INFECTION CONTROL AND OCCUPATIONAL HEALTH 11

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Links to: Chapter 4: Natural history of chronic hepatitis B virus infection
Chapter 5: Primary prevention of hepatitis B virus infection
Chapter 12: Privacy, confidentiality and other legal responsibilities

KEY POINTS

- The potentially infectious nature of all blood and body substances necessitates the implementation of infection control practices and policies in the health care setting.
- The current best practice guidelines for infection control procedures in Australian health care settings are outlined in *Infection Control Guidelines for the Prevention of Transmission of Infectious Diseases in the Health Care Setting* (2004), accessible at http://www.health.gov.au/internet/wcms/Publishing.nsf/Content/icg-guidelines-index.htm
- The universal application of standard precautions is the minimum level of infection control required in the treatment and care of all patients to prevent the transmission of hepatitis B virus (HBV). These include personal hygiene practices—particularly hand-washing, the use of personal protective equipment such as gloves, gowns and protective eye wear, aseptic techniques, safe disposal systems for sharps and contaminated matter, the adequate sterilisation of reusable equipment and environmental controls.
- Vaccination is an important infection control strategy for the prevention of HBV. All health care workers should be vaccinated and be aware of their vaccination status.
- Clinicians and other health care workers who regularly perform exposure-prone procedures have a responsibility to be regularly tested for the human immunodeficiency virus (HIV), the hepatitis C virus (HCV) and HBV if they are not immune. Health care workers who are infected with HIV, HBV or HCV should not perform exposure prone procedures.

Myths and facts
MYTH – Wearing gloves means you do not need to wash your hands.
FACT – Gloves are not a substitute for effective hand-washing.
MYTH – Health care workers should use additional precautions when caring for a patient with HBV to prevent transmission.
FACT – The implementation of standard precautions ensures a high level of protection against the transmission of HBV in the health care setting.
MYTH – Health care workers need to have booster doses of hepatitis B vaccine every five years.
FACT – Booster doses are no longer recommended in immunocompetent individuals after a primary course of HBV vaccine, as evidence suggests that a completed course of HBV vaccination provides long-lasting protection.
MYTH – Health care workers with HBV must not have contact with patients because of the risk of transmission.
FACT – Health care workers with HBV are generally advised to avoid performing exposure prone procedures, however, they can still have non-invasive contact with patients.

Introduction

Maintaining the safety of the health care environment for patients and health professionals is essential and necessitates the implementation of infection control guidelines. The current best practice guidelines for infection control procedures in Australia are outlined in *Infection Control Guidelines for the Prevention of Transmission of Infectious Diseases in the Health Care Setting*.[1] These guidelines are based on the model of universal precautions developed in 1987 by the United States Centers for Disease Control and Prevention (CDC). State and Territory Health Departments in Australia have adopted a broader definition of universal precautions and have introduced the principle of standard precautions. Standard precautions ensure a high level of protection against transmission of infection in the health care setting and represent the level of infection control required in the treatment and care of all patients to prevent the transmission of blood-borne infections.

The implementation of standard precautions minimises the risk of transmission of the infection from patient-to-clinician, clinician-to-patient and patient-to-patient, even in high-risk situations. The use of additional precautions is only recommended during the care of patients known or suspected to be infected or colonised with disease agents that may not be contained by standard precautions alone, such as tuberculosis.

Clinicians and other health care workers need to be aware that infection control guidelines are relevant in social and domestic contexts, as well as in occupational settings. The implementation of infection control guidelines in social and domestic settings can assist patients with hepatitis B virus (HBV) to reduce the risk of transmission to family and household contacts. Clinicians should be able to answer patients' questions about a clinic's infection control policies and provide advice for patients in relation to infection control in their daily environment. This chapter provides an overview of the current Australian infection control guidelines and their relevance in treating patients with HBV.

Transmission

Chapter 4: Natural history of chronic hepatitis B virus infection, outlines the modes and risks of HBV transmission. The transmission of HBV is approximately 100 times more efficient than the transmission of HIV and approximately 10 times more efficient than HCV.[2]

The risk of blood-borne virus transmission is dependent on a number of factors. Incidents involving blood-to-blood contact with infectious blood are associated with a high risk of infection when:

- There is a large quantity of blood, indicated by visible contamination
- A needle is inserted directly into a vein or artery or body cavity
- The patient has high levels of HBV DNA and detectable HBeAg; HCV ribonucleic acid (RNA) detected by polymerase chain reaction (PCR); the patient suffers from advanced HIV disease and has a high HIV viral load.

Patient-to-patient transmission of HBV, although rare, has been associated with oral surgery, and inadequate use or disinfection of medical devices, such as blood glucose finger stick devices and acupuncture needles.[2-4]

Worldwide, published incident reports indicate that a total of 12 health care workers with HBV infection have transmitted the virus to approximately 91 patients.[5] The transmission of HBV in the health care setting can be prevented through health care worker, patient and community hepatitis B vaccination programs and strict adherence to standard precautions.

Standard precautions

Standard precautions ensure a high level of protection against the transmission of infections, including blood-borne viruses in the health care setting, and are recommended for the care and treatment of all patients and in the handling of:

- Blood, including dried blood
- All other body substances, secretions and excretions (excluding sweat), regardless of whether they contain visible blood
- Non-intact skin
- Mucous membranes.

The universal application of standard precautions is the minimum level of infection control required in the treatment and care of all patients to prevent the transmission of blood-borne viruses. These include personal hygiene practices—particularly hand-washing; the use of personal protective equipment such as gloves, gowns and protective eyewear; aseptic techniques; the safe disposal systems for sharps and contaminated matter; the adequate sterilisation of reusable equipment; and environmental controls.

Standard precautions should be implemented universally, regardless of existent information or assumptions about a patient's blood-borne virus status. This process would ensure the reduction of potential stigma and discrimination in the health care setting.

Hand hygiene

Hand-washing is generally considered the most important hygiene measure in preventing the spread of infection. Clinicians should wash their hands before and after contact with any patient and after activities that may cause contamination.

Hand-washing should occur:

- Before and after each clinical contact with a patient
- Before and after eating
- After using the toilet
- Before and after using gloves
- After contact with used equipment
- Immediately following contact with body substances.

It is important to note that gloves are not a substitute for effective hand-washing. A routine hand-wash should include the removal of jewellery and the use of a cleaning solution (detergent with or without disinfectant) and water for 15 to 20 seconds, followed by drying with a single-use towel.

Skin care is important because healthy, unbroken skin provides a valuable, natural barrier to infection. Skin breaks should be covered with a water-resistant occlusive dressing. Alcohol-based hand rubs can be used in the absence of appropriate washing facilities.

Gloves

Gloves are a form of personal protective equipment. Clinicians and other health care workers should wear gloves whenever there is a risk of exposure to blood or body substances and should change their gloves and wash their hands after contact with each patient and during procedures with the same patient if there is a chance of cross-contamination. Gloves must be used when:

- Handling blood and body substances
- Performing venepuncture
- Touching mucous membranes
- Touching non-intact skin
- Handling contaminated sharps
- Performing invasive procedures
- Cleaning body substance spills or any equipment (instruments) or materials (linen) or surface that may have been contaminated by body substances.

For further information about the appropriate use of sterile, non-sterile and general purpose gloves refer to *Infection Control Guidelines for the Prevention of Transmission of Infectious Diseases in the Health Care Setting*.[1]

Other personal protective equipment

Personal protective equipment should be readily available and accessible in all health care settings. The type of protective equipment required depends on the nature of the procedure, the equipment used and the skill of the operator. For example, the use of protective equipment is recommended in the following circumstances:

- Protective eyewear and face shields must be worn during procedures where there is the potential for splashing, splattering or spraying of blood or other body substances
- Impermeable gowns and plastic aprons should be worn to protect clothing and skin from contamination with blood and body substances
- Footwear should be enclosed to protect against injury or contact with sharp objects.

Needlestick or sharps injury prevention

Inappropriate handling of sharps is a major cause of accidental exposure to blood-borne viruses in health care settings. To minimise the risk of a needlestick or sharps injury, needles, sharps and clinical waste should be handled carefully at all times. Specifically, clinicians and other health care workers should:

- Minimise their handling of needles, sharps and clinical waste
- Not bend or recap needles or remove needles from disposable syringes
- Use safe needle-handling systems, including rigid containers for disposal, which should be kept out of the reach of toddlers and small children
- Have 'sharps' containers available at the point of use or in close proximity to work sites to aid easy and immediate disposal.

Importantly, the person who has used a sharp instrument or needle must be responsible for its immediate safe disposal following its use.

Issues for health care workers

Hepatitis B vaccination

Vaccination is an important infection control strategy to prevent the transmission of HBV. A safe and effective vaccine to protect against HBV has been available in Australia since 1988. *The Australian Immunisation Handbook* (2007)[6] recommends the following groups be vaccinated against hepatitis B:

- Infants and young children
- Adolescents aged between 10 and 13 years
- Sexual contacts of people with acute and chronic hepatitis B
- Other household contacts of people with acute and chronic hepatitis B
- People on haemodialysis, individuals with HIV and other adults with weakened immune systems
- Injecting drug users
- Recipients of certain blood products
- Individuals with chronic liver disease and hepatitis C
- Residents and staff of facilities for persons with intellectual disability
- Individuals adopting children from overseas
- Liver transplant recipients
- Inmates and staff from long-term correctional facilities
- Health care workers, dentists, embalmers, tattooists and body-piercers
- Others at risk including:
  - Police, members of the armed services and emergency services staff
  - Long-term travellers to regions with high endemicity
  - Staff of child day-care centres
  - People playing contact sport.

In addition, consideration for HBV screening and vaccination should be given to people from other community groups with high prevalence of HBV infection. These include:

- Indigenous peoples
- Cultural and linguistically diverse communities (CALD).

There is a significant variation between Australian jurisdictions in the availability of funded hepatitis B vaccination programs for people considered at high risk of exposure to hepatitis B infection. For further information about the availability of local HBV vaccination programs, contact relevant State and Territory health departments.

Hepatitis B vaccination regime

For adults over 20 years of age, a full course of HBV vaccine consists of three doses at 0, 1 and 6 month intervals. Adolescents aged between 11 and 15 years should receive a two-dose regimen of the adult formulation of HBV vaccine at 0 and 4–6 months intervals. It is recommended that children have a total of three doses of the paediatric formulation of HBV vaccine at 0, 1 and 6 month intervals. Infants should receive a birth dose of HBV vaccine, followed by doses at 2, 4 and either 6 or 12 months.

Post-vaccination serological testing is recommended four weeks after the third dose of HBV vaccine for people in the following categories:

- People at significant occupational risk (e.g. clinicians and other health care workers whose work involves frequent exposure to blood and body substances)

- People at risk of severe or complicated disease (e.g. people who are immunocompromised and people with pre-existing liver disease not related to HBV)
- People in whom a poor response to HBV vaccination is expected (e.g. patients undergoing haemodialysis).

If a person's anti-HBs level is <10 IU/mL following the third dose of vaccine, he or she is classified as a non-responder and should be offered further doses of HBV vaccine. A dose of HBV vaccine can be given as either a fourth double dose or a further three doses at monthly intervals, with further serological testing four weeks later.

Testing

The mandatory testing of clinicians and other health care workers for HBV, HCV and HIV is not warranted, due to the low risk of transmission if standard precautions are followed. Testing for blood-borne viruses should only be undertaken on the basis of clinical assessment or where testing is in the interests of patients and health care workers (e.g. a needlestick injury).[1] Clinicians and other health care workers who regularly perform exposure prone procedures have a responsibility to be regularly tested for HIV, HCV and HBV if they are not immune (Table 11.1). The provision of confidentiality, privacy and consent for testing should be applied.

TABLE 11.1: Exposure-prone procedures[1]
High-risk or 'exposure-prone' procedures
▪ Any submucosal invasion with sharp, hand-held instruments or procedures dealing with sharp pathology and bone spicules, usually in confined spaces or where visibility is poor (e.g. orthopaedic surgery, trauma, internal cavity surgery)
Variable-risk procedures
▪ Minor dental procedures (excluding examination) and routine dental extractions ▪ Internal and instrument examination; biopsy (e.g. endoscopy, vaginal examination, laparoscopy) ▪ Minor skin surgery
Low-risk procedures
▪ Interview consultation and dental examination ▪ Non-invasive examinations or procedures (aural testing, electrocardiogram, abdominal ultrasound) ▪ Intact skin palpation (gloves not required) ▪ Injections and venepuncture (gloves required)

Persistent non-responders should be informed about the need for hepatitis B immunoglobulin (HBIG) within 72 hours of a potential exposure to HBV.

Booster doses are no longer recommended in immunocompetent individuals after a primary course of HBV vaccine, as the evidence suggests that a completed course of HBV vaccination provides long-lasting protection. This applies to children and adults, including health care workers.[6] For further information about the HBV vaccine, please refer to *The Australian Immunisation Handbook,* 9th edition (2007),[6] and Chapter 5: Primary prevention of hepatitis B virus infection.

Occupational exposures

All clinicians and health care workers should have access to infection control guidelines that advise about the management of an occupational injury, including clear written instructions on the appropriate action to take in the event of a needlestick and other blood or body substance exposures involving either patients or other health care workers. Clinicians and health care workers are encouraged to report occupational exposures immediately and all testing procedures and follow-up treatment should be fully documented. Confidentiality should be maintained.

In general, if an injury or incident occurs where blood or body substances come into contact with non-intact skin or membranes, the following action should be taken:

- Wash exposed membrane or injury with soap and water (an antiseptic could also be used on the skin)
- If eyes have been exposed, thoroughly rinse the eyes with tap water or saline while open
- If mouth has been exposed, thoroughly rinse the mouth with water and spit out
- Seek medical advice immediately for assessment of the nature of the exposure, the risk of transmission of blood-borne viruses and the need for HIV or HBV post-exposure prophylaxis (PEP)
- If the exposure is significant and the source patient is known, his or her consent for HIV antibody, HCV antibody and HBsAg testing should be sought.

For more information, contact the NSW Needlestick Injury Hotline (1800 804 823). The Hotline is a free 24-hour service for health care and emergency services workers who require assistance following a needlestick injury or other occupational exposure.

Hepatitis B post-exposure prophylaxis (PEP) in the health care setting

Unvaccinated individual

In the case of an unvaccinated individual who is exposed to HBV-infected blood or body substances, HBIG should be administered within 72 hours of the exposure to prevent HBV infection. The first dose of the HBV vaccine should also be administered as soon as possible.

Vaccinated individual

For people who have been vaccinated and who have a documented protective response after vaccination (anti-HBs level ≥ 10 IU/mL), PEP is not recommended. A person's response to the vaccine should be determined immediately. If there is no protection, the individual should be offered a dose of HBIG and HBV vaccine.

Clinicians and other health care workers should always refer to the most recent protocols and seek appropriate advice, as the field of PEP and post-exposure management is constantly evolving.

Health care workers with hepatitis B virus infection

Clinicians and other health care workers have a legal obligation to care for the safety of others in the workplace, which includes colleagues and patients. Clinicians and other health care workers with HBV infection should consult State or Territory regulations to determine what restrictions are placed on their clinical practice. In general, it is recommended that they do not perform procedures that carry a high risk of transmission of the virus from the health care worker to the patient, such as exposure-prone procedures (Table 11.1).[1]

Infection control in the primary care setting

Infection Control Guidelines for the Prevention of Transmission of Infectious Diseases in the Health Care Setting (2004) provides detailed information relating to the application of infection control in an office or primary health care setting, including: routine cleaning; disinfectants and antiseptics; the design and maintenance of health care premises; the management of clinical waste and linen; and reprocessing of instruments and equipment. Specific procedures relating to the office practice, and home and community care are included in the guidelines.[1]

The general principles of infection control that apply to large health care settings also apply to office practices. Issues that relate to preventing transmission of blood-borne viruses include:

- All clinical waste, such as dressings containing expressible blood, human matter (excluding hair, nails, urine and faeces) and blood sharps, must be appropriately packed for transport and disposal according to local regulations.
- Sharps are to be disposed of in yellow, rigid-walled containers displaying the 'Biological Hazard' label and symbol.

- Injecting equipment (including hypodermic syringes, needles, vials of local anaesthetic agent, dental local anaesthetic cartridges, dental needles, intravenous lines and giving sets) must be discarded after single use. Syringes used to hold single-use anaesthetic cartridges must be sterilised between patients.
- Dressings, suture material, suture needles, scalpels, intracranial electrodes, pins or needles used for neurosensory testing, spatulas, electric clips and razors blades must also be discarded after single use.
- Linen must be managed using standard precautions. Contaminated linen should have body substances removed with paper towels and cold running water, before being washed in cold or hot water. Drying at high temperature aids disinfection. Linen which is to be treated off-site must be packed in labelled, water-resistant, regulation bags.
- Re-usable equipment and instruments should be re-processed, and sterilisation and disinfection procedures followed in accordance with the manufacturers' and the national guidelines.
- Sterile equipment must be used on critical sites (sterile tissue).
- Sterile equipment is generally recommended for semi critical sites (intact mucous membrane), except in the case of single-use clean tongue depressors and vaginal specula, which are used in procedures unlikely to penetrate the mucosa.
- When steam or dry heat sterilisation is not suitable, other sterilisation systems, such as ethylene oxide or automated, low-temperature chemical sterilisation, may be used if acceptable to the instrument's manufacturer.

Management of blood and body substance spills in the health care setting

The management of blood and body substance spills depends on the nature of the spill, likely pathogens, type of surface and the area involved. The basic principles of spills management are:

- Standard precautions (including the use of personal protective equipment) apply where there is a risk of contact with blood or body substances.
- Spills should be cleaned up before the area is disinfected.
- The generation of aerosols from spilled material should be avoided.

All spills must be dealt with as soon as possible. In general, cleaning blood and body substance spills should take into account the following factors:

- The nature of the spill (e.g. sputum, vomit, faeces, urine, blood or laboratory culture).
- The pathogens most likely to be involved in the spill.
- The size of the spill (spot, small or large spill).
- The type of surface (e.g. carpet or impervious flooring).
- The area involved (i.e. whether the spill occurs in a contained area, such as a microbiology laboratory or in a public area such as a hospital ward or outpatient area).
- The likelihood of bare skin contact with the soiled surface.

In the case of a small spill, wipe the area clean using a paper towel and then clean with detergent and warm water. A disposable alcohol wipe also may be used. Quarantine areas where soft furnishings are involved (carpet, curtains or seating) until dry. In the case of larger spills, mop up with paper towel or use 'kitty litter' or granular chlorine, picking up the larger amount with cardboard.

In general, it is unnecessary to use sodium hypochlorite for managing spills, because there is no evidence of any benefit from an infection control perspective. However, it is recognised that some health care workers may feel more reassured that the risk of infection is reduced through the use of sodium hypochlorite.

Legal and ethical issues

Legal liability may occur if inadequate care has been taken to prevent the transmission of infection. Regulatory authorities (e.g. environmental protection) and Commonwealth, State and Territory and local governments enforce laws and regulations relating to infection control and waste disposal. These regulations can vary considerably throughout Australia, and such regulations should take precedence over the general information presented in this chapter. For further information contact State and Territory health departments, and medical and other professional boards. Legal issues are considered in greater detail in Chapter 12: Privacy, confidentiality and other legal responsibilities.

Summary

Standard precautions and infection control procedures protect against the transmission of blood-borne viruses, including HBV, HCV and HIV in the health care setting. Regardless of the perceived risk, infection control procedures must be followed in all clinical settings to minimise the risk of accidental transmission of blood-borne viruses. Clinicians and other health care workers should be vaccinated against HBV and be aware of their vaccination response. Exposures to blood and body substances should be reported immediately and monitored in case the administration of PEP is appropriate.

References

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