



Postexposure Prophylaxis after Occupational HIV Exposure

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HIV postexposure prophylaxis (PEP) is a form of secondary HIV prevention that may reduce the incidence of HIV infections. HIV PEP is commonly conceived of as 2 types: occupational and nonoccupational. Occupational HIV PEP is an accepted form of therapy for health care workers exposed to HIV through their jobs. Ever since its inception, medical profession has been vulnerable to occupational exposure to infectious materials and at risk of acquiring life threatening infections. With the emergence of HIV infection and its relentless global spread, health care workers (HCWs) are increasingly being exposed to patients who are HIV +ive or have frank AIDS. Despite the use of universal precautions (like use of gloves, masks etc.) or rarely when they are not followed, accidental occupational exposure to blood or potentially infectious materials does occur.

Who are at risk?

Hospital staff and all other human or veterinary health care workers, including laboratory, research, emergency service, or cleaning personnel are exposed to the risk of occupational infection following accidental exposure to blood or body fluids (BBF) contaminated with a virus. The human immunodeficiency virus (HIV) or those of hepatitis B (HBV) or C (HCV) account for most of this risk for occupational infections in health care workers worldwide¹. Emergency medical service personnel, dental personnel, autopsy personnel, nurses, nursing assistants, physicians, technicians, therapists, pharmacists, students and trainees, contractual staff not employed by the health-care facility, and persons not directly involved in patient care but potentially exposed to blood and body fluids are also at risk. The same principles of exposure management could be applied to other workers who have potential for occupational exposure to blood and body fluids in other settings (2).

Hospital nurses are the most exposed group (3). Similarly surgeons have high rates of exposure to BBPs and are similar to those of nurses and surgical residents

(4). Marcuccio *et al* (5) reported that nurses are the most exposed category (46.5%) followed by physicians (27.2%). The highest load of accidents happen in surgical area (53%) and at a greater extent after the first three hours of the work shift (60%). In a recent study conducted over a period of five year, 820 episodes with occupational blood or body fluid exposures were reported and nurses (27%) were the largest group at risk (6). Theoretical career risk of occupational HIV (2.4%) and HCV (39%) infections has been suggested for forensic pathologists (7).

Exposure

A percutaneous injury (e.g., a needlestick or cut with a sharp object) or contact of mucous membrane or nonintact skin (e.g., exposed skin that is chapped, abraded, or afflicted with dermatitis) with blood, tissue, or other body fluids that are potentially infectious. In addition to blood and visibly bloody body fluids, semen and vaginal secretions also are considered potentially infectious. The following fluids also are considered potentially infectious: cerebrospinal fluid, synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid, and amniotic fluid. Feces, nasal secretions, saliva, sputum, sweat, tears, urine, and vomitus are not considered potentially infectious unless they are visibly bloody; the risk for transmission of HIV infection from these fluids and materials is low (8).

The mean risk suggested by Regez *et al* (9) after a percutaneous exposure is approximately 0.3%. Pruss-Ustun *et al* (10) documented that the fraction of infections with HCV, HBV, and HIV in HCWs attributable to occupational exposure to percutaneous injuries fraction reaches 39%, 37%, and 4.4% respectively. The instruments that have caused endermic lesions have been more frequently the hollow bone needles (53.2%) in the study of Marcuccio *et al* (5). Similarly the most common type of exposure was percutaneous injuries (82%) in the

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study of Kiertiburanakul *et al* (6). Occupational exposures to percutaneous injuries are thus the substantial source of infections with bloodborne pathogens among health-care workers (HCWs).

Risk of Transmission

The risk for transmission of HIV infection after exposure has been variedly suggested by different authors and risks vary with the type and severity of exposure (Table-1). Although episodes of HIV transmission after nonintact skin exposure have been documented, the average risk for transmission by this route has not been precisely quantified but is estimated to be less than the risk for mucous membrane exposures. The risk for transmission after exposure to fluids or tissues other than HIV-infected blood also has not been quantified but is probably considerably lower than for blood exposures.

