Prevention of HIV infection in dental practice

Peer review status:
No

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Article ID: WMC004763
Article Type: My opinion
Article URL: http://www.webmedcentral.com/article_view/4763
Subject Categories:AIDS
Keywords:Dental Practice, HIV, Prevention.
How to cite the article: Khedkar D, Banerjee A. Prevention of HIV infection in dental practice. WebmedCentral AIDS 2014;5(11):WMC004763
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Source(s) of Funding:
Nil
Competing Interests:
None
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My opinion

Introduction
Since the HIV epidemic started, about 75 million people have been infected with the HIV virus and about 35 million people have died of HIV.1 Globally, 35.3 million people were living with HIV at the end of 2012.2 In view of the magnitude of the HIV problem globally, apprehension among professionals in the field of dentistry (which involves a lot of invasive procedures) regarding occupational risk of HIV transmission need to be allayed. At the same time, dental workers should be fully conversant with universal precautions as applicable to their practice.

Prevention of occupational exposure to HIV
The unique nature of dental practice may require specific strategies directed to the prevention of transmission of blood borne pathogens among dental workers and their patients. Available data suggest that the risk of blood-borne disease transmission among workers and patients in the dental setting is low.2,3 However, during dental procedures, there may be exposure to a variety of microorganisms in blood or in oral secretions. Understanding the nature, frequency, and circumstances of occupational exposure specific to dental procedures is important in evaluating the risk of disease transmission. Percutaneous exposure poses the greatest risk for infection.

Frequency of injuries to dental workers
Retrospective, observational and prospective studies of injuries among general dentists, oral surgeons and dental hygienists have shown that injury rates among dental professionals are less than among general surgical personnel. Data from a prospective observational study among general dentistry and oral surgery residents found that dental residents experienced about 2 injuries per 1000 working hours of observation.4

Instruments associated with injuries among dental workers.4
The types of instruments most commonly associated with injuries are dental burs, syringe needles and sharp instruments. Most of these injuries occur to the dentist’s fingers or hand. Among oral surgeons wire is associated with most injuries. Injuries occur more frequently during fracture reductions. No association with the experience of the dentist, as measured by years in practice, has been reported.

Prevention of occupational blood exposures
Strategies to prevent occupational blood exposures in dentistry require improved engineering controls, safer work place practices, and improved personal protective equipment. Some of the strategies include use of safer devices, such as self-sheathing hollow-bore needles and dental units with designs that shield burs in handpieces placed in the unit. Safe practices should discourage uncontrolled movements of instruments, such as scalers or laboratory knives, under force or the use of fingers to retract or suture tissues in the operative field. Placement of cork or other covers on exposed wires should be explored as a preventive measure during oral surgery. Since most injuries involve the fingers and hands, the continued development of personal protective equipments such as puncture-resistant gloves and thimbles may be explored. Once developed, these preventive interventions must be evaluated to determine if sharps injuries among dental workers are reduced without adversely affecting patient care.

Patient to patient transmission
Reusable medical or dental instruments contaminated with blood or tissue during use have the potential to transmit infection to a subsequent patient if these instruments are not appropriately cleaned and disinfected or sterilized after each use.

HIV in saliva
Trace amounts of HIV are infrequently isolated from saliva or HIV-infected persons. No epidemiologic evidence exists, however, to indicate that saliva is an effective medium for HIV transmission.4 HIV titres in saliva are much lower than in blood, and several studies have demonstrated HIV inhibitory activity in human saliva. Despite the absence of clinical evidence of HIV transmission by the oral route, most dental procedures produce various amounts of blood in the oral cavity. For this reason, continued adherence to recommended infection control practices is essential during delivery of dental services.

Principles of infection control
Because all infected persons cannot be identified by medical history, physical examination or laboratory tests, it is recommended that all patients be treated as if they were infectious, and proper infection control procedures should be used on all patients at all times while they are receiving dental care. Dental workers should adhere to following principles of dental infection control.

(a) Avoid contact with blood
(b) Decontamination
(c) Immunization as indicated
(d) Post-exposure prophylaxis
(e) Proper waste management

Avoid contact with blood
Medical gloves should be worn whenever the potential exists for contacting blood, blood-contaminated saliva, or mucous membranes. Sterile gloves should be used when performing surgical operations; nonsterile gloves are appropriate for examination and other nonsurgical procedures. Medical gloves should be changed between patients and should never be washed, disinfected, or sterilized for reuse.

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Surgical masks and protective eyewear should be worn when splashing or spattering of blood or other body fluids is likely, as is common in dentistry.

Contaminated sharp items, such as needles, scalpels, and wires, should be considered potentially infective and handled with care to prevent injuries. Needles should never be recapped or otherwise manipulated using both hands or using any other technique that involves directing the point of a needle toward any part of the body.

The spread of blood and saliva contaminated with blood can be minimized by planning ahead and anticipating the treatment needs of each patient. Impervious backed paper, aluminum foil, or plastic covers should be used to protect items and surfaces such as light handles or x-ray equipment that may become contaminated during use and that are difficult or impossible to clean and disinfect. Between patients, the coverings should be removed and discarded and then replaced by new covering. The use of rubber dams, high-velocity air evacuation, and proper patient positioning can minimize the formation of droplets, spatter, and aerosols during patient treatment.

Decontamination
Cleaning, disinfection, and sterilization are all decontamination processes. Cleaning is the first step in all decontamination procedures; it removes debris and reduces the number of microorganisms present. Sterilization kills all microbial life and is the most effective decontamination process available. Disinfection is a process that kills disease-causing microorganisms, although not necessarily all microorganisms. Some nonpathogenic microorganisms may remain on an object after disinfection; the number and type depend on the level of disinfection used. There are three levels of disinfection:

(a) Low-level disinfection does not kill bacterial spores or Mycobacterium tuberculosis var. bovis, a test microorganism used to classify the strength of disinfectant chemicals.
(b) Intermediate-level disinfection does kill M tuberculosis var bovis, which indicates that the process also kills more easily killed organisms such as HBV and HIV.
(c) High-level disinfection kills some bacterial spores.

Dental instruments are classified into three categories – critical, semicritical, and noncritical – depending on their use and their risk of transmitting infections. All dental centers should classify instruments as follows:

Critical instruments: used to penetrate soft tissue or touch bone, include forceps, scalpels, bone chisels, scalers, and burs. They should be sterilized after every use.

Semicritical instruments: do not penetrate soft tissues or touch bone, but they do contact oral tissues. Examples include mirrors and amalgam condensers; they should be sterilized after each use. If sterilization is not feasible because the instrument will be damaged by heat, the instrument should receive, at minimum, high-level disinfection.

Noncritical instruments: instruments that come into contact only with intact skin and include x-ray tube heads and protective eyewear. Because noncritical surfaces have relatively low risk of transmitting infection, they may be reprocessed between patients with intermediate-level or low-level disinfection or with detergent and water washing, depending on the degree and nature of contamination.

Methods of sterilization and disinfection of dental instruments
Cleaning is the first step. Persons decontaminating dental instruments should wear heavy-duty (reusable) gloves, rather than surgical gloves. All critical and semicritical dental instruments that are heat stable should be sterilized between patients by means of steam under pressure (i.e., autoclaving), dry heat, or chemical vapor, following the instructions of the manufacturers of the instruments. Weekly use of biological indicators (i.e., spore tests) to verify proper functioning of sterilization cycles is recommended.

Indications for use of liquid chemical germicides to sterilize instruments are limited. Use of these products may require up to 10 hours of exposure to a liquid chemical agent. When using any of these chemicals to achieve high-level disinfection of heat-sensitive semicritical dental instruments, the manufacturer's directions regarding appropriate concentration and exposure time should be followed.

Cleaning and disinfection of environment surfaces
After each patient and at the end of the work day, counter tops and the dental unit surfaces that may have become contaminated with patient material should be cleaned using an appropriate cleaning agent and water. Fresh solutions of sodium hypochlorite (i.e., household bleach) in concentrations ranging from 500 ppm to 800 ppm of chlorine (1/4th cup bleach to 1 gallon of water) are effective on environmental surfaces that have been cleaned of visible contamination.

Immunization and personal hygiene
Dental workers can protect themselves from several infections such as hepatitis B by immunization.

Proper handwashing removes microorganisms and helps diminish the likelihood of infection. For most routine dental procedures, handwashing with plain soap and water is adequate. For surgical procedures, an antimicrobial product should be used.

Post Exposure Prophylaxis
On exposure to a needle stick injury, blood and body fluids from a known HIV positive person, the dental worker should report to MO i/c MI Room/ Duty Medical Officer who will send him for HIV testing and administer Zidovudine (300 mg) and Lamivudine (150 mg) at the earliest (preferably within 24 hours) and continue this twice daily for four weeks. If the exposure is of severe type, protease inhibitor (Indinavir 800 mg TDS) will be added for 4 weeks.

When the HIV status of the patient is not known, the first dose of the drugs are given immediately to the health care worker. The source patient’s blood will be sent for HIV testing. If the HIV report is negative, post
exposure prophylaxis will be discontinued.

Management of waste material
Blood, suctioned fluids, or other liquids waste may be poured carefully into a drain connected to a sanitary sewer system. Disposable needles, scalpels or other sharp items should be placed intact into puncture-resistant containers before disposal. Solid waste contaminated with blood or other body fluids should be placed in sealed, sturdy, impervious bags to prevent leakage of the contained items. All contained solid wastes should be then disposed of according to requirements established by local, state, or federal regulating agencies.

Operational implications
In all dental practice, emphasis should be placed on consistent adherence to above recommended infection-control practices. The following five strategies may provide guidance to achieve this goal.
(i) Each dental office should earmark a dentist or other staff member to hold responsibility for infection control program. This person should have a thorough understanding of the principles of infection control.
(ii) There should be initial training and retraining of the dental staff in the principles of infection control and standard operating procedures.
(iii) A written infection control policy should be developed. This policy should include the use of Hepatitis B vaccinations; safe work practices, such as handwashing and careful handling of sharp instruments; personal protective equipments; engineering controls, such as rigid containers for disposal of sharps; adequate decontamination procedures; and reporting and follow-up of occupational exposure incidents. The last ensures that exposed workers receive appropriate counseling and testing and post-exposure prophylaxis when indicated. Prompt reporting of occupational exposures can help to identify and alter specific work practices that may increase the risk for future exposures.
(iv) A checklist for standard office procedures may assist the dental staff in establishing and ensuring that patterns of performance for each infection control process are followed consistently.
(v) It is important for each dental office to maintain adequate records. Such records may include sterilizer spore test results and injury reports, including occupational exposures to blood or potentially infective material.

Conclusion
The aim of all precautions is to reduce blood contact, thereby minimizing bloodborne pathogen transmission to dental workers or patients. Little research has been done to examine specific prevention strategies. Studies are needed for the development and evaluation of improved designs for dental instruments, equipment, and personal protective equipment. More efficient reprocessing techniques should be considered in the design of future dental instruments and equipment. Systematic evaluation must be ongoing to ensure that new technologies can improve the safety of dental treatment without comprising the quality of patient care.

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