

# Sexual transmission of HIV and the law: an Australian medical consensus statement

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All Australian states and territories have criminal laws that may be applied in cases of alleged human immunodeficiency virus transmission and, in some jurisdictions, exposure. None of these laws are HIV specific; they generally relate to causing grievous bodily harm, serious injury or grievous bodily disease, or to endangerment by exposure to the risk of infection.<sup>1</sup>

There have been at least 38 Australian criminal prosecutions for HIV sexual transmission or exposure since the first known case in 1991. Such cases require that courts, legal practitioners and juries interpret detailed scientific evidence on HIV transmission risk and the medical impact of an HIV diagnosis. Analysis suggests that scientific concepts have been inconsistently applied in Australian trials involving HIV.<sup>1,2</sup> In some cases, the risks and impacts of HIV infection may have been overstated.

It is not the intention of this consensus statement to directly critique the evidence in past trials, or to suggest that any miscarriage of justice has occurred. Rather, we hope to inform the criminal justice system to ensure that future allegations are addressed in a scientifically robust way, consistent with the interests of justice. This statement, which draws on a similar consensus statement published in Canada,<sup>3</sup> represents our opinion based on a review of the best available medical and scientific evidence. The evidence demonstrates that most sexual encounters entail low to no possibility of HIV transmission. While HIV remains a serious infection, the medical impact of an HIV diagnosis has decreased due to improved treatment; most people recently infected with HIV are able to commence simple treatment that offers them a life expectancy comparable with that of their HIV-negative peers.

## HIV transmission risk

HIV is not transmitted readily from one person to another. HIV cannot survive outside the body or be transmitted through air. For transmission to occur, particular bodily fluids from an HIV-positive person (blood, semen, pre-seminal fluid, rectal fluids, vaginal fluids or breastmilk) must enter an HIV-negative person's body.

For HIV transmission to occur through sex:

- There must be a sufficient amount of the virus in the HIV-positive person's bodily fluid.
- Bodily fluid containing HIV must come into contact with an HIV-negative mucous membrane or damaged tissue. Mucous membranes are located in the foreskin and urethra of the penis; cervix and vagina; anus and rectum; and mouth and throat. In the absence of trauma, oral mucous membranes are much less vulnerable to HIV transmission than anogenital mucous membranes.

## Abstract

**Introduction:** Criminal cases involving human immunodeficiency virus transmission or exposure require that courts correctly comprehend the rapidly evolving science of HIV transmission and the impact of an HIV diagnosis. This consensus statement, written by leading HIV clinicians and scientists, provides current scientific evidence to facilitate just outcomes in Australian criminal cases involving HIV.

**Main recommendations:** Caution should be exercised when considering charges or prosecutions regarding HIV transmission or exposure because:

- Scientific evidence shows that the risk of HIV transmission during sex between partners of different HIV serostatus can be low, negligible or too low to quantify, even when the HIV-positive partner is not taking effective antiretroviral therapy, depending on the nature of the sexual act, the viral load of the partner with HIV, and whether a condom or pre-exposure prophylaxis is employed to reduce risk.
- The use of phylogenetic analysis in cases of suspected HIV transmission requires careful consideration of its limited probative value as evidence of causation of HIV infection, although such an approach may provide valuable information, particularly in relation to excluding HIV transmission between individuals.
- Most people recently infected with HIV are able to commence simple treatment providing them a normal and healthy life expectancy, largely comparable with their HIV-negative peers. Among people who have been diagnosed and are receiving treatment, HIV is rarely life threatening. People with HIV can conceive children with negligible risk to their partner and low risk to their child.

## Changes in management as result of the consensus statement

Given the limited risk of HIV transmission per sexual act and the limited long term harms experienced by most people recently diagnosed with HIV, appropriate care should be taken before HIV prosecutions are pursued. Careful attention should be paid to the best scientific evidence on HIV risk and harms, with consideration given to alternatives to prosecution, including public health management.

- The virus must overcome the cellular defences of the HIV-negative person's mucous membrane and the body's immune response to pathogens in order to establish an infection in target immune cells.

