



BC Centre for Disease Control
AN AGENCY OF THE PROVINCIAL HEALTH SERVICES AUTHORITY

Hepatitis C Public Health Nurse Resource

A document to help guide public health nurse practice
as it pertains to clients infected with hepatitis C

BC Hepatitis Services, April 2006



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Goals

To provide Public Health Nurses with information to assist them to:

- Enter HCV data into iPHIS
- Interpret HCV tests
- Assess individuals for HCV risk factors
- Provide education and counseling for those at risk of HCV acquisition
- Provide education and counseling for HCV infected persons

Introduction

Hepatitis C is an infection of the liver caused by the Hepatitis C Virus (HCV). HCV is primarily spread through direct exposure to blood of an infected person. Hepatitis C infection is usually asymptomatic and its diagnosis must be made by laboratory testing.

Transmission through sharing of needles, syringes, swabs, filters, spoons, tourniquets, water, other drug equipment and/or paraphernalia for injection drug use represents the highest risk behaviour for HCV acquisition.

10% of existing HCV infections were acquired through receipt of blood or blood products. The introduction of universal testing of blood donations since 1990 has reduced the current risk to less than 1 in two million.

Risk of acquiring HCV by sexual contact is low in long-term, monogamous relationships (3-5%) but risks increase with high risk sexual activities.

Infection of infants by an HCV-infected mother (i.e. vertical transmission) occurs in about 5-6% of births; this risk increases approximately 3 fold with HIV co-infection. The timing of this vertical transmission is not fully known but may occur at the time of delivery.

HCV can be transmitted by tattooing and body piercing carried out under non-sterile conditions. There is potential risk of infection through household contact (horizontal transmission) and contact with articles (such as toothbrushes and razors) contaminated with blood. The risk of HCV transmission by accidental needle stick in health care workers and others is estimated at about 3%.

Intranasal cocaine (snorting) is an independent risk factor for acquiring HCV but its link to transmission is not fully understood. Sharing crack pipes has been suggested as a possible mode of transmission due to open sores on the lips or in the mouth.



Definitions

The term Acute or Chronic Hepatitis C is associated with the natural progression of the disease. The first 6 months of infection is considered the acute phase and if the virus persists longer than 6 months, which occurs approximately 75% of the time, a lifelong chronic phase ensues.

For BC, the term acute and chronic hepatitis C are defined within the limits of laboratory testing results regardless of clinical presentation. Please note the following two definitions for HCV are also used for iPHIS data entry.

Acute Hepatitis C

Laboratory test findings indicate seroconversion within the past 12 months (i.e. a person whose anti-HCV test is initially non-reactive and within 12 months becomes reactive is considered an acute case, regardless of clinical presentation).

Hepatitis C

Laboratory test findings indicate reactivity but cannot ascertain that seroconversion occurred within the past 12 months.

HCV infection is considered chronic when anti-HCV testing indicates:

- 1) seroconversion occurred more than 12 months prior
- 2) anti-HCV reactivity has existed for more than 12 months or
- 3) duration of anti-HCV reactivity of 12 months or less cannot be established, such as in the case of a person with a single reactive test result with no existing prior test results

Resolved Infection

Serum is anti-HCV reactive but no longer has detectable HCV RNA after 2 qualitative polymerase chain reaction tests (qualitative PCR), 6 months apart.

Contact

An individual who has had a percutaneous or mucosal exposure to the blood, blood products, or potentially infective body fluids of an HCV-infected person. See BCCDC Blood and Body Fluid Exposure Management Section of CD Manual for the infective potential of various body fluids www.bccdc.org/content.php?item=192

Percutaneous Exposure

Contact through the skin with blood or infective body fluids of an HCV infected person. For example, through needlestick or other sharps injuries, tattooing, body piercing, electrolysis, or acupuncture. This form of exposure includes contact with damaged skin such as contact with a healing wound less than 3 days old, or with skin having compromised integrity from dermatitis, abrasions, fresh cutaneous scratches, burns, or other lesions.



Mucosal Exposure

Contact with blood or body fluids of an HCV-infected person of the mucous membrane lining body cavities of eyes, nose, mouth, vagina, rectum or urethra.

