
DISEASES SPREAD THROUGH BLOOD AND BODY FLUIDS

A. Introduction

The viruses that cause bloodborne diseases are carried in an infected person's bloodstream and/or in other body fluids, such as semen, vaginal secretions, discharge from wounds and saliva. Sometimes the viruses may also be present in normally sterile body fluids such as pleural, amniotic, pericardial, peritoneal, synovial and cerebrospinal fluids (see Glossary). People who carry these viruses may not show any signs of illness, but they can infect others. **For this reason, and because it is hard to know in an emergency situation what fluids are present, all blood and body fluids should be treated as potentially infectious.**

In this section you will find information on the following topics:

- Bloodborne pathogens – hepatitis B, hepatitis C and HIV/AIDS
- Differences between hepatitis B, hepatitis C and HIV/AIDS
- Level of risk
- Situations where transmission may occur

B. Hepatitis B

Hepatitis B is an infection of the liver caused by the hepatitis B virus (HBV). Ninety per cent of those infected with HBV recover completely from the disease. Three to 10 per cent of cases go on to be chronic carriers of the virus (i.e., individuals who are not able to develop antibodies to the complete virus), and capable of infecting others. They are infectious for life, and may not be aware they are infectious. These individuals are at risk of eventually developing permanent liver damage such as cirrhosis (scarring) of the liver or liver cancer.

Please note that hepatitis B is a reportable disease and must be reported to YRCHS for appropriate follow-up.

Transmission

HBV is highly infectious. It is found in infected blood and body fluids (E.g. semen, vaginal secretions, pleural, amniotic, pericardial, peritoneal, synovial and cerebrospinal fluids, saliva, breast milk and discharge from wounds) of an infected person. Emergency services workers can get HBV if they are exposed to an infected person's blood or body fluids through the mucous membranes of their eyes, nose or mouth, by a needle stick injury, or through cracks and cuts in broken skin. The virus can survive in dried blood on contaminated surfaces for up to seven

days¹. It is easily destroyed by chlorine bleach (one part bleach to nine parts water), heat, and rubbing alcohol. For risk of transmission, see, [Situations where transmission of bloodborne pathogens can occur](#)

HBV can be passed onto others through unprotected sexual contact and by sharing contaminated syringes/needles. It can also be passed on to babies born to hepatitis B carrier mothers. Hepatitis B is not spread through kissing*, coughing or sharing eating utensils.

Symptoms

The incubation period of HBV is 45 to 180 days with an average of 60 to 90 days. Approximately 30 to 50 per cent of people who are infected have symptoms. This may include fever, nausea, tiredness, jaundice and tenderness in the upper abdomen, dark urine, clay coloured bowel movements and joint pain. Symptoms can last up to three months.

A blood test can be done to determine if a person is infected with HBV.

Treatment/Immunization

There is currently no cure or treatment for acute HBV. For those who become chronic carriers (i.e., with no evidence of complete antibody response six months after exposure), treatment may be offered to suppress HBV replication and promote remission of liver disease. Current treatments are not effective for everyone, but new treatments are being developed and researched.

The best protection against HBV infection is to be immunized against hepatitis B. In adults, it consists of receiving three doses of hepatitis B vaccine over a six month period. This produces immunity in over 95 per cent of people. Emergency services workers should know their antibody titre value, which will indicate if the immunization has produced immunity. Your physician can check your titre levels one to six months after the course of vaccine is completed. A titre value greater than or equal to 10 I.U./L** indicates immunity. For individuals without sufficient immunity, a booster shot or a second series of vaccine may prompt sufficient antibody levels.

What do you do if you think you have been exposed?

The Canadian Immunization Guide provides a complete protocol on what to do when a hepatitis B exposure is suspected. The steps to take depend on the immune status of the exposed individual. Hepatitis B Immune globulin (HBIG) is available for individuals without protective immunity. It provides short-term immediate immunity. HBIG can be given up to seven days

¹ Centers for Disease Control and Prevention. Hepatitis B Frequently Asked Questions. [Online] 2006 [cited January 23, 2007]; Available from: www.cdc.gov/ncidod/diseases/hepatitis/b/faqb.htm#gen