## Assessing HIV transmission risk from sexual activity

HIV transmission during sex is not inevitable. In fact, HIV is more difficult to transmit via sexual acts than many other sexually transmitted infections (STIs). Unlike the risk of transmission through HIV-infected blood, which rises to almost 100% through blood transfusion,<sup>4</sup> risk of transmission through sexual acts is relatively low.

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**Possibility of HIV transmission**

Possibility	Conditions for viral transmission present	Reports of transmission (worldwide)	Possibility of transmission per act	Risk of transmission per event
Low	Usually	Most reports linked to these activities	Possible but risk remains low	1.4% (1/70) to 0.04% (1/2500)
Negligible	Very rarely	Isolated reports, difficult to confirm	Highly unlikely, if not impossible in most circumstances	< 0.016% (1/6250) to < 0.0016% (1/62 500)
None	Never	None reported	Not possible	Too low to quantify

This consensus statement uses three categories to define the possibility of HIV transmission per sexual act: low, negligible and none (Box). These categories have been developed to inform consideration of HIV transmission risk in a criminal justice context. They have been deliberately chosen to differ from terms used in the public health context (which usually describes activities as ranging from high to low risk), where the messages function to encourage safe sexual practice. This consensus statement is intended for a legal context and is a more precise reflection of our clinical understanding of the likelihood of HIV transmission per event.

The possibility of HIV transmission during sex varies according to a number of intersecting factors.

**The amount of HIV in a person’s bodily fluid (viral load).** Soon after being infected, a person’s viral load is high. Then, as the immune system responds, viral load typically decreases. If a person does not commence treatment, their viral load will eventually increase until HIV overwhelms their immune system and they begin to develop HIV-related illnesses.

When treatment is commenced, the viral load usually drops to undetectable levels (less than 50 copies per millilitre of blood) within a few weeks (“undetectable viral load” or “effective treatment”). With continuing adherence to treatment, undetectable viral load is usually maintained for prolonged periods. Having an undetectable viral load dramatically reduces the risk of transmitting HIV.<sup>5,6</sup>

Some people may be unable to access treatment, choose to defer commencing treatment or be unable to achieve an undetectable viral load on treatment; however, even a low viral load reduces transmission risk.

**Type of sexual activity.** Some activities carry higher risk than others (see below).

**Condom use.** HIV cannot pass through intact latex or polyurethane condoms. HIV transmission is possible only where condom slippage or breakage occurs. Epidemiological evidence on the reliability of condoms shows using condoms reduces transmission risk by at least 80%,<sup>7</sup> although recent research suggests that estimate may underestimate condom reliability.<sup>8</sup> Importantly, condom-related risk operates in conjunction with the established risk of particular behaviours, so correct condom use reduces the risk of HIV transmission to a level that is almost unquantifiable.<sup>9</sup>

At a population level, studies have shown that even when factoring in possible instances of incorrect use or breakage, consistent condom use dramatically reduces the possibility of HIV transmission.<sup>7</sup>

**Whether the HIV-negative partner is using effective pre-exposure prophylaxis (PrEP).** PrEP is the use of anti-HIV medication by HIV-negative people to prevent HIV infection.

Correct use of PrEP by an HIV-negative individual substantially reduces the risk of HIV acquisition.<sup>10-12</sup>

**Whether a person who believes they have recently been exposed to HIV takes post-exposure prophylaxis (PEP).** PEP describes commencement of short term antiretroviral treatment by an HIV-negative person within 72 hours of a risk event. Even when the virus has entered a person’s body, PEP can stop the virus becoming established, significantly reducing the likelihood of the person becoming HIV-positive.

**Risk associated with specific sex acts**

**Oral sex including oral–penile sex (fellatio) and oral–vaginal sex (cunnilingus).** When an HIV-positive partner has a very low or undetectable viral load, *or* a condom or similar latex barrier is properly used, *or* the HIV-negative partner is taking effective PrEP, *or* where oral sex is performed by an HIV-positive person on an HIV-negative person, there is no possibility of HIV transmission from oral intercourse.<sup>13</sup>

When oral sex is performed by an HIV-negative individual on an HIV-positive individual with a detectable viral load, there is negligible possibility of HIV transmission.<sup>13</sup> Risk of transmission increases if the HIV-negative partner has cuts or lesions in their mouth and the HIV-positive partner ejaculates, but the risk remains very low.

