

Blood Borne Infections in Health Care Workers

Issued December 2003ⁱ

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The Council of the College of Physicians and Surgeons of Alberta established a committee of physicians and dentists to develop guidelines on HIV and HBV-infected health care workers (HCWs)*, recognizing that those statements would require review and revision as knowledge and recommendations evolved. The resulting documents were published first in 1992 and 1994, followed by a major policy in 1998 from Health Canada concerning blood borne infections. HIV, HCV, and HBV are blood borne pathogens and, although the underlying principles for the management of infected HCWs are similar, certain differences in the clinical and epidemiological patterns of infection require different recommendations for HBV, HCV, and HIV.

BACKGROUND INFORMATION

A) GENERAL

1. Rigorous routine attention to routine practices/routine precautions and to established infection prevention practices, while significantly reducing transmission of blood borne infections, does not completely eliminate the risk.
2. The statements in this document apply to all HCWs, whether employed in health care institutions/agencies or privately, or practising independently (self-employed), but are most particularly applicable to those who engage in exposure-prone procedures.

Health Canada's definition of exposure-prone procedures is those during which transmission of HBV, HCV, or HIV from a HCW to patient is most likely to occur and includes the following:

- a) digital palpation of a needle tip in a body cavity, a hollow space within the body or one of its organs, or the simultaneous presence of the HCW's fingers and a needle or other sharp instrument or object in a blind or highly confined anatomic site, e.g., during major abdominal, cardiothoracic, vaginal, and/or orthopedic operations, or
- b) repair of major traumatic injuries, or
- c) major cutting or removal of an oral or perioral tissue, including tooth structures, during which there is a potential for the patient's open tissues to be exposed to the blood of an injured HCW.

***HCW**—Registered member of any health care association recognized by independent legislation or by regulation under the Health Disciplines Act, the essential element being patient contact, direct or indirect, in any setting where that may occur. The content of this document is relevant to any health care provider who has patient contact, even if not subject to regulation.

3. Although the risk of patient to HCW is greater than that of HCW to patient, it still is extremely low with effective application of standard precautions. The potential ramifications of a HCW becoming infected with a blood borne pathogen (HIV, HBV, HCV) through patient contact must not be used to justify denying service to anyone based on the patient's positivity for blood borne pathogens.

B) HIV

1. In the delivery of health care services, transmission of HIV from a HCW can occur only when infected blood enters a patient through accidental percutaneous exposure or mucous membrane contact. The average risk of HIV transmission after a percutaneous exposure to HIV infected blood is 0.3%, and after a mucous membrane exposure is 0.09%.
2. Since the early 1980's when the first case of AIDS was reported, there have been millions of procedures carried out by HCWs, some of whom have been HIV-positive. Current evidence indicates that the risk of transmission during these services is almost zero. There are **only three reports** of HIV infection transmission by a HCW to patients. One in 1991 concerns a dentist in Florida who appears to have infected five of his patients; the mechanism of the HIV transfer is not certain. This case was unique until May 1998 when HIV transmission from an orthopedic surgeon to a patient was reported in France. The third involved an infected nurse in France in 2000.
3. Look-backs at patients of other HIV-positive HCWs providing health care services have failed to identify other transmission of HIV infection from HCW to patient.
4. Seronegativity of an individual does not ensure the absence of HIV infection because there is a delay of up to six months from the time of infection before measurable antibodies appear in serum. Mass routine HIV screening of HCWs would be of limited benefit, if any, and might be falsely reassuring. Furthermore, such an approach would divert millions of dollars from other health care programs. Testing of individual HCWs after possible exposure is definitely of value.
5. Neither vaccine nor curative therapy is yet available for HIV infection, though prophylaxis following HIV exposure is now available. Treatment protocols for those infected are now very much more effective than in the early years. Although this means that infected individuals are living for longer periods of time, they are still potentially infectious, albeit at a lower level of risk for transmission, when involved in exposure prone therapies.