Perinatal Exposure

The neonate of an HCV-infected woman is at risk of exposure to HCV before, during, and after birth. The likelihood of transmission of infection to the infant is dependant on the viral load of the mother and risk is higher if the viral load is greater than 10^6 genome copies/mL as determined by a quantitative polymerase chain reaction (PCR) test. Assessment of perinatal exposure for HCV should also include consideration of any co-infections such as HIV.

Case Reports

The following are important points to consider when following HCV cases:

- I. Initiate a report of the case in the Communicable Disease Surveillance System (CDSS) module of iPHIS (See Appendix B)
- II. If there is a history of blood donation or receipt since 1980, determine if criteria for transfusion-transmitted infection (TTI) are met. Report the case in the CD module in iPHIS as a TTI in addition to reporting as a case of hepatitis C.

Counseling

In general, the specimen submitter is responsible for informing the client of the diagnosis, explaining reportability, counseling and making appropriate referrals. In addition to the information below please refer to the health files www.bchealthguide.org/healthfiles and search for Hepatitis C virus and living well with hepatitis C virus infection. Basic client counseling to be given to a client to prevent HCV transmission should include:

- Not donating blood, semen, breast milk, body organs or tissues
- Not sharing toothbrushes, dental floss, razors, earrings or manicure equipment (articles that might have traces of blood)
- Keeping all open cuts and sores covered until healed
- Putting articles with blood on them (e.g. tampons, pads, tissue, dental floss and bandages) in a separate plastic bag before disposing of them into household garbage;
- Disposing of bloody sharp items (razor blades, needles etc) into a hard-sided container taped shut
- Using bleach to clean up blood spills. Wet surfaces with 1 part bleach to 9 parts water and leave for 10 minutes before wiping off



- Although client is not obligated to disclose HCV status, situations in which informing health care providers of disease status may enhance general care and safety should be
- If considering pregnancy discuss risk of transmission to infant, and transmission factors associated with breast feeding
- Consider with client, readiness to reduce or stop injecting illegal drugs and advise on resources available for this. However, with likely continued injection drug use, advise the following practices:
 - Do not reuse or share syringes, water or drug preparation equipment or any drug paraphernalia (pipes, spoons, snorting equipment, etc.). Do not share tattoo equipment
 - Use syringes obtained from a reliable source and safely dispose after one use. Ensure a new, sterile syringe and needle is used for each injection, not just each session
 - Use sterile water to prepare drugs; otherwise use clean water from a reliable source
 - Prior to injection clean the site with a new alcohol swab
 - Save one vein for medical use
- Inform all prospective sexual partners of HCV status and practice safer sex by:
 - Informing partners
 - Using latex condoms (NB – risk of sexual transmission in monogamous, long-term relationships without high risk sexual practices is considered extremely low. Once disclosed and discussed, use of condoms is personal choice of the couple)
 - Discussing higher risk sexual practices including anal sex, multiple partners, traumatic / rough sex, substance use during sex, etc... can increase blood to blood transmission during sex

Referrals to Community Resources are dependent on both the region and the individual's needs. Examples of community resources may include: STI clinics; integrated hepatitis network centres; liver disease/hepatitis clinics or specialists; peer support groups; needle exchanges; physicians/clinics / HCPs prescribing methadone, etc...



Vaccinations

Adults

Initiate appropriate immunizations for clients based on laboratory test findings for hepatitis A virus and hepatitis B virus immune status and vaccine history. Offer Pneumococcal vaccine, annual Influenza vaccine.

Infants

In addition to the routine recommended infant vaccines, an HCV infected infant will require hepatitis A vaccine (after 6 months of age), the pneumococcal conjugate vaccine with the schedule for high risk (4 doses), pneumococcal polysaccharide vaccine at 24 months of age and annual influenza vaccine.

Laboratory Testing

Laboratory Confirmation of HCV Infection

Initially, client serum is tested for the presence of antibodies to HCV (anti-HCV), anti-HCV reactivity indicates the person has been infected with HCV but does not indicate immunity; once infected with HCV, antibodies usually persist for life. All persons with anti-HCV in their blood are considered to be infectious unless the infection has been documented to have resolved. Infection may spontaneously resolve in a minority of cases (25%), Polymerase Chain Reaction (PCR) testing is used to detect HCV RNA (looks for actual virus in the blood). The majority of persons who are anti-HCV reactive will also have detectable HCV RNA, indicating active infection with HCV. Where infection has resolved either spontaneously or due to successful treatment, the anti-HCV testing will be reactive but the PCR testing will not detect HCV RNA.

