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SHORT COMMUNICATION

Post-Exposure Prophylaxis: What Every Dental Personnel Should Know

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ABSTRACT

Percutaneous injuries in the dental office are one of the main risk factors for the transmission of diseases like hepatitis B (HBV), hepatitis C (HCV) and human immunodeficiency virus (HIV). HBV is an important infectious disease that is to be focused on in a dental setting. According to Centers for Disease Control and Prevention (CDC), dental work ranks first in the frequency of potential sources for acquiring viral hepatitis, while dental employment ranks eleventh. It is necessary that all dental practitioners are aware of the post-exposure prophylaxis (PEP) to be followed in case of exposure to HBV, HCV or HIV and the protocol followed in situations of exposure and that adequate reporting of the situation is performed. The protocol discussed is to be displayed in all dental settings so that every dental personnel will be aware of the necessary prophylaxis to be followed in any case of accidental exposure to infected source.

Keywords: PEP, Prophylaxis, HIV, HBV, Accidental exposure.

THE PRESENT SCENARIO

Percutaneous injuries in the dental office are one of the main risk factors for the transmission of diseases, like hepatitis B (HBV), hepatitis C (HCV) and human immunodeficiency virus (HIV).[1,2] HBV is an important infectious disease that is to be focused on in a dental setting. According to Centers for Disease Control and Prevention (CDC), dental work ranks first in the frequency of potential sources for acquiring viral hepatitis, while dental employment ranks eleventh.[3] A study by Ilguy D et al has reported that 0.8% of the patients in a dental facility were HBV carriers and 17% of the patients did not know what type of hepatitis they suffered from. They concluded that this poses a risk of transmission in the dental office, so strict sterilization procedures should be adhered to.[4] In a study done in Vancouver, 11% of dental professionals had HBV infection and the infection rate was 18% higher among dentists than other dental professionals.[5] Another study done among Egyptian dentists showed that dentists had an exposure rate of 27.1% with a carrier rate of 7.1% for HBV.[6] Comparing general dentists and oral surgeons in the United States showed presence of serological markers of HBV infection in 7.8% of general dentists and 21.2% in oral surgeons.[7] A study among dentists in Berlin showed that 7% of dentists had evidence of previous infection with HBV and HCV and only 74% had been vaccinated against HBV.[8] Among doctors and dentists in Ibadan, Nigeria, a high prevalence of HBV was reported with a high potential for transmissibility.[9] A study in Brazil showed that seropositivity for HBV infection was high among dentists.[10] Another study among dentists in Khartoum, Sudan showed that only 52% of the dentists had undertaken HBV vaccination.[11] Vaccination against HBV was reported as 62% among dentists in Haryana, India.[12] There have also been evidence of the presence of HBV DNA in saliva of infected individuals, which maybe a potential route of horizontal transmission of the disease.[13-15] The risk of transmission of HBV varies between 37 and 62% if the HBsAg and HBeAg are both positive, while the risk is lower (23-37%) if the carrier is positive only for HBsAg.[16] Risk of transmission of hepatitis C ranges between 0 and 7%.[16]

HIV and AIDS are on the rise in the present day. Although the risk of HIV transmission in the dental office is very low,[17,18] there have been reports of transmission of HIV from patient,[19] and seroconversion of dental care professionals.[20] Studies done on the risk of HIV infection among health care professionals have reported that the average risk is 0.3% on percutaneous injury[21] and 0.1% on exposure of mucous membranes in the eye, mouth or nose.[22] The transmission of HIV can be significantly reduced by the use of appropriate infection control procedures, safety needles and safety equipment.[23] A study among HIV individuals on self-disclosure of HIV status to dentists reported that only 53% revealed their HIV status.[24]

THE FIRST STEP: SELF PROTECTION

Self protection of the dental professional can be inculcated by ensuring thorough washing of hands prior to and after patient care. Use of personal protective equipment, such as gloves, masks, aprons and safe handling and disposal of needles are essential for prevention of infection. In case of accidental spill of body fluids, pour disinfectant (1% sodium hypochlorite) over the spill, and mop up using gloves with an absorbent material

after a contact period of 30 minutes. The gloves and the mop are then disinfected and hands washed thoroughly.