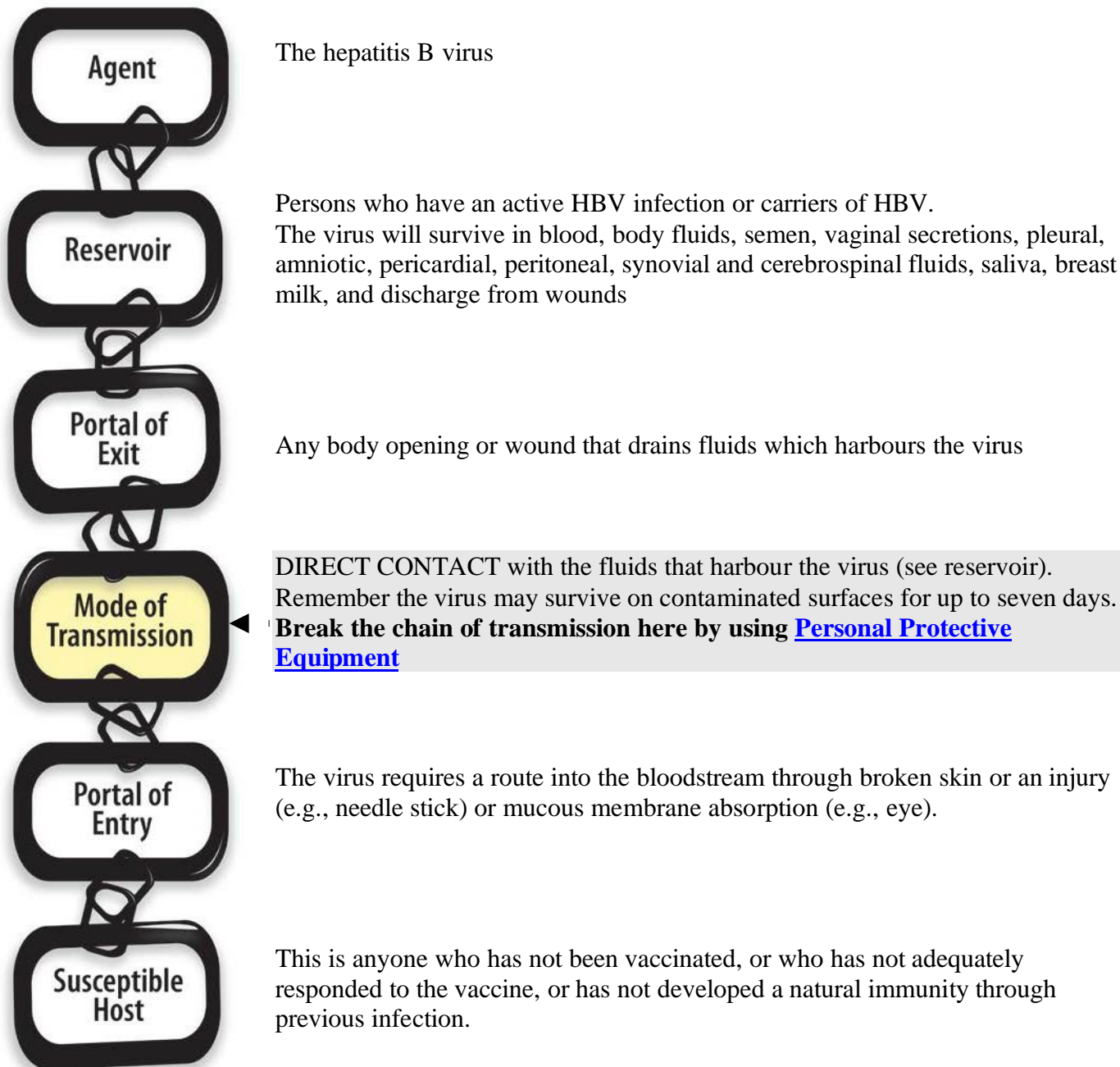
* There is a potential for infection with French kissing, if and when there are open sores or abrasions on gums, tongue, and palate (Hep B Foundation, 2002).

** I.U./L is international units per litre

(ideally within 48 hours) after exposure. HBIG is not necessary for those who have immunity or have been vaccinated against HBV.

For more information, read our [Hepatitis B Fact Sheet](#)

HEPATITIS B CHAIN OF TRANSMISSION



Remember: Break the Chain, Stop Infection!

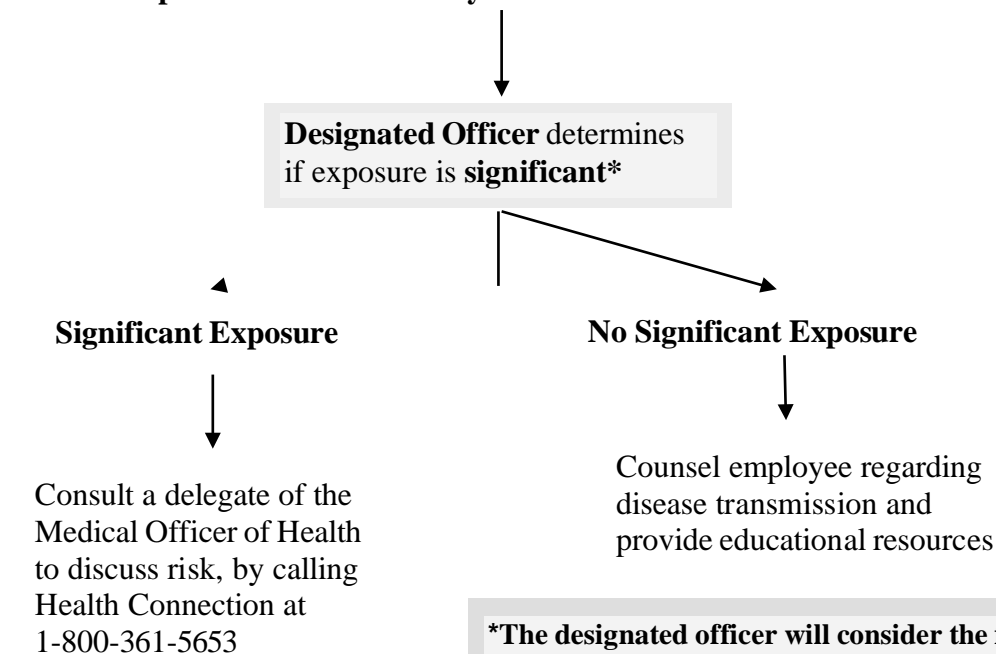
Decision Tree: Possible Exposure to Hepatitis B Virus (HBV)

Exposure to blood and/or body fluids

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Report to **Designated Officer**

A thorough risk assessment for occupational exposure to bloodborne diseases must take place. If Post-Exposure Prophylaxis (PEP) is required due to possible exposure to Hepatitis B, previously unimmunized persons exposed to HBV should be given a single dose of HBIG as soon as possible, and at least within 24 hours of exposure, and the hepatitis B vaccine series should be started. **For this reason, the Designated Officer should be contacted immediately when there is an exposure to blood or body fluids.**



- *The designated officer will consider the following:**

 - How much of a substance was present in the environment and how much of it did the person come in contact with?
 - Was there direct contact with the reservoir that carries this disease?
 - Was protective clothing and/or equipment used that should have prevented the transmission of the disease (e.g., gloves, eye protection, mask)?
 - Was the personal protective equipment compromised?
 - Is the person susceptible?
 - Was there an appropriate “route of entry” for the disease in question?

C. Hepatitis C

Hepatitis C is an infection of the liver caused by the hepatitis C virus (HCV). It can cause permanent liver damage such as cirrhosis (scarring) or liver cancer in some people.

Please note that hepatitis C is a reportable disease and must be reported to YRCHS for appropriate follow-up.

Transmission

Hepatitis C spreads through **direct blood-to-blood contact** with a person infected with HCV. For example, emergency services workers could get HCV if exposed to an infected person's blood through a needlestick injury.

Prior to the initiation of blood screening in July 1992, hepatitis C was most often transmitted through transfusion of infected blood and blood products. Since then, getting hepatitis C through infected blood products has been rare. Currently, the people most likely to get hepatitis C are drug users who share needles, spoons, straws and other drug related equipment. HCV can also be spread by sharing contaminated tattooing and body piercing equipment, razors, toothbrushes, nail scissors/clippers/files. Transmission through sexual intercourse is rare in long-term, monogamous relationships. Hepatitis C transmission can also occur when children are born to infected mothers, but are very rare. Hepatitis C is not spread through kissing, coughing or sharing eating utensils. For risk of transmission, visit [Situations where transmission of bloodborne pathogens can occur](#).

General disinfection measures against hepatitis B virus are applicable to HCV.

Symptoms

The signs and symptoms of hepatitis C virus infection usually are indistinguishable from those of hepatitis A or B. Most people with chronic infection are asymptomatic. In acute hepatitis onset is usually insidious. Symptoms may resemble a flu-like illness, including muscle pain, jaundice, nausea, tiredness, loss of appetite, joint pain, dark urine and clay-coloured bowel movements. Fatigue is the most common symptom in hepatitis C. Although initial infection may be asymptomatic or mild, a high percentage (between 50 per cent and 80 per cent) will develop chronic infection. Chronic infection may persist for up to 20 years before the onset of symptoms, but during this period they can spread the hepatitis C virus to others.

Incubation Period

The time between exposure to the virus and development of symptoms ranges from two (2) weeks to six (6) months but is commonly six (6) to nine (9) weeks.

Treatment/Immunization

There is treatment for hepatitis C. When an HCV infection is identified early, the individual should see the family physician for assessment and a referral to a specialist for proper management.¹

There is currently no vaccine for HCV.

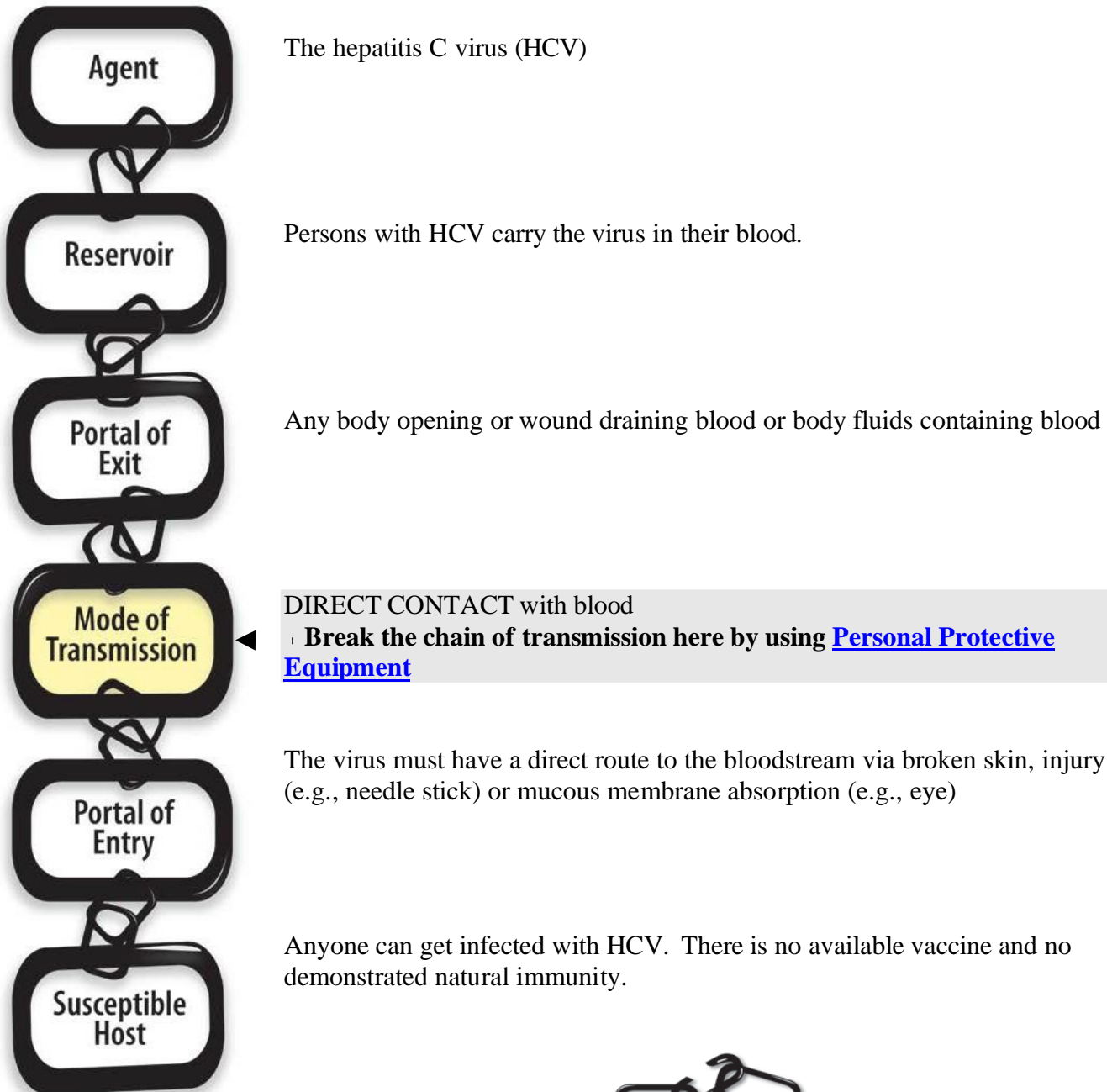
What do you do if you think you have been exposed?

At this point, there are no recommendations for HCV post-exposure prophylaxis (PEP), which are the medications and/or treatments offered to an exposed individual to help reduce his/her risk of acquiring an infection. Immune globulin is not effective. Exposed emergency service workers should receive appropriate counselling, testing, and follow up.

