Hepatitis C (Chronic Case)

Revision Dates

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Case Definition

**Confirmed Case**
Detection of anti-hepatitis C antibodies (anti-HCV) and should be confirmed by a second manufacturer’s EIA, immunoblot or nucleic acid (e.g., PCR) for HCV-RNA.

**OR**
Detection of hepatitis C virus RNA (HCV-RNA).

**Laboratory Comments**
Anti-HCV testing should not be performed in infants < 18 months of age as the anti-HCV may represent passive maternal antibody. As most infections occur at the time of childbirth, if testing for HCV-RNA is considered, it should be delayed beyond 4 to 12 weeks to avoid false negative HCV-RNA test results. Cord blood should not be used because of potential cross-contamination with maternal antibody.

The HCV serological window period is approximately 5–10 weeks and it is estimated that 30% of acute infections may be missed if anti-HCV is the only marker of infection used during this time period. HCV-RNA is detectable within 2–3 weeks of infection and, in the context of clinical illness, can identify acute HCV infection even in the absence of anti-HCV.

If HCV-RNA is used solely to confirm active infection, a repeat test is recommended.

Confirmation of acute infection requires a documented seroconversion (i.e., in a previously anti-HCV seronegative individual).

Approximately 25% (range 15 to 45%) of HCV infections will be resolved spontaneously. These individuals will typically demonstrate anti-HCV without detectable HCV-RNA (using a test with a lower limit of detection of 10-50 IU/mL)

Immunocompromised individuals may not develop anti-HCV (e.g., HIV infection with CD4 counts < 50). These individuals may need to undergo HCV-RNA testing.
Reporting Requirements

1. Physicians/Health Practitioner and others
   Physicians, health practitioners and others listed in Section 22 of the Public Health Act shall notify the Medical Officer of Health (MOH) (or designate) of all confirmed cases in the prescribed form by mail, fax or electronic transfer within 48 hours (two days).

2. Laboratories
   All laboratories, including the Canadian Blood Services (CBS) Laboratory, insurance company laboratories, regional laboratories and the Provincial Laboratory of Public Health (PLPH), shall report all positive laboratory results by mail, fax or electronic transfer within 48 hours (two days) to the:
   - Chief Medical Officer of Health (CMOH) (or designate),
   - MOH (or designate),
   - Attending/ordering physician and
   - Individual donor (as per current CBS policy).

   When reporting positive tests, laboratories shall include:
   - name of individual,
   - date of birth,
   - personal health number,
   - address of the individual,
   - phone number of the individual,
   - date of test and
   - name of laboratory performing test.

3. Alberta Health Services and First Nations and Inuit Health Branch
   The MOH (or designate) shall forward the preliminary Notifiable Disease Report (NDR) of all confirmed cases to the CMOH (or designate) within six weeks of notification and the final NDR (amendment) within eight weeks of notification.
   For out-of-zone reports, the MOH (or designate) first notified shall notify the MOH (or designate) where the case resides by mail, fax or electronic transfer and fax a copy of the positive laboratory report within 48 hours (two days).
   For out-of-zone contacts, the MOH (or designate) first notified shall notify the MOH (or designate) where the contact resides by mail, fax or electronic transfer within 48 hours (two days) including:
   - name,
   - date of birth,
   - personal health number and
   - contact information i.e., address and phone number.
   For out-of-province and out-of-country case reports and/or contacts, the following information should be forwarded to the CMOH (or designate) by phone, fax or electronic transfer within 48 hours (two days) including:
   - name,
   - date of birth,
   - out-of-province health care number,
   - out-of-province address and phone number,
   - attending physician (locally and out-of-province) and
   - positive laboratory report (faxed).
4. Additional Reporting Requirements

- Canadian Blood Services (CBS): All persons testing positive must be reported by the MOH (or designate) to CBS within two working days if the case has ever had a history of donating or receiving blood in Canada. (as per CBS policy, November 22, 2002).
  - A copy of the positive test result must accompany all reports, and all information should be sent to Lookback/Traceback Coordinator, CBS:
    - For north of Red Deer via confidential fax number 780-433-1907 or phone 780-431-8712.
    - For south of Red Deer via confidential fax number 403-410-2797 or phone 403-410-2711 (as per CBS policy, September 09, 2009).
  - For donors the following information is required:
    - where and when donated blood,
    - all names (first and surnames) used and
    - date of birth.
  - For blood recipients (when blood transfusion is the only risk factor identified), the following additional information is required:
    - year of transfusion and
    - hospital of transfusion.