Vaccination against HBV is to be taken by every dental professional. It is administered as three doses. It is advisable to check the antibody levels a month after the third dose. The protective level of antibodies is 10 IU/L or more.[16]

WHAT TO DO IMMEDIATELY IN CASE OF OCCUPATIONAL EXPOSURE

Immediately following an exposure:

- Needle stick injuries and cuts should be washed with soap and water
- Pricked finger should not be put into mouth reflexively
- Splashes to the nose, mouth or skin should be flushed with plenty of water
- Eyes should be irrigated with clean water or saline.

There is no need for local antiseptics or disinfectants as they have not been known to reduce the transmission of the virus, but they have not been contraindicated.

REPORTING AND DOCUMENTATION

Reporting the exposure to the appropriate authority is essential, and the post-exposure prophylaxis should be started as soon as possible. The infection control officer or authorized medical attendant (AMA) should record the circumstances, details of the injury, ordering baseline investigations based on exposure and also to provide counseling. Then the AMA will begin the postexposure prophylaxis (PEP) in consultation with a physician.

The following are to be recorded in the exposed person's confidential medical record:

- Date and time of exposure
- Details of the procedure being performed, including where and how the exposure occurred; if related to a sharp device
- Details of the exposure, including the type and amount of fluid or material and the severity of the exposure (e.g. for a percutaneous exposure, depth of injury and whether fluid was injected; for a skin or mucous membrane exposure, the estimated volume of material and the condition of the skin, such as chapped, abraded, intact)
- Details about the exposure source (e.g. whether the source material contained HBV, HCV or HIV; if the source is HIV-infected, the stage of disease, history of antiretroviral therapy, viral load and antiretroviral resistance information, if known)
- Details about the exposed person (e.g. hepatitis B vaccination and vaccine-response status); and
- Details about counseling, post-exposure management, and follow-up.

Evaluation of the Exposure

In order to administer the appropriate prophylaxis, it is necessary to assess type of occupational exposure. The factors to be considered are given in Table 1. The dental professional should be assessed for baseline status in terms of HBsAg, anti-HCV and anti-HIV within 72 hours of injury. In case of exposure to HBV, the vaccination status and antibody response should be assessed.

Evaluation of the Source

The person whose blood or body fluid was the source of exposure should be evaluated for infection with HBV, HIV or HCV. Information from the medical record at the time of exposure or from the source person may confirm or exclude the presence of infection. If the infection status of the source is unknown, the person should be informed of the incident and tested for the presence of infection. Testing to determine HBV, HCV, HIV should be done as soon as possible (24-48 hours).[25]

On serologic testing, if HBsAg is positive, then HBeAg has to be assessed. If the anti HCV is positive, then HCV viral load is to be assessed. If the HIV antibody is positive, then CD4 count, HIV-1 load, history of antiretroviral therapy and stage of clinical disease has to be assessed (Table 2).[27] If the source individual cannot be tested or identified, then information on the circumstances of exposure should be assessed based on

Table 1: Factors to assess the need for assessing follow-up of occupational exposure

Type of exposure	• Percutaneous injury • Mucous membrane exposure • Nonintact skin exposure • Bites resulting in blood exposure to either person involved
Type and amount of fluid/tissue	• Blood • Fluids containing blood • Potentially infectious fluid or tissue • Direct contact with concentrated virus
Infectious status of source	• Presence of HBsAg • Presence of HCV antibody • Presence of HIV antibody
Susceptibility of exposed person	• Hepatitis B vaccine and vaccine response status • HBV, HCV and HIV immune status

Source: CDC. Updated US public health service guidelines for the management of occupational exposures to HBV, HCV and HIV and recommendations for post-exposure prophylaxis. MMWR Jun 29 2001;50(No. RR-11):1-42.