C) HBV

1. HBV immunization is available and has been recommended for all HCWs since 1982. The safety and effectiveness of the HBV vaccine has been proven in universal programs for the general population. It is important that non-immune HCWs accept immunization.
2. In the delivery of health care services, transmission of HBV from a HCW can occur only when infected blood, its components, or other body fluids enter a patient through parenteral therapy, percutaneous injury, or mucocutaneous contact. Percutaneous exposure to even microscopic amounts of HBeAg-positive blood from HCWs has resulted in seroconversion (see Appendices 3 and 4) in up to 30% of patients exposed.
3. Transmission of HBV infection from HCW to patient, although well documented, is rare. Clusters of patients with HBV infection likely acquired from HBsAg-positive or HBeAg-positive HCWs have been reported. A variety of types of HCW have been implicated in occupational transmission of HBV. An identifiable exposure-prone procedure with consequent blood-to-blood transmission between an infected HCW and a patient represents the probable means of infection in most but not all cases.

4. In a few instances, HCWs who may be unusually infectious and who continue to perform exposure-prone procedures continue to transmit HBV to patients despite modification of technique (e.g., double gloving).
5. Reports from England and other European countries of transmission of HBV from HBsAg-positive, HBeAg-negative surgeons to patients have recently been published. Some HBV infected individuals carry a genetic variant of the virus that is unable to produce the e antigen but is still capable of replicating at high levels with high viral loads in blood. As a consequence, there are highly infectious individuals who cannot be identified by e antigen testing, but who are identifiable by HBV DNA assay.
6. When HBV exposure is recognized, effective early prophylaxis is available through the use of hepatitis B immune globulin (HBIG) and concurrent immunization. Prophylaxis with HBIG is preferably given within 48 hours after exposure; efficacy is unknown if given after seven days.
7. New therapies are increasingly available that may substantially lower the risk of HBV transmission from infected HCWs indicated by reduction in HBV DNA and/or clearance of HBeAg. HBsAg clearance is rare in chronic carriers but does ensure that the HCW is non-infectious.

D) HCV

1. Transmission of HCV from HCW to patient has been reported in only three instances to date. The mechanism of transmission has not always been clear, but likely occurs only when infected blood or its components enter a patient through parenteral therapy, percutaneous injury, or mucocutaneous contact. The average incidence of transmission of HCV after accidental percutaneous exposure from an HCV positive source is 1.8%.
2. Upwards of 15% of individuals who become infected with HCV will spontaneously clear their infection as evidenced by undetectable HCV RNA. The remaining individuals with HCV are chronically infected with persistent viremia and remain infectious over an extended period of time. In the absence of successful treatment, most of those who do become infected will go on to develop chronic hepatitis which, in a minority, may progress to cirrhosis and then rarely to hepatocellular carcinoma.
3. At present, no effective prophylaxis or vaccine exists for HCV.
4. Therapy for HCV in the first few months of infection appears to be highly effective in eradicating the virus; it is not known at the present time if this represents permanent eradication of infection.
5. Detection of any HCAb in serum is a marker of HCV infection, acute or chronic, but may take up to six months to become detectable. The presence of HCV RNA is an indicator of active infection.

COMMITTEE RECOMMENDATIONS

A) GENERAL

1. The Canadian Medical Association's view has been "that any policy development in this area should be based on scientific, epidemiologic and ethical principles, and its primary purpose should be to promote effective action in the prevention and control of infection, for the protection of HCWs and the public, while at the same time safeguarding human rights".

2. The College of Physicians and Surgeons of Alberta, the Alberta Dental Association, and other participating health care organizations have formed a provincial expert review panel (see Appendices 1 & 2) composed of medical officers of health, infectious diseases specialists, infection control officers, public health nurses, occupational health nurses, and members of the public. Others will assist as required and will include the HCW's private physician and a HCW of the same discipline who is knowledgeable about the type of services provided by the infected HCW. This panel now is constituted as advisory to the Minister of Health and Wellness.

The panel will provide evaluation for HCWs (and their licensing authorities) with blood borne infections who carry out exposure-prone procedures and counsel them on an individual and confidential basis concerning continued or modified professional practice and possible therapy that may alter infectivity. The panel will consider not only the health status of the HCW but also other facts including the specific services provided, adherence to infection control practice, and the HCW's skill and judgment. Location and type of practice may warrant consideration.

If the HCW is found to be an ongoing source of infection to others despite having implemented appropriate safety measures, the HCW shall be required to cease exposure-prone procedures as required by the Communicable Diseases Regulation. Reporting to the Medical Officer of Health of the RHA in order to ensure compliance would not breach confidentiality improperly since the Medical Officer of Health would already be notified under the Public Health Act.

