An **exposure** involves the transmission of blood or body fluid between a *source* and an *exposed person:*

- One-way exposure – where the blood or body fluid from the source person has a portal of entry into an exposed person; or
- Reciprocal exposure – where there has been an *exchange* of blood or body fluids between individuals such as in sexual exposures or biting incidents. In these situations, it is prudent to assess both individuals from the perspective of being the exposed and the source.

Table 2.1 Risk Estimates of HIV, hepatitis B virus (HBV), hepatitis C virus (HCV) Transmission after Exposure to Infected Blood

INFECTED BLOOD	HIV	HBV	HCV
Risk of transmission after percutaneous exposure[1]	0.3% (3 in 1000)	1-30% (6-30 in 100)	1.8% (3-10 in 100)
Risk of transmission after mucocutaneous exposure[2]	0.1% (1 in 1000)		

(U.S. Centers for Disease Control and Prevention, 2010)

Risk of HIV Transmission

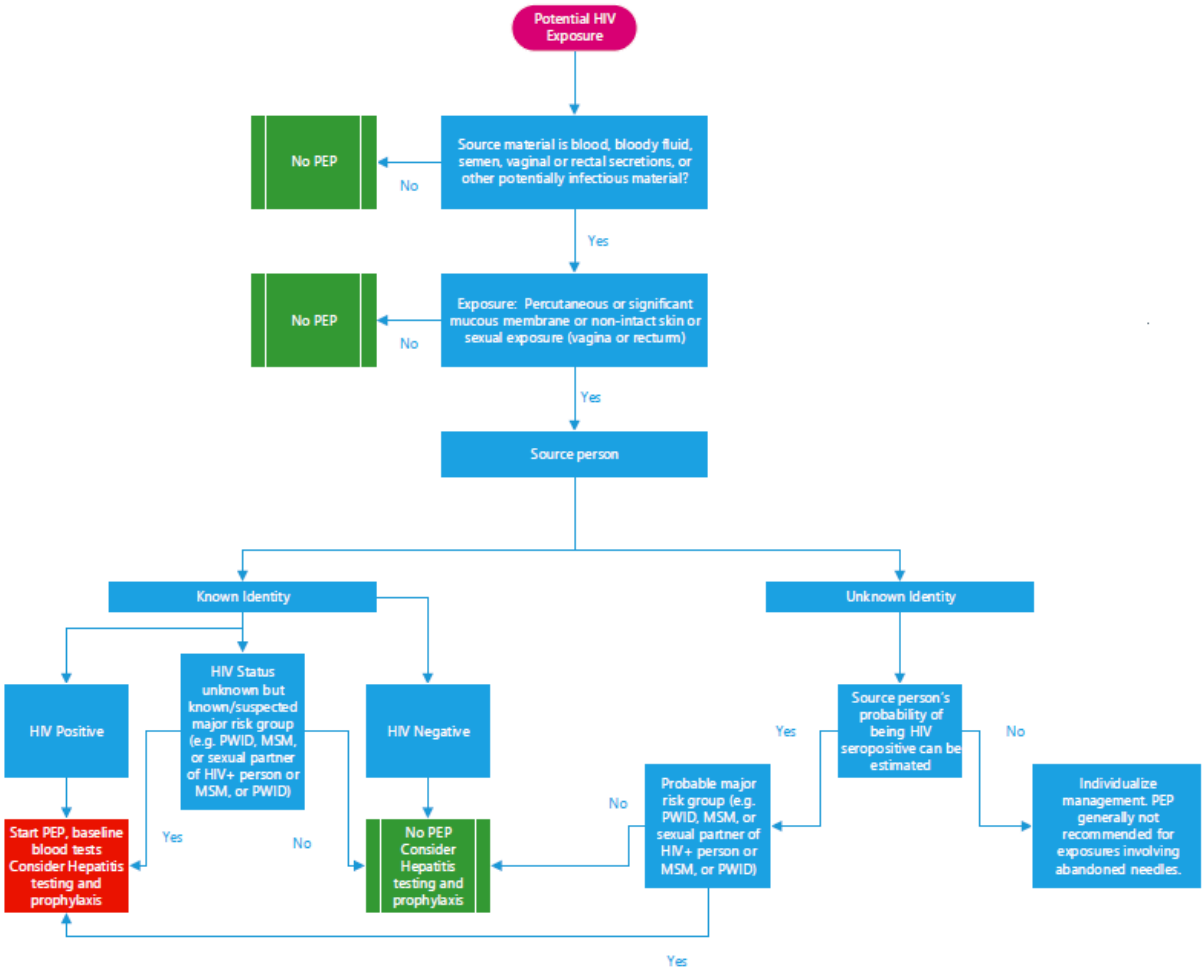
Conducting an objective and thorough risk assessment is the key to making a recommendation for HIV post-exposure prophylaxis (PEP). The risk of transmission is calculated based on the:

- type of fluid involved in the exposure;
- type of exposure; and
- likelihood the source is infected.