Table 2: Evaluation of exposure source

Known sources	• Test known sources for HBsAg, anti-HCV and HIV antibody • Direct virus assays for routine screening of source patients are not recommended • Consider using a rapid HIV-antibody test • If the source person is not infected with a blood borne pathogen, baseline testing or further follow-up of the exposed person is not necessary • For sources whose infection status remains unknown (e.g., the source person refuses testing), consider medical diagnoses, clinical symptoms, and history of risk behaviors • Do not test discarded needles for blood borne pathogens
Unknown sources	• Evaluate the likelihood of exposure to a source at high-risk for infection • Consider likelihood of blood borne pathogen infection among patients in the exposure setting

Source: CDC. Updated US Public Health Service guidelines for the management of occupational exposures to HBV, HCV and HIV and recommendations for post-exposure prophylaxis. MMWR Jun 29;2001;50(No. RR-11):1-42.

Table 3: Recommendation of post-exposure prophylaxis (PEP) regimens based on source of exposure and status of source[27]

a. If EC1 and SC1	PEP may not be required
b. If EC1 and SC2 or EC2 and SC1	Basic regimen (two drugs) required
c. If EC2 and SC2	Expanded regimen (three drugs) warranted
d. If EC3 and SC 1 or 2	Expanded regimen (three drugs) warranted
e. If both EC and SC are not known, or if EC2 or EC3 in the absence of SC	Basic regimen (two drugs) required

Source: Col K Kapila, Col RM Gupta, Brig GS Chopra. Post-exposure Prophylaxis : What Every Health Care Worker Should Know. MJAFI 2008;64:250-53.

Table 4: Post-exposure prophylaxis for exposure to hepatitis B

*Vaccination and antibody response status of exposed workers**	*Treatment* *Source HBsAg+ positive*	*Source HBsAg+ negative*	*Source unknown or not available for testing*
Unvaccinated	*HBIG[$] × 1 and initiate hepatitis B vaccine series[ϕ]*	*Initiate HB vaccine series*	*Initiate hepatitis B vaccine series[ϕ]*
Previously vaccinated			
Known responder**	No treatment	No treatment	No treatment
Known nonresponder[++]	HBIG × 1 and initiate revaccination or HBIG × 2[$$]	No treatment	If known high-risk source, treat as source were HBsAg positive
Antibody response unknown	Test exposed person for anti-HBs[ϕϕ] 1. If adequate,** no treatment is necessary 2. If inadequate,[++] administer HBIG × 1 and vaccine booster	No treatment	Test exposed person for anti-HBs 1. If adequate,[$] no treatment is necessary 2. If inadequate,[$] administer vaccine booster and recheck titer in 1-2 months

*Persons who have previously been infected with HBV are immune to reinfection and do not require post-exposure prophylaxis
[+]Hepatitis B surface antigen
[$]Hepatitis B immune globulin; dose is 0.06 mL/kg intramuscularly
[ϕ]Hepatitis B vaccine (3 doses - 0,1 and 6 months)
**A responder is a person with adequate levels of serum antibody to HBsAg (i.e. anti-HBs >10 mIU/mL)
[++]A nonresponder is a person with inadequate response to vaccination (i.e. serum anti-HBs < 10 mIU/mL)
[$$]The option of giving one dose of HBIG and reinitiating the vaccine series is preferred for nonresponders who have not completed a second 3-dose vaccine series. For persons who previously completed a second vaccine series but failed to respond, two doses of HBIG are preferred
[ϕϕ]Antibody to HBsAg

Source: CDC. Updated US Public Health Service guidelines for the management of occupational exposures to HBV, HCV and HIV and recommendations for post-exposure prophylaxis. MMWR Jun 29 2001;50 (No. RR-11):1-42.