3. Each health care organization and employer of health care workers must, according to its own mandate, address issues of retraining and provision of compensation if the HCW withdraws from or alters professional activity after receiving the review panel's advice. This is fundamental to any expectation that HCWs will self report.
4. The potential ramifications of a HCW becoming infected with a blood borne pathogen (HIV, HBV, HCV) through patient contact must not be used to justify denying service to anyone based on the patient's infection with a blood borne pathogen.
5. The primary training and continuing education of all HCWs must include the principles of infection prevention/control techniques and routine practices. These principles must be applied at all times.
6. Provision must be made for education and training of all HCWs in matters relating to blood borne infections at all levels of learning—pre- and post-qualification and continuing health care education.
7. There should be access for all HCWs to immunization programs at no personal cost.
8. All HCWs who have reason to believe they may have been exposed to infection with blood borne pathogens through either occupational or non-occupational risks have a professional and ethical duty to learn their serologic status for HIV, HBV, and HCV if their practice involves exposure-prone patient contact.
9. All HCWs must report blood or other body fluid exposures so that appropriate tests, vaccinations, prophylaxis, counselling, treatment, and follow-up can be provided. Each employer of HCWs must ensure an organized system exists to ensure that this is available without financial barriers to the HCW or risk of dismissal for workers or employees. Self-employed HCWs need to ensure the availability of similar services.

10. Particular emphasis should be placed upon individualized career counselling for blood borne pathogen infected students in any health care discipline. The committee or a designated member would advise the licensing authority and/or school; that entity, in turn, would provide the appropriate counselling and follow-up as necessary. The fact of such infection alone must not be used to deny any individual entry into an appropriate health care profession, faculty, or school.

B) HIV

1. Mandatory screening of HCW's for HIV is NOT recommended. Testing should be voluntary with appropriate safeguards for confidentiality and with comprehensive pre- and post-test counselling.

NOTE: Employers of health care workers who have direct patient contact are encouraged to develop policies related to recommendations B(2) and C(1). The Occupational Health and Safety Act makes employers responsible for costs of work related injuries.

2. All HIV-positive HCWs are ethically obliged, either themselves or through their physicians, to contact their licensing authority for evaluation of their professional activities and referral to an expert review panel if performing exposure-prone procedures. It is extremely important that HIV-infected HCWs have the same rights of confidentiality as any other patient seeking or receiving medical care. Employers and professional associations should promote a climate that supports this process.
3. Since it would not enhance public safety, we believe that HCWs should not be required routinely to inform their patients or employers that they are HIV-positive. It would only discourage voluntary testing and medical evaluation while potentially decreasing the availability of professional health care services by those HCWs who, despite their HIV seropositivity, do not put their patients at risk.
4. If an exposure occurs from HCW to patient, the patient must be informed so that early follow-up and treatment can be provided if appropriate.

C) HBV

1. HCWs require immunization against HBV at the earliest possible date in their careers, and certainly prior to clinical training. Until programs of universal HBV immunization in childhood have been implemented as recommended by the National Advisory Committee on Immunization and Health Canada, student health and staff health programs must actively promote HBV vaccination and ensure that HCWs are immunized. Post-vaccination testing for anti-HBs at one to twelve months is recommended for all HCWs in order to distinguish responders from non-responders and identify the need for further vaccination or post-exposure prophylaxis.
2. Restrictions concerning the practices of HBV-infected HCWs who do not carry out exposure-prone procedures are not justified.
3. HCWs with acute or chronic HBV infection should not perform exposure-prone procedures unless they are documented to be probably non-infectious by the absence of any detectable viral load (i.e., negative for HBsAg, or negative for both HBeAg and HBV DNA using the most sensitive DNA assay available, currently $\geq 10^3$ copies/ml). Determination of infectiousness requires case by case consideration. Viral load is typically less during treatment with antiviral agents and, in any case, may show some natural fluctuation.

The Expert Review Panel acknowledges the lack of hard evidence to support choosing 10^3 copies/ml as the threshold. There is no prospective study available, and will never be one, to show non-infectivity below 10^3 . There is evidence of $\pm 4\%$ transmission at 10^4 or higher (seven of 206 patients); this was from receiving substantial volumes of blood products and involved patients with a high rate of endemic HBV infection. That finding has more to do with HCW safety than safety of the public. Exposures from HCW to patients during exposure-prone procedures typically involve only very small volumes of blood.