[1] needlestick or cut with a sharp object contaminated with infected blood

[2] contact of mucous membrane or non-intact skin (e.g., exposed skin that is chapped, abraded, or afflicted with dermatitis) with blood, saliva, tissue, or other body fluids that are potentially infectious

Figure 2.1 Decision-Making Algorithm for HIV PEP[3]



Risk by Type of Fluid

Infectious body fluids (capable of transmitting HIV)

- Blood
- Any body fluid visibly contaminated with blood
- Semen
- Vaginal/rectal secretions
- Cerebrospinal fluid (CSF); breast milk; amniotic, pericardial, peritoneal and synovial fluids ; and inflammatory exudates
- Tissue or organs e.g transplantation

[3] Charts from Alberta Guidelines for Post-Exposure Management and Prophylaxis; 2019 Government of Alberta

Table 2.2 HIV Post-Exposure Prophylaxis Recommendations for Other Exposures*

Type of Exposure	Source Status		
	HIV Positive**	Unknown HIV Status	
		From major risk group	Not known to be in a major risk group OR Unknown risk factors for HIV OR Unknown
High-risk			
Needle sharing, IDU	**Recommended**	**Recommended**	Not Applicable
Percutaneous, hollow bore needle stick	**Recommended**	Case-by-Case	*Not recommended*
Occupational mucous membrane (splashes to eyes, nose and mouth; risk may be lower with non-intact skin)	**Recommended**	Case-by-Case	*Not recommended*
Human bites involving blood	**Recommended**	Case-by-Case	*Not recommended*
Low Risk			
Receptive oral sex (condomless)	Case-by-Case	*Not recommended*	*Not recommended*
Insertive oral sex (condomless)	Case-by-Case	*Not recommended*	*Not recommended*
Percutaneous injury (solid bore needle, superficial injury), Permucosal exposure to non-blood containing bodily fluids or non-intact skin exposure to blood or visible blood-stained bodily fluid	*Not recommended*	*Not recommended*	*Not recommended*
Negligible Risk			
Discarded needles found in the community, Human bites not involving blood; Contact with intact skin; Superficial scratches that do not bleed	*Not recommended*	*Not recommended*	*Not recommended*

Recommended: Risk about 1/1000 (0.1%) or greater;
Case-by-Case: Risk between 1/1000 and 1/10,000 (0.01%) if there are other factors that may increase the risk of transmission;
Not recommended: Risk less than 1/10,000 (0.001%) or below
** Viral load in an HIV positive source should not be considered in the context of an occupational exposure due to a lack of direct evidence at this time.

With lower risk exposures, assess for factors that increase risk before recommending initiation of HIV PEP.

Factors that increase risk:

- Source person is known to be HIV-infected with high viral load
- An oral mucosa that is not intact (e.g., oral lesions, gingivitis, wounds)
- Blood exposure – it is important to note that blood exposure can be minimal and therefore not recognized by the exposed person. If the exposed person reports frank blood exposure, PEP would be indicated
- Presence of genital ulcer disease or other STIs
- Trauma at the site of exposure (for example, sexual assault)
- Cervical ectopy
- Lack of circumcision
- Deep injury
- Direct injection into a vein or artery
- Terminal illness in the source patient

Risk Based on Assessment of Source

The source, if available, should be tested and or interviewed to provide the most appropriate care to the exposed. The source must provide informed consent regarding use and disclosure of information prior to conducting the interview or obtaining specimens for testing. Refer to Appendix 15-Collection Use and Disclosure of Information and Appendix 16 – Consent for Source Patient Testing Following a Blood/Body Fluid Exposure.

If antiretrovirals are indicated for PEP, they are most effective if initiated within two hours, and not more than 72 hours, after exposure. Therefore, the health care provider should complete a risk assessment of the exposure **as soon as possible** after presentation.

Source known to be HIV positive - The risk of HIV transmission is directly related to the HIV viral load (level of HIV viral particles in the blood) of the source[4].

- Obtain history of antiretroviral medications, recent viral load, CD4 cell count, and date of results.
- Consider drawing HIV viral load, CD4 cell count and resistance testing.

[4] The risk is lower if the HIV positive source is receiving effective antiretroviral therapy and has a consistently (in at least two consecutive measurements) undetectable plasma viral load (<40 copies/mL

- Consider evaluation and testing for other STIs, including syphilis, hepatitis B and hepatitis C.

Sources with an unknown HIV Status – Obtain history of risk and obtain HIV test (Refer to Appendix 14 – Source Patient Risk Assessment). Source known to be at high risk of being HIV positive include:

- People who inject drugs (PWID)
- Men who have sex with men (MSM)
- Persons who have had multiple transfusions of blood or blood products (e.g. hemophiliacs) prior to November 1985
- Sexual partners of persons known to be HIV positive, or at high risk of being HIV positive.
- Sex with known or suspected HIV positive people
- History of multiple sexual partners
- Concomitant hepatitis C infection
- From a country with an HIV prevalence rate greater than 5%

Table 2.3 Recommendations for Source Based on HIV Status

Unknown HIV Status	• Obtain risk history and HIV test. • Consider evaluation and testing for other STIs, including hepatitis B and hepatitis C.
Known Positive HIV Status	• Obtain history of antiretroviral medications, recent viral load, CD4 cell count, and date of results. • Consider drawing HIV viral load, CD4 cell count and resistance testing. • Consider evaluation and testing for other STIs, including syphilis, hepatitis B and hepatitis C.

When the results for the source are available, the provider for the exposed person should immediately be notified. The exposed person is entitled to know if continued prophylaxis is required or not, but details regarding the source should NOT be provided to the exposed person.

Window Period Considerations

In HIV testing, the window period refers to the time between a person becoming infected and when laboratory tests can detect HIV infection. The window period varies based on the test that is completed.

A summary of window periods based on the HIV test used provides context to the reliability of the test results:

- antibody/antigen (4th generation test) has window period of approximately 18 days;
- 95 % of people test positive within 4 weeks, 99% by 6 weeks post-infection as detected by Geenius testing. (personal communication, Amanda Lang, RRPL, April 2019);
- point of care test has a window period of approximately 22 days (personal communication, Amanda Lang, April 2019);
- 95% of people will test positive by 40 days post-infection, and 99% of individuals will have seroconverted by 3 months.

Suppressed Viral Load

Multiple studies have occurred to observe HIV transmission between serodiscordant couples when the HIV positive partner was virally suppressed. Some of the notable studies are the HPTN 052 study, the PARTNER study, and the OPPOSITES ATTRACT study, which all demonstrated no HIV transmission events when viral suppression had been reached.
Based on this evidence, the source viral load should only be considered in the risk assessment process for consensual sexual exposures and should be done in consultation with a clinician knowledgeable about HIV. In order for a source to be considered to have a 'suppressed viral load' for the purposes of the risk assessment, the source needs:

1. Most recent serum viral load must be < 40 copies/mL (< 1.84 log10) and tested within the last six months; **AND**
2. No current other STIs at the time of exposure; **AND**
3. Stable on ART (as determined by a clinician knowledgeable in HIV) with no indication of issues impacting (or potentially impacting) medication adherence.

When in doubt about the viral load of the source, it's interpretation, or application to the risk assessment process, the remaining criteria should be used in the risk assessment process.
This updated guideline does not recommend PEP for individuals who have had a consensual sexual exposure from a source who is known to be HIV-positive but has a suppressed viral load. These guidelines have adopted the use of viral load < 40 copies/mL threshold to define undetectable viral load. This is consistent with the Canadian Guidelines, 2017 that have been clarified on this issue (Clarification, Canadian Guidelines, June 25, 2018). The basis for the definition of undetectable viral load < 40 copies/mL is that it is the most commonly used definition in clinical care in Canada. However, it is acknowledged that numerous studies on viral load used different thresholds most often < 200 copies/mL. Clinical discretion is advised where

there are interim fluctuations in the viral load and consultation with an HIV specialist should be sought if there is uncertainty regarding interpretation or implications of viral load test results. For situations other than consensual sexual exposures, it is possible that the same principles of viral load suppression and risk of HIV transmission also apply. However, there is currently no data to support applying this principle to other blood and bodily fluid exposures (e.g., needlestick injuries or traumatic sexual assault) at this time.
(Alberta Guidelines for Post-Exposure Management and Prophylaxis: 2019)