Table 5: Recommended post-exposure HIV regimens

	Preferred	*Alternatives*	*Not recommended*
Basic two drugs regimen	Zidovudine (AZT) 300 mg twice daily + Lamivudine (3TC) 150 mg twice daily or Emtricitabine (FTC) 200 mg once daily*	Stavudine (d4T) + Lamivudine (3TC) or Emtricitabine (FTC)	Nevirapine (NVP) Delavirdine (DLV) Abacavir (ABC) Zalcitabine (ddC) Didanosine (DDI) Stavudine (d4T)
Expanded three drugs regimen	Tenofovir (TDF) 300 mg once daily + Lamivudine (3TC) 300 mg once daily or Emtricitabine (FTC) 200 mg once daily**	Didanosine (ddI) + Lamivudine (3TC) or Emtricitabine (FTC)	
	Basic regimen + Lopinavir - ritonavir (LPV/r) 400/100 (mg twice daily)	Basic + Atazanavir- ritonavir (ATV/r) Basic + Fosamprenavir- ritonavir (FPV/r) Basic + Indinavir-ritonavir (IDV/r) Basic + Saquinavir -ritonavir (SQV/r) Basic + Efavirenz (EFV)	

*Less well tolerated than Tenofovir- containing regimen; available as Combivir (ZDV +3 TC) one tablet twice daily; **Better tolerated

Source: Col K Kapila, Col RM Gupta, Brig GS Chopra. Post-exposure Prophylaxis: What Every Health Care Worker Should Know. MJAFI 2008;64:250-53

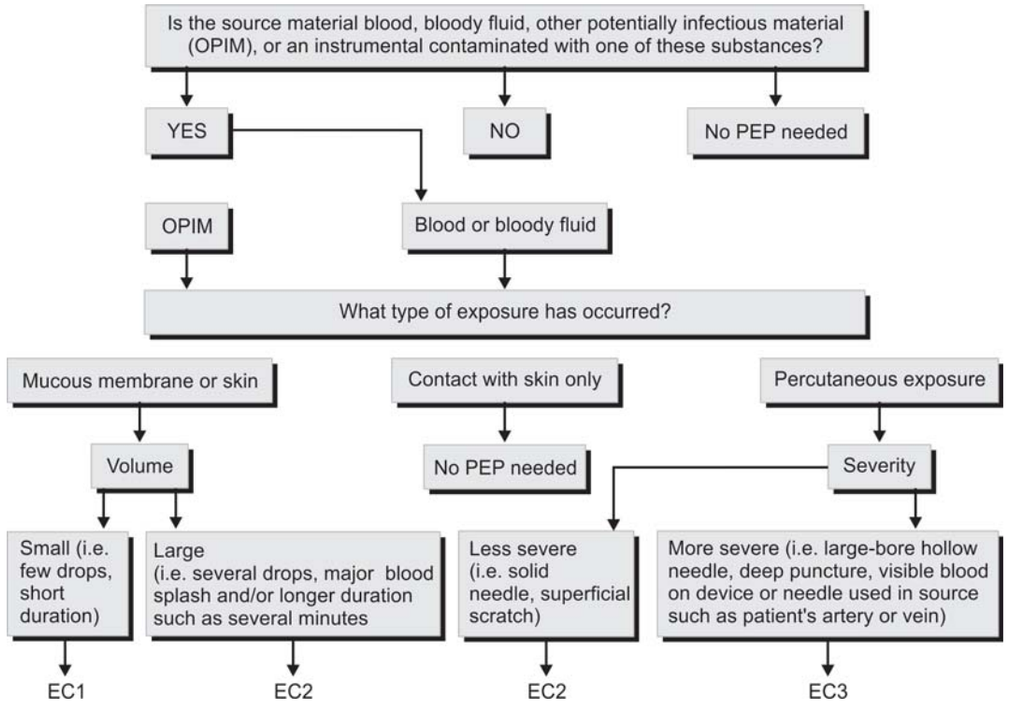

Fig. 1: Determination of exposure code (EC)

Source: National AIDS Control (NACO) guidelines. Available at http:/www.nacoonline.org/About_NACO/Policy__Guidelines. Accessed on 10.04.2009

the details of the medical history, clinical symptoms and history or likelihood of high-risk exposure (Table 3).

The guidelines for HIV PEP depend on the source of exposure and the status of the source.[16,27] The flowchart to determine the source of exposure and status of the source are presented in Figures 1 and 2.

Table 3 classifies the type of PEP recommended based on the exposure and status of source.

POSTEXPOSURE PROPHYLAXIS

PEP for exposure to HBV, HCV and HIV have to be started as soon as possible after the incident, preferably within 1-2 hours.[16,26]

HBV

PEP for HBV should be given as soon as possible (possibly within 24 hours) and at least within 7 days of exposure as given in Table 4.