The BC Centre for Disease Control HCV testing sequence is:

I. HCV antibody testing (anti-HCV testing)

EIA (enzyme-linked immunosorbent assay) screening test: Detects circulating antibodies produced in response to HCV infection. As false positives may occur a supplemental EIA on an alternate testing platform is used to confirm reactivity.

Anti-HCV Testing Results:

Anti-HCV reactive: If both EIA tests are reactive, the results are reported as anti-HCV reactive. Further PCR testing is required to confirm whether infection is active or resolved.

Anti-HCV non-reactive: If the initial EIA test is non-reactive, the results are reported as anti-HCV non-reactive. In an immunocompetent person, no further testing is required. In



an immunocompromised person, the anti-HCV response may be blunted and further confirmatory PCR testing may still be required.

Anti-HCV equivocal: If one EIA test is anti-HCV reactive and the other is anti-HCV non-reactive, the results are reported as equivocal. In general, this discord will be resolved by the laboratory through further confirmatory testing in consultation with a virologist prior to reporting.

Anti-HCV weakly reactive: If either of the EIA tests are below threshold of reactivity but in the grey zone above non-reactivity, the results are reported as weakly reactive. Generally,

further confirmatory testing with an EIA or PCR at a later date is required to confirm diagnosis and to be able to report appropriately into iPHIS.

II. Polymerase Chain Reaction (PCR) testing

PCR testing is used for confirm active infection. There are two types: qualitative and quantitative PCR testing. Qualitative tests are generally used to confirm HCV infection because they are more sensitive than quantitative PCR testing (they can detect a lower

concentration of the virus in the blood). Quantitative PCR testing on the other hand is generally used for treatment purposes because unlike qualitative tests it can determine the amount of virus present in the blood. It is used to determine response to treatment by tracking viral load. Laboratories may refer to qualitative PCR testing as RT-PCR assay, PCR assay or Qual-RT-PCR.

Qualitative PCR Testing Results:

HCV RNA detected: May be seen on laboratory reports as: HCV RNA detected by Qual-RT-PCR.

HCV RNA not detected: If the qualitative PCR does not detect HCV RNA, this indicates no current active infection. This may be seen on reports as: No HCV RNA detected by Qual-RT-PCR.

III. Reflex Laboratory Testing

For sera determined to be anti-HCV reactive (or weakly reactive), BCCDC will automatically test for hepatitis A and B immune status. Sera are tested for anti-HAV (total) and anti-HBs. For sera non-reactive for anti-HBs, it will be further tested for HBsAg and anti-HBc (total). Based on these findings, recommendations are made on the appropriate vaccines to administer.



Infants and Children, Pregnant Women, Breastfeeding

Hepatitis C in Neonates and Children

Infants born to HCV positive mothers are recommended to be PCR/RNA-tested at 6 weeks and, unless initial test is positive, antibody tested at 12 months. If the anti-HCV at 12 months is negative, no further testing is necessary and HCV infection in the infant is ruled out. If it is anti-HCV positive at 12 months, an additional antibody test should be done at 18 months (see appendix D).

Maternal antibodies cross the placenta yielding false positive anti-HCV results in newborns. In 95% of cases maternal antibody will no longer be detectable in the infant by 12 months of age. In the remaining 5%, maternal antibody will no longer be detectable by 15 to 18 months.

A qualitative HCV RNA after six weeks of age is recommended to identify active HCV infection in the neonate. Requests for antibody testing on infants less than one year are automatically processed by the lab as PCR tests to detect active infection. For children older than 18 months of age, an antibody test will confirm infection as maternal antibody will have disappeared. Thus, the adult recommendations for hepatitis C testing apply for children older than 18 months.

The follow-up of infants and children with proven chronic hepatitis C infection is complex. Consultation with a pediatric specialist with expertise in viral hepatitis is recommended.

