

# Post exposure prophylaxis to occupational injuries for general dentist

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**Abstract** Occupational injuries which expose health-care professionals to blood-borne pathogens continue to be an important public health concern. Especially, dentists are at increased risk of exposure to Hepatitis B, Hepatitis C, and HIV. Dentists should remember and apply many precautions to prevent the broad spectrum of sharps and splash injuries that could occur during the delivery of dental care. This article updates and consolidates recommendations for the management of dental health-care personnel who have occupational exposure to blood and other body fluids.

**Keywords** Post exposure prophylaxis · Needle stick injury · Occupational injury

## Introduction

Occupational injuries in health professionals are very common. World Health Organization report estimates that 2.5 % of human immunodeficiency virus (HIV), 40 % of Hepatitis B virus (HBV) and Hepatitis C virus (HCV) cases among HCWs worldwide are the result of occupational exposures [1]. In dentistry, serious infections can be

transmitted as occupational accidents involving exposure to biological material are frequent due to working with needles and sharp instruments [2] in a field with restricted vision and subject to the movement of patients. Spread of HBV, HCV, HIV, Cytomegalovirus (CMV), Epstein-Barr virus (EBV), Parvovirus, Treponema pallidum (syphilis), and Yersinia plasmodium infections have been recognized as occupational hazards for dentists [3, 4] despite the risk in dentistry from blood-borne pathogens is considered low.

## Risk of Infection

### Hepatitis B

For an unvaccinated person, the risk from a single needle stick or a cut exposure to HBV-infected blood ranges from 6 to 30 % and depends on the Hepatitis B antigen (HBsAg) status of the source individual. About 95 % of HBV infections [5, 6] will be detectable by the 6 months after exposure. HBV has been demonstrated to survive in dried blood at room temperature on environmental surfaces for at least 1 week [7]. Thus, HBV infections that occur in dentists with no history of nonoccupational exposure that might have resulted from direct or indirect blood or body fluid exposures during cutaneous scratches, abrasions, burns, other lesions, or on mucosal surfaces.

### Hepatitis C

HCV most frequently acquired by direct blood to blood contact. HCV is not transmitted efficiently through occupational exposures to blood. The average incidence of anti-HCV seroconversion after accidental percutaneous exposure from an HCV-positive source is 1.8 % [8]. (Range: 0–7 %)

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No prophylactic measures involving drugs or immunoglobulins are at present available so, recommendations for post exposure management are intended to achieve early identification of chronic disease and, if present, first aid and referral for evaluation of treatment options.

### Human Immunodeficiency Virus (HIV)

The average risk of HIV transmission after a percutaneous exposure to HIV-infected blood has been estimated to be approximately 0.3 % [9] and after a mucous membrane exposure, approximately 0.09 % [10]. The risk after exposure of the eye, nose, or mouth to HIV-infected blood is estimated to be, on average, 0.1 % (1 in 1,000). There are no documented cases of HIV transmission due to an exposure involving a small amount of blood on intact skin.

### Prevention

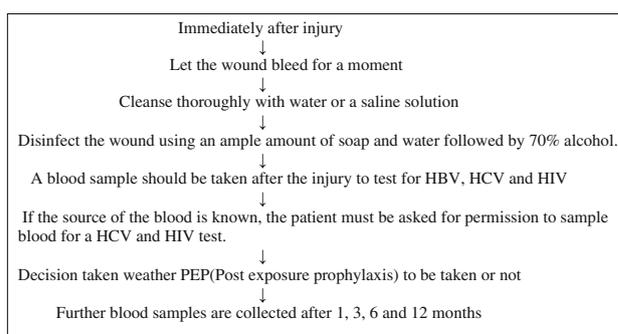
In dentistry, accidental contact with blood occurs especially during re-capping the syringe needle. During surgery, biopsy, suturing, when taking used needle to the waste container and during the cleaning up and transporting of waste material etc.

These injuries can be prevented by

- Put the needle back in its cover
- Healthcare personnel at risk from accidental exposure to blood should be vaccinated against HBV. There are no preventive vaccines available yet for HCV and HIV.
- Use mouthmasks, gloves and gowns. Double gloving is safer than single gloving.
- Contaminated materials should be cleaned immediately and then disinfected. Small surfaces are cleaned with 70 % alcohol. Large surfaces such as floors are disinfected with a chlorine solution 1,000 ppm.
- Thus all dental practices should have a written, relevant, up-to-date and easily accessible protocol that is understood by all the staff.

### First Aid

There are no clear protocols on first aid treatment in reducing the risk of blood born virus transmission following occupational exposure. For percutaneous (needle-stick/sharpobject) injuries (Fig. 1) the wound should be washed (and not scrubbed) for several minutes with soap and water, or a disinfectant (10 % iodine solution or chlorine compounds). Induce bleeding from the contaminated injury. This will lower the number of organisms below that required to initiate infection. Assess patient's



**Fig. 1** First aid

risk factors. Identify the status of dentist. A blood sample should be taken after the injury to test for HBV, HCV, and HIV.

If the source of the blood is known the patient must be asked for permission to sample blood for a HCV and HIV test. Protected dose of anti-HBs antibody titre was greater than 100 IU/L or 10–99 IU/L if last vaccine dose was within 2 years. If blood or body substance accidentally gets into the eye it should be irrigated gently and thoroughly with water, without the use of soap.

### Post Exposure Prophylaxis (PEP)

Post exposure prophylaxis is generally means the medical response given to prevent the transmission of blood-borne pathogens following a potential exposure to HIV, HBsAg, HCV and other virus. It should be initiated as soon as possible, within hours and no later than 72 h following the potential exposure. It is recommended [11] to start PEP within 6 h of suspected exposure. Do not wait for laboratory results, start PEP at once. In most cases it is possible to stop PEP immediately after the results prove negative and thus avoid potential adverse events. PEP cannot prevent the infection but it can prevent the incorporation of the viral DNA into host DNA.

### Prophylactic Regimen for HIV

The risk of a HIV infection following exposure to blood is very small (0.1–0.5 %). The actual risk depends on type of contact and on the amount of virus in the contaminated material. Factors which are associated with a higher risk are deep wounds, visible blood on the instrument, needle-stick injury by using hollow-bore needles containing blood, intravenous or intramuscular injection of contaminated blood etc. Standard regimen is a 3-drug combination consisting of 2 RT (reverse transcriptase) inhibitors and one protease inhibitor i.e. Indinavir lamivudine zidovudine (300 mg of zidovudine with 150 mg of lamivudine and

800 mg of Indinavir) twice daily. Antiretroviral drugs have side effects like nausea, vomiting, anaemia, fatigue, insomnia and renal stone formation.

#### Prophylactic Regimen for HBV

Regimens involving either multiple doses of Hepatitis B immunoglobulin (HBIG) alone or the Hepatitis B vaccine series [12] alone are 70–75 % effective in preventing HBV infection. If the person who is not vaccinated or antibody response is unknown, HBIG should be given as soon as possible and Hepatitis vaccine should be completed. If previously vaccinated and known responder no treatment is necessary. If source person is HBV positive then HBIG should be administered.

#### Prophylactic Regimen for HCV

Immune globulin and antiviral agents (e.g., interferon with or without ribavirin) are not recommended for PEP of Hepatitis C. For HCV post exposure management, the HCV status of the source and the exposed person should be determined, and for health-care person exposed to an HCV-positive source, follow-up HCV testing should be performed to determine if infection develops.

#### Conclusion

The introduction of universal precautions and Hepatitis B immunisation by the dental profession has done much to reduce the risks of such occupational infections. However, despite this a situation may arise where a considerable degree of doubt exists about the most appropriate action to take, especially in the setting of general dental practice.

Another important aspect of the prevention and management of sharps injuries are to undertake staff training. Regular staff training should focus on topics such as the avoidance of injuries, the use of heavy duty gloves and of eye protection whilst cleaning instruments or, providing them with the appropriate training to enable employees to

understand the rationale for the safety procedures that prevent exposures to blood-borne pathogens the immediate application of first aid treatment.

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