- Citizenship and Immigration Canada (CIC): There are currently no guidelines for immigrants as hepatitis C testing is not required as part of the immigration process (S. Martin, personal communication, June 2008).
Etiology
Hepatitis C (HCV) is an enveloped RNA virus. It is a member of the Flaviridae family, genus *Hepacivirus*. At least 6 major genotypes and approximately 100 subtypes exist. Types 1a and 1b are the most common types found in North America. Although the predominant type of hepatitis C in Canada is genotype 1, all types have been reported in Canada. Genotypes appear to vary in pathogenicity and in how they respond to antiviral therapy.

Clinical Presentation
Most people (more than 90%) infected with HCV have either no symptoms or exhibit only mild symptoms of illness, such as anorexia, vague abdominal discomfort, nausea and vomiting. In acute infections, the most common symptoms are fatigue and jaundice. A person with acute disease may have elevations in serum ALT levels, often in a fluctuating pattern. Although initial illness may be asymptomatic or mild, a high percentage (50–80%) develop chronic HCV infection. Up to 70% of individuals with chronic HCV infection have evidence of active liver disease, however, the majority of these individuals may not be aware of their infection because they are not clinically ill, and symptoms are often non-specific. Chronic infection can be marked by fluctuations in clinical symptoms and liver enzyme tests such as serum transaminases. Many people complain of chronic or intermittent fatigue, which can be debilitating. The degree of fatigue is often not correlated with the severity of liver disease. Although most people show few physical signs of the disease during the first 20 years of infection, of those chronically infected with HCV, about half will eventually develop cirrhosis or hepatocellular carcinoma (HCC). Long-term complications (e.g., cirrhosis and HCC) generally occur more than 20 years after infection, although more rapid progression does occur.

HCV is the leading cause for liver transplants worldwide. Alcohol consumption, older age at time of infection (>40 years old), male gender, and co-morbidities including obesity, co-infection with hepatitis B, and co-infection with HIV are factors that accelerate liver disease progression in people with HCV infection. It is estimated that approximately 20% of HIV-positive people in Canada are co-infected with HCV and the risk for cirrhosis in these individuals is nearly twice that in persons with HCV infection alone.

Diagnosis
In Alberta, serology and nucleic acid testing (NAT) for HCV is done at the Provincial Laboratory for Public Health (PLPH). A HCV infection diagnosis is based on positive antibodies to HCV (anti-HCV) and/or positive HCV NAT results.

A positive NAT is an indication of viremia i.e., HCV is detected in the blood indicating viral replication. NAT does not distinguish between acute or chronic infection with HCV. From the clinical assessment and management perspective, HCV PCR is an important test, as only individuals who are viremic will be considered for antiviral treatment. Moreover, HCV NAT is a useful diagnostic tool in immunocompromised individuals who might not mount an antibody response.

For neonates born to HCV positive mothers, physicians can determine if vertical transmission has occurred by performing HCV antibody after 18 months of age when maternal antibodies are cleared. If confirmation of a diagnosis that will impact infant management prior to 18 months is required, NAT is indicated. (G. Zahariadis, personal communication, November 22, 2009).
Epidemiology

Reservoir
Humans.

Transmission
Hepatitis C is primarily transmitted through parenteral exposure to HCV infected blood.(8) Transmission is most efficient through large or repeated percutaneous exposures to blood, such as transfusion of blood from unscreened donors or through injection drug use (IDU). Although less efficient, occupational, perinatal, and sexual exposures can also result in transmission of HCV.(5) Current or past IDU accounts for more than 58% of all reported cases of HCV in Canada(11), and between 70–80% of all newly acquired HCV infections acquired in Canada are related to IDU(12), through sharing of injection equipment(13) (sharing needles, syringes, spoons, filters, water, tourniquets, and swabs).(14)

Non-injection drug use also poses a risk for HCV transmission. It has been established that HCV can be transmitted through sharing straws and crack pipes when snorting or smoking drugs. Other activities involving needles, such as tattooing, piercing, electrolysis and acupuncture may pose a risk of HCV transmission if not carried out using new needles for each procedure, or if equipment is not properly sterilized.(14)

Any body fluid contaminated with HCV-infected blood can be a source of infection.(15)

Household (non-sexual) transmission has been reported through sharing sharp instruments/personal hygiene equipment with an infected person (e.g., toothbrushes, nail scissors and clippers, and razors).(14;16;17)

Sexual transmission is low (probably less than 5%), but can occur if blood is present, either visibly or through microscopic cuts or tears in the skin and/or mucosa.(14)

Populations identified as being at increased risk of sexual transmission of HCV include men who have sex with men (MSM), sex trade workers or sexually promiscuous groups, persons attending a sexually transmitted infection (STI) clinic, persons and their partners with HIV, sexual partners of HCV-infected hemophiliac men, and sexual partners of patients with chronic hepatitis.(17) Sexual transmission (in low prevalence countries) among long-term sexual partners is relatively low (<5%). The risk of transmission increases with multiple sexual partners.(8;18)

The risk of vertical transmission (mother to baby) has been estimated to be between 1–6% of HCV-infected. Maternal co-infection with HIV is associated with an increased risk of transmission.(15) Maternal risk factors that increases the risk of transmission of HCV include HIV co-infection, history of IDU, and high maternal viremia (>10^8 copies/ml).(19) Breastfeeding is considered safe as long as nipples are not cracked and bleeding. Transmission through breast milk is unlikely.(14)

In Canada, since the early 1990s, the risk of transmission from screened and donated blood, manufactured blood products, and transplanted organs has been minimal due to screening and processing of blood products. The current risk for HCV transmission from blood transfusion is very low and is thought to be less than 1:3,100,000 units of blood donated.(20) Individuals who were exposed to contaminated blood, blood products or transplantation prior to 1992 in Canada may be at risk of having HCV infection.
HCV is not transmitted efficiently through occupational exposures to blood. The average incidence of anti-HCV sero-conversion after accidental percutaneous exposure from an HCV positive source is 1.8% (range 0 to 7%).(18)

A more detailed description of HCV transmission is available in the Canadian AIDS Society publication, *HIV Transmission: Guidelines for Assessing Risk*, 5th ed., 2004. These guidelines now include a section, *Assessing Risk of Hepatitis C Transmission* (pp. 41-52).(14)

**Incubation Period**
The incubation period ranges from 14 days to 6 months, commonly 6 to 9 weeks.(1) After exposure, HCV RNA can be detected in plasma within days, often 1 to 4 weeks before liver enzymes rise.(8) There is normally a time lapse of 6 to 7 weeks between the exposure to the HCV and any symptoms that may result.

**Period of Communicability**
Hepatitis C is communicable from one or more weeks before the onset of symptoms,(21;22) up to lifelong.(22) Peaks in virus concentration appear to correlate with peaks in liver ALT activity. People who are positive for HCV antibody may, from a medical perspective, clear the virus following treatment.

**Host Susceptibility**
Susceptibility is universal. The degree of protective immunity following infection is not known but repeated infections with HCV have been demonstrated in experimental chimpanzee models and human case reports.(23)

**Occurrence**

**General**
Hepatitis C is a major public health concern around the world. It is estimated that approximately 3% of the world’s population, or 180 million persons worldwide are infected, 130 million of whom are chronic HCV carriers at risk of developing liver cirrhosis and/or liver cancer. In addition, it is estimated that three to four million people worldwide are newly infected with HCV each year.(7)

Disease prevalence is considered low (<1%) in Canada, Australia, and northern Europe, and is approximately 1% (medium endemicity) in the USA and most of Europe. Many countries in Africa, Latin America, and Central and Southeastern Asia are considered high endemicity (>2%), with some countries in these areas reporting prevalence rates between 5 and 10%. (7)

**Canada**
Prior to 1989, when hepatitis C was first identified, it was known that there was some factor causing hepatitis among people who received blood transfusions or blood products. It was originally known as “non-A, non-B” hepatitis.(3) A test for hepatitis C was introduced in Canada in 1990.(4) As of December 2007, it is estimated that 242,500 people in Canada (approximately 0.7% of the Canadian population) were infected with HCV, with an estimated 7,900 individuals newly infected in 2007, mostly through IDU.(11) In Canada, approximately 20% of reported HCV infections are in the immigrant community. HCV infections from transfusion of blood products accounts for only (approximately) 13% of all cases.(13)

The number of cases diagnosed has increased dramatically since 1992, in part due to improved awareness and recognition of the infection(3), however, it estimated that perhaps
only 65% of the estimated cases in Canada have been identified. Many individuals could be in the long asymptomatic stage of the illness and are unaware of their infection.

Reported HCV infection rates vary across Canada. In 2008, the highest rates were found in the Yukon (84.5 per 100,000), followed by Saskatchewan (69.3 per 100,000) and B.C. (56.6 per 100,000). The lowest rates were found in Newfoundland (19.5 per 100,000) and Nunavut (6.4 per 100,000). Alberta’s rate in 2008 (33.3 per 100,000) was lower than the national average (35.5 per 100,000).

Alberta
Non-A/non-B hepatitis (hepatitis C) became reportable in 1983, and there were 10 cases reported that year. In 1997, hepatitis C was designated as a notifiable disease. Between 1998 and 2006, the rate of newly diagnosed cases of HCV declined substantially in the province. The rate of newly diagnosed cases of HCV has consistently been higher in males than females in Alberta; approximately double in recent years. In 2006, there were 911 new cases of HCV in males (54.0 per 100,000 males) and 464 new cases among females (27.5 per 100,000 females). HCV rates are much higher in First Nations individuals than in non-First Nations individuals. Between 1998 and 2006, First Nations individuals represented 13.6% of HCV cases, while representing only 4.7% of the population.

Between 1998 and 2006, the peak rate of newly diagnosed cases of HCV was at an older age for males (40–59 years) than for females (30 to 39 years). Rates of newly diagnosed HCV were higher for males in most age groups, with the exception being in the 15–19 age group (16.0 per 100,000 for females, and 7.2 per 100,000 for males).

Key Investigation

Single Case/Household Cluster
- Determine the reason for the test (from the case or physician).
- Assess risk factors for potential source of infection including:
  - IDU (priority follow-up),
  - needle sharing,
  - recent incarceration,
  - receipt of blood/tissue/organ between 1978 and 1990,
  - receipt of blood/tissue/organ at any time in a developing country,
  - skin piercing procedures e.g., tattooing, body piercing, acupuncture,
  - workplace or non-occupational exposure, and
  - recent invasive medical or dental procedures e.g., hemodialysis.
- Assess sexual relationships and high-risk sexual behaviors.
- Ascertain status of co-infection with other blood borne infections (BBIs).
- Ascertain co-infection with STI.
- If female, determine pregnancy status.
- Determine donation of blood, tissue, or organs.
- Identify household and other intimate contacts for potential blood exposure from the case. Contacts include:
  - needle sharing partners,
  - persons who share personal use items e.g., razors, toothbrushes,
  - long term and short term sexual partners, and
  - other persons with an identified exposure to the blood or other body fluids capable of producing HCV infection.
Control

Management of a Case

- Public health personnel may contact the physician to make them aware of the need for:
  - public health follow-up including client education,
  - follow-up of contacts,
  - provision of resources,
  - additional epidemiologic information, and
  - the possibility of testing for other types of hepatitis (to determine the need for hepatitis A and B vaccine).
- Discussion of healthy lifestyle and information to minimize liver damage e.g., avoid intake of alcohol and hepatotoxic drugs, eating a well balanced diet, and having regular medical checkups.
- Education about the modes of transmission and reducing the risk of transmission to others.
- Referral to a specialist for medical management.
- Provide information about community support agencies.
- HIV and hepatitis B testing is recommended for clients involved in relevant risk activities.
- Determine the need for hepatitis A and hepatitis B vaccine. Testing may have been requested by the physician. Persons who are anti-HCV positive and are not already immune to hepatitis A and hepatitis B, are eligible for provincially funded vaccine as per the current *Alberta Immunization Manual*.

Treatment of a Case

- Treatment (e.g., antivirals) is determined on an individual basis, is generally based on genotype and severity of liver disease, and may prevent progression of liver disease or development of HCC.
- Criteria for initiating treatment are complex and should be done in conjunction with a medical specialist.
- Response to treatment and duration of therapy depends on the hepatitis genotype. Genotype 1 is most common in Canada and responds poorly to current treatment options.

Management of Contacts

- Persons who are identified as contacts of IDUs should be given priority for follow-up by public health personnel and should be notified of possible exposure to HCV by the case or by public health personnel.
- Short-term sexual contacts should be assessed for risk behaviors and appropriate testing for STIs, hepatitis C and other BBIs should be recommended. They should be notified by the case or by public health personnel.
- Most long-term sexual partners of HCV positive persons test anti-HCV negative, however, they may elect to be assessed by their physician.
- Infants born to HCV positive mothers should be followed up by a pediatric infectious disease physician or an expert in hepatitis C infection.

