

Hepatitis C

1. Case Definition

Confirmed case that does not distinguish acute from chronic infection:

- Detection of anti-hepatitis C Virus (HCV) antibodies in blood (anti-HCV Ab) by an immunoassay that is confirmed by: the HCV Core antigen test, or a qualitative nucleic acid amplification test (NAAT) for hepatitis C virus RNA (HCV RNA), or by immunoblot.
- OR
- Detection of HCV RNA in blood (1).

2. Reporting Requirements

2.1 Reporting to Manitoba Health and Other Requirements

- All confirmatory positive laboratory results noted in the case definition are reportable by laboratory to the Public Health Surveillance Unit (204-948-3044 secure fax).
- Confirmed cases are referred by Manitoba Health to the health jurisdiction (i.e., Regional Health Authority [RHA], First Nations Inuit Health [FNIH]) of residence for follow-up.
- The *Investigation Form for Hepatitis B and C Positive Cases* should be completed by Public Health for all confirmed cases (this applies to all cases new to Manitoba) with assistance from the ordering practitioner, and forwarded to the Public Health Surveillance Unit (204-948-3044).
- Operators of Manitoba clinical laboratories are required to submit the residual serum or plasma specimens from individuals who tested positive for hepatitis C virus to Cadham Provincial Laboratory within seven days of report for surveillance purposes.
- Positive test results identified through the local Canadian Blood Services are reportable to the Public Health Surveillance Unit (204-948-3044 secure fax).

2.2 Reporting to Canadian Blood Services

- If the case investigation suggests that the source of infection in a client testing positive for hepatitis C is the receipt of blood or blood products or if the case has a history of blood donation, Manitoba Health will inform Canadian Blood Services.

3. Clinical Presentation/Natural History

Acute HCV Infection:

Acute (initial) infection with hepatitis C virus (HCV) is mild or asymptomatic in more than 90 per cent of cases (2). When symptoms occur, they may include fatigue, anorexia, nausea and vomiting, jaundice and vague abdominal discomfort (2, 3). Symptoms usually subside after several weeks (4). The signs and symptoms of HCV infection are indistinguishable from those of hepatitis A or hepatitis B virus (HBV) infections (5, 6). Jaundice is less frequent (2), and abnormalities in liver transaminase concentrations generally are less pronounced than abnormalities in patients with hepatitis B virus infection (5). Extrahepatic manifestations are uncommon (3).

Spontaneous clearance of acute HCV infection occurs within six months of infection in 15-30% of infected individuals in the absence of treatment (7). Almost all of the remaining persons will harbour HCV for the rest of their lives and are considered to have chronic HCV infection (7). Spontaneous clearance of HCV infection appears most frequently with younger age, female gender and specific major histocompatibility complex genes (4).

Chronic Infection:

The lack of an effective T-lymphocyte response and the high propensity of the virus to mutate appear to promote a high rate of chronic infection (4). The majority of infected persons might not be aware of their infection because they are not clinically ill (7). The most commonly reported symptom of chronic

HCV infection is fatigue (8). Children with chronic infection are usually asymptomatic (5). Individuals who have chronic HCV infection are at risk of developing chronic liver disease and its complications, including cirrhosis, decompensated liver disease, and hepatocellular carcinoma (HCC) (5). About 30% of chronically infected persons develop chronic liver disease by 30 years after acquiring infection (6, 9).

Factors associated with more severe disease include older age at acquisition, HIV infection, excessive alcohol consumption, and male gender (5). Virologic factors including viral load, viral genotype and quasi-species diversity may significantly affect the risk of progression of liver disease (4). Persons with chronic liver disease from HCV who become coinfecting with hepatitis A or B virus have a very high rate of severe hepatitis (5). Persons coinfecting with HIV have a significantly accelerated progression of liver disease to cirrhosis, decompensated liver cirrhosis and HCC than mono-infected persons (9). Coinfection with the parasite *Schistosoma* (schistosomiasis) has been associated with viral persistence (6). Relatively little is known about how chronic HCV infection leads to cancer (6).