Pregnancy and Breastfeeding

Mother-to-child (MTC) transmission of HCV occurs in about 5% of HCV-infected, HIV-negative pregnant populations, whether infants are breastfed or bottle-fed. There is limited understanding of the mechanisms of HCV vertical transmission and it may occur intrauterine, peri-partum and/or post-partum. Infections acquired by infants are generally chronic.

Three risk factors have been associated with increased risk of HCV transmission from chronic HCV-infected mothers to their infant:

- When the mother has a high serum HCV RNA titre (i.e. 10^6 copies/ml or higher)
- When the mother has clinical symptoms and/or signs of acute hepatitis
- When the mother is co-infected with HIV

It is biologically plausible that breastfeeding with cracked and bleeding nipples may pose a higher risk than breastfeeding alone. The decision of whether to breastfeed is made by the woman in consultation with her physician. If the mother is HIV-negative,



asymptomatic, and has a low serum titre there is a very low risk of MTC HCV transmission by breastfeeding.

If the mother is HIV co-infected, experiencing acute symptoms, and/or has high serum HCV RNA titre it may be reasonable to consider not breastfeeding.

If the mother does not wish to expose the infant to any possible risk of transmission via breastfeeding, then it may be reasonable to consider not breastfeeding.



Appendix A: Hepatitis C Terminology

Alanine aminotransferase (ALT)	An enzyme produced by the liver. Increased blood levels of ALT indicate liver cell damage but do not always correlate with the severity of the disease process.
Aspartate Aminotransferase (AST)	An enzyme produced by the liver. Increased blood levels of AST indicate hepatitis or inflammation of the liver. Often followed as a marker for response to treatment during a course of therapy for hepatitis C.
Assay	Test to determine the presence, absence, or quantity of one or more components of a substance. For example, anti-HCV testing is an assay. See <i>HCV Antibody Testing</i> below.
Chronic Hepatitis	A progressive form of hepatitis in which symptoms and abnormal laboratory results persist for months or years; may result in liver degeneration and possible <i>liver cirrhosis</i> .
Cirrhosis (Liver Cirrhosis)	A term used to describe an abnormal state of the liver, where normal cells are replaced with fibrous, scar tissue. The damaged cells are unable to function properly placing additional strain on the remaining healthy cells. Often seen after long-term alcohol exposure or liver infections such as HCV.
Co-infection	A condition in which two different infecting organisms co-exist. For example, HCV and HIV.
Fulminant Hepatitis	The most severe form of hepatitis; may lead to acute liver failure and death.
Genotype	The genetic subtype of HCV can be determined by genetic sequencing of the viral RNA. 6 major genotypes of HCV have been identified. Genotype 1 is the most common in Canada, being present in 2/3 of cases.
HCV Antibody Testing (anti-HCV testing)	A test that detects HCV antibodies (anti-HCV) in serum. HCV antibodies are produced against HCV and remain present for life.



Hepatitis C RNA (HCV RNA)	RNA derived from hepatitis C virus circulating in the bloodstream. The presence of HCV RNA in serum indicates an active infection.
Mucosal Exposure	Contact through the mucous membrane lining with the blood potentially-infective body fluids of an HCV-infected person. Mucosa includes membrane lining of body cavities of eyes, nose, mouth, vagina, rectum, or urethra.
Percutaneous Exposure	Contact through the skin with the blood or potentially-infective body fluids of an HCV-infected person.
Resolved Infection	Serum is anti-HCV reactive but no longer has detectable HCV RNA after 2 <i>qualitative polymerase chain reaction tests</i> (qualitative PCR), 6 months apart.
Seroconversion	An immune response characterized by a change from the absence of antibody to HCV (anti-HCV non-reactive) to the presence of antibody to HCV (anti-HCV reactive) in the serum of an individual.
Polymerase Chain Reaction Test (PCR Test) - qualitative - quantitative	Hepatitis C RNA (HCV RNA) can be detected by PCR testing. There are two types: a) The qualitative test tells whether or not there is HCV RNA in the blood; and b) The quantitative test measures the number of HCV RNA particles in the blood (see viral load testing below)
Viral Load Testing	Quantitative PCR testing is sometimes referred to HCV PCR viral load testing. This quantitative test looks for the virus and estimates the number of HCV viruses per ml of blood.