The expert review panel understands the implications of these recommendations, but bases them on the premise that it is the panel's duty to protect the well-being of all patients to the best of its ability. If in time there is evidence that these restrictions can be modified, then the guidelines can be changed.

4. A safe course would be for a HCW who might be infectious to limit exposure-prone interventions only to patients who are known to be not susceptible as evidenced by adequate levels of HBsAb as reported by the testing laboratory.
5. If an exposure occurs from HCW to patient, the patient must be informed so that early follow-up and treatment can be provided if appropriate.

D) HCV

1. All HCWs with a history of HCV positivity have an ethical obligation to report themselves to their licensing authorities and to appear before the expert review panel if they perform any exposure-prone procedures.
2. If an exposure occurs from HCW to patient, the patient must be informed so that early follow-up and treatment can be provided if appropriate.

CONCLUDING COMMENTS

It is not possible to expect or to offer any absolute guarantee of safety. As in all aspects of health care delivery, this applies equally to the patient and to the HCW. This document has sought to produce a balanced statement that recognizes the interests and concerns of both the public and the health care professions with respect to transmissibility of blood borne infections during health care delivery.

EXPERT REVIEW PANEL

Several points about the expert review panel require expansion and clarification.

Its purpose is to give expert advice to infected HCWs through their licensing authorities in order to minimize concern for possible transmission of infection to patients and, if changing circumstances warrant it, to review matters again. This might lead to different advice than was originally given. Monitoring and supervision of the HCW's activities, professional or personal, would not be the panel's responsibility. That duty will fall to the licensing authority, together with the HCW's personal physician. Each case will require evaluation on an individual basis considering all unique circumstances that will exist.

If the HCW were found to be putting patients at risk through ignoring reasonable advice or because of developing cognitive impairment (through dementia, substance abuse, mood disorder, etc.), confidentiality could no longer be maintained; the HCW would have to be reported to his/her own licensing body by the attending physician, by the employer, or by the review panel.

Participation in the review process, on a case by case basis, of an expert from the same health care discipline as the infected HCW can be essential and must always be made available.

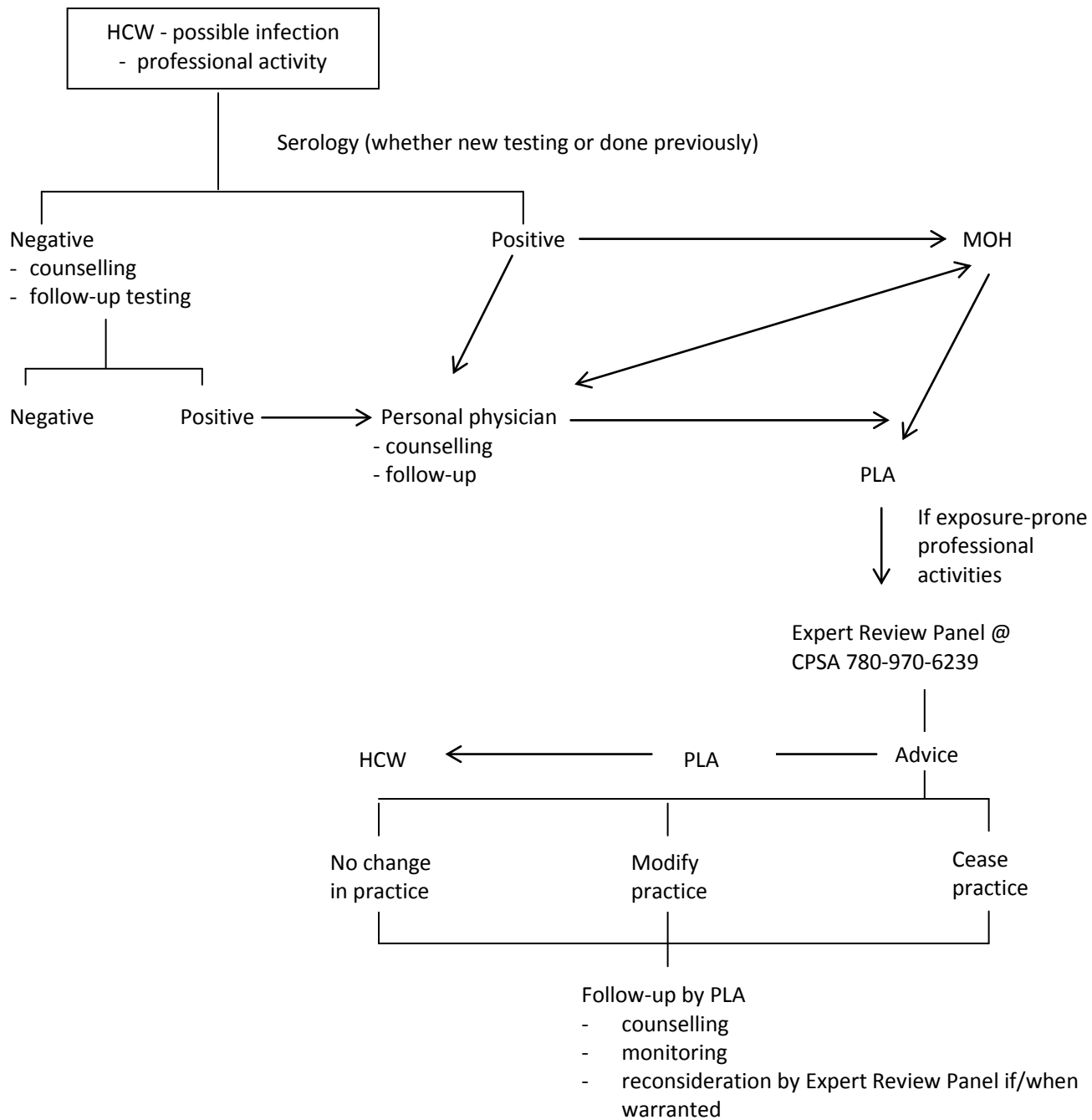
While the HCW will usually, with or without the assistance of an attending physician, present his/her own case to the review panel, there may be instances where the HCW will choose to have the facts presented anonymously by a surrogate, probably the individual's own physician.