Limited data suggest that chronic hepatitis and cirrhosis occur less commonly in children (4, 5, 10-14). Among children, liver disease progression appears to be accelerated when comorbid conditions, including childhood cancer, iron overload, thalassemia, or HIV coinfection, are present (5).

4. Etiology

Hepatitis C virus, identified in 1989 (15), is a small, enveloped, single-stranded RNA virus that is a member of the Flaviviridae family (5). Multiple HCV genotypes and subtypes exist (5). Genotype 1 is the most common genotype reported in Canada (16).

5. Epidemiology

5.1 Reservoir and Source

Humans: the virus has been transmitted experimentally to chimpanzees (2). Injection drug

users are the most common reservoir for new infections in Canada (16). The duration of HCV viability in the environment is at least 16 to 23 hours (17).

5.2 Transmission

Almost all HCV transmission is by parenteral or percutaneous exposure to HCV-infected blood (5). In economically developed countries, most new HCV infections are related to illicit injection drug use (6). Non-injecting drug use (e.g., through sharing of inhalation equipment for cocaine) is also associated with a higher risk of HCV infection (9). HCV may be transmitted by other percutaneous exposures not associated with drug use (e.g., tattooing or syringe reuse) (6).

In the past, HCV transmission via contaminated blood transfusions was common (6, 18). Transmission through transplanted organs and tissues has been documented (19). The estimated risk of HCV contamination in blood or blood products in Canada, after current donor screening and viral inactivation/reduction processes have occurred is very low (approximately one in 5 to 7 million) (20).

Sex partners of HCV-infected people may become infected (5, 9, 21), but it is much less common than blood exposures. Sexual activity during menstruation may increase the risk of transmission if the woman is HCV positive (15). The risk of sexual transmission of HCV is increased among HIV-infected persons (7), especially among men with lower CD4 T-cell counts; older age; and being the receptive partner with multiple unprotected sex partners in men-who-have-sex-with-men (22).

Transmission among family contacts is uncommon, but could occur from direct or inapparent percutaneous or mucosal exposure to blood (5). There is no evidence of HCV transmission with kissing, hugging, sneezing, coughing, food, water, sharing eating utensils or drinking glasses, casual contact or other contact without exposure to blood (8).

Five to six per cent of women who are HCV RNA positive at the time of delivery will transmit the

infection to the infant (5). Maternal coinfection with HIV has been associated with increased risk of perinatal transmission of HCV (5, 9). Both intrauterine and intrapartum transmission of HCV have been described (19). Although HCV RNA and antibody to HCV (anti-HCV Ab) have been detected in colostrum, HCV transmission from HCV positive mothers is not increased in breast-fed infants when compared to bottle-fed infants (5). Breastfeeding does not increase the risk of HCV transmission (23).

Nosocomial exposure through contaminated needles and syringes is a leading cause of infection in developing countries, but rare where appropriate health care practices are followed (6). There are reports in developed countries linking health care procedures to transmission of HCV from infected to susceptible individuals when appropriate practices have not been followed (24-25). The risk for HCV transmission from an infected health care worker to patients appears to be low (26). HCV is not transmitted efficiently through occupational exposures to blood; the average incidence of anti-HCV seroconversion after accidental needle sticks or sharps exposures from an HCV-positive source is 1.8 per cent, with one study indicating that transmission occurred only following injury with hollow-bore needles (17).

5.3 Occurrence

General: It is estimated that 185 million people around the world have been infected with the hepatitis C virus, of whom 350,000 die each year (9). Despite the high prevalence of disease, most people infected with HCV are unaware of their infection (9). Globally, most HCV infections occur following inadequate infection control procedures with the reuse of injection equipment or transfer by blood that has not been screened for HCV antibodies (9). People who inject drugs represent the core of the HCV epidemic in developed countries, accounting for the majority of new (80%) and existing (60%) cases (27). The estimated prevalence of HCV infection is highest in Central and East Asia and in the North Africa/Middle East regions (9). Egypt has the largest burden of HCV infection in the world,

much of which is attributed to health care associated transmission (28).

Canada: The number of reported cases of hepatitis C has declined in Canada in recent years (29). In 2010, there were 10,741 cases of HCV reported to the Public Health Agency of Canada, or a rate of 31.5 per 100,000 people, down from 40.5 per 100,000 in 2005 (29). The highest reported infection rate occurred among males 40 to 59 years old (78.2 per 100,000) and among females 25 to 29 years old (34.4 per 100,000) (29). In Canada, approximately 60% of reported HCV cases are among current or former injection drug users, 20% are among infected immigrants and 11% have received contaminated blood products (16).

Manitoba: Of the reportable blood-borne infections, HCV is the most common, with an average of 384 newly reported cases per year in Manitoba between 2002 and 2011. Most cases could not be differentiated as acute or chronic at the time of reporting to the public health surveillance system. Provincial HCV rates peaked in 2001, at 64 cases per 100,000 population, and have gradually declined and stabilized in recent years to 28 cases per 100,000 population in 2012. Incidence rates are higher among males than females (for example, in 2012, the crude rate of HCV was 35.3 per 100,000 males; and 20 per 100,000 females). Reported cases are typically 30-49 years of age. Manitoba has had rates of HCV that are similar to the national rate (29.2 cases per 100,000 population) and, in 2011, ranked among the lower rates when compared to other provinces and territories.

5.4 Incubation Period

The incubation period for HCV disease averages six to seven weeks, with a range of two weeks to six months (5). The time from exposure to development of viremia is generally one to two weeks (5). Long-term complications (e.g., cirrhosis and HCC) generally occur more than 20 years after the onset of infection, although more rapid progression has been reported (6).

5.5 Host Susceptibility and Resistance

All humans are susceptible (2). It is not known whether protective immunity develops following infection (2). Repeated infections with HCV have been demonstrated in an experimental chimpanzee model (2). Reinfections may occur in humans with continuing risk exposures.

5.6 Period of Communicability

Communicability begins from one or more weeks before onset of symptoms (2). All individuals with HCV infection should be considered infectious (5) and should take measures to limit/prevent transmission to others. Refer to section 8.1.4 *Education of Cases*.

6. Diagnosis

NOTE: Where the testing for HCV is being done pursuant to an order issued under *The Testing of Bodily Fluids and Disclosure Act*, refer to the *Integrated Post-Exposure Protocol for HIV, HBV and HCV: Guidelines for Managing Exposures to Blood and Body Fluids* for testing procedure available at: http://www.gov.mb.ca/health/publichealth/cdc/protocol/hiv_postexp.pdf.

Cadham Provincial Laboratory (CPL) performs serological and nucleic acid testing for HCV in clinical specimens. The initial test for detection of HCV infection is chemiluminescent microparticle immunoassay (CMIA) test which detects antibody to HCV (anti-HCV Ab). A positive anti-HCV Ab test may indicate an acute, chronic or resolved infection. It may take 12 to 14 weeks or longer after infection with HCV for the antibodies to be detected. A positive result from the CMIA test is confirmed with the HCV Core antigen test, a qualitative nucleic acid amplification test (NAAT) for hepatitis C virus RNA, or immunoblot (Line immunoassay: INNO-LIA™). Only confirmed positive results are reported.

Nucleic acid testing to detect HCV RNA or detection of HCV Core antigen is necessary to confirm the diagnosis of active HCV infection in a person who is anti-HCV-Ab positive. Either a positive HCV RNA test or a positive HCV Core antigen test is an indicator of active infection

(either acute or chronic) and therefore communicability.

The HCV RNA and HCV Core antigen tests can detect HCV infection within one to two weeks after exposure and may be indicated in the following circumstances:

- For individuals undergoing testing who are suspected to be in the “window period” (i.e., infected but not yet producing detectable antibody);
- For immunocompromised individuals who may not develop detectable anti-HCV Ab (e.g., HIV infection with CD4 counts < 50);
- For infants younger than 18 months of age (refer to section below) when the presence of maternal antibody cannot be ruled out.

