Occupational Hazards Of HIV And Its Prophylaxis

M Mittal, P Khanna, B Yadav, V Dhakray

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Abstract

Doctors currently recommend a four-week preventive treatment with zidovudine and lamivudine for health professionals accidentally exposed to HIV-infected blood. Preliminary research has shown that the average risk for infection (0.3%) after an injury involving HIV-infected blood can be reduced by nearly 80% with preventive treatment. The risk may be higher for those repeatedly exposed to infected blood and if the virus level in the exposed blood is high. Treatment with indinavir may be advisable if the exposure is extensive or if the infected patient carries a virus resistant to treatment.

INTRODUCTION

HIV transmission in the health-care setting is of concern. Transmission is evidently rare in the industrialized nations and can be significantly reduced or prevented by the use of standard infection control measures, appropriate clinical and instrument-handling procedures, and the use of safety equipment and safety needles. Viruses can be transmitted in health-care settings including dentistry, albeit rarely, where standard infection control measures are not implemented. The epidemic of Acquired Immune Deficiency Syndrome (AIDS) has been recognized for about 25 years, and concern about the transmission of human immunodeficiency viruses (HIV) is therefore not new.

The human immunodeficiency virus (HIV) is transmitted from person to person via the following routes:

Most dental HCPs appear to be careful to try to avoid injury during intra-oral procedures, but it is during extra-oral procedures—laboratory work, operatory clean up, and instrument preparation for sterilization—that most percutaneous injuries occur.

WHAT IS AN OCCUPATIONAL EXPOSURE?

According to the ILO/WHO guidelines

“An occupational exposure is defined as a percutaneous, mucous membrane or non-intact skin exposure to blood or body fluids that occurs during the course of an individual’s employment. This applies to health care workers (HCW) and to non-health workers.”

The risks for occupational transmission of HIV vary with the type and severity of exposure:

A percutaneous injury refers to an injury resulting from a needle prick, or a cut with a sharp object. The risk after percutaneous exposure is estimated to be about 0.3% i.e. 3 out of a thousand needle pricks may result in HIV infection.

The risk after a mucous membrane exposure is estimated to be lower; about 0.09%. This includes contact with the mucous membranes of the eyes, nose and mouth, or contact with chapped, abraded or inflamed skin.

Episodes of HIV transmission have also been documented after non-intact skin exposure. Although the average risk for transmission by this route has not been precisely quantified, it is estimated to be much less than the risk for mucous membrane exposures.

Various factors increase the risk of acquiring HIV infection. These include:

POTENTIALLY INFECTIOUS BODY FLUIDS

The most frequent areas of contact are the hands, eye or mucous membrane contacts may occur in cases where there is splattering of blood.

POST EXPOSURE PROPHYLAXIS

Post-exposure prophylaxis (PEP) refers to treatment of occupational exposures using antiretroviral therapy. The rationale is that antiretroviral treatment which is started immediately after exposure to HIV may prevent HIV infection. Protocol for post-exposure prophylaxis (PEP) of percutaneous injury with known HIV-contaminated blood

has been modified relatively recently. This change has been supported by the Canadian Medical Association and other agencies concerned with infection control and aseptic procedures in health care settings. The PEP protocol is altered from time to time following review of prospective, case-controlled studies of HIV seroconversion in health care workers after percutaneous exposure to HIV-contaminated blood. These studies are commonly known as the CDC Needlestick Study.

Although the possibility of seroconversion following an HIV-contaminated percutaneous injury in a dental setting appears to be extremely unlikely, contaminated percutaneous injuries in dentistry do, unfortunately, occur. There are several preventive measures to reduce the risk of HIV transmission. These include:

What immediate measures should be taken after an occupational exposure?

Following exposure to HIV, there are currently only two known means to reduce the risk of developing HIV infection: post-exposure prophylaxis (PEP) and interventions to prevent mother-to-child transmission

Currently recommended guidelines for pep state that:

Therapy should be recommended after exposure

Therapy should be initiated within one to two hours of exposure, for a period of 4 weeks

2- and 3-drug PEP regimens that are based on the level of risk for HIV transmission represented by the exposure are recommended

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

If the source patient's HIV status is unknown at the time of exposure, decide whether to give PEP on a case-to-case basis after considering the type of exposure and clinical/epidemiological likelihood of HIV infection in the source.

If a source person is determined to be HIV-negative, PEP should be discontinued

Basically, 2 types of regimens are recommended for PEP: a “basic” 2-drug regimen that should be appropriate for most HIV exposures and an “expanded” three-drug regimen that should be used for exposures that pose an increased risk for transmission

TWO-DRUG ARV REGIMENS

PREFERRED

ZDV + 3TC (or FTC)

ALTERNATIVES

TDF + FTC (or 3TC)

or

d4T + 3TC

THREE ARV DRUG REGIMENS

Expanded ARV regimens are combinations of three ARVs (two NRTIs + one protease inhibitor (PI)). They are recommended for exposures that pose an increased risk of transmission or that involve a source in whom antiretroviral drug resistance is likely.