For more information, read our [Hepatitis C Fact Sheet](#)

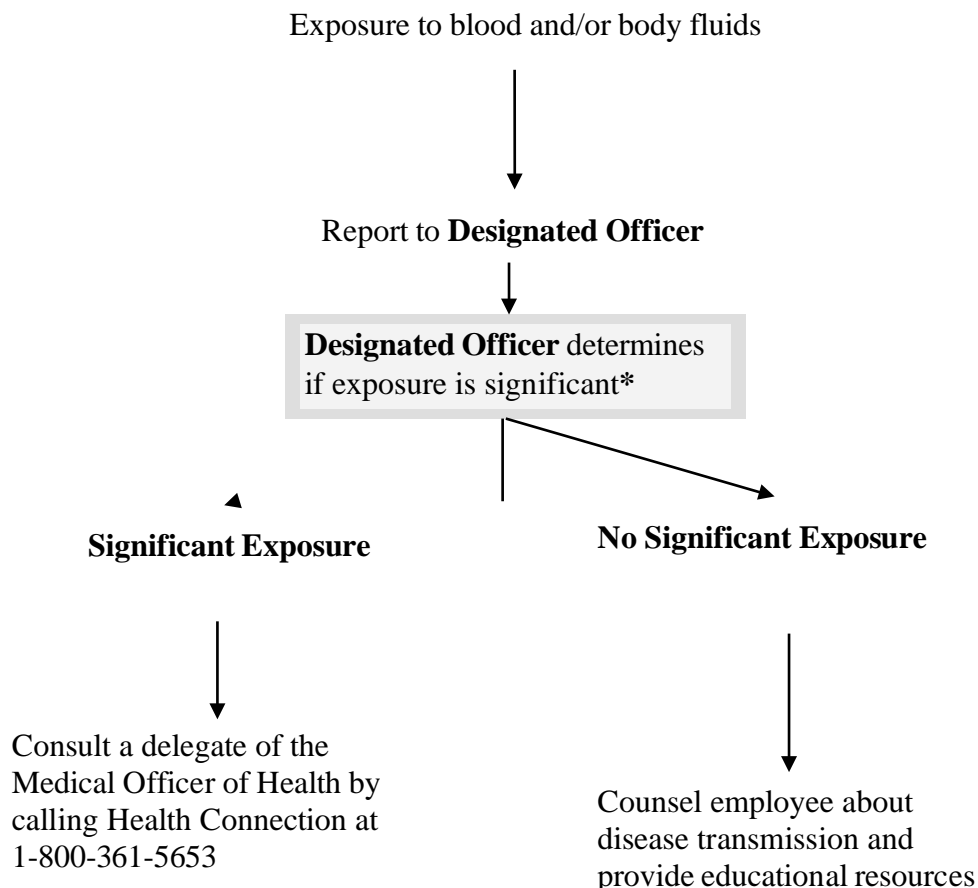
¹ Centers for Disease Control and Prevention. Updated U.S. public health service guidelines for the management of occupational exposures to HBV, HCV, and HIV and recommendations for postexposure prophylaxis. MMWR [Online] June 29, 2001 [cited January 23, 2007]; 50 (RR-11): Available from: www.cdc.gov/mmwr/PDF/rr/rr5011.pdf

HEPATITIS C CHAIN OF TRANSMISSION



Remember: Break the Chain, Stop Infection!

DECISION TREE: POSSIBLE EXPOSURE TO HEPATITIS C



***The designated officer will consider the following:**

- How much of a substance was present in the environment and how much of it did the person come in contact with?
- Was there direct contact with the disease reservoir?
- How long was the exposure?
- Was protective clothing and/or equipment used that should have prevented the transmission of the disease (e.g., gloves, eye protection, mask)?
- Was the personal equipment compromised?
- Was there an appropriate “route of entry” for the disease in question?

D. HIV/AIDS

Acquired Immune Deficiency Syndrome (AIDS) is caused by a virus called the Human Immunodeficiency Virus (HIV). HIV breaks down the body's immune system defences against disease. If HIV goes untreated, AIDS develops in most individuals within an average of 10 years after infection. With treatment, the progression to AIDS may be delayed or prevented. The infections associated with AIDS are called opportunistic infections (e.g., candidiasis, kaposi sarcoma) because they take advantage of the body's weakened immune system. It is the opportunistic infections and not AIDS that causes death.

Please note that HIV/AIDS is a reportable disease and must be reported to YRCHS for appropriate follow-up.

Transmission

HIV is carried in the blood, semen, vaginal fluids, pleural, amniotic, pericardial, peritoneal, synovial and cerebrospinal fluids and breast milk of an infected person. HIV is not present in sufficient quantities in saliva, tears, vomitus, feces, and urine to cause an infection unless these fluids are visibly stained with blood.