Acute Hepatitis C: Acute (initial) HCV infection is defined as the presence of HCV RNA or HCV Core antigen within six months of exposure to and infection with HCV (9). Patients with acute hepatitis C may not be anti-HCV positive at initial testing (30). If clinical signs and symptoms are present, diagnosis in the acute phase can be established by detection of HCV RNA or HCV Core antigen (31). In the absence of anti-HCV Ab, any positive HCV Core antigen result must be confirmed by HCV RNA testing.

Chronic Hepatitis C: The diagnosis of chronic hepatitis C is based on the detection of both HCV antibodies and HCV RNA. Evidence of chronic hepatitis includes elevated aminotransferases and/or histological changes consistent with chronic hepatitis on biopsy (30). Spontaneous viral clearance is rare beyond six months from infection; therefore, if the virus can still be detected after six months, the diagnosis of chronic hepatitis C can be made (30).

Genotyping: Determination of the viral genotype is important to guide treatment choice and duration, and to predict response to therapy (9, 16). HCV genotyping in clinical specimens is performed by CPL, but it is not used to diagnose HCV infection.

Table 1. Interpretation of Hepatitis C Virus Test Results for Individuals ≥ 18 Months of Age

Test	Acute Hepatitis C (active infection)	Chronic Hepatitis C (active infection)	Resolved Hepatitis C Infection	No Hepatitis C Infection
Anti-HCV Ab*	+/-	+	+	-
HCV RNA#	+	+	-	-
HCV Core Antigen#	+	+	-	-

*A positive test result is followed by a HCV RNA or HCV Core antigen test to confirm active infection. It may take up to six months after infection for anti-HCV antibody to be detected. Therefore, if infection is suspected to have occurred less than six months prior, (e.g., 1 month ago) a negative test result should be followed up by retesting at ≥ six months after infection.

Individuals having positive test results for one or more of these markers are considered to be infectious.

Table Abbreviations

Anti-HCV Ab: Antibody to Hepatitis C virus

HCV RNA: Hepatitis C virus nucleic acid

HCV Core Antigen: Hepatitis C virus Core antigen

Infants younger than 18 months of age: There is passive transfer of maternal HCV antibodies to infants, so the diagnosis of infant HCV infection must be based on detection of HCV RNA or HCV Core antigen or on the persistence of HCV antibody after 18 months of age (5). Cord blood should not be used to test for HCV because of potential cross-contamination with maternal antibody (1). The recommended laboratory screening test for otherwise well infants born to HCV-infected mothers is anti-HCV Ab, performed at 12 to 18 months of age. A positive HCV antibody test obtained prior to 18 months must be repeated at 18 months to confirm that it is still positive (10).

HCV RNA testing might be considered after two months of age, in consultation with an appropriate specialist and in select circumstances (e.g., significant parental anxiety, concern that the infant will be lost to follow-up care) (10). However, as false negatives may be observed with HCV RNA testing, a negative HCV RNA test should be confirmed by performing anti-HCV Ab testing at or after 18 months of age.

7. Key Investigations

- Efforts to identify the potential source of acquisition of infection by the case, and any subsequent transmission from the case to contacts.
- Interviewing cases for contact identification if applicable.

8. Control

For the purposes of this protocol, “Public Health” refers to provincial regional public health authorities as well as First Nations Inuit Health.

8.1 Management of Cases

NOTE: It is recommended that interviewing for contact information be done by the first health professional (e.g., physician, public health nurse) who interviews the case as there may not be a subsequent opportunity to do so.