PREFERRED

ZDV + 3TCa + LPV/r

ALTERNATIVES

ZDV + 3TCa + SQV/r

a) The combination ZDV + 3TC is available as a fixed-dose combination (FDC) (Combivir), one tablet twice daily (BID).

b) The combination TDF + FTC is available as an FDC (Truvada), one tablet once daily (OD).

ARV dosage:

ZDV: 300 mg per os (PO), BID with food

3TC: 150 mg PO, BID or 300 mg PO, OD

FTC: 200 mg, PO, OD

TDF: 300 mg, PO, OD

d4T: 30 mg PO, BID

LPV/r: 400 mg/100 mg PO, BID with food

SQV/r: 1000 mg/100 mg PO, BID

ATV/r: 300 mg/100 mg PO, OD

FPV/r: 700 mg/100 mg PO, BID

In cases involving children who need PEP, dosages should be adjusted accordingly. Some ARVs are not recommended for use in PEP, primarily because of a higher risk for potentially serious life-threatening events: abacavir (ABC), the combination of didanosine (ddI) and d4T, and NVP. Amprenavir (APV) should not be given to pregnant or lactating women. In addition, EFV is not recommended because of low genetic barrier.

European guidelines suggest that PEP should be started as soon as possible with any triple combination of antiretroviral drugs approved for the treatment of HIV-infected patients; initiation of PEP is discouraged after 72 hours. The UK Department of Health recommends zidovudine as first choice, with lamivudine and nelfinavir, and recommends that PEP be considered whenever there is significant exposure to high-risk body fluids. In an ideal situation, PEP should be commenced immediately, preferably within 1 hour, but starting PEP up to 2 weeks after exposure may still be beneficial.

Follow-up counseling and HIV testing should be carried out periodically for at least 6 months (i.e. at baseline, 6 weeks, 12 weeks and 6 months). It is estimated that 95% of HCP seroconvert within 6 months of exposure. The development of HIV antibody is considered a reliable indicator of HIV infection, and HIV antibody testing is currently considered the gold standard for following up exposed HCP. The routine use of direct virus assays (e.g. HIV p24 antigen or tests for HIV RNA) to detect infection in exposed HCP generally is not recommended due to the infrequency of seroconversion and expense. Baseline HIV testing should be carried out to rule out any existing HIV infection at the time of exposure. Potential benefits of PEP must be balanced against potential toxicities.

CONCLUSION

HIV transmission in the dental care setting continues to be of concern, but it is rare in industrialized nations and can be significantly reduced or prevented by the use of standard infection control measures, appropriate and careful clinical and instrument-handling procedures, and the use of safety equipment and safety needles. There should not be any breaches in standard infection control and percutaneous injuries should be carefully avoided. Nevertheless, if an exposure does occur, instead of being ignored, prompt post-exposure prophylaxis should be instituted.

References

1. ADA (2003). AIDS update: no transmission data. Report online by Berthold M. http://www.ada.org/prof/resources/pubs/adanews/adanewsarticle.asp?articl eid=558
2. Bagg J, Sweeney CP, Roy KM, Sharp T, Smith A (2001). Cross infection control measures and the treatment of patients at risk of Creutzfeldt Jakob disease in UK general dental practice. Br Dent J 191:87-90.
3. Bednarsh HS, Klein B (2003). Legal issues for healthcare workers with bloodborne infectious disease. Dent Clin North Am 47:745-756.
4. Cardo DM, Bell DM (1997). Bloodborne pathogen transmission in health care workers. Risks and prevention strategies. Infect Dis Clin North Am 11:331-346.
5. Cardo DM, Culver DH, Ciesielski CA, Srivastava PU, Marcus R, Abiteboul D, et al. (1997). A case-control study of HIV seroconversion in health care workers after percutaneous exposure. Centers for Disease Control and Prevention Needlestick Surveillance Group. N Engl J Med 337:1485-1490.
6. Centers for Disease Control (CDC) (1990). Possible transmission of human immunodeficiency virus to a patient during an invasive dental procedure. MMWR Morb Mortal Wkly Rep 39:489-493.
7. Centers for Disease Control (CDC) (1991). Update: transmission of HIV infection during an invasive dental procedure—Florida. MMWR Morb Mortal Wkly Rep 40:21-27, 33.
8. Centers for Disease Control (CDC) (1992a). Update: investigations of patients who have been treated by HIV-infected health-care workers. MMWR Morb Mortal Wkly Rep 41:344-346.
9. Centers for Disease Control (CDC) (1992b). Surveillance for occupationally acquired HIV infection—United States, 1981-1992.

Author Information

Manoj Mittal, MDS
Professor&HOD, Dept of Periodontics, Mauras College of Dentistry

Prateek Khanna, MDS
Assistant Professor, Dept of Periodontics, Maharana Pratap Dental College and Hospital

Bipin Yadav, MDS
Assistant Professor, Dept of Periodontics, Maharana Pratap Dental College and Hospital

Vidhi Dhakray, MDS
Assistant Professor, Dept. of Oral Pathology, Maharana Pratap Dental College and Hospital