Appendix B: Coding of HCV Cases in iPHIS
(iPHIS: Integrated Public Health Information System)

1) Children/Adults:

Code as:

- a. **Acute Hepatitis C** when anti-HCV testing indicates seroconversion from a non-reactive to a reactive result within the previous 12 months.
- b. **Hepatitis C** for all reactive results other than a) above and would include:
 - i. when no past testing was done
 - ii. when no past testing is available
 - iii. when the most recent past testing available was done > 12 months prior
 - iv. when the reporting laboratory is other than BCCDC and does not provide simultaneous reporting of past testing results

2) Neonates/Infants of a Woman who is Anti-HCV Reactive:

6 weeks to 12 months:

Qualitative PCR testing is recommended for neonates \geq 6 weeks up to 12 months. **Due to circulating maternal antibody**, anti-HCV testing before 12 months is not useful.

- a. TESTING/RESULT Qualitative PCR testing detects HCV RNA: active infection confirmed
CODE AS: **Hepatitis C**
FOLLOW-UP: Coding on neonate is complete
- b. TESTING/RESULT Qualitative PCR testing does not detect HCV RNA: infection status remains indeterminate
CODE AS: Do not code at all
FOLLOW-UP: Recommend anti-HCV testing at 12 months



12 months to 18 months:

Anti-HCV testing is recommended for infants \geq 12 months to ascertain past infection. Qualitative PCR testing *may* be done to confirm active infection.

- a. TESTING/RESULT Anti-HCV testing is reactive: past infection confirmed
Active infection status remains indeterminate in the absence of qualitative PCR testing or anti-HCV testing at 18 months
CODE AS: **Hepatitis C**
FOLLOW-UP: Recommend repeat anti-HCV testing at 18 months

- b. TESTING: Anti-HCV testing is non-reactive: no evidence of infection *
CODE AS: Do not code at all
FOLLOW-UP: Coding on infant is complete

- c. TESTING: Qualitative PCR testing detects HCV RNA: active infection confirmed
CODE AS: **Hepatitis C**
FOLLOW-UP: Coding on infant is complete

- d. TESTING: Qualitative PCR testing does not detect HCV RNA: active infection status remains indeterminate
CODE AS: Code according to anti-HCV testing results
FOLLOW-UP: Recommend repeat anti-HCV testing at 18 months

* Although in <5% of cases maternal antibody can remain for 15-18 months, a non-reactive anti-HCV test at 12 months is considered to rule out both past and active infection

\geq 18 months:

Anti-HCV testing is recommended for infants \geq 18 months to ascertain past infection. Qualitative PCR testing *may* be done to confirm active infection.

- a. TESTING: Anti-HCV testing is reactive: past infection confirmed*
CODE AS: **Hepatitis C**
FOLLOW-UP: Coding on infant is complete

- b. TESTING: Anti-HCV testing is non-reactive *after a previously reactive* result: no evidence of infection
CODE AS: **Not a Case** (add this code but do not remove previous coding)
FOLLOW-UP: Coding on infant is complete



- c. TESTING: Qualitative PCR testing detects HCV RNA: active infection confirmed
CODE AS: **Hepatitis C**
FOLLOW-UP: Coding on infant is complete
- d. TESTING: Qualitative PCR testing does not detect HCV RNA: no evidence of active infection
CODE AS: If no previous coding, do not code at all. If has been previously coded as **Hepatitis C**, code as **Not a Case** (add this code but do not remove previous coding)
FOLLOW-UP: Coding on infant is complete

* At 18 months, a reactive anti-HCV test is reasonable confirmation of both past and active infection

Summary

- Enter a neonate/infant as **Hepatitis C** when there is HCV RNA detected by qualitative PCR testing at 6 weeks or later.
- Enter an infant as **Hepatitis C** when there is anti-HCV reactivity at 12 or 18 months.
- Remember to change an infant's coding from **Hepatitis C** to **Not a Case** if anti-HCV testing at 12 months was reactive but anti-HCV testing at 18 months is non-reactive.



Appendix C: Sample Letter to Physician
Re: Testing and Immunization of Infants Born to Mothers with Hepatitis C

(Month Day, Year)

First Name, Last Name, Title
Health Region, Unit
Address
City, Province
Postal Code

RE: Testing and Immunization of Infants Born to Mothers with Hepatitis C

Dear Doctor X:

We have been advised that your client ----- is hepatitis C positive and delivered -----
----- on -----.