To become infected with HIV, the virus must get directly into the bloodstream. HIV can spread during unprotected sexual intercourse with an infected person, or through sharing needles and syringes that are contaminated with infected blood. The virus can also spread through percutaneous injury with contaminated sharp objects (e.g., needle stick injuries), from mother to infant during pregnancy, delivery or breastfeeding, and transfusion of infected blood or its components. For the risk of transmission, visit [Situations where transmission of bloodborne pathogens can occur](#).

The virus is not spread by ordinary, everyday contact with people at work, in school, or the general public. You cannot get HIV from telephones, toilet seats, swimming pools, whirlpools, hugging, sharing eating utensils, or sharing transportation with someone who is infected.

Outside the body, the virus is very fragile. It is easily destroyed by household detergents, chlorine bleach (one part bleach to nine parts water), heat, rubbing alcohol, or hydrogen peroxide.

Symptoms

About half of people infected with HIV do not experience any symptoms following infection. Others may experience flu-like symptoms two to four weeks after being infected. They may have a fever, headache, sore muscles and joints, stomach ache, swollen lymph glands, or a skin

rash for one or two weeks. However, these symptoms tend to be overlooked as they can occur with many minor illnesses.

Healthcare providers use an antibody test to determine if someone exposed to HIV has become infected, but it can take from three to six months for HIV antibodies to develop. For this reason, emergency services workers who might have had a possible exposure may have to wait several months to know whether or not they are infected.

Incubation period

The incubation period for HIV is variable although the time from infection to the development of detectable HIV antibodies is generally as early as four to 12 weeks (30 to 90 days or one to three months) but may be longer. Once a person is infected with the virus, it can take anywhere from a few months to many years to become ill. The time from HIV infection to diagnosis of AIDS may range from one to 15 years or more.

Treatment/Immunization

Treatment is available that can tremendously improve the quality of life of those who are infected with HIV. However, the treatment is expensive and the drugs do not work for everyone.

There is no vaccine against HIV.

What do you do if you think you have been exposed?

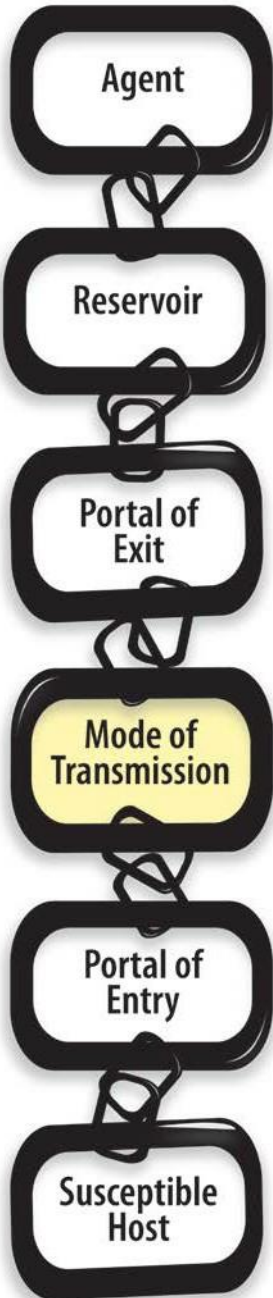
If there is a risk of exposure to HIV, the emergency services worker needs to be assessed at the emergency department at the hospital. If the decision to start post-exposure prophylaxis (PEP) is made, based on risk factors, such as exposure type and other, antiretroviral medications should be started within 72 hours and preferably within one hour of exposure¹. The interval after which there is no benefit from PEP is undefined.²

For more information, read our [HIV/AIDS Fact Sheet](#)

¹Public Health Agency of Canada. Canadian Guidelines on Sexually Transmitted Infections, 2006 edition. Ottawa, ON. 2008.

²Ontario Hospital Association/Ontario Medical Association. Communicable Disease Surveillance Protocols. Bloodborne Diseases. Revised June 2006. Page 14.

HIV CHAIN OF TRANSMISSION



The human immunodeficiency virus (HIV)

HIV infected individuals

- The virus will survive in blood and body fluids such as semen, vaginal secretions, pleural, amniotic, pericardial, peritoneal, synovial and cerebrospinal fluids and breast milk. Exclude: saliva, tears, vomitus, feces, and urine unless visibly stained with blood

Any body opening or wound that drains fluids which harbour the virus

DIRECT CONTACT with the fluids that harbour the virus

Break the chain of transmission here by using [Personal Protective Equipment](#)

The virus must have a direct route to the bloodstream via an open wound, broken skin, needle stick or mucous membrane absorption

Anyone can become infected with HIV. There is no vaccine and natural immunity has not been demonstrated.



Remember: Break the Chain, Stop Infection!