Initial access to the panel may be by telephone, by personal contact or proxy, or in writing to the Registrar/Chief Executive Officer of the HCW's licensing authority or professional organization as the point of anonymous initial contact for referral to the panel. The appropriate name, address, and telephone number of that contact person should be advertised to all members of that professional group. The next contact will be to the College of Physicians and Surgeons of Alberta as the agency that administers the panel's activities.

The panel members are appointed by, advisory to, and provided indemnification by the Alberta Minister of Health and Wellness.

Expenses for the panel's activities with respect to an individual infected HCW should be the responsibility of the relevant professional organization, e.g., Alberta Dental College for dentist, College of Physicians and Surgeons of Alberta for physician and osteopath, etc.

Referrals to Alberta Expert Review Panel for Health Care Workers with Blood Borne Infections (HBV, HCV, HIV)



CPSA	College of Physicians and Surgeons of Alberta
HCW	Health Care Worker
MOH	Medical Officer of Health
PLA	Professional Licensing Authority

Glossary of laboratory markers and timing and sequence of detectability of serologic markers of HIV infection. (see reference <http://www.cdc.gov/mmwr/pdf/rr/rr5019.pdf>, CDC, 1999. Revised Guidelines for HIV counselling, Testing and Reform)

Lab Marker	Application	Comments
HIV antibody (anti-HIV)	<ul style="list-style-type: none"> Indicates presence of infection with either HIV-1 or -2, but does not allow determination of duration of infection. 	<ul style="list-style-type: none"> HIV-2 rare in Canada; HIV-1 much more prevalent. Usually positive by six weeks after infection but may take up to six months to become detectable.
HIV ribonucleic acid (HIV RNA) {commonly referred to as viral load} <ul style="list-style-type: none"> Quantitative tests 	<ul style="list-style-type: none"> Determines concentration of HIV RNA in plasma. Used to monitor patients on antiviral therapy. 	<ul style="list-style-type: none"> Test to be performed only in consultation with an HIV specialist. Detects virus as early as 1-2 weeks after exposure. Not intended for routine diagnosis of HIV infection. Negative HIV RNA does not imply absence/clearance of infection.
HIV resistance testing (also known as HIV genotyping)	<ul style="list-style-type: none"> Reports on genetic based antiviral resistance to specific HIV drugs or drug classes. Used to monitor for resistance to antiretroviral agents. 	<ul style="list-style-type: none"> Test to be performed only in consultation with an HIV specialist.

Glossary of laboratory markers and timing and sequence of detectability of serologic markers of hepatitis B (HBV) infection.