Table-1. Risk of Transmission of HIV and coinfection after occupational exposure

Authors	Mode of exposure	Prevalence
Marcuccio <i>et al</i> (5)	Hollow bone needles	HBV, HCV, and HIV 13/114 HCV, 1/114 for HIV & 2/114 were HbsAg positive
Kiertiburanakul	Percutaneous	0% HIV seroconversion
Nolte & Yoon (7)	Percutaneous	Theoretical career risk of occupational HIV (2.4%)
Bell (8)	Percutaneous	HIV 0.3%
Regez <i>et al</i> (9)	Percutaneous	0.3%
Pruss-Ustun <i>et al</i> (10)	Percutaneous	HCV, HBV, and HIV 39%, 37%, and 4.4% respectively
Fisker <i>et al</i> (11)	Frequent blood exposure	HIV, HCV & HBV 0%, 0.14% and 1.6% respectively
Shiao <i>et al</i> (12)	Needlestick injury	HIV was low, with 1 nurse & possibly 1 other staff potentially exposed annually
Short & Bell (13)	Blood-borne	HIV infection (0%–0.1%)
CDC (14)	After a mucous membrane exposure	0.09% HIV

Transmission from health care workers (HCWs) to patient

The report of transmission of viruses, such as human immunodeficiency virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV), from health care workers (HCWs) to patient has been reported. To date, 3 cases of transmission of HIV and 8 confirmed cases of transmission of HCV (to a total of 18 patients) from infected healthcare workers to patients have been reported. The factors influencing the transmissibility of infection include: type of procedures performed, surgical techniques used, compliance with infection control

precautions, the clinical status and viral burden of the infected HCW and susceptibility of the patient to infection. The risk of transmission of HIV, HBV and HCV from HCWs to patients is associated primarily with certain types of surgical specialities (obstetrics and gynaecology, orthopaedics, cardiothoracic surgery) and surgical procedures that can expose the patient to the blood of the HCW: exposure-prone procedure (15). There is currently no public policy that provides guidance concerning whether and when physicians infected with hepatitis B virus (HBV), hepatitis C virus (HCV), and/or human immunodeficiency virus (HIV) can safely perform invasive procedures (16).

Effective measures to prevent infections from occupational exposure of healthcare workers include (17-21)

- To prevent such exposures, it would be prudent for HCWs to assume that all patients are potentially infected and a set of precautions applicable universally be followed in contacts with all patients (19).
- Implementing Universal Precautions.
- Wear gloves when contamination of hands with body substances anticipated.
- Protective eyewear and masks should be worn when splashing with body substance is anticipated
- Eliminating unnecessary injections.
- All health care workers should take precautions to prevent injuries during procedures, cleaning or during disposal of needles and other sharp instruments.
- Needles should not be recapped.
- Needles should not be purposely bent or broken by hand.
- Needles not to be removed from disposable syringe nor manipulated by hand.
- After use, disposable syringes and needles, scalpel blades and other sharp items should be placed in a puncture resistant container.
- Eliminate needle recapping and dispose of the sharp needles into a container immediately after use,
- Use of safer devices such as needles that sheath or retract after use,
- Use safer needle devices, sharps collection boxes, gloves and personal protective gear (18).
- Health care workers who have exudative lesions or dermatitis should refrain from direct patient care and from handling equipment
- Handle and dispose of sharp needles/instrument safely
- Clean & disinfect blood / body substances spills with appropriate agents
- Adhere to disinfection and sterilization standards
- Regard all waste soiled with blood/body substance as contaminated and disposes of according to relevant standards



- Vaccinate all clinical and laboratory workers against hepatitis B
- Other measures : double gloving and changing surgical techniques to avoid “exposure”
- Use of needle-less systems and other safe devices
- Protective barriers such as gloves, gowns, masks, and protective eyewear reduce the risk of exposure of health care workers’ skin or mucus membranes to these potentially infective materials. Although saliva has not been implicated in HIV transmission, mouthpieces, resuscitation bags, or other ventilation devices should be available in operating theaters, intensive care units, labor suites, and other areas where they could be called upon to minimize the need for emergency mouth-to-mouth resuscitation and the potential of infection (20).
- The provisions of “Universal Precautions” apply to blood, CSF, genital secretions and all body fluids. It is essential that barrier protection and washing of hands be practiced, body fluids be handled with care, correct sterilization and disinfection procedures be followed and a suitable system of waste disposal be evolved. Universal Precautions have been useful in abating some of the more extreme behavior associated with treating AIDS patients
- Provision and use of personal protective equipment and training workers in the risks and prevention of transmission.
- Post-exposure prophylaxis with antiretroviral medications can reduce the risk of HIV transmission by 80%.

What to do after exposure (21)

- Do not Panic
- Do not put cut / pricked Finger into your mouth
- Wash hand after patient contact, removing gloves
- Wash hands immediately if hands contaminated with body fluids
- All needle stick injuries should be reported to infection control officer
- It is necessary to determine the status of the exposure and the HIV status of the exposure source before starting post-exposure prophylaxis(PEP)
- Post-exposure treatment should begin as soon as possible
- Preferably within two hours
- Not recommended after seventy -two hours
- Late PEP? may be yes
- Is PEP needed for all types of exposures? NO

What are the current guidelines for PEP (14)?

- Baseