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Prevention of transmission of HIV & hepatitis during dental procedures

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Abstract

HIV/AIDS & Hepatitis profoundly affect every aspect of the health profession. Patients suffering from HIV/ Hepatitis are sometimes devoid of treatment due to doctors' fears & apprehensions caused by their lack of understanding of the disease and its modes of transmission. Exposure to blood-borne pathogens poses a serious risk even to oral health care workers. Despite improved methods of preventing exposure, occupational exposures continue to occur. However, understanding the transmission of these infections and emphasis on proper infection control can help the dental team provide proper patient care.

Keywords: Diseases, Microorganisms, Health, Transmission, Exposure

Introduction

Mouth is the mirror of general health which helps in early detection of many systemic diseases, as most lesions present orally during the initial stage of the disease. The possibility of HIV & Hepatitis transmission in the oral health care setting has become common as dental surgeons deal with body fluids, sharp instruments and needles. Dental surgeons are exposed to a variety of disease-causing microorganisms that may be transmitted in dental settings through several routes, including 1) Intact or non-intact skin in direct contact with blood, oral fluids, or other potentially infectious substances, 2) Indirect contact with a contaminated object e.g., instruments, operatory equipment, or environmental surfaces, 3) Contact of mucous membranes of the eyes, nose, or mouth with droplets (e.g., blood spatter) containing microorganisms.

Human Immunodeficiency Virus

The average risk of HIV infection after a single percutaneous exposure to HIV- infected blood is 0.3% (range: 0.2%–0.5%) and after an exposure of mucous membranes in the eye, nose, or mouth, the risk is approximately 0.1%^[1]. A deep injury with an instrument that was visibly contaminated with the patient's blood, or a procedure that involved a needle placed in a vein or artery of patient increase risk for HIV infection^[2]. The risk also increases if the exposure to blood from patients with terminal illnesses is present. Nearly 2% of new cases of HIV occur due to unsafe injection practices^[3]. Only invasive dental procedures are significantly associated with HIV virus transmission. Transmission can also occur from patient to patient via contaminated dental instruments. Guidelines for infection control have been recommended by Centers for Disease Control and Prevention to decrease the risk of occupationally acquired infections. It is not always feasible to test each patient for HIV; therefore universal precautions should be followed, assuming each patient as potentially infectious. This will substantially minimize risk of HIV transmission from patients to dentists^[3].

Hepatitis Virus

The hepatitis viruses of extreme concern to dentists are the blood borne hepatitis B virus (HBV) hepatitis C virus (HCV) and hepatitis D virus (HDV). HBV is transmitted by percutaneous or mucosal exposure to blood or body fluids of a person with either acute or chronic HBV infection. Persons infected with HBV can transmit the virus for as long as they are HBsAg-positive. HDV can occur only as a co-infection with HBV and HBV immunization confers immunity to both HBV and HDV^[4]. Both HBV and HCV are present in saliva also. In addition, HBV survive in dried blood at room temperature on environmental surfaces for ≤ 1

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week. Thus, HBV infections can occur in health care providers with no history of non-occupational exposure^[5].

HBV presents the greatest risk to the non-immune dental worker. It has been estimated that every year 6,800 non-vaccinated health care workers in the United States get infected with HBV. The reason for loss of life includes cirrhosis, liver cancer or fulminant hepatitis^[4]. However, as a result of increasing compliance with HBV immunization and following strict infection control protocol; there have been decline in reports of transmission of HBV to dental surgeons. Although the infectivity of HCV is lower than HBV, immunization against this virus is not available and concerns related to its transmission are increasing. Seroprevalence studies indicate that oral surgeons are at increased risk of HCV infection, especially in areas of high prevalence^[4].

Discussion

Dental surgeons are exposed to a variety of microorganisms that are transmittable via blood, saliva or other body fluids & secretions. Occupational exposure can occur percutaneously through needle stick or cuts from sharp instruments contaminated with infected blood or blood splashes to the eyes, nose or mouth^[6]. Any dental surgery exposes to cross-infection with pathogens including HIV, hepatitis B and hepatitis C viruses. Therefore, the dental health care provider must be aware and well educated about the diseases commonly encountered during dental care^[3].

The risks of transmission of HBV, HCV and HIV as a result of injury with a contaminated needle are approximately 30% (HBV), 3% (HCV) and 0.3% (HIV)^[7]. Not observing basic universal precautions put dentists at a higher risk of exposure. Universal precautions were introduced by the Centres for Disease Control and Prevention (CDC 1993) with the aim of reducing the transmission of pathogens in the routine dental practice. These recommended infection control practices are widely accepted and used in many countries and should be strictly followed. The guidelines outline specific recommendations related to:

- Vaccinations of oral health care worker (OHCW)
- Protective attire and barrier techniques (e.g., gloves, masks, protective eyewear, and gowns)
- Hand washing and care of hands
- Careful handling of sharp instruments and needles
- Sterilization or disinfection of instruments
- Cleaning and disinfection of the dental unit and environmental surfaces
- Use and care of handpieces
- Use of extracted teeth in dental educational settings
- Disposal of waste material and single use disposable instruments

These universal precautions were based on the concept that all blood and body fluids that might be contaminated with blood should be treated as infectious because patients with blood borne infections can be asymptomatic or unaware they are infected^[8].

In 2003, CDC released the latest guidelines, which consolidates previous recommendations and adds new ones for infection control in dental settings. Of note is the change in terminology from what were commonly referred to as *universal precautions* to *standard precautions*. Standard precautions apply to contact with 1) blood; 2) all body fluids, secretions, and excretions (except sweat), regardless of whether they contain blood; 3) non-intact skin; and 4) mucous membranes (CDC, 2003). It is recommended that OHCW adhere to these standard precautions for all patients they treat –

regardless of the patient's known or suspected health status, especially HIV status. Additional recommendations on the latest CDC guidelines for infection control in dental health care settings include:^[1]

- Use of standard precautions rather than universal precautions
- Work restrictions for health care personnel infected with and occupationally exposed to infectious diseases
- Management of occupational exposures to blood borne pathogens including post exposure prophylaxis (PEP) for work exposures for Hepatitis B virus (HBV), Hepatitis C virus (HCV) and Human Immunodeficiency Virus (HIV)
- Selection and use of devices designed with features to prevent sharps injury
- Hand hygiene products and surgical hand antiseptics
- Sterilization of unwrapped instruments

Each occupational exposure should be evaluated individually for its potential to transmit HBV, HCV, and HIV, based on the following^[1]:

- Type and amount of body substance involved
- Type of exposure (e.g., percutaneous injury, mucous membrane or non-intact skin exposure, or bites resulting in blood exposure to either person involved)
- Infection status of the source
- Susceptibility of the exposed person.

All of these factors should be considered in assessing the risk for infection and the need for further follow-up (e.g., PEP).

Post-exposure Management and Prophylaxis

Post-exposure management remains an important integral component of a complete program to prevent infection following exposure to blood. After an occupational blood exposure, first aid should be administered as necessary. Needle-stick injuries, puncture wounds and other injuries to the skin should be washed with soap and water and should not be squeezed; mucous membranes should be flushed with water. No evidence exists that using antiseptics for wound care reduces the risk of blood-borne pathogen transmission; however, use of antiseptics is not contraindicated. The application of caustic agents (e.g., bleach) or the injection of antiseptics or disinfectants into the wound is not recommended^[8].

If the HIV serostatus of the source patient is unknown, consent for voluntary HIV testing of the source patient should be sought as soon as possible after the exposure. Antiretrovirals (ARVs) are prescribed to prevent infection in case of accidental or occupational exposure. This intervention is called post-exposure prophylaxis (PEP) and involves taking a 28-day course of ARVs. PEP should be initiated as early as possible and ideally within 72 hours. If started soon after exposure, PEP can reduce the risk of HIV infection by over 80%. Adherence to a full 28-day course of ARVs is critical to the effectiveness of the intervention. Exposure to saliva, tears, sweat, or non-bloody urine or faeces does not require PEP^[9, 10]. Females who may have been exposed to HIV through occupational exposure should avoid breastfeeding for 3 months after the exposure. PEP is indicated at any time during pregnancy when a significant exposure has occurred, despite possible risk to the woman and the foetus. Before administering PEP to a pregnant woman, the clinician should discuss the potential benefits and risks to her and to the foetus. The recommended PEP regimen is the same for pregnant women as for non-pregnant adults. In December 2014, WHO released an update which includes a new set of recommendations for PEP. For adults, Tenofovir 300 mg daily

plus Emtricitabine 200 mg daily / lamivudine 150 mg orally twice a day or 300 mg orally once a day, Raltegravir 400 mg twice daily or Dolutegravir 50 mg daily is recommended PEP regimen and these are also the preferred drugs for treating HIV. Zidovudine and lamivudine are backbone drugs for children aged 10 or below, with ritonavir-boosted lopinavir recommended as the third drug choice. These are also preferred drugs for treating HIV in children^[9, 10].

Administration of prophylactic hepatitis B immune globulin (HBIG) and the initiation of the hepatitis B vaccine series injected at different sites are recommended in unvaccinated non-HBV immune workers who sustain a blood or body fluid exposure to a source patient with known acute or active HBV. Both HBIG and the first dose of the hepatitis B vaccine series should be ideally administered within 24 hours of exposure; HBIG should not be given later than 14 days post-exposure. The three-dose HBV vaccine series is given at 0, 1 to 2 months, and 6 months. Hepatitis B vaccine may be administered simultaneously with HBIG in a separate injection site. Individuals who have written documentation of a complete hepatitis B vaccine series and who did not receive post-vaccination testing should receive a single vaccine booster dose. Individuals who are in the process of being vaccinated but who have not completed the vaccine series should receive the appropriate dose of hepatitis B immune globulin (HBIG) and should complete the vaccine series^[11].

Initiation of the HBV vaccine series within 12 to 24 hours of an exposure has been demonstrated to be 70% to 90% effective in preventing HBV infection. The combination of vaccine and HBIG achieves a similar level of efficacy. Among known non-responders to vaccination, one dose of HBIG is 70% to 90% effective in preventing HBV when administered within 7 days of percutaneous HBV exposure, and multiple doses have been shown to be 75% to 95% effective. Pregnant women can safely receive both the HBV vaccination and HBIG^[11].

Conclusion

There is risk of viral transmission in the dental office and evidences of transmission of HBV, HIV and HCV in the dental office are present. Those who are not immune to HBV are particularly vulnerable. There are clear indications that the frequency of exposures to blood among dentists needs to be reduced in order to minimize the risk of occupationally acquired infections. In future, more systematic surveillance of occupationally acquired HIV, HBV and HCV infection is required; better definition of the epidemiology of blood contact and the efficacy of preventive measures; development and evaluation of new safety devices and protective barriers; constant evaluation of PEP; and development and evaluation of vaccines for HIV and HCV.

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