HIV prevention for people who inject drugs: New biomedical approaches and time-honoured strategies

By Camille Arkell

In Canada, people who inject drugs are disproportionately affected by HIV compared to the general population. Among people who inject drugs, HIV transmission happens primarily through the sharing of injection drug use equipment, but also through sexual transmission.

This article will look at the risk of HIV transmission through injection drug use, and will explore some of the factors that contribute to an increased risk among people who inject drugs. We will also review evidence on effective interventions to reduce the risk of HIV transmission among people who inject drugs, including newer biomedical approaches. Finally, this article will provide recommendations for service providers who provide HIV prevention services to people who inject drugs.

What do we know about the risk of HIV transmission through injection drug use?

Very few studies have tried to estimate the risk of HIV transmission from a single injection with a needle contaminated with HIV. Using mathematical modelling, it was estimated that the risk per injection with an HIV-contaminated needle is about 63 per 10,000 exposures. This is equivalent to one HIV transmission occurring for every 159 exposures to an HIV-contaminated needle. It is challenging for researchers to accurately estimate this risk because of difficulties in measuring the number of times an HIV-contaminated needle is shared, or to account for other factors such as viral load of the blood in the needle.

Transmission can also occur if other HIV-contaminated injection-related equipment such as cookers, filters and water are re-used. Although the magnitude of risk has not been estimated for other injection-related equipment, research suggests that HIV can be transmitted by sharing previously used equipment – a common practice among some people who inject drugs.

What injection-related factors increase transmission risk for people who inject drugs?

We know that certain behaviours increase the risk of HIV transmission and that these behaviours continue to occur among people who inject drugs in Canada. Research from 2010 to 2012, conducted in Canadian cities among people who inject drugs, found that many report re-using needles and other injecting equipment. Sixteen percent reported injecting with a used needle, and 35% said they had injected with other used injecting equipment in the six months before being surveyed. This study also found high rates of sexual risk in people who inject drugs, with only 37% reporting they used a condom the last time they had sex.
What other factors increase transmission risk for people who inject drugs?

Factors other than re-using needles and injecting equipment also contribute to HIV risk. These include the prevalence of HIV in the surrounding community and socio-economic factors that can impact health.

National HIV estimates and studies tell us a lot about the epidemiology of HIV in people who inject drugs in Canada. National estimates from 2014 suggest that people who inject drugs are 59-times more likely to get HIV than people who do not inject drugs. It is estimated that 19% of people living with HIV in Canada acquired their HIV infection through injection drug use, however, this proportion varies considerably across the country (from 10% in Ontario to 74% in Saskatchewan). A study of people who use injection drugs in Canadian cities, estimated that 11% are living with HIV. This means that about one in 10 people who inject drugs in Canada have HIV.

This type of information is important because we know that when more people within a given population are living with HIV, a person having unprotected oral, anal or vaginal sex, or sharing injecting equipment within that population has a greater chance of being exposed to HIV. For people who inject drugs, their risk of being exposed to HIV is increased because people in their drug use and/or sexual networks may be more likely to have HIV.

Although risk taking at the individual level does increase HIV risk for people who inject drugs, it is important to consider the social and structural factors that also influence risk for this population. For example, there are disproportionately high levels of injection drug use and higher rates of HIV among low-income people. In addition to poverty, many factors, including homelessness, stigmatization and the criminalization of drug use, disproportionately affect people who inject drugs, and contribute to an increased risk for HIV infection.

What can reduce the risk of HIV transmission for people who inject drugs?

There are many interventions that reduce the risk of HIV transmission among people who inject drugs. The new biomedical approaches and harm reduction interventions described below can have many interrelated goals in addition to HIV prevention, such as bringing people into healthcare services, preventing the transmission of hepatitis C and other blood-borne infections, as well as preventing overdose and other drug-related harms.

New biomedical prevention options for people who use drugs

In recent years there has been a lot of research on new biomedical strategies that help prevent the sexual transmission of HIV. While there is limited research on the ability of biomedical strategies to prevent HIV transmission among people who use drugs, it is expected that these approaches will also have a significant impact for people who inject drugs.