It is recommended that this infant be tested for hepatitis C according to the attached algorithm. In addition to the routine recommended infant vaccines, an HCV infected infant will require hepatitis A vaccine (after 6 months of age), the pneumococcal conjugate vaccine with the schedule for high risk (4 doses), pneumococcal polysaccharide vaccine at 24 months of age and annual influenza vaccine.

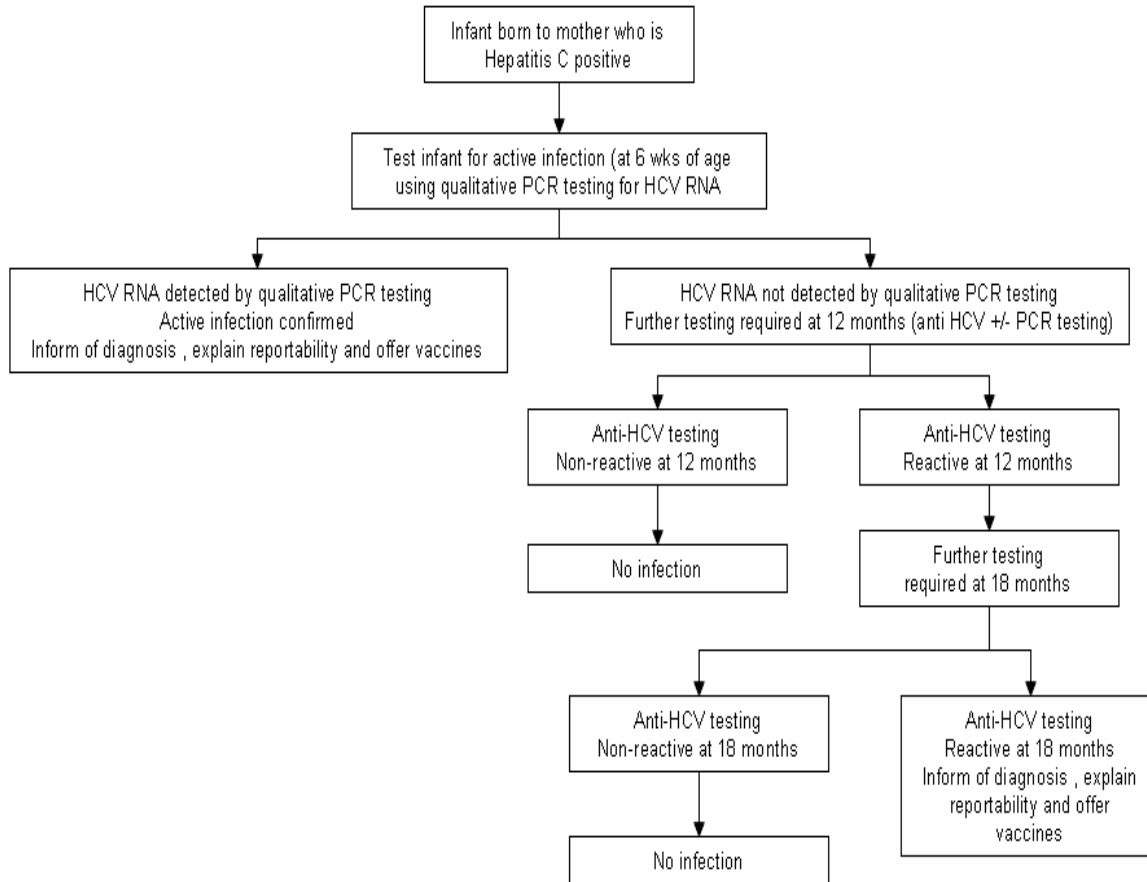
Please contact public health nurse, -----, if you have questions at {-----}.

Sincerely,

(First Name / Last Name)
(Position)

Acknowledgment: This sample letter was based on 2005 policy and procedures documents shared by Northern Health Authority

Appendix D: Neonate/Infant HCV Testing



Acknowledgment: This algorithm was based on 2005 policy and procedures documents shared by Northern Health Authority



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