Per-act Risk of Sexual HIV Transmission

Key Points

- Certain sexual activities generally carry a greater risk of HIV transmission than others.
- Receptive anal sex is associated with the highest risk of HIV transmission, followed by injecting drugs using a shared needle.
- Each exposure to HIV is unique and carries its own unique risk for HIV infection, based on many factors.

Several research studies have attempted to calculate the risk of HIV transmission associated with one exposure to HIV through sexual contact or from sharing needles. These studies have found that certain activities generally pose a greater risk of HIV transmission than others.

The following table shows estimates for the average transmission risk from one exposure to HIV through different activities, listed from highest to lowest risk:

<table>
<thead>
<tr>
<th>Activity (sexual activities are according to position of the HIV-negative partner)</th>
<th>Average risk estimate</th>
<th>Rate of transmission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receptive anal sex</td>
<td>1.4%</td>
<td>1 transmission per 71 exposures</td>
</tr>
<tr>
<td>Injecting drugs using a shared needle</td>
<td>0.63%</td>
<td>1 transmission per 159 exposures</td>
</tr>
<tr>
<td>Insertive anal sex</td>
<td>0.11%</td>
<td>1 transmission per 909 exposures</td>
</tr>
<tr>
<td>Receptive vaginal sex</td>
<td>0.08%</td>
<td>1 transmission per 1,250 exposures</td>
</tr>
<tr>
<td>Insertive vaginal sex</td>
<td>0.04%</td>
<td>1 transmission per 2,500 exposures</td>
</tr>
</tbody>
</table>

It is important to understand that these per-act risk estimates are based on research studies that look into average rates of transmission. They do not consider the effect of specific biological factors that can impact risk, such as the viral load of the person with HIV. Because risk involves multiple factors, it is very difficult to accurately quantify the risk from one exposure. Each exposure to HIV has a unique risk of transmission, determined by the complex interplay of the various biological factors involved.

Receptive anal sex (where an HIV-negative person receives a penis into their anus), carries the highest risk of HIV transmission. Research suggests the risk may be 10 to 20 times higher than that for vaginal or insertive anal sex (where an HIV-negative person inserts their penis into an anus). This is partly because the epithelial cell layer lining the rectum is only one layer thick, making it more susceptible to tearing and inflammation, which can facilitate HIV transmission. In contrast, the epithelial cell layers in the vagina, penis and mouth are several layers thick.

Studies suggest that receptive vaginal sex is approximately two times riskier than insertive vaginal sex. This is partly
because the mucous membranes of the vagina and cervix have a greater surface area than the urethra and foreskin of the penis, and the vagina remains in contact with sexual fluids for a longer time.

There is little to no risk of HIV transmission through oral sex. There is no risk of an HIV-negative person contracting HIV from receiving oral sex. There is a theoretical risk of HIV transmission when an HIV-positive man ejaculates in the mouth of an HIV-negative partner, however, the risk is still very low, much lower than for anal or vaginal sex. There are several biological reasons for this. Saliva contains enzymes that can inactivate HIV, the mouth and throat have multiple layers of epithelial cells, and fluids that contain HIV do not generally stay in prolonged contact with possible routes of infection after oral sex.

When a person is exposed to HIV through sharing needles, the risk of transmission is higher than the risk from vaginal and insertive anal sex. This relatively high risk is because the virus is introduced directly into the body, bypassing some of the body’s natural HIV defences.

**Resources**

- **Putting a number on it: the risk from an exposure to HIV** - *Prevention in Focus*
- **HIV Risk Behaviors** - U.S. Centers for Disease Control and Prevention

**Sources**

Disclaimer

Decisions about particular medical treatments should always be made in consultation with a qualified medical practitioner knowledgeable about HIV- and hepatitis C-related illness and the treatments in question.

CATIE provides information resources to help people living with HIV and/or hepatitis C who wish to manage their own health care in partnership with their care providers. Information accessed through or published or provided by CATIE, however, is not to be considered medical advice. We do not recommend or advocate particular treatments and we urge users to consult as broad a range of sources as possible. We strongly urge users to consult with a qualified medical practitioner prior to undertaking any decision, use or action of a medical nature.

CATIE endeavours to provide the most up-to-date and accurate information at the time of publication. However, information changes and users are encouraged to ensure they have the most current information. Users relying solely on this information do so entirely at their own risk. Neither CATIE nor any of its partners or funders, nor any of their employees, directors, officers or volunteers may be held liable for damages of any kind that may result from the use or misuse of any such information. Any opinions expressed herein or in any article or publication accessed or published or provided by CATIE may not reflect the policies or opinions of CATIE or any partners or funders.

Information on safer drug use is presented as a public health service to help people make healthier choices to reduce the spread of HIV, viral hepatitis and other infections. It is not intended to encourage or promote the use or possession of illegal drugs.

Permission to Reproduce

This document is copyrighted. It may be reprinted and distributed in its entirety for non-commercial purposes without prior permission, but permission must be obtained to edit its content. The following credit must appear on any reprint: This information was provided by CATIE (the Canadian AIDS Treatment Information Exchange). For more information, contact CATIE at 1.800.263.1638.

© CATIE

Production of this content has been made possible through a financial contribution from the Public Health Agency of Canada.

Available online at: