



PREVENTING NURSE-TO-CLIENT TRANSMISSION OF BLOOD BORNE VIRUS AND OTHER COMMUNICABLE DISEASES

The legislative mandate of the College of Licensed Practical Nurses of Alberta (CLPNA) is to serve and protect the public by ensuring its members deliver safe, competent and ethical nursing care. Practice guidelines provide guidance in a particular aspect of clinical care provision that enables Licensed Practical Nurses (LPNs) to make informed decisions based on the best available evidence. These guidelines support nursing judgment and help LPNs meet expectations of professional behaviour and requirements for practice as set out in legislation, regulation, Standards of Practice, Code of Ethics, and Practice Policies.

<i>This document is linked to legislation:</i>	Health Professions Act Occupational Health & Safety Act	Licensed Practical Nurses Profession Regulation	Public Health Act
<i>This document is linked to other documents that direct expectations of professional behavior and requirements for practice:</i>	Standards of Practice Code of Ethics	Personal Declaration for Registration Requirements	Expectations and Obligations During Emergencies
<i>This document is linked to related supportive documents:</i>	Duty to Report	Pandemic Characteristics and Response Measures	

KEY WORDS: *hepatitis B, hepatitis C, HIV, blood borne virus, communicable disease, routine practices, additional precautions, exposure-prone procedures, non-exposure prone procedures*

INTRODUCTION Over the past two decades, there have been a number of highly publicized cases involving the transmission of communicable disease between care providers and clients. Notable cases include the transmission of Human Immunodeficiency Virus (HIV) in 1990 from a Florida dentist to his clients. In 2003, the outbreak of Severe Acute Respiratory Syndrome (SARS) affected over 8,000 people with one in five being healthcare providers. More recently in 2012, a nurse *possibly* transmitted tuberculosis to multiple infants in a Toronto hospital. These occurrences contribute to ongoing public and professional concern of the transmission of communicable disease in care settings. Communicable diseases are caused by infectious pathogens that are spread from person to person either through direct or indirect contact, droplet, airborne, common vehicle, or vectorborne transmission.¹ Healthcare professionals follow best practices in infection prevention and control to reduce their risk of occupational exposure to communicable disease and to prevent the inadvertent transmission of communicable disease to their clients and colleagues.

PURPOSE The purpose of this practice guideline is to support licensed practical nurses (LPNs) in making informed decisions about preventing the transmission of communicable diseases generally, and blood borne viral infections specifically, from nurse-to-client.

CURRENT EVIDENCE TO INFORM PRACTICE Blood-borne viruses (BBVs) are defined as pathogenic microorganisms that are present in human blood or body fluids and cause infection and disease.² They include Hepatitis B virus (HBV), Hepatitis C virus (HCV) and Human Immunodeficiency Virus (HIV). BBVs can be transmitted in the healthcare setting when infected blood and body fluids of one person comes into contact with the tissues of another either percutaneously (by needle-stick, other sharp object or human bite), or by a splash onto mucous membranes (eyes, nose, mouth) or onto non-intact skin (cuts, abrasions).³ Further, HBV can remain viable on surfaces for up to a week; thus, can be transmitted via contact with contaminated medical instruments and environmental surfaces in the care setting.⁴

The risk of BBV transmission to a client is influenced by several factors. These factors include the susceptibility of the client, infectivity or viral load of the care provider, type of pathogen, and significance of the exposure (type of body fluid and type of exposure/contact). The most common occupational transmission of BBV occurs through percutaneous injury (PI) involving needles or other sharp objects.⁵ The risk of infection after percutaneous exposure to infected blood varies by pathogen as each has its own degree of intrinsic transmissibility.⁶ The risk of transmission associated with HIV is about 0.3%, HCV is estimated at 1.8% and HBV is estimated at 6 to 30% even with microscopic exposure.⁷ One of the professional groups that



have reported the greatest number of occupationally acquired BBVIs from percutaneous injury is nurses.⁸

A diagnosis of infection from a BBV can be a devastating experience for a healthcare professional. Not only is there concern over one's own personal health and well-being, there are additional concerns over one's professional practice and the safety of clients. Over the last two decades, considerable progress has been made in our understanding of blood borne viruses and in the ability to detect, monitor and treat HBV, HCV, and HIV infections including:⁹

- development of sensitive molecular blood tests to measure circulating viral load (infectivity of the person); and
- improvement of effective treatments to control infection such as antiviral therapies.

Additionally, advances in infection prevention and control practices have substantially reduced the risk of transmission of BBV both to and from health care workers (HCWs). These practices include:¹⁰

- implementation of routine practices (formerly known as universal precautions) to decrease exposure to blood and body fluids through use of gloves and other protective barriers;
- implementation of safety-engineered devices (retractable syringes, needle-free systems, winged butterfly needles, blunt-tip suture needles) to decrease the risk of percutaneous injuries;
- immunization against Hepatitis B to prevent HBV infection;
- mandatory self-reporting of exposure to determine if exposure has been significant; and
- implementation of effective post-exposure management and prophylaxis treatment as required.

Conclusions from expert panels indicate that the risk of HCWs transmitting BBV to clients is exceptionally low and will continue to fall as more effective methods of prevention and treatment are developed.¹¹ Based on available evidence and expert opinion, it is well known that when care providers are treated so that their viral load becomes, and remains low or undetectable, and when they adhere to strict use of infection control procedures, the risk of BBV transmission to clients is essentially 'negligible' during the course of routine client care.¹²

One factor known to increase the risk of BBV transmission to clients is the nature of the HCW's clinical practice, for

example, whether it involves the performance of exposure-prone procedures or non-exposure-prone procedures.¹³

In their policy document, Health Canada describes exposure-prone procedures (EPPs) as those during which transmission of a blood borne virus infection (BBVI) from an infected HCW to a client is most likely to occur.¹⁴ During the performance of EPPs, the risk of injury to the HCW from needles or other sharp instruments is increased. Accidental puncture can expose the infected blood of the injured HCW to the client's open tissue, an occurrence referred to as 'bleedback'.¹⁵

Exposure prone procedures (EPPs) are defined as:

*procedures where there is the potential for digital palpation of a needle tip in a body cavity, or direct contact between the gloved fingers of the HCW and sharp surgical instruments, needle tips or sharp tissues (bone or teeth spicules) in a blind or poorly visualized or highly confined anatomical space, where the hands or finger tips of the worker may not be completely visible at all times.*¹⁶

Transmission of BBVs from HCWs to clients almost exclusively occurs via the performance of EPPs.¹⁷ EPPs are mainly in the domain of surgeons, obstetricians and dentists. EPPs include major neurological, abdominal, cardiothoracic, orthopedic and trauma surgeries; obstetrical and gynecological surgeries; and major cutting or removal of oral or perioral tissue.¹⁸ Other examples include rectal exams in the presence of pelvic fractures or chest tube insertion with rib fractures.¹⁹ Medical clinicians with BBVI who perform EPPs generally have a practice assessment done by an expert panel to determine transmission risks. The clinicians may be advised to double glove during EPPs or may be advised to not perform EPPs until their infectivity is reduced (especially for HBV). With medical treatment, low infectivity and infection control practices, the risk of transmission of BBV from physician-to-client during EPPs is significantly reduced.²⁰

A procedure designated as an EPP according to guidelines used in Alberta that is relevant to nursing includes interaction with a violent or seizing client.²¹ There is potential for the client to bite the nurse with contact of the nurse's infected blood with the client's oral mucosa. However, it has been documented that the risk of BBV transmission from the HCW to the biting client is extremely unlikely, although theoretically possible.²²



Non-exposure prone procedures (NEPPs) are defined as:

*Procedures where the hands and fingers of the HCW are visible and outside the client's body at all times and do not involve possible injury to the care provider's hands from sharp instruments or tissues, and are considered to be non-exposure prone provided routine infection prevention and control procedures are adhered to at all times.*²³

Examples of NEPPs include routine oral, vaginal and rectal examinations; drawing of blood, insertion and maintenance of peripheral lines; minor suturing; and incision of external abscesses.²⁴

Based on these definitions, the risk of an LPN transmitting BBV to clients is very low. The scope of practice and list of restricted activities do not include performing EPPs. They do include performing NEPPs (i.e., cutting a body tissue or performing surgical or other invasive procedure below the dermis for corn or callus removal; setting or resetting a bone fracture for the purposes of inserting and removing orthopedic devices). However, the possibility cannot be ruled out that LPNs may, in certain emergent situations, be involved with EPPs or may have increased transmission risks in practice areas such as emergency, hemodialysis, psychiatry or corrections.²⁵ Adherence to IPC practices and safety when handling sharps is critical to preventing injury and exposure of blood and body fluid.

Most published reports of HCW-to-client transmissions of BBVs occurred prior to implementation of routine practices, availability of modern anti-viral therapies, and introduction of safety-engineered devices. These occurrences included surgeons, obstetricians and dentists routinely involved in performing EPPs.²⁶ Published reports of nurse-to-client transmission of BBV describe three occurrences, including one singular HBV transmission, one combined HIV and HCV transmission in France, and an outbreak of HBV transmission in Illinois.²⁷ In the Illinois occurrence, an infected nurse transmitted HBV to eleven (11) surgical patients. In each of these published cases, the exact mode of transmission could not be identified, although managing venous perfusions, performing intramuscular injections, potentially abusing drugs (related to HCV transmission), not wearing gloves and not knowing they were infected with a BBV were contributing factors.

UNDERLYING PRINCIPLES AND APPLICATION OF PRINCIPLES TO PROMOTE EVIDENCE INFORMED PRACTICE

LPNs must be supported with principles and application of these principles to guide evidence informed practice in preventing nurse-to-client transmission of communicable disease. LPNs must also be supported with a quality practice environment in order to apply principles to their nursing practice.²⁸ CLPNA, employers, public health stakeholders and practicing LPNs all share in the common interests of quality care and patient safety. A quality practice environment includes the resources necessary to protect clients from infection and nurses from exposure to blood borne pathogens and other communicable diseases; for example, use of needleless syringes, available personal protective equipment, etc. Quality practice environments also have adequate education, resources, policies and procedures in place to manage an exposure involving its nursing staff, and can accommodate adjustments to patient care assignments and provide re-training for nurses infected with a BBV or other communicable disease if necessary, simultaneously protecting the dignity of the nurse and the safety of the patients.

CONCLUSION Licensed Practical Nurses are accountable to practice competently, safely and ethically in a manner that protects clients, colleagues and themselves from communicable disease. By following organizational infection prevention and control policies and procedures, demonstrating best practices based on evidence, and advocating for quality workplace environments, CLPNA members can deliver standards of excellence and client safety in nursing practice.



APPLYING PRINCIPLES TO EVIDENCE INFORMED NURSING PRACTICE

Underlying Principle	Application of Principles to Evidence Informed Practice
<p>Healthcare professionals reflect on their knowledge and competence in infection prevention and control, and address their learning needs to protect clients from communicable disease.</p>	<ul style="list-style-type: none"> ▪ Maintain an on-going self-assessment of your knowledge and competence in infection prevention and control (IPC) practices and take the necessary steps to address learning needs. ▪ Seek out infection control practitioners, educators and learning resources to ensure you have adequate knowledge and skill in best practices for IPC to provide safe, competent and ethical care and to prevent transmission of communicable disease.²⁹
<p>Adherence to routine practices and additional precautions decreases the risk of communicable disease transmission.</p>	<ul style="list-style-type: none"> ▪ LPNs apply routine practices and additional precautions to their nursing practice to reduce their risk of occupational exposure to communicable disease and to prevent transmission of communicable disease to clients and to other care providers. <p>ROUTINE PRACTICES</p> <ul style="list-style-type: none"> • Routine practices are considered the foundation of infection prevention and control.³⁰ They prevent the transmission of microorganisms from one person to another. Routine practices are a level of care “routinely” provided to all clients, all the time and in all care settings. They are based on the premise that <i>all clients are potentially infectious, even when asymptomatic</i>.³¹ • Routine practices are used to prevent exposure to the blood, body fluids, secretions and excretions of another.³² • Routine practices substantially reduce the transmission of BBV both to and from HCWs by reducing exposures to blood and body fluids.³³ • Routine practices reduce the transmission of infection in healthcare settings, and can minimize the need to use additional precautions.³⁴ • Routine practices include hand hygiene, risk assessment and risk reduction strategies:³⁵ <ul style="list-style-type: none"> ○ Hand hygiene. Hand washing is the single most effective way to protect clients from infection. ○ Point-of-care risk assessment (assess risk of infection transmission and determine appropriate risk reduction strategies): <ul style="list-style-type: none"> • What task will I be performing? • What is my risk of exposure to blood, body fluids, excretions, secretions (does the client have coughing, sneezing or diarrhea; will my hands be exposed to blood, non-intact skin, contaminated items; will my face be exposed to splash, cough or sneeze; will my clothes be exposed to splash or contamination in the client's environment?) • How competent or experienced am I to manage this care situation? • How cooperative is the patient? ○ Personal Protective Equipment (PPE); e.g., gloves, mask, eye protection, gown. ○ Environmental controls (client placement/accommodation; equipment and environment cleaning; dishware, laundry, waste and biohazard management; safe handling of sharps and use of safety-engineered devices to decrease injury). ○ Administrative controls (client/family/staff education, immunization programs, healthy workplace policies, exposure protocols, adequate supplies).



	<p>ADDITIONAL PRECAUTIONS</p> <ul style="list-style-type: none">• Additional (transmission-based) precautions are a level of care provided in addition to routine practices. They are used to interrupt transmission of <i>suspected or known infectious microorganism</i> to protect clients, self and others.³⁶ These precautions are based on the method of transmission, (e.g., contact, droplet, airborne) and include:³⁷<ul style="list-style-type: none">○ specialized accommodation (spatial separation/segregation of infected client)○ specific IPC signage on the client’s door or other appropriate area○ dedicated availability of PPE○ dedicated client equipment○ additional cleaning measures○ limited client transport within the care facility○ communication with other care providers regarding additional precautions
<p>LPNs are aware of the risks of communicable disease transmission and take steps to prevent transmission of infection.</p>	<ul style="list-style-type: none">▪ LPNs maintain safe practice while handling sharps. Reducing percutaneous injury reduces exposure to blood and body fluids and transmission of disease both to and from clients.³⁸▪ LPNs who have reason to believe they may have been exposed to a BBV (occupational or non-occupational) have a professional and ethical duty to seek out their serological status for HBV, HCV, and HIV.³⁹ Transmission of BBVI has occurred from HCW-to-client in some reported cases due, in part, by the fact that HCWs were not aware they were infected.⁴⁰▪ Nurses from developing countries who immigrate to Alberta should verify their serological status and receive appropriate vaccination if necessary.⁴¹ Although Canada is considered a low-endemic country for BBVs, other countries, especially developing countries, are not. The prevalence of each of the BBVs among populations in developing countries differs from, and is higher than, the prevalence of HIV, HBV and HBC in Canada.⁴² For example, there are approximately 350,000 chronic HBV carriers in Canada, and an estimated 350 million worldwide.⁴³ Further, the proportion of occupationally acquired BBVIs is greater for HCWs in developing countries than in countries such as Canada.⁴⁴▪ LPNs who test positive for BBVI or other communicable disease that can put clients at risk, are responsible to seek medical advice with respect to the potential for transmission of the infection to clients.⁴⁵ According to Health Canada, this is a fundamental ethical principle for all HCWs.⁴⁶
<p>LPNs have the right to be treated with dignity and respect and are entitled to privacy and confidentiality of personal health information.</p>	<ul style="list-style-type: none">▪ If a client is exposed to your blood and you have a BBVI, the client must be informed by preferably a third party such as a physician without disclosing the name of the nurse. With informed consent, the client will be tested, provided with counselling and medically treated as required.⁴⁷
<p>LPNs who have BBVI or other communicable disease protect public safety and maintain their health and fitness to practice.</p>	<ul style="list-style-type: none">▪ Notifiable communicable diseases are reported to the Medical Officer of Health (MOH) as per legislation of the <i>Public Health Act</i> and <i>Communicable Diseases Regulation</i> and are also referred to in the <i>Health Professions Act</i>. Most often, notification is done through the provincial lab.▪ Reporting and managing occupational exposures are guided by the <i>Public Health Act</i> and <i>Occupational Health & Safety Act</i>. LPNs are responsible to follow the protocols and procedures established by the healthcare agency.▪ If you test positive for a BBV, the team of health professionals involved in your care will usually include an infectious diseases specialist, family physician, occupational health and



	<p>public health nurses. The care team contributes to the following goals:⁴⁸</p> <ul style="list-style-type: none">• to promote the health and well-being of the nurse and safe return to practice• to provide counselling and education for emotional support and for obtaining informed consent for serological testing and prophylaxis treatment• to provide counselling and education on secondary transmission of BBV to others• to assess the risk of transmitting BBV based on the condition of the nurse (infectivity or viral load), the nurse's practice (does the nurse perform exposure-prone procedures), the nurse's skill and judgment, and the nurse's adherence to infection prevention and control practices• to recommend appropriate infection prevention and control (IPC) strategies for the nurse to apply in the practice setting (double gloving as an example)• to apply an evidence-informed decision-making model, if required, to inform any practice restrictions, modifications or conditions that may be imposed to minimize unnecessary risk of disease transmission to clients, and to maintain public safety (if the nurse's practice involves EPPs) <ul style="list-style-type: none">▪ CLPNA expects its members to: follow medical advice to maintain their health, be medically fit to practice, and to adhere to any precautions and/or practice conditions or modifications that may be imposed to protect client safety. Failure to do so would be considered breach of professional conduct if the LPN's actions compromised his or her ability to provide safe and effective care. It is unethical for LPNs to practice while unsafe to do so and/or to put their clients at risk.▪ Practice Consultants at CLPNA are available to provide confidential guidance and support regarding any questions or concerns members may have related to maintaining client and public safety, meeting fitness to practice requirements and on determining if their nursing practice involves EPPs. This may include a referral to the Medical Officer of Health or Expert Review Panel if required to conduct a risk assessment of the nurse's practice to ensure the highest standard of patient safety.
<p>LPNs advocate for, contribute to, and provide a quality practice environment for the safety of their clients, their colleagues and themselves.</p>	<ul style="list-style-type: none">▪ Follow healthy workplace practices of infection prevention and control (IPC) at all times in your nursing practice and understand how they apply to any illness or infection you may have, from a cold to HBV.⁴⁹▪ Healthy workplace best practices also include self-monitoring and education on knowing when to stay home, immunization and following protocols for exposure to blood and body fluids.⁵⁰ <p>SELF-MONITOR</p> <ul style="list-style-type: none">• Follow agency policy if you are ill with a communicable disease. Generally speaking, if you have influenza symptoms such as fever, chills and general malaise; new cough or cold symptoms; diarrhea; new skin rashes; red eyes with discharge, or severe sore throat, you should stay home from work. You are unlikely to work effectively and you are likely contagious.⁵¹ You could unwittingly expose colleagues and clients to your communicable disease. "Healthcare workers who report to work despite having ongoing symptoms of an infectious disease extend risks to patient safety and public health."⁵² In a research study, an outbreak of norovirus gastroenteritis occurred in a long term care facility affecting 23 residents and 18 staff as a result of health professionals coming into work while ill.⁵³ Clients should not be at risk of becoming ill from the same care providers who are there to help them get better.• Agencies should provide education to staff about knowing when to stay home as part of their IPC and risk reduction programs.⁵⁴



	<p>IMMUNIZATION</p> <ul style="list-style-type: none"> • Hepatitis B is the most important vaccine-preventable occupational disease for HCWs.⁵⁵ • Hepatitis B vaccine is recommended for HCWs who may be exposed to blood or body fluids, are at increased risk of sharps injury or bites, perform EPPs, or work in certain geographical regions or with populations where HBV is highly endemic.⁵⁶ • It is important that HCWs also know their post-immunization status.⁵⁷ • Based on research evidence, mandatory testing for blood borne pathogens upon hire is not recommended and is not required by CLPNA for initial registration or registration renewal.⁵⁸ • Annual influenza immunization is recommended for all health care personnel.⁵⁹ Influenza immunization of HCWs has been shown to reduce the mortality and morbidity of clients under their care in long-term settings and to reduce HCW illness and absenteeism during the Influenza season.⁶⁰ • Understand provincially recommended schedules for immunization and know your immunization status and keep it up to date.⁶¹ • Agencies should provide and promote vaccine programs in the workplace.⁶² <p>EXPOSURE CONTROL⁶³</p> <ul style="list-style-type: none"> • You need to know where, when and how to obtain follow up after a potential blood borne pathogen exposure. This is particularly important for LPN’s in self-employed practice. • Perform first aid: rinse, wash and clean involved area after exposure. • Report the injury according to agency protocol. • Recognize the importance of medical attention including appropriate tests, vaccines, prophylaxis, counselling, treatment and follow up: <ul style="list-style-type: none"> ○ informed consent for serological testing ○ use of post-exposure prophylaxis medication for HIV; vaccine and/or immune globulin for HBV if required (initiation within one to two hours can reduce HIV transmission by 90%) ○ counselling (emotional support and education on reducing secondary spread to others) ○ medical post-exposure monitoring and treatment if required
<p>LPNs demonstrate leadership in infection prevention and control.</p>	<ul style="list-style-type: none"> ▪ Act as a role model to other health care providers, clients/residents and families/visitors with regard to infection prevention and control strategies. ▪ Demonstrate work practices that reduce the risk of infection – e.g. hand hygiene, respiratory hygiene and cough etiquette, proper use of PPE, safe handling of sharps, not working when contagious with a communicable disease, maintain immunizations.⁶⁴ ▪ As an LPN manager or supervisor, create a healthy work environment by: <ul style="list-style-type: none"> • promoting vaccination to prevent disease, providing education for staff about when to stay home, ensuring hand hygiene • providing PPE equipment, needleless systems and all other resources required for IPC best practices • ensuring exposure protocols are available to the healthcare team
<p>LPNs provide education in infection prevention and control.</p>	<ul style="list-style-type: none"> ▪ Educate clients/residents/families about infection prevention strategies such as hand hygiene, respiratory hygiene, cough etiquette and flu vaccination.⁶⁵ ▪ Educate clients/residents/families about any additional precautions that have been instituted for the client.⁶⁶



<p>LPNs are professionally and ethically obligated to complete a declaration of fitness to practice advising CLPNA of any medical condition that may interfere with the ability to provide safe, competent and ethical care.</p>	<ul style="list-style-type: none"> ▪ CLPNA obligates its members for mandatory reporting on fitness to practice.⁶⁷ ▪ Complete the <i>Personal Declaration</i> for initial registration and registration renewal honestly. It is considered a breach of professional conduct to provide false information. ▪ CLPNA is committed to providing guidance and support for members and to ensuring the highest standard of nursing practice and client safety.
<p>LPNs are professionally, ethically and legally accountable to report any health professional with a communicable disease who may be endangering the health of the public.</p>	<ul style="list-style-type: none"> ▪ Take action on identifying and addressing unsafe behaviours of an LPN or other regulated health professional that puts clients and the public at risk. This may include reporting your concerns to your supervisor and/or to the regulatory body or to the Medical Officer of Health.⁶⁸

DEFINITIONS

<p>Any definitions listed in the following table apply to this document only.</p>	
<p><i>Airborne transmission</i></p>	<p>Airborne transmission refers to organisms that are contained in small droplets or in dust particles that remain suspended in the air for long periods of time. They are widely dispersed and inhaled by susceptible hosts (e.g., tuberculosis, measles).⁶⁹ (Back to top)</p>
<p><i>Blood and Body fluids</i></p>	<p>Body fluids capable of transmitting HBV, HCV, and HIV from an infected individual include:⁷⁰</p> <ul style="list-style-type: none"> • blood, serum, plasma, and all biologic fluids visibly contaminated with blood • laboratory specimens, samples, or cultures that contain concentrated HBV, HCV, and HIV • organ and tissue transplants • pleural, amniotic, pericardial, peritoneal, synovial, and cerebrospinal fluids • uterine/vaginal secretions or semen (unlikely to transmit HCV) • saliva (for HBV only, unless contaminated with blood). <p>Feces, nasal secretions, sputum, tears, urine, and vomitus are not implicated in the transmission of HBV, HCV, and HIV unless visibly contaminated with blood. (Back to top)</p>
<p><i>Common vehicle transmission</i></p>	<p>Common vehicle transmission refers to a single contaminated source that transmits infection to many hosts such as food (e.g., E.coli, salmonella) or water (e.g., cholera).⁷¹ (Back to top)</p>

OTHER RESOURCES

Centers for Disease Control and Prevention (CDC). Clean Hands Saves Lives <http://www.cdc.gov/handwashing/>
 CDC. Bloodborne Infectious Diseases: HIV/AIDS, Hepatitis B, Hepatitis C <http://www.cdc.gov/niosh/topics/bbp/>
 CDC. Updated CDC Recommendations for the Management of Hepatitis B Virus-Infected Health-Care Providers and Students <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6103a1.htm>



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