Treatment as prevention

In addition to improving the health of people living with HIV, it is now clear that antiretroviral treatment (ART) has important HIV prevention benefits. We now know that taking treatment consistently and maintaining an undetectable viral load is a highly effective strategy to reduce the risk of HIV transmission.

Due to a large amount of evidence, we know that an HIV-positive person taking ART, who attains and maintains an undetectable viral load, has a negligible risk of passing HIV to sexual partners. The evidence we have for people who inject drugs tells us that this approach works but we don’t have enough evidence to help estimate the risk when using this strategy consistently and correctly.

There are two ecological studies from Vancouver and Baltimore that reported on reductions in new HIV infections over time and found an association with a reduction in the community viral load of people who inject drugs. Although it is likely that increased uptake of ART is partly responsible for the observed decline in the number of new infections, some researchers have pointed out that with this study design it is difficult to know how much of this change can be attributed to an increase in harm reduction services that also occurred during this period. However, a recent cohort study in India among people who inject drugs found a clear correlation between treatment, viral suppression and HIV incidence. While there is no estimate of effectiveness currently available, we know that high adherence to treatment can produce viral suppression in people who inject drugs and that viral...
suppression is strongly predictive of HIV transmission.\textsuperscript{14}

However, HIV treatment can only have health and prevention benefits if people who use injection drugs can access treatment. Unfortunately, people who inject drugs have inequitable access to ART, globally, as well as in developed countries such as Canada and the U.S.\textsuperscript{9,15} People who inject drugs are less likely to be on ART compared to other people living with HIV, and are more likely to start ART at a later stage of HIV infection or to die without ever starting ART.\textsuperscript{9} Research from Vancouver found that up to 50\% of people who inject drugs stopped taking ART prematurely, and that 60\% of those on treatment have poor adherence.\textsuperscript{16,17} This suggests that additional supports may be necessary to support people with HIV who also inject drugs to remain in care and adhere to HIV treatment.

Research has identified many individual-level factors (such as higher-intensity drug use, and mental health issues) that can limit access and adherence to ART among people who inject drugs. In contrast, the use of opioid substitution therapy (OST) has been associated with greater adherence to ART, highlighting the importance of a combination approach to harm reduction and HIV prevention. However, we also know that social and structural factors such as stigma and social exclusion, unstable housing, and criminalization also negatively influence the ability of people who inject drugs to access and adhere to ART.

\textit{Pre-exposure prophylaxis (PrEP)}

Oral pre-exposure prophylaxis (PrEP) is the use of oral antiretroviral drugs by an HIV-negative person, on a regular basis, starting before and continuing after exposure to HIV occurs. Oral PrEP involves the use of a pill called Truvada, which contains the two antiretroviral drugs tenofovir and emtricitabine. However, we know that in rare cases people can become infected with HIV despite taking PrEP and that PrEP is most likely to work when used consistently and correctly including:

- obtaining Truvada from a healthcare provider and taking it as prescribed
- initial and regular testing for HIV and sexually transmitted infections
- attending healthcare appointments every three months.

Health Canada has only approved PrEP for reducing HIV risk through sexual transmission. However, Canadian guidelines on PrEP and PEP (post-exposure prophylaxis), anticipated for early 2017, will recommend PrEP for people who inject drugs if they participate in injection behaviours or sexual practices that place them at high risk for HIV infection. Guidelines from British Columbia and the U.S. Centers for Disease Control (CDC) also recommend PrEP for people who inject drugs. PrEP is a proven HIV prevention tool that all people at high risk for HIV should have the opportunity to use, if they so choose.

There has been one large randomized placebo-controlled study evaluating the daily use of tenofovir as oral PrEP among people who inject drugs. This study, conducted in Thailand and known as the Bangkok Tenofovir Study, found a 49\% reduced risk of HIV infection among people who were randomized to take PrEP compared to people who took a placebo drug.\textsuperscript{18} However, an additional adherence analysis found an 84\% reduced risk of HIV among people who were taking PrEP consistently compared to those who were not.\textsuperscript{19} This highlights the importance of being highly adherent to PrEP medications.

Despite the fact that tenofovir is not the standard of care for PrEP (the standard of care is Truvada, which contains both tenofovir and emtricitabine), the results from this study are comparable to studies evaluating the effectiveness of Truvada as PrEP for sexual HIV transmission. This suggests that PrEP also provides protection for people who inject drugs. However, since people who inject drugs are at risk of HIV through both injection drug use and sex, we don’t know if the protective effect relates to sexual, injection and/or both behaviours.

