STIs: What role do they play in HIV transmission?

By James Wilton

Rates of sexually transmitted infections (STIs) in Canada are on the rise. Research suggests that STIs can increase both a HIV-negative person’s risk of becoming infected with HIV and an HIV-positive person’s risk of transmitting HIV to someone else. This article explores how STIs may increase the risk of sexual HIV transmission, how STIs may be undermining our HIV prevention strategies, and what we can do about it.

The basics

There are many different types of STIs. Some of the more common ones include gonorrhea, chlamydia, Trichomonas vaginalis, human papillomavirus (HPV), herpes and syphilis. Some of these (such as herpes and syphilis) cause ulcers on the genitals or rectum, while others (such as gonorrhea, chlamydia, and Trichomonas vaginalis) can cause painful urination and/or discharge. HPV can cause the growth of genital warts on or around the genitals or rectum. Most STIs can also infect the mouth and throat.

STIs can cause swelling, redness and pain in the infected area. However, many people who have an STI have no symptoms at all—this is known as being asymptomatic—so neither they nor their partner may realize they are infected.

Although all STIs are treatable, only some can be cured through treatment and completely cleared from the body. STIs that can be cured through treatment include gonorrhea, chlamydia, syphilis and Trichomonas vaginalis. STIs that can be managed through treatment, but not cured, include HPV, herpes and HIV.

How do STIs cause inflammation?

To understand how STIs increase the risk of HIV transmission, we need to understand what STIs do once they come in contact with our mouth, genitals or rectum.

Sexually transmitted infections are caused by bacteria, viruses and parasites, also known as germs. When germs enter the body, they are recognized by the immune system, which, as part of the body’s response to infection, starts a process known as inflammation. This leads to the symptoms associated with many STIs, such as redness, swelling and pain. The inflammatory process “activates” our immune cells to fight germs and recruits more immune cells to the site of the infection, helping the body clear the germs. For example, if someone has a vaginal STI, then the inflammatory response will recruit more immune cells to the lining of the vagina.

How do STIs increase the risk of becoming infected with HIV?

Research suggests that HIV-negative individuals with an STI may be at increased risk of becoming infected with HIV through anal sex, vaginal sex, frontal sex (a term used by some trans people to refer to sex using genitals on the front of the body) and oral sex. But how do STIs increase someone’s risk of HIV infection?
Scientists believe that inflammation plays an important role. Inflammation increases the concentration of “activated” immune cells in the area infected with the STI. Although the inflammatory response is meant to help fight the sexually transmitted infection, HIV likes to infect some of these recruited immune cells, also known as CD4 cells. Also, HIV finds it easier to infect, and replicate in, CD4 cells that are “activated”. Therefore, if someone has an STI in the mouth, genitals or rectum, and that area is exposed to HIV, the higher concentration of “activated” CD4 cells facilitates HIV infection, replication and spread throughout the body.

All types of STIs cause inflammation and therefore may increase the risk of becoming infected with HIV in this way. Also, some types of STIs increase the risk of HIV infection through ulcers, which create “holes” or ways for HIV to enter the body through the mouth, genitals or rectum.

**How do STIs increase the risk of transmitting HIV?**

Research suggests that HIV-positive individuals with an STI may be at increased risk of passing HIV to someone else through anal, vaginal and frontal sex. But how do STIs increase someone’s risk of transmitting HIV?

Again, it comes down to inflammation. If a person living with HIV has an STI, then inflammation will “activate” and recruit more immune cells to the infected genitals or rectum. Some of the immune cells in a person living with HIV are already infected with HIV, therefore the inflammatory response brings more HIV (contained in the infected immune cells) to the site of the STI in the genitals or rectum. Consequently, more HIV enters the body fluids in that area. For example, a vaginal STI increases the amount of the virus (viral load) in the vaginal fluid. Research shows that the more virus there is in the body fluids of a person living with HIV the higher the risk of passing HIV to someone else. HIV also replicates, or makes more HIV, quicker in immune cells that have been “activated” through inflammation, compared to immune cells that are not “activated.”

**STI rates on the rise**

In Canada, the rate of new STIs is on the rise. According to the latest report published by the Public Health Agency of Canada, over the past decade chlamydia and gonorrhea rates have increased almost twofold, while syphilis rates have increased more than eightfold (see table).

The rate of new STI diagnoses is defined as the number of STIs diagnosed in the Canadian population over the course of a year. For example, if an STI had a rate of 150 in 2009, this means that 150 infections were diagnosed for every 100,000 people in the Canadian population that year.

<table>
<thead>
<tr>
<th>Year</th>
<th>Chlamydia</th>
<th>Gonorrhea</th>
<th>Syphilis</th>
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<tbody>
<tr>
<td></td>
<td>Cases</td>
<td>Rates</td>
<td>Cases</td>
</tr>
<tr>
<td>2000</td>
<td>46,439</td>
<td>150.9</td>
<td>6,189</td>
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<tr>
<td>2009</td>
<td>87,210</td>
<td>258.5</td>
<td>11,178</td>
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*Source: Public Health Agency of Canada*

Research suggests that STIs are particularly prevalent among people living with HIV. A recent review of 37 studies found that, on average, 16.3% of people living with HIV were co-infected with another STI. Included in the review was a Canadian study, which enrolled people living with HIV from infectious disease clinics in Edmonton, Quebec City and Toronto; of those participants, 54% were co-infected with genital herpes. Researchers also estimate that up to half of new syphilis cases in Canada occur in people living with HIV.
Do STIs undermine our HIV prevention efforts?

