

UNIVERSAL PRECAUTIONS OF INFECTION CONTROL
AGAINST BLOOD BORNE PATHOGENS

ABSTRACT:

Barrier precautions are a fundamental component of any blood borne pathogen strategy and a critical aspect of all isolation systems. Many infections are transmitted from patient-to-patient via the hands of personnel and gloves and gowns are widely recommended to provide an extra measure of protection against cross-infection. Barrier precautions may also fail if infected patients are not identified promptly. Universal precautions were designed to protect personnel, not to provide barriers to cross-infection and are prone to misinterpretation and misapplication.

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INTRODUCTION

The practice of barrier precautions to prevent cross-infection, particularly the use of gloves, has all the characteristics of a typical ritual¹. It would be difficult for a person living in an industrialized society during the twentieth century not to have been exposed to concepts of public and personal hygiene².

In the last decade, health professions have reassessed infection control and the ethics of the provision of healthcare as a result of professional and public concern regarding bloodborne pathogens such as human immunodeficiency virus (HIV) , hepatitis B virus (HBV) ,and

hepatitis C virus (HCV).³

Dental professionals are exposed to a wide variety of microorganisms in the blood and saliva of patients. These microorganisms may cause infectious diseases such as the common cold, pneumonia, tuberculosis, herpes, hepatitis B, and acquired immune deficiency syndrome (AIDS)⁴.

Hepatitis A,B and C viruses and the delta agent are responsible for most infectious hepatic diseases. Although hepatitis types A and C are spread primarily by contact with the faeces of infected individuals, Hepatitis B can be spread by contact with any human secretion³. The Hepatitis B virus therefore, has the most serious risk of transmission for the

dentist, staff, and patients. It is usually transmitted by the introduction of infected blood into the bloodstream of a susceptible person, but infected individuals may also secrete large amounts of the virus in their saliva, which can enter an individual through any moist mucosal surface or epithelial wound⁵. Minute quantities of the virus have been found capable of transmitting disease (only 10^5 to 10^7 virions/ml of blood). Unlike most viruses, it is exceptionally resistant to desiccation, and quaternary ammonium compounds².

KNOWLEDGE OF DENTISTS AND PATIENT'S

The acquisition of Hepatitis B virus infection by health service staffs or from patients is an occupational hazard, which can be estimated by comparing infection rates in health service staff with the general population. During normal dental practice, dentists are at risk of infection from microorganisms carried by patients. Injuries in dental offices happen because of a confined space, the frequent patient movement and the variety of sharp dental instruments used in normal dental practice².

Universal precautions of infection control apply to blood, other body fluids containing visible blood, semen, and vaginal secretions. Universal precautions also apply to tissues and to the following fluids: cerebrospinal, synovial, pleural, peritoneal, pericardial, and amniotic fluids. However, Universal precautions do not apply to faeces, nasal precautions, sputum, sweat, tears, urine, and vomitus unless they contain visible blood.⁵

Patient's attendance in dental clinics exposes them to two risks: first, the probability of cross-infection from one patient to another from an infected dental instrument and second: the potential hazard of an infected dentist, whereby the pathogen can be transmitted from the operator to the patient.

IMPORTANCE OF PREVENTION IN DENTISTRY

The recommendation to use universal precaution systems form a necessity for treating all patients, as though they are infected with HIV, HCV, or HBV. Thus additional precautions for infected patients are unnecessary. Dental surgeons, who wear glasses and work with ultrasonic and rotary instruments, are aware of the amount of droplet spread of saliva, blood and water because of deposits on their glasses. Blood-borne infections such as HBV have an occupational risk of a percutaneous exposure to HBV as estimated to be 2% for HBeAg-negative and about 30% for HBeAg-positive blood⁷.

Dentists are among the most at high risk of exposure of Hepatitis B virus. Reusing local anesthetic syringes following recapping, and cleaning instruments were the two most important causes of needlestick injuries in dental students and dental hygienists. Currently, vaccination is the most

important method of preventing HBV infection. The number of vaccinated dentists is increasing constantly. Unvaccinated dentists are five times more likely to be infected than vaccinated dentists. Transmission of blood-borne pathogens following an exposure depends on the concentration of virus in the blood or body fluid, the volume of infective material inoculated, the loss of infectivity during transfer of inoculate and the port of entry⁵.

Since dentists who perform oral surgical procedures are exposed to blood and saliva, the dental surgery team should wear barriers to protect from contaminating any open wounds on hands and any exposed mucosal surfaces. This includes wearing of gloves, face mask, and eyeglasses, during surgery¹⁰. The dental staff should continue to wear these protective devices when cleaning instruments and when handling impressions, casts, or specimens from patients. The current climate in today's society regarding infectious diseases, in particular herpes, hepatitis, and HIV infections, dictates that the dental profession must close the door to any possible transmission of infection in the dental surgery and incorporate within their practices accepted infection control techniques.⁶

An injury caused by needle or blade can be prevented by holding the sheath with an instrument during resheathing of needles after use, taking care never to apply or remove a blade from a scalpel handle or a needle from a syringe without an instrument, and disposing of used blades and needles into rigid, well marked receptacle box, container specially designed for contaminated sharp objects. Post exposure prophylaxis refers to comprehensive management given to minimize the risk of infection following potential exposure to blood-borne pathogens (HIV, HBV, HCV).⁷

PROTOCOL FOR NEEDLE STICK INJURY

A) FIRST AID

Immediately following any exposure, whether or not the source is known to pose a risk of infection.

- 1) The wound should be washed immediately and thoroughly with soap and water.
- 2) Antiseptics are not necessary as there is no evidence of their efficacy.
- 3) Wounds should not be sucked.
- 4) For mucosal contact such as spillage into the conjunctiva, the exposed part should also be washed immediately and liberally with clean running water⁸.

MANAGEMENT OF ACCIDENTAL EXPOSURE TO HEPATITIS B VIRUS (HBV)

- 1) The management of an incident of accidental exposure to Hepatitis B virus involves proper risk assessment, counseling

tailored to the needs of individual, and the prescription of postexposure prophylaxis as appropriate⁶.

2) For the best protection, all health care staff with potential risk of exposure to blood and body fluids are advised to receive hepatitis B vaccination as soon as possible for their own safety. Subjects with anti-HBs titre ≥ 10 ml/mL 1-4 months after vaccine completion are considered as responders. Non-responders are those with no detectable anti-HBs and hypo-responders refer to those whose anti-HBs titre are between 0-10 mIU/mL. Both non and hypo-responders should complete a second 3-dose vaccine series and retested at the completion of the second vaccine series. Non-responders to the initial 3-dose vaccine series have a 41% chance of responding to a second 3-dose series⁶.

Two types of products are available for prophylaxis against HBV infection. Hep B vaccine which provides long term protection against HBV infection. HBIG (Hepatitis B immunoglobulin) provides temporary protection (i.e for 3-6 months). Both passive and active PEP with HBIG and hepatitis A vaccination and active PEP with hepatitis B vaccine alone has been demonstrated to be highly effective in preventing transmission after exposure to HBV.

If percutaneous exposure (e.g bite or needlestick injury) Administer Hepatitis B vaccine and Hepatitis B immunoglobulin.

MANAGEMENT OF ACCIDENTAL EXPOSURE TO HCV

1) One principle of Hepatitis C virus post-exposure management is to identify those with acute Hepatitis C virus infection and refer them to specialists for further evaluation⁹. At baseline, Hepatitis C virus antibody should be tested for both the source and the exposed. Sera should be stored for at least one year. For the exposed, testing should be repeated at 6 months, 12 months if the source is HIV-HCV co-infected.

2) Currently, there is no effective vaccine or chemoprophylactic agent for Hepatitis C virus infection after accidental occupational exposure.

3) Hepatitis C virus often causes persistent infection, and is important factor in the etiology of fibrosis, cirrhosis, and hepatocellular carcinoma (HCC).⁹

MANAGEMENT OF ACCIDENTAL EXPOSURE TO HIV

1) Occupational injuries may be divided into:

- Percutaneous exposure (from needles, instruments, bone fragments, human bite with breach of skin.)
- Exposure via broken skin (abrasions, cuts, eczema.)
- Exposure via mucous membranes including the eyes.

2) A person infected with HIV may not be aware of his or

her own HIV serostatus⁷. Therefore the exposed person should always be encouraged to have baseline blood taken for HIV antibody after receiving pre-test counseling and giving consent.

3) The HIV status of the source person is not always obtainable. Therefore, the likelihood of HIV infection has to be estimated based on clinical clues in the setting:

- HIV prevalence of the community group which the source belongs to
- HIV-related risk behaviours e.g unprotected sex, multiple sex partners, needle-sharing for drug injection.
- HIV related illnesses, e.g Pneumocystis jiroveci pneumonia, oral thrush etc.

4) To date, Zidovudine is the only drug for which there is evidence of a reduction in risk of HIV transmission following occupational exposure and it continues to be a reasonable choice as component of PEP.

CONCLUSION

It's a multifactorial approach as improvement of infection control practice requires continual assessment of the group's stage, intervention and prophylaxis assessment of appropriate intervention supporting individual and group creativity¹¹. Because of the complexity of the change process, it is not surprising that single behavioural theory but are out of organizational or individual context- often fail. More education is required to promote a more realistic perception of the risk of cross-infection with HIV and HBV and the use of Universal Precautions. This may allay fears related to personal risk and facilitate access to care for patients with bloodborne pathogens.

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