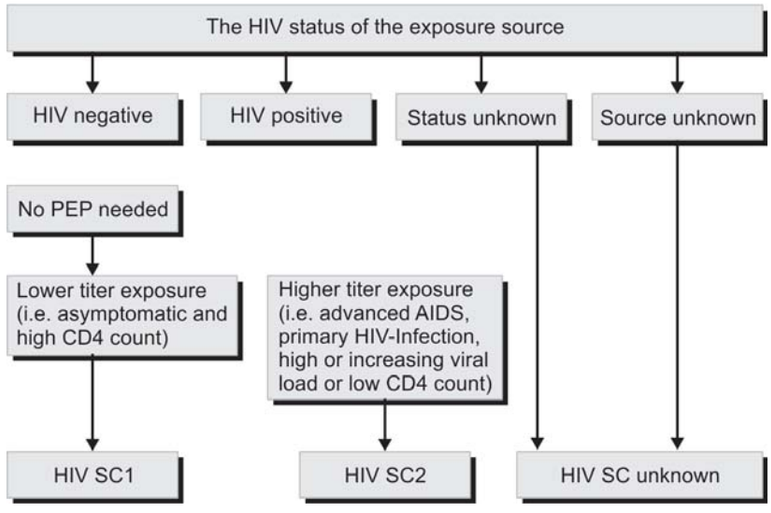

Fig. 2: Determination of status code (SC). Available at http:/ www.nacoonline.org/About_NACO/Policy__Guidelines. Accessed on 10.04.2009

HCV

Presently, there are no PEP recommendations for HCV. A baseline testing of anti-HCV antibodies is suggested for the source person, while a baseline anti-HCV and ALT are to be done for the dental personnel exposed. Though there is no recommended schedule for occupationally acquired acute HCV infection, investigations including HCV RNA qualitative/ quantitative assay with genotype of virus are mandatory before initiation of anti-viral therapy.[16]

HIV

PEP for HIV exposure should start within the next hour after the exposure. Expert consultation is to be sought if the delay is more than 36 hours. Once the PEP is started it should continue for a period of 28 days. A two drug regimen is used for low-risk exposures and a three drug regimen is used for exposures with increased risk of transmission. When PEP is initiated, a baseline investigation of serum creatinine, liver function tests with enzymes and complete blood counts is to be completed. The following are recommendations regarding HIV post-exposure prophylaxis:[27]

- If indicated, start PEP as soon as possible after an exposure. Reevaluation of the exposed person should be considered within 72 hours post-exposure, especially as additional information about the exposure or source person becomes available.
- Administer PEP for 4 weeks, if tolerated.
- If a source person is determined to be HIV-negative, PEP should be discontinued.

FOLLOW-UP OF EXPOSED DENTAL PERSONNEL[16]

HBV: The dental personnel should be tested for HBsAg at intervals of 6 weeks, 3 and 6 months. If the vaccination had already been undertaken, then tests to determine presence of anti-HBs antibodies should be determined. If HBIG has been given 3 to 4 months prior to the incident, then anti-HBs cannot be determined.

HCV: Tests for anti-HCV and ALT are done at intervals of 4 to 6 weeks and then repeated at 4 to 6 months. If the tests are positive repeatedly, then supplemental HCV testing, like recombinant immunoblot assay (RIBA) should be done. HCV RNA can be performed at 4 to 6 weeks for early diagnosis of infection.

HIV: HIV antibody should be tested for at intervals of 6 weeks, 3 and 6 months. HIV antibody testing with enzyme immunosorbent assay (EIA) should be done to monitor for seroconversion.

CONCLUSION

Due to the nature of dental treatment and dental work, it is necessary that all dental practitioners are aware of the PEP to be followed in case of exposure to HBV, HCV or HIV and the protocol followed in situations of exposure and that adequate reporting of the situation is performed. The protocol is to be displayed in all dental settings so that every dental personnel will be aware of the necessary prophylaxis to be followed in any case of accidental exposure to infected source.

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