- Immunization against hepatitis A virus (HAV) and hepatitis B virus (HBV) is recommended for all HCV cases who have not been previously immunized or infected with HAV and/or HBV as they may be at risk of more severe disease if infection occurs (32). Immunization should be completed as early as possible in the course of HCV disease, as the immune response to vaccine

is suboptimal in advanced liver disease (32). Individuals testing positive for hepatitis C for the first time are routinely screened by CPL for hepatitis A and hepatitis B.

- Where testing indicates susceptibility to both HAV and HBV, the combined or bivalent hepatitis vaccine (offering protection against both hepatitis A and hepatitis B) is recommended (32).
- Where the case is susceptible to HAV but not HBV, the monovalent hepatitis A vaccine is recommended.
- Where testing indicates that the case is susceptible to HBV, but not HAV, the monovalent hepatitis B vaccine is recommended.
- When indicated, Manitoba Health provides the HAV and HBV vaccines at no charge to HCV-infected individuals. Refer to the most recent edition of the *Canadian Immunization Guide* for vaccine schedules and clinical use information.
- Hepatitis A, B and combined A/B vaccines are available in adult and pediatric formulations. During regular business hours, contact the Provincial Vaccine Warehouse at 204-948-1333 or 1-855-683-3306. A current Biologics/Vaccine Order Form is available by calling the warehouse. After regular office hours the on-call warehouse staff may be contacted at 204-805-4096.
- Serologic testing is not routinely recommended after receiving HAV-containing vaccine (32). HAV vaccine may have reduced efficacy in individuals who are immunosuppressed; referral to a physician with expertise in immunization and/or immunodeficiency is advised (33). Anti-HBs testing may be used to document response to HBV vaccine (32). For HCV cases with advanced liver disease, seroconversion should be assessed after vaccination (32). Offering higher doses of vaccine should be considered as defined in the *Canadian Immunization Guide* <http://www.phac-aspc.gc.ca/publicat/cig-gci/p04-hepb-eng.php> to those who do not respond to the first series of HBV vaccine (32).
- HIV antibody testing with appropriate pretest and post-test counseling is recommended for HCV-infected clients (33).
- An alcohol intake assessment is recommended for all persons with HCV infection followed by the offer of a behavioral alcohol reduction intervention for persons with moderate-to-high alcohol intake (9). Cases should be advised to limit or avoid alcohol and not to initiate therapy with any new medicines (including OTC and herbals) without checking with their health care provider (7).
- Cases who are parenteral drug users should be advised on safe injection practices (i.e., not to reuse needles).
- HCV-positive women do not need to avoid pregnancy or breastfeeding (7), as transmission of HCV by breastfeeding has not been documented (5). However, mothers who experience a flare of chronic HCV infection with postpartum jaundice or who develop cracked, bleeding nipples should abstain from breastfeeding (5, 10).
- There is insufficient evidence to recommend caesarian section in HCV-positive women as a means of preventing transmission to the newborn (10, 23).
- Individuals need not be excluded from work, school, play, child care or other settings on the basis of their HCV infection status (5).
- Although there is a theoretical risk of HCV transmission during contact sports, there are no firm recommendations for exclusion. The exception in Manitoba is boxing and other sports covered under boxing regulation 14 (1)(b) of *The Boxing Commission Act* (C.C.S.M. c. B80) where to be eligible to participate in a boxing contest, a boxer must within six months before the boxing contest, have negative tests for HIV, hepatitis B and C.
- Routine Practices in health care as per Manitoba Health's *Routine Practices and Additional Precautions: Preventing the Transmission of Infection in Health Care* available at: (<http://www.gov.mb.ca/health/publichealth/cdc/docs/ipc/rpap.pdf>).

8.1.1 Treatment

All HCV-infected patients should be referred to the Viral Hepatitis Investigative Unit (VHIU) (204-787-3630) or appropriate specialist for consideration of treatment. Therapies are rapidly changing and referral will ensure that patients are treated with the most appropriate therapy available at that time.

- Timing of treatment in the disease course is an important consideration; therefore, early referral is recommended.
- The primary outcome is cure of the infection as manifested by HCV RNA loss three to six months after therapy is complete. The resolution of elevated alanine aminotransferase (ALT) levels with antiviral therapy is also an indicator of disease response (4).
- Herbal remedies have not been shown to be effective (8).