As STIs in Canada are increasing among both HIV-positive and HIV-negative individuals, they may be undermining HIV prevention strategies used by individuals and public health agencies in this country.

HIV prevention strategies used by individuals

STIs may decrease the effectiveness of some prevention strategies that individuals are using to reduce their risk of HIV transmission. Although condoms are a highly effective way of reducing both HIV and STI transmission, they aren’t always used. Instead, some people reduce their risk of HIV transmission in other ways, for example, by having oral sex instead of anal and vaginal sex, through serosorting (practice of choosing sexual partners based on their and your HIV status), strategic positioning (adopting the insertive or receptive role during unprotected sex depending on HIV status), pre-exposure prophylaxis (PrEP), post-exposure prophylaxis (PEP), male circumcision, and having unprotected sex with an HIV-positive person only if they have an undetectable viral load. Although these strategies may reduce someone’s risk of HIV transmission, they do not reduce the risk of STI transmission. If the use of these strategies leads to the transmission of STIs, people may inadvertently increase their (or their sexual partner’s) overall risk of HIV transmission. In other words, STIs may decrease the protection provided by certain HIV risk-reduction strategies.

Public health strategies used to prevent HIV

STIs may also decrease the effectiveness of public health strategies being rolled out to reduce new HIV infections in Canada. One example is the use of antiretroviral treatment as an HIV prevention strategy. (This strategy is also referred to as a “test and treat,” “treatment as prevention,” “seek and treat” or “testing and linkage to care (TLC)” strategy.) The goal of this strategy is to increase the number of people living with HIV who are on treatment and have an undetectable blood viral load, in order to decrease the overall viral load in a population (also known as the “community viral load”). Research suggests that a lower “community viral load” is associated with reductions in HIV transmissions in a population.9

Alarmingly, a high prevalence of STIs among people living with HIV may undermine the effectiveness of this strategy.9,9 This is because having an STI can lead to a person having a high level of HIV in their genital or rectal fluids, even if the virus level is low or undetectable in their blood. This makes it more difficult for the “test and treat” strategy to prevent HIV transmissions.

STI prevention is an important component of HIV prevention—or is it?

It is generally believed that the management of STIs should be an essential component of a comprehensive approach to HIV prevention. Reducing the infection rates and prevalence of STIs—through improved STI prevention, diagnosis and treatment—may help reduce the number of new HIV infections that occur in Canada each year.

However, research studies investigating whether improved management of STIs can reduce new HIV infections have produced mixed results.10 All of these studies were carried out in heterosexual communities in Africa, and most showed that STI prevention and treatment is not a successful HIV prevention strategy. It is not completely clear why, but some researchers believe this may be the result of poor study design or other factors, such as:

- the stage of the epidemic in the population being studied (STI management may be more effective in curtailing an emerging epidemic compared to one that is more generalized throughout the population)11
- poor adherence to STI treatments among the study participants12
- ongoing residual inflammation that remains during/after STI treatment13

Click here to read a summary of these study results.

Improving the control of STIs—what can we do?

Regardless of the role STIs play in HIV transmission, the management of STIs is critical. STIs can be painful, unpleasant and, in some cases, cause serious complications, such as anal and cervical cancer and infertility. Some
STIs can also cause problems during pregnancy and be transmitted from a pregnant woman to her baby during birth.

Community-based organizations have a key role to play in preventing the spread of STIs and encouraging people to get tested and treated. Community-based organizations can contribute to the control of STIs in various ways:

1. **Awareness campaigns**

Campaigns that increase people’s awareness of the risks, symptoms and spread of STIs, and of the importance of STI treatment, may help reduce the behaviours that put people at risk and encourage regular STI testing.

Several awareness campaigns have been developed across Canada. One example is the recent “Attack of the cursed syphilis” campaign, originally developed by the AIDS Committee of Toronto (ACT) and further redeveloped by ACT and The Gay Men’s Sexual Health Alliance, and later disseminated nationally by CATIE through funding from the Public Health Agency of Canada.

2. **Counselling and educational workshops**

During counselling and group workshops, community-based organizations can communicate key messages about the prevention and management of STIs, for example:

- Condoms (female and male condoms), when used correctly, are the most effective method of preventing the transmission of STIs and HIV.
- If a person is engaging in any type of sexual activity, it’s important to get tested regularly for HIV and STIs.
- If a person tests positive for HIV they should be tested for STIs, and vice versa
- If a person suspects they are infected with an STI, they should get tested and, if they test positive, seek treatment as soon as possible. Leaving an STI untreated may not only increase their risk of HIV and STI transmission, but also make the STI more difficult to treat and could lead to other complications.
- Although only some STIs are curable, they are all treatable. Management of incurable STIs—such as herpes and genital warts—through treatment may help reduce inflammation and other symptoms, as well as the risk of HIV and STI transmission.
- For people living with HIV, STIs may take longer to treat and also speed up the rate at which HIV weakens the immune system.

3. **Advocacy**

Advocacy may be needed to improve access to appropriate and non-judgmental sexual health services, particularly for marginalized populations and people who live in rural areas.

**Conclusion**

STIs are on the rise in Canada, and remain an important public health concern. There is plenty of evidence to suggest that they can contribute to an overall increase in HIV transmission. Although there is mixed evidence on whether the management of STIs is an effective HIV prevention strategy, there are several ways in which community-based organizations can help stem the continuing rise of STIs in this country.

**Resources**

High prevalence of sexually transmitted infections among people living with HIV – implications for HIV prevention - CATIE-News

Sexually Transmitted Infections and HIV transmission - CATIE fact sheet

About HIV and STIs - Health Initiative for Men (HIM)

**References**


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