Antiretroviral drugs are expensive and Truvada as PrEP costs approximately $1000 a month. Currently, only some private and public health insurance plans in Canada will cover the cost of the drugs. Now that PrEP for prevention of sexual transmission has been approved in Canada, more insurance coverage will likely eventually become available. Advocacy may be needed to get PrEP covered by provincial, territorial and federal drug programs to ensure that people who need PrEP can access it.

Advocates and researchers have identified a number of concerns with PrEP for people who inject drugs because they fear it may be prioritized over access to and scale-up of other harm reduction programs and HIV treatment.
There is already limited access to proven harm reduction interventions for people who inject drugs, such as sterile needle and syringe distribution and supervised injection facilities, and people who inject drugs also have low access to HIV treatment.

Post-exposure prophylaxis (PEP)

Post-exposure prophylaxis (PEP) involves the use of antiretroviral drugs by an HIV-negative person as soon as possible (but within 72 hours) after a potential exposure to HIV, to help prevent HIV transmission. However, we know that people can become infected with HIV despite taking PEP and that PEP is most likely to work when used consistently and correctly including:

- obtaining PEP from a healthcare provider
- taking it every day as prescribed for 28 days
- accessing PEP as soon as possible after a potential exposure.

The forthcoming Canadian guidelines on PEP (and PrEP) will recommend PEP as an HIV prevention option for people who inject drugs. Some provinces and territories, in addition to the CDC and the World Health Organization (WHO), already have guidelines that recommend PEP for people who use injection drugs.

Research has found that PEP can reduce the risk of HIV by over 80%. However, no studies have looked exclusively at PEP use among people who inject drugs. However, evidence suggests that PEP is effective in this population, as some studies have included small numbers of people who reported HIV exposures from sharing injection equipment.

Time-honoured harm reduction strategies

Needle and syringe distribution

One effective way to prevent HIV transmission is to use new injecting equipment every time a person uses drugs. Needle and syringe programs (NSPs) distribute new needles and other injection-related equipment to people who inject drugs, and typically offer other services such as information, counselling and referrals. NSPs operate most commonly out of fixed sites; however, needle and syringe distribution also happens through mobile sites, pharmacies, vending machines and during outreach. Evidence reviews have found that the use of NSPs by people who inject drugs is associated with reductions in injecting risk behaviours and reduced HIV transmission rates. NSPs are thought to be more effective when combined with an array of harm reduction approaches, such as educational interventions and OST.

Opioid substitution therapy (OST)

Opioid substitution therapy involves the use of prescription medications (such as methadone and buprenorphine) that can reduce drug cravings and prevent withdrawal symptoms for people who use opiates. These drugs do so without creating the same euphoric or high feeling that a person would get from injecting, snorting or swallowing opiates. OST has consistently been shown to help reduce or eliminate injection drug use, related injection risk behaviours and HIV infection rates among people who inject drugs. For example, a meta-analysis estimated that the use of OST by people who inject drugs is associated with a 54% reduced risk of HIV, compared to not using OST.

Supervised injecting facilities

Supervised injecting facilities (SIFs) are supervised areas where people who use drugs can inject pre-obtained drugs in a clean and safe environment. SIFs have been shown to attract people who are at increased risk of HIV infection, and they can be important settings for delivering harm reduction education, distributing injection-related equipment and providing referrals to addiction treatment programs. Several studies have shown that SIFs are associated with reductions in injecting risk behaviours such as needle/syringe sharing, which can lead to reductions in HIV transmission. However, no studies have directly assessed whether or not SIFs have an impact on the number of
HIV infections among people who use them. However, a modelling study looking at the cost effectiveness of supervised injection facilities in Toronto and Ottawa estimated the number of HIV and hepatitis C infections averted. It was estimated that if one to three SIFs were implemented in Toronto about two to three HIV infections would be averted per year at each facility and that about 15 to 20 hepatitis C infections would be averted per facility over 20 years. In Ottawa the estimated number of averted HIV infections was six to 10 per SIF (up to a maximum of two SIFs) and the number of hepatitis C virus infections averted was 20 to 35 per SIF per year.

Educational interventions

Educational interventions for people who inject drugs focus on providing clients with information about what behaviours to adopt or avoid to reduce HIV risk from injection drug use or sex. Educational risk reduction interventions that have been evaluated in the scientific literature incorporate a variety of different strategies and delivery methods. For example, information about HIV transmission, risk behaviours, and harm reduction strategies may be delivered through peer-training sessions, outreach, one-on-one counselling, group discussions, written materials, videos, demonstrations and role-playing. Although these interventions can differ greatly based on location, population and the combination of harm reduction strategies used, evidence suggests that educational interventions can have moderate effects on reducing risk behaviours.

Coverage and reach

Coverage of harm reduction services must be high, including in rural and remote communities to have an impact on reducing HIV transmission among people who inject drugs. For example, NSPs that do not distribute enough equipment or do not reach enough people who inject drugs are less likely than other programs with better coverage and reach to have an impact on transmission rates. Little is known about coverage in Canada because of insufficient data. However, we do know that HIV prevalence and incidence vary across the country, suggesting that some programs may have better reach and coverage than others.

Despite the proven effectiveness of multiple harm reduction interventions, many of these have not been effectively scaled-up for people who inject drugs. While, historically, SIFs have been rarely implemented in Canada because they have low community and government support, this tide seems to be shifting. Many jurisdictions in Canada have applied for an exemption under the Controlled Drugs and Substances Act to operate the sites. In addition, in December 2016 the Federal Health Minister, Jane Philpott, announced new legislation that will remove barriers and make it easier for municipalities to apply to open SIFs.

Recommendations for service providers who provide HIV prevention services to people who inject drugs:

- Provide a variety of harm reduction services (such as needle and syringe distribution, safer injection education, etc.) through a variety of delivery methods (for example, fixed sites, mobile and street outreach, and peer training), and offer referrals to other harm reduction services and supports, including OST. For more information see Best Practice Recommendations for Canadian Harm Reduction Programs that Provide Service to People Who Use Drugs and are at Risk for HIV, HCV, and Other Harms: Part 1.
- Talk with clients about new biomedical HIV prevention technologies so that they are aware of the full range of options available to them.
  - Discuss the consistent and correct use of PrEP and PEP with clients. PrEP is not for everyone, but may be considered by any person who is at high risk of getting HIV. PEP is available for emergencies, when an exposure to HIV may have already occurred (within 72 hours). PrEP and PEP may be used in combination with other harm reduction strategies and safer sex practices, to reduce HIV risk.
  - Discuss the consistent and correct use of ART by people living with HIV to achieve and maintain an undetectable viral load. Make sure that clients living with HIV know about the health and prevention benefits of having an undetectable viral load. Support them to achieve and maintain an undetectable viral load, or refer to appropriate support services.
- Offer safer sex supplies (such as condoms, lube, etc.) and counselling services to reduce the risk of HIV and other sexually transmitted infections.
- Provide or refer to HIV and hepatitis C testing services.
- For people living with HIV and/or hepatitis C, provide linkage to care and support services.
- Offer referrals to other services that clients may be connected to, as appropriate, to help address the social
determinants of health that impact HIV risk for people who inject drugs (for example, housing and social assistance, mental health and addiction services, etc.).

Resources

- Best Practice Recommendations for Canadian Harm Reduction Programs that Provide Service to People Who Use Drugs and are at Risk for HIV, HCV, and Other Harms: Part 1
- Best Practice Recommendations for Canadian Harm Reduction Programs that Provide Service to People Who Use Drugs and are at Risk for HIV, HCV, and Other Harms: Part 2
- CATIE statement on the use of condoms to prevent the sexual transmission of HIV
- CATIE statement on the use of oral pre-exposure prophylaxis (PrEP) to prevent the sexual transmission of HIV
- CATIE statement on the use of antiretroviral treatment (ART) and an undetectable viral load to prevent the sexual transmission of HIV
- Oral pre-exposure prophylaxis (PrEP) – CATIE fact sheet
- Guidance for the use of pre-exposure prophylaxis (PrEP) for the prevention of HIV acquisition in British Columbia

References

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