**Vaginal–penile intercourse.** When a condom is used correctly, *or* the HIV-positive partner has a very low or undetectable viral load, *or* the HIV-negative partner is taking effective PrEP, there is negligible possibility of transmission from vaginal–penile intercourse.<sup>5,14</sup> When two or more of these prevention strategies are simultaneously employed, risk of transmission approaches zero.

When the HIV-positive partner has a detectable viral load and a condom is not used, there is a low possibility of transmitting HIV during vaginal–penile intercourse.<sup>15</sup> If no ejaculation occurs inside the HIV-negative partner’s body, transmission risk decreases significantly.

**Anal–penile intercourse.** When a condom is used correctly, *or* the HIV-positive partner has a very low or undetectable viral load, *or* the HIV-negative partner is taking effective PrEP, there is a negligible possibility of transmission through anal–penile intercourse.<sup>16</sup> Where two or more of these prevention strategies are simultaneously employed, risk of transmission approaches zero.

When a condom is not used, *and* the HIV-positive partner has a detectable viral load, anal–penile intercourse poses a low possibility of transmitting HIV.<sup>17</sup> The risk is similar whether the receptive partner is male or female. The risk is lower where the HIV-positive partner takes the receptive, rather than insertive, role.

The possibility of HIV transmission during anal intercourse decreases when no ejaculation occurs inside the body.

**Other risk factors.** Presence of an STI, particularly an ulcerative STI, in either partner has been associated with an increased risk of HIV transmission during sexual activity.<sup>18</sup> However, the presence of an STI does not increase transmission risk if a condom is used correctly *or* the HIV-positive person is on effective anti-retroviral therapy *or* the HIV-negative person is taking PrEP.

**Biting and spitting.** There is no possibility of HIV transmission from contact with the saliva of an HIV-positive person through spitting or biting. There is a negligible possibility of HIV transmission from spitting or biting where the HIV-positive person's saliva contains blood, *and* their blood comes in direct contact with a mucous membrane or open wound, *and* they have a high viral load. No transmission through biting or spitting has ever been documented in Australia.

### Evidence of transmission: phylogenetic analysis as forensic evidence

A small number of Australian trials have admitted expert evidence based on phylogenetic analysis to show an accused caused the complainant's HIV infection.<sup>19</sup> While phylogenetic studies are invaluable as research tools, their probative value as evidence of causation is limited because of the limitations of the methodology. This statement aims to minimise the incorrect application or interpretation of phylogenetic analysis to prove causation in HIV transmission cases.

HIV's genetic sequence is widely variable at a population level, and changes rapidly over time both in response to the host immune response and in cases of HIV treatment resistance. Consequently, comparisons of genetic sequences of samples of the virus taken from different individuals can estimate the likelihood that these samples are linked by transmission events.<sup>20</sup> To test whether any relationship exists, phylogenetic analyses use a statistical approach to assess the relatedness of viral genetic sequences in a process analogous to, but significantly less specific than, DNA profiling. Samples of viral RNA from the complainant and accused (reference samples) are compared to determine the degree of similarity. A database of samples from randomly selected but unrelated individuals (control samples) is employed to estimate the probability of the reference samples being related through a common ancestor.

This assessment is influenced by the number of control samples, which has typically been small in the context of criminal cases.<sup>21</sup> The small number of controls significantly limits the reliability of analysis.

Phylogenetic analysis has its most useful application in definitively ruling out a connection between the infections of the complainant and accused, but it cannot determine beyond reasonable doubt that the reference samples are linked. Even where there is a strong correlation (high similarity) between the RNA sequences (irrespective of the size and characteristics of the control group), alternative hypotheses must be discounted, including infection of the accused by the complainant, infection of both complainant and accused by a common source person, or infection of the complainant by a third person infected by the accused.