Lab Marker	Application	Comments
Hepatitis B surface antigen (HBsAg)	<ul style="list-style-type: none"> • First marker to appear in blood. • Signals infectivity of the person. • Persistence >6 months after infection indicates chronic HBV infection. 	<ul style="list-style-type: none"> • Usually positive by four weeks (range 1-12 weeks) after exposure to HBV. • Usually persists for 4-14 weeks. • Detection may precede onset of clinical symptoms and elevation of liver enzymes.
Hepatitis B core antigen (HBcAg)	<ul style="list-style-type: none"> • Not a useful serological marker of HBV infection as not found free in the bloodstream. 	
Hepatitis B e antigen (HBeAg)	<ul style="list-style-type: none"> • Indicates that the person is highly infectious. 	<ul style="list-style-type: none"> • Appears shortly after HBsAg and disappears before HBsAg becomes undetectable. • Disappearance after acute HBV infection is an indicator of decreasing virus reproduction. • A genetic variant of HBV that is unable to produce the e antigen but is still highly infectious may be identified by testing for HBV DNA.
HBV DNA	<ul style="list-style-type: none"> • Determines concentration of HBV DNA in blood. • Used to measure level of infectivity and response to treatment. 	<ul style="list-style-type: none"> • Test to be performed only in consultation with a specialist.
Antibody to Hepatitis B core antigen (anti-HBc)	<ul style="list-style-type: none"> • Early anti-HBc is of the IgM class and indicates presence of acute infection. • Anti-HBc IgG is present in persons with chronic HBV infection (marked by 	<ul style="list-style-type: none"> • First antibody to appear in blood. • Anti-HBc IgM present for several weeks.

persistence of HBsAg for >6 months).

- Anti-HBc IgG is also present in persons who have completely recovered from HBV infection (as evidenced by absence or clearance of HBsAg).

Antibody to hepatitis B e antigen (anti-HBe)

- Clearance of HBeAg and development of antibodies to HBeAg indicates reduction in infectivity.

- Usually present for \geq one year after resolution of HBV infection.

Antibody to hepatitis B surface antigen (anti-HBs)

- Presence indicates clinical recovery from HBV infection and development of immunity and suggests that the person is no longer infectious.
- In a person who has received HBV vaccine indicates immunity due to vaccine.

- Last antibody to appear after infection with HBV.
- Usually detectable 2-6 weeks after clearance of HBsAg.
- Usually remains positive for many years after HBV infection.

NOTE: In most cases HBsAg, anti-HBs, and anti-HBc (IgG or IgM) are useful tests when assessing a patient. HBeAg or anti-HBe and HBV DNA assays are useful in assessing infected HCWs, but should be ordered on the recommendation of a specialist in the field.

Glossary of laboratory markers and timing and sequence of detectability of serologic markers of Hepatitis C infection. (modified from reference http://www.cdc.gov/ncidod/diseases/heptitis/c_training/edu/2/screening.htm, CDC, Hepatitis C Screening and Diagnostic Tests)

Lab Marker	Application	Comments
Hepatitis C virus antibody (anti-HCV)	<ul style="list-style-type: none"> Indicates past or present infection, but does not differentiate between acute, chronic, or resolved infection. 	<ul style="list-style-type: none"> May take up to six months after infection for antibody to become detectable.
Hepatitis C ribonucleic acid (HCV RNA) <ul style="list-style-type: none"> Qualitative tests 	<ul style="list-style-type: none"> Detects presence or absence of circulating HCV RNA in serum. Used to monitor patients on antiviral therapy. 	<ul style="list-style-type: none"> Detects virus as early as 1-2 weeks after exposure. Detection of HCV RNA during course of infection might be intermittent; a single negative qualitative test for HCV RNA is not conclusive for the absence/ clearance of active infection.
Hepatitis C ribonucleic acid (HCV RNA) <ul style="list-style-type: none"> Quantitative tests 	<ul style="list-style-type: none"> Determines concentration of HCV RNA. Might be useful for assessing the likelihood of response to antiviral therapy. 	
Hepatitis C genotype	<ul style="list-style-type: none"> Groups isolates of HCV based on genetic differences, into six genotypes and >90 subtypes. Length of treatment and response to treatment varies by genotype. 	<ul style="list-style-type: none"> Genotype 1 is the most common in Canada and associated with lower response to treatment.

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ⁱ Replaces *Blood Borne Infections in Health Care Workers, CPSA Guideline*, September 1992 & April 1994