8.1.2 Management of Infants Younger than 18 Months of Age

- Infected infants may be more likely than adults to have a transient infection that does not progress to chronic disease; therefore, no immediate intervention is recommended.
- HCV-infected infants should be referred to a specialist with expertise in HCV infection for further assessment and monitoring.

8.1.3 Public Health Investigation and Management

NOTE: Cases more likely to have poor outcomes (e.g., individuals with alcohol dependency or co-infected with HIV or HBV) or to transmit infection to others (e.g., injection drug users) should be given priority for public health follow-up.

Once a positive laboratory report of a newly detected case is received by the Public Health Surveillance Unit, a referral is made to the appropriate regional health jurisdiction. It is recommended that the public health nurse responsible for the case liaise with the primary care provider before contacting the client. The purposes of this liaison are as follows:

- Confirm receipt of the referral.
- Verify the primary case manager.
- Determine the reason for the test. The primary care provider should be informed of the requirements for public health investigation (i.e., patient education and interview, contact follow-up, provision of resources) and that the Manitoba Health, Healthy Living and Seniors *Investigation Form for Hepatitis B and C Positive Cases* needs to be completed and returned as per instructions on the form.
- Recommend referral of the case to the VHIU or appropriate specialist (if not already referred by primary care provider) for additional testing, investigation and possible treatment.
- Confirm who (primary care provider or Public Health) will advise on and provide case with immunization for HAV and/or HBV if indicated.
- Provide literature/information for the primary care provider and/or client.

Where possible, case follow-up should consist of an in-person meeting for the following purposes:

- education and recommendations regarding future management;
- contact identification and follow-up; and
- completion of the Manitoba Health, Healthy Living and Seniors *Investigation Form for Hepatitis B and C Positive Cases*. If the primary care provider elects to manage the case on his/her own, he/she should complete the investigation form and return it to Manitoba Health. The public health nurse may contact the client for further education and an interview. In many instances, the public health nurse responsible for the case will be expected to complete the investigation form.

8.1.4 Education of Cases

All people with HCV infection should be considered infectious (5). Cases should be educated about how hepatitis C virus is spread and advised on harm reduction measures to limit/prevent transmission to others. Specifically, it is recommended that cases:

- Refrain from donating blood, organs^a, tissue or semen (5)
- Not share personal items that might come into contact with blood such as toothbrushes, dental appliances, razors, nail clippers or injection/ inhalation drug use equipment (e.g., needles, pipes) (5, 34).
- Prevent their blood and other potentially infective body fluids from coming into contact with other individuals (e.g., cover open wounds).
- Avoid using parenteral drugs but if they are used, follow safe injection practices (i.e, not reusing needles).
- Know how to safely clean up blood spills.
- Inform individuals providing health care or other personal services who may be exposed to their blood (e.g., piercing, tattooing) that they have been infected with HCV (15).
- Limit or avoid alcohol consumption as alcohol consumption is a risk factor for more rapid progression to cirrhosis (3, 6).
- Be advised to decrease the number of partners and to use condoms to prevent transmission if they have multiple sexual partners (5). Changes in sexual practices of infected people with a steady partner are not recommended; however, they should be informed of the possible risks and use of precautions to prevent transmission (5, 7).
- No data exist to support counseling a woman against pregnancy (5).

8.2 Management of Contacts

- There is no effective post-exposure prophylaxis available for hepatitis C (5).
- Individuals who are contacts of injection drug users should be given priority for follow-up by Public Health.
- Generally, contacts with exposure within one year of the first positive test obtained from the index case should be followed up. However, there may be situations where more distant contact identification and notification are indicated depending on the period of infectivity,

the significance of the exposure, the feasibility of notification and prioritization of contacts at risk.