DECISION TREE: POSSIBLE EXPOSURE TO HIV

Exposure to blood and/or body fluids



Report to **Designated Officer**

A thorough risk assessment for occupational exposure to bloodborne diseases must take place. If Post-Exposure Prophylaxis (PEP) is required due to possible exposure to **HIV**, it should be started within 72 hours, preferably within one hour. **For this reason, the Designated Officer should be contacted immediately when there is an exposure to blood or body fluids.**



Designated Officer Assesses Risk*:

1. Identifies body fluid(s) involved
2. Determines the 4 Es:
 - Exit** – route of exit from body
 - Environment** – warm, moist
 - Enough** – e.g., quantity of blood/body fluid
 - Entry** – into worker’s blood stream

Some risk established

No risk established

Consult with a delegate of the Medical Officer of Health (or designate) by calling Health Connection at 1-800-361-5653

Counsel employee re: disease transmission and provide educational resources

Counsel worker about risk and post-exposure prophylaxis treatment if required

***The designated officer will consider the following:**

- How much of a substance was present in the environment and how much of it did the person come in contact with?
- Was there direct contact with the reservoir that carries this disease?
- Was protective clothing and/or equipment used that should have prevented the transmission of the disease (e.g., gloves, eye protection, mask)?
- Was the personal equipment compromised?
- Was there an appropriate “route of entry” for the disease in question?

E. Differences between the infectiousness of HBV, HCV and HIV/AIDS

Hepatitis B: Only a minuscule amount of blood is needed to cause the infection. Hepatitis B virus can survive on surfaces for up to one week.¹

Hepatitis C: Only a small amount of blood is required, but it is not as easily transmitted as hepatitis B. HCV can survive outside the body for at least 16 hours, but not longer than four days.²

HIV: This virus is very fragile outside the body. It is harder to become infected with HIV than hepatitis B and C because it cannot live outside the body for very long. In open air, HIV dies within minutes. No one has been identified as infected with HIV due to contact with an environmental surface.^{3 4}

F. Level of risk

The level of risk will vary depending on the situation, the type of care being provided and the type of contact. Several factors influence the risk of infection, including:

- The virus involved. HBV and HCV are more infectious than HIV
- The type of exposure. The risk of a virus being passed from one person to another is much greater from a needle stick injury than from contact with broken skin or mucous membrane
- The amount of blood involved in the exposure (more blood is associated with more risk)
- The amount of virus in the source person's blood at the time of exposure (more virus is associated with more risk)

¹ Centers for Disease Control and Prevention [Online]. Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis. *Morbidity and Mortality Weekly Report*. 2001 June 29; 50 (RR-11):1-7. [cited January 3, 2007]; Available from <http://www.cdc.gov/mmwr/PDF/rr/rr5011.pdf>

² Centers for Disease Control and Prevention [Online]. Frequently asked questions about hepatitis C. 2006 [cited January 3, 2007]; Available from: <http://www.cdc.gov/ncidod/diseases/hepatitis/c/faq.htm#1h>

³ Canadian AIDS Treatment Information Exchange [Online] http://www.hepcinfo.ca/coinfection_basics_sp_e.html

⁴ Centers for Disease Control and Prevention [Online]. Frequently asked questions about hepatitis C. 2006 [cited January 3, 2007]; Available from: <http://www.cdc.gov/ncidod/diseases/hepatitis/c/faq.htm#1h>

G.SITUATIONS WHERE TRANSMISSION OF BLOODBORNE PATHOGENS CAN OCCUR

Situations where there may be a risk of exposure are described in Table 1.

Table 1: Situational Risks of Bloodborne Pathogen Transmission

Situation	Likelihood of Transmission		
	HIV	HBV	HCV
<p>Needle stick injury</p> <p>Needle stick injury provides a direct route into the bloodstream. The level of risk depends upon how deep the needle goes in and the amount of blood in/on the needle.</p>	Yes, 0.3 per cent ¹	Yes, 6-30 per cent ²	Yes, 2 per cent ³
<p>Spitting/Saliva</p>	No	Yes, but only if visible blood is present in the saliva	No
<p>Rescue breathing/CPR</p> <p>Generally, there is no risk of exposure if a barrier or mask is used for rescue breathing/CPR, unless blood or bloody body fluids are present and the barrier/mask is broken or</p>	No	No	No

