the risk of

If the HIV-positive partner is taking antiretroviral treatment and has a fully suppressed viral load ('undetectable'), the risk of HIV transmission through anal intercourse is zero.

The PARTNER-2 study followed 783 male couples in which the HIV-positive partner had an undetectable viral load and no condoms were used in anal intercourse. After 1596 couple-years of follow-up and 77,000 acts of unprotected anal intercourse, no HIV transmission from HIV-positive partners took place and the researchers concluded that the risk of HIV transmission in these circumstances was effectively zero (Rodger).

If viral load is detectable, condomless anal intercourse is a highly efficient way of transmitting HIV, and it is considered a high-risk activity for both partners, although the exact degree of risk can depend on many factors.

For each condomless act with an untreated HIV-positive partner, the risk of infection has been estimated at 1.38% (one in 72 chance) and 0.11% (one in 909 chance) for the receptive and insertive partners respectively.

However, it may be 10 to 25 times higher if the positive partner is recently infected. Studies have identified several other factors that further increase the risk of transmission.

Risks to insertive and receptive partners

There is a widespread belief among gay men that the insertive partner ('top') is at very low risk of HIV infection. It is true that HIV infection occurs less frequently in men who solely take the

However, being the insertive partner in condomless sex remains a high-risk activity. The per-act risk for the insertive partner in anal sex is comparable to the per-act risk for the male (insertive) partner in vaginal sex.

The receptive partner ('bottom') is at risk of infection from HIV in the semen and pre-seminal fluids ('pre-cum') of the infected partner. Rectal tissue is delicate and easily damaged, which can give the virus direct access to the bloodstream. However, such tissue damage is not necessary for infection to occur: the rectal tissue itself is rich in cells which are directly susceptible to infection.

The insertive partner ('top') is also at risk of infection, as there are high levels of HIV in rectal secretions, as well as blood from the rectal tissues (Zuckerman). This creates a risk of transmission to the insertive partner through the tissue in the urethra and on the head of the penis – particularly underneath the foreskin.

Several systematic reviews of studies have calculated that condomless receptive anal intercourse posed approximately ten to twelve times greater risk of infection than insertive anal intercourse.

Glossary

insertive

rectum

viral load

sexually transmitted infections (STIs)

The most recent review of the evidence estimated that for each condomless act with an HIV-positive partner, the risk of infection was 1.38% (one in 72 chance) for the receptive partner and 0.11% (one in 909 chance) for the insertive partner (Patel).

Nonetheless, many of the studies were carried out before antiretroviral treatment after diagnosis became the norm and so are likely to over-estimate the risk of infection.

Anal intercourse between men and women

Anal intercourse between men and women has generally not received as much attention as anal intercourse between men. However, there is evidence that anal sex is practised by large numbers of sexually active adults. In 2010, 11% of women and 13% of men in the United Kingdom report having anal intercourse in the past year, with younger generations being more likely to report it (Mercer).

Unprotected heterosexual anal sex probably plays an important role in HIV transmission among heterosexuals, although reliable estimates are lacking (Baggaley).

Recent infection

The first few weeks or months after HIV has entered a person's body, their viral load is usually extremely high and they are very infectious.

Viral load is the term used to describe the amount of HIV circulating in the body. As viral load rises, so does



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infectiousness. On the other hand, when viral load is so low as to be undetectable, there is no risk at all of HIV transmission.

For example, a study of heterosexual couples in Rakai, Uganda, where one partner was HIV positive and the other HIV negative at the start of the study, showed that the likelihood of HIV transmission is highest in the first two and a half months following initial infection with HIV, and that this correlated with higher viral load levels in early HIV infection. The researchers estimated that relative to chronic infection, infectiousness during primary infection was enhanced 26-fold (Hollingsworth).

As people are usually unaware of their infection at this stage, they are not taking treatment and may inadvertently expose sexual partners to HIV. People who have HIV without realising it are much more likely to be involved in HIV transmission than people who know they have HIV, as the latter can receive treatment.

Sexually transmitted infections

Most sexually transmitted infections, especially those which cause ulceration, including herpes simplex 2 (HSV-2), syphilis, gonorrhoea, and chlamydia, increase HIV-negative partners' risk of acquiring HIV during vaginal intercourse. HIV-negative people with recurrent STIs may be at increased ongoing risk of HIV infection.

In people living with HIV who are *not* taking HIV treatment, STIs also lead to increased genital shedding of HIV, which increases the risk of transmitting HIV to others. Nonetheless, STIs do not

taking effective HIV treatment and have an undetectable viral load. In the PARTNER study, there was not a single HIV transmission even though many study participants had STIs.

There are two main reasons for the effect of STIs on HIV transmission. Firstly, many (although not all) STIs can cause ulcers, sores or lesions. They provide a direct physical route of entry for HIV in an uninfected person. Secondly, immune cells that are, themselves, prone to HIV infection – such as activated T-cells and dendritic cells – are prone to be present in greater numbers at the site of an infection.

"Being the insertive partner in condomless sex remains a high-risk activity."

The strongest evidence is for herpes simplex virus type 2 (HSV-2). A meta-analysis found that having HSV-2 was associated with an increased risk of acquiring HIV both in the general population (an increase of 270%) and in higher risk groups such as sex workers and men who have sex with men (170%). Having a recent HSV-2 infection was associated with an almost fivefold (470%) increased risk of acquiring HIV, probably because genital ulceration, viral shedding and inflammation in the genital tract are most severe in new HSV-2 infections and tend to decrease over time (Looker).

Human *papillomavirus* (HPV), the cause of genital warts, is associated with an increased risk of HIV infection in women regardless of whether it is an HPV type that causes genital

presence of HPV in cells in the penis also increases the risk of acquisition in men (Rositch).

Poppers

Poppers are nitrite-based inhalants, widely used as a recreational drug by gay men in many countries. Especially popular for use during receptive anal intercourse, sniffing poppers relaxes the anal sphincter muscles, making intercourse easier and intensifying pleasure.

However, using poppers during unprotected, receptive anal intercourse more than doubles the risk of HIV infection (Macdonald). This may be because poppers increase blood flow to the rectal tissues, heightening their susceptibility to infection. Poppers do not affect the insertive partner's risk of infection.

Rectal douching

Rectal douching is the insertion of a liquid, such as tap water or soapsuds, into the rectum via a tool, to cleanse the rectum before or after anal sex and is a common activity among gay and bisexual men. However, it may damage the rectal lining and remove protective naturally occurring bacteria. If the same douching bulb, showerhead or other tool is used by different people, infections could also be transmitted that way.

A synthesis of 24 studies showed that rectal douching was associated with an almost threefold increased odds of infection with HIV and a more than twofold increase in the risk of a

While it is possible that this result could simply be due to behavioural differences, most of the studies performed multiple analyses to take into account potential confounders such as frequency of sex and partner numbers.

Rectal bleeding

Rectal bleeding also raises the risk of infection, and could be caused by haemorrhoids, certain STIs such as anal warts, herpes lesions, the prior use of sex toys, or by fingering and fisting.

Male circumcision

There are some data from low and middle-income countries to suggest that circumcision may be protective, but only for men who exclusively take the insertive role (Yuan).

How you can reduce the risk

Effective protective measures are:

- The HIV-positive partner taking effective HIV treatment and having an undetectable viral load.
- The HIV-negative partner taking pre-exposure prophylaxis (PrEP).
- Condoms and lubricant.
- As an emergency measure, post-exposure prophylaxis (PEP).

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This page was last reviewed in July 2019. It is due for review in July 2022.