### Understanding the harms of HIV infection

Over the past two decades, HIV antiretroviral drug regimens have become simpler, more tolerable, and much more effective.<sup>22-24</sup>

Consequently, HIV is now treated as a chronic illness. For many people diagnosed with HIV, effective treatment is achieved by taking a single pill each day. Most people on treatment are able to achieve an undetectable HIV viral load and maintain a healthy immune system, which makes it highly likely that the person will remain healthy for a very long time and ensures they pose a negligible risk of transmitting HIV to sexual partners.

Life expectancy after HIV diagnosis has dramatically increased,<sup>24,25</sup> to the point that the life expectancy of a recently diagnosed adult on antiretroviral treatment approaches that of an adult in the general population.<sup>22</sup> Given that individuals living with HIV often exhibit demographic, clinical and behavioural characteristics associated with greater morbidity and mortality than the general population,<sup>26</sup> any remaining gap in life expectancy may be attributable to these factors.<sup>27</sup>

Treatment of HIV has improved to the point that HIV-related illnesses are uncommon among diagnosed individuals. Instead, the focus of HIV care has shifted towards the management of non-HIV-related chronic diseases (such as smoking-related cardiovascular disease) which may be exacerbated by HIV and/or its treatment. Australian HIV surveillance programs no longer record the number of deaths from AIDS (acquired immunodeficiency syndrome), as this is no longer considered a useful marker of Australia's HIV epidemic.<sup>28</sup>

A better understanding of treatments and prevention has also revolutionised conception and childbirth where one or both partners is or are HIV-positive. Where a couple is hoping to conceive, specific interventions (including antiretroviral treatment and PrEP) allow them to conceive through vaginal sex with negligible risk of HIV transmission from one partner to another.<sup>29</sup> HIV *per se* does not adversely affect pregnancy. If interventions are implemented to minimise HIV transmission risk from mother to child during pregnancy, birth and postnatally, and a woman's viral load is less than 50 copies per millilitre of blood, HIV transmission risk is reduced to less than 0.09%, including through vaginal birth.<sup>30</sup>

Although arguably fear surrounding HIV has decreased as public awareness has improved, people with HIV may experience psychosocial disadvantage such as stigma, discrimination and difficulties in interpersonal relationships.<sup>31</sup> Such experiences vary by individual, typically decrease over time, and may be responsive to psychological and counselling interventions.<sup>32</sup> Unfortunately, media coverage of criminal trials appears to heighten stigma and exacerbate other psychosocial issues for people living with HIV.

### Recommendations

Given the limited *per act* likelihood of HIV transmission during sex and the limited medical harms experienced by most people recently diagnosed with HIV, we recommend that caution be exercised when considering criminal prosecutions, with careful appraisal of current scientific evidence on HIV risk and harms.

HIV science continues to deliver impressive results. During the past decade, a fuller understanding of the effectiveness of HIV antiretroviral treatments as a preventive tool (including treatment of an HIV-infected person, and use of PrEP and PEP) has resulted in a significant decrease in estimates of HIV transmission risk during sexual acts. Similarly, research shows that improved treatments have delivered consistent increases in life expectancy. Given the rapid pace at which science is evolving, reference to risk and harms associated with HIV must reference the most robust and up-to-date evidence.

It has long been recognised that correct use of condoms is an effective means of reducing HIV sexual transmission risk to an acceptably low level. We now know that if an HIV-positive partner is on treatment and maintains an undetectable viral load, or if the HIV-negative partner takes PrEP correctly, risk is reduced to a similar degree. In our opinion, the use of any one of these strategies reduces the risk of transmission to a negligible level and represents taking reasonable precautions to prevent HIV transmission.

In clinical practice, it is extremely unusual to encounter a person who is dismissive of the need to protect others from HIV infection. In the rare instances where this does occur, public health management processes have proven very effective. Public health management guidelines in each state and territory focus on achieving sustained behaviour change through counselling, education and addressing the underlying causes of risk behaviour. Public health officials are well resourced to provide as much support, direction or restriction as required to prevent individuals

putting others at risk of HIV infection, including isolation from the community in extreme circumstances.<sup>33</sup>

Given the effectiveness and lower cost of the public health management approach, and the relatively low per act risk of HIV transmission during sex, we recommend that prosecutorial authorities give consideration to public health management as an alternative to prosecution wherever appropriate.

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