^{1,2,3} Ontario Hospital Association and Ontario Medical Association. Blood-Borne Diseases Surveillance Protocol for Ontario Hospitals. [Online] 2006 [cited January 3, 3007]; Available from: [http://www.oha.com/Client/OHA/OHA_LP4W_LND_WebStation.nsf/resources/Communicable+Disease+Surveillance+Protocols/\\$file/Blood+Borne+Diseases+Protocols.pdf](http://www.oha.com/Client/OHA/OHA_LP4W_LND_WebStation.nsf/resources/Communicable+Disease+Surveillance+Protocols/$file/Blood+Borne+Diseases+Protocols.pdf)

contaminated.			
Situation	Likelihood of Transmission		
	HIV	HBV	HCV
<p>Blood or body fluid contact with broken skin or mucous membranes</p> <ul style="list-style-type: none"> • If an emergency services worker has a break in the skin (e.g., a cut, a wound, or skin that is chapped or scraped) and comes in contact with an infected person’s blood or bloody body fluids, then they could be exposed to a bloodborne virus. • If blood or bloody body fluids are splattered in an emergency services worker’s eyes, nose or mouth, there is a risk that they could be exposed to the virus. • Feces, nasal secretions, sputum, tears, urine or vomit are not infectious unless they contain visible blood. <p>Intact skin is the one of the best defences against bloodborne diseases. Contact with intact skin is not a significant exposure, but the larger the area of skin exposed and the longer the time of contact, the more important it is to verify that the skin is intact.</p>	Yes	Yes	Yes

<p>Bites</p> <ul style="list-style-type: none"> Both HIV and hepatitis B virus have been reported to be transmitted by human bites, but these instances appear to be quite rare.¹ Severe trauma with extensive tissue tearing and damage and presence of blood were reported in each of these instances.² When such bites occur, routine medical and surgical therapy (including an assessment of tetanus vaccination status) should be implemented as soon as possible since such bites frequently result in infection with organisms other than HIV and hepatitis B. <p>Note: Wounds caused by animal bites can become infected with organisms such as rabies and need to be seen by a doctor immediately for assessment and treatment. For more information see Rabies.</p>	<p>Yes, but rare</p>	<p>Yes, but rare</p>	<p>No</p>
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¹ Braunwald E, Fauci AS, Kasper DL, Hauser SL, Longo DL, Jameson JL, editors. Harrison's principles of internal medicine. 15th ed. New York: McGraw-Hill Book Co; 2001.

² Centers for Disease Control and Prevention. HIV and Its Transmission. July 1999

H. Mandatory Blood Testing Act (MBTA) 2006

Purpose: The *Mandatory Blood Testing Act (MBTA) 2006* is applicable to classes of persons as set out in the Act (i.e., police officers, firefighters, correctional services staff, and others) who have come in contact with the blood and/or body fluids of a source person. The purpose of the Act is to expedite the process of obtaining blood samples from the source person. The results will assist in decision making about the appropriate course of action.

Diseases that are listed as communicable under the Act

- Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome (HIV/AIDS)
- Hepatitis B
- Hepatitis C

Following exposure

Workers who believe they have been exposed to another person's blood or bodily fluids should immediately contact their designated officer who will determine if a significant exposure has occurred and take appropriate steps. In addition, a medical professional may also be contacted who will assess the risk of infection and determine the need for treatment.

MBTA Application

[Mandatory Blood Testing forms and other information](#)

(If this web link is not available, please visit the Ministry of the Solicitor General at ontario.ca/page/ministry-solicitor-general)

- Applications must be submitted to the Medical Officer of Health (MOH) in the health unit where the respondent lives.
- The MOH or designate in the health unit where the respondent lives must receive an application no more than seven (7) days after the date of the occurrence. However, if the deadline falls on a Saturday, Sunday or other holiday, the deadline is extended by one day.
- Once the requirements of the application have been met, the MOH or designate will attempt to contact the respondent and request that the respondent voluntarily provide a blood sample for testing.

Section III: Diseases Spread through Blood and Body Fluids

- If the respondent does not provide a blood sample within two (2) days of the MOH receiving the application, or if the respondent cannot be located in time, the application will be referred to the Consent and Capacity Board. The Board will hold a hearing to decide whether to issue a mandatory order.
- If the process for obtaining blood samples from the respondent is successful, a copy of the respondent's blood sample results is forwarded to the MOH office.
- The MOH or designate forwards these blood sample results to the applicant's physician for review.
- The MOH or designate will notify the applicant to contact their physician to obtain the blood sample results.
- **Note:** The MOH or designate does not disclose lab results to the applicant

More information is found on the Province of Ontario website at ontario.ca/page/mandatory-blood-testing

To submit an MBTA application to York Region Public Health, please send the forms directly to the Sexual and Bloodborne Infection team via fax at 905-940-4541 or, if fax is unavailable, via email at OnDutyPHN@york.ca. If you have any questions, please call 1-877-464-9675 ext. 74214.