Preventive Measures

- Injection Drug Use (IDU)
  - The identification of injection drug users, with harm reduction counseling and education about the infection, is critical for prevention. Harm reduction efforts may include participation in needle-exchange programs, participation in addiction programs and drug substitution.
  - Street-based and prison-based programs are important for identifying and educating high-risk persons.
Research shows the need to direct hepatitis C prevention strategies towards people who are just beginning to inject drugs or contemplating injection. More than half of those new injection drug users become positive for HCV within six to 12 months.(26)

Users of drugs that are not injected should be counseled in the danger of infection from equipment such as straws, which could be contaminated with infected blood.

• Skin Piercing Procedures
  - Anyone considering tattooing, body piercing, or acupuncture should be counseled to ensure that these practices are carried out with sterile equipment, preferably one-time-use equipment.

• Occupational Exposure
  - Health care and emergency workers should all be trained in the risk and prevention of bloodborne infections and should report any percutaneous or permucosal exposure to their respective occupational health and safety (OHS) representative for appropriate management.
  - Prevalence of HCV infection among health care workers is about 1 to 2%, which is the same as among the general population.(27)

• Non-Occupational Exposure
  - Refer to the current Guidelines for Post-exposure Prophylaxis in the Non-Occupational Setting, AHW.

• Sexual Activity
  - Transmission from partner to partner in a long-term relationship is relatively low, however, the risk of transmission increases with multiple sexual partners, co-infection with HIV, and high-risk sexual behavior (i.e., where blood is present).
  - The infected person should inform (or public health personnel can notify) sexual partners. Testing should be offered to the partners.
  - Recommend use of condoms in short-term sexual relationships.
  - Infected women should avoid unprotected sex during menstruation, as the virus may be present in menstrual blood.

• Vertical Transmission
  - Transmission of HCV from mother to baby can occur at the time of birth. It remains uncertain whether delivery by elective caesarian prevents transmission. This intervention is not currently recommended.
  - Breastfeeding is recommended in general because of its proven health benefits and because the risk of HCV transmission by this means is only theoretical.
  - Women who wish to take no risk may choose to use alternative feeding methods. If the nipples are bleeding or cracked, it is recommended that breastfeeding be suspended until they are healed.

• Household Exposure
  - People with HCV should be advised not to share personal articles such as razors, nail scissors or clippers, and toothbrushes because of the possibility they may be contaminated with small amounts of blood containing the HCV.
  - Cuts and open sores on the skin should be covered up, and counseling on how to manage accidental spills of blood should be provided.
  - After a blood spill, removal of organic material must occur followed by cleaning with an appropriate disinfectant (usually 1:10 dilution of household bleach).(28)

• Screening for HCV
  - Early detection of HCV infection is important so that treatment may be initiated if indicated, and so that infected persons may be given the opportunity to initiate lifestyle changes to
reduce other risks that might lead to liver damage. Response to treatment may also be enhanced in persons with a shorter duration of infection.

○ Persons with significant risk factors (e.g., ever injected drugs [even once], history of incarceration, tattoos, ear or body piercing, organ transplant or a transfusion of blood or blood products before 1990, and health care workers who have injuries from needlesticks or sharps) should be screened for HCV.

○ Persons with liver dysfunction of unknown etiology or chronic liver disease should also be screened.

○ In Canada, the risk of infection through blood transfusion has been reduced but not eliminated by the testing of donors for HCV. The incidence of post-transfusion hepatitis C in the mid 1980s was 3.1%. The rate had fallen to 1.3% by the late 1980s. The current risk for HCV transmission from blood transfusion is very low and is thought to be less than 1:3,100,000 units of blood donated. (20)

○ All blood donations are screened by the CBS for HCV. Persons who are found to be positive in this manner are referred to the MOH (or designate) for the zone in which the donor lives, for appropriate follow-up.

○ All donations of blood, blood products, tissues, organs, and semen are screened for HCV, and people infected with HCV should be counselled not to donate.

Health Care Workers

- In any situation in which a worker who is HCV positive, is uncertain about the potential transmission risks of HCV or proper practices to minimize the risk to clients, he or she should consult with employee health or an infection control practitioner or patient safety group responsible for the quality of care for the clients.

- In addition, HCWs who are HCV positive should contact the Zone MOH or designate to discuss the potential risks of transmission to clients. Upon assessment by the Zone MOH, a worker may or may not be referred to the Alberta Expert Review Panel for Blood Borne Viral Infections in Health Care Workers for further assessment services, if indicated.

- The Panel is established to review circumstances of HCWs who are found to have a blood borne viral infectious disease. The panel may receive referrals from MOHs regarding HCWs who perform exposure-prone procedures when there is uncertainty as to whether continued or modified professional practice is indicated.
References