- Needle-sharing partners who test negative for HCV should be advised to seek re-testing every six to 12 months if needle-sharing continues.
- As most long-term sex partners of HCV-positive persons test anti-HCV Ab negative, long-term sex partners need not be followed by Public Health. However, sex contacts may choose to be tested for HCV by their health care provider. Those at higher risk include HIV-infected men who have sex with men as well as others infected with HIV (9).

Perinatal Contacts:

- It is important to establish whether HCV was transmitted to the child to ensure appropriate medical follow-up of infected children, and to reassure the large majority of women where transmission of HCV to their infants does not occur (10).
- It is recommended that perinatal contacts who are well not be tested for HCV until after one year of age. Additional testing (e.g., at 18 months) may be necessary to confirm results obtained from earlier testing. Refer to section 6 for testing procedure.
- Pregnant women should be advised that as many as six of every 100 infants born to HCV-infected women become infected; and that no treatment or delivery method such as caesarian section has been demonstrated to decrease this risk (7).

8.3 Preventive Measures

- There is no effective pre-exposure or post-exposure prophylaxis available for hepatitis C (5).
- Individuals who are HCV-positive should refrain from donating blood, organs, tissues or semen, and sharing items potentially contaminated with blood (e.g., razors, nail clippers, scissors, toothbrushes) (3).

a Some organ donation between HCV-infected individuals has occurred and should be assessed on a case-by-case basis.

- Use of condoms can minimize the risk of sexual transmission from an infected to an uninfected partner. If condoms are not used, avoidance of unprotected sexual intercourse during menses if the woman is HCV positive may limit transmission (15).
- Follow-up of individuals who have sustained exposures to blood and/or body fluids (e.g., needlestick injury in a health care worker) and are deemed at risk of acquiring infection. See Manitoba Health's *Integrated Post-Exposure Protocol for HIV, HBV and HCV: Guidelines for Managing Exposures to Blood and Body Fluids* available at:
http://www.gov.mb.ca/health/publichealth/cdc/protocol/hiv_postexp.pdf
- Education of individuals at high risk of infection.
- Case Finding:
 - Testing of individuals at high risk of infection including but not limited to individuals with a history of injection drug use or who have ever shared drug related equipment, incarceration, body piercing, tattooing, blood transfusion in Canada prior to April 1992, persons with persistently abnormal alanine aminotransferase levels, children born to HCV-positive women, or any other high risk exposures and immigrants from endemic regions (15, 34). The hepatitis C testing recommendations are undergoing review; the recommendations in this protocol will be updated if necessary as more information becomes available. Early detection of HCV infection is important so that treatment may be initiated if indicated, appropriate immunizations undertaken, lifestyle changes initiated to reduce other exposures that might increase the risk of liver damage and to reduce the risk of spread to others. Response to treatment may also be enhanced in individuals with a shorter duration of infection.
 - Routine serologic testing of pregnant women and adoptees is not recommended (5, 7), unless risk factors described above are present.
 - All persons with HIV infection should be offered HCV counseling and testing (7).
- Health care and personal care service precautions:
 - routine practices including safe disposal of sharps;
 - adequate sterilization of instruments used in invasive procedures, including personal care services (e.g., piercing, tattooing);
 - avoidance of personal care services where there may be a possibility of transmission through blood exposure (e.g., piercing, tattooing);
 - appropriate disinfection measures following body fluid spills.
- Harm reduction activities:
 - The risk of HCV transmission through injection drug use can be significantly reduced by use of a new needle, syringe and all other equipment (e.g., filters, water, spoon) for each injection (35, 36).
 - Harm reduction activities such as safe injection practices may help to reduce HCV transmission within injection drug using populations (36-38).

9. Additional Resources

- 9.1 Canadian Liver Foundation
(www.liver.ca/Home.aspx)
- 9.2 Canadian Association for the Study of the Liver
(www.hepatology.ca)
- 9.3 Cadham Provincial Laboratory Guide to Services
<http://www.gov.mb.ca/health/publichealth/cpl/docs/guide.pdf>

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