Additional Considerations Prior to Initiating HIV PEP

Risk/Benefit Analysis

One must weigh the risks of becoming infected with HIV (which are frequently extremely low) against the risk of taking antiretroviral therapy (which can be significant). HIV PEP should not be initiated if the risk/benefit ratio is unfavourable. Refer to Section 3 – Antiretroviral Therapy (ART) for HIV Post-Exposure Prophylaxis (HIV PEP) for details about HIV PEP medications to assist conducting the risk/benefit ratio.

HIV Test Results

Standard HIV tests routinely have a turn-around time from 2-3 days up to 2 weeks. When managing an exposure, timely results of source tests can inform the decision for necessary management of the exposed.

An HIV POC test can provide more timely results and should be considered where available for the source and/or the exposed.

If at any point in the process there is an unexpected HIV + result for either the source person or the exposed individual, they should be referred for appropriate follow-up by an HIV care provider.

Risk of Hepatitis B Transmission

For percutaneous and mucosal exposure to blood, several factors should be considered when making a decision to provide prophylaxis with hepatitis B vaccine and/or immune globulin (HBIg), including the predicted serostatus of the source, the exposed hepatitis B immunization status and vaccine response. Refer to Appendix 8 – Management of Potential Exposures to Hepatitis B.

Table 2.1 demonstrates that HBV is transmitted more efficiently than HIV. When the source is known, the following risk factors should be assessed:

- multiple sexual partners;

- type of sexual contact (anal intercourse carries a higher risk than vaginal intercourse which is higher risk than oral-anal); oral-genital and/or oral-oral contact do not appear to influence the risk of becoming infected with HBV;
- the presence of other sexually transmitted infections;
- if the source is from an endemic country[5];
- high HBV DNA levels or HBe antigen positivity in the source.

Exposed individuals, including sexual assault victims should be managed with hepatitis B vaccine and/or HBIg as outlined in Appendix 8 – (a) Management of Individuals with Percutaneous or Mucosal Exposure to an Infected or High-Risk Source.

Risk of Hepatitis C Transmission

While HCV is transmitted more efficiently than HIV by the parenteral route, transmission through sexual contact is much less efficient then either HBV or HIV. Persons with multiple partners and those with STIs are at increased risk of acquisition.

HIV co-infection seems to increase the rate of HCV transmission, while individuals without detectable HCV RNA appear to be at extremely low or near zero risk of transmitting HCV.

Currently, there is no effective post-exposure prophylaxis against HCV. Refer to Appendix 9 – Management of Potential Exposures to Hepatitis C.

[5] https://wwwnc.cdc.gov/travel/yellowbook/2020/travel-related-infectious-diseases/hepatitis-b

Attachment - Estimated Per-Act Probability of Acquiring HIV from a Known HIV - Infected Source by Exposure Act

Type of Exposure	Estimated Risk	Reference
Parenteral		
Blood Transfusion	90% (9 in 10)	Patel, et al (2014)
Needle-sharing during injection drug use	0.63% (63 in 10000)	
Percutaneous (needlestick)	0.23% (23 in 10 000)	
Sexual		
Receptive anal intercourse	1.4% (7 in 5000)	Patel, et al (2014)
Receptive penile-vaginal intercourse	0.08% (8 in 10000)	Patel, et al (2014)
Insertive anal intercourse	0.11% (11 in 10000)	Patel, et al (2014)
Insertive penile-vaginal	0.04% (4 in 10000)	Patel, et al (2014)
Receptive oral intercourse	Low[a]	Varghese, et al. (2002) Page-Shafer, et al. (2002)
Insertive oral intercourse	Low[a]	Varghese, et al. (2002)
Other[b]		
Biting	Negligible	Pretty, et al. (1999)
Spitting	Negligible	
Throwing body fluids (including semen or saliva)	Negligible	
Sharing sex toys	Negligible	

[a] HIV transmission through oral sex has been documented, but rare. Accurate estimates of risk are not available. It is prudent to recommend HIV PEP for receptive oral sex with ejaculation, although discussion about the low risk should occur. Refer to Table 5.1 for further consideration.

[b] HIV transmission through these exposure routes is technically possible but extremely unlikely and cases are not well documented. Increased risk occurs when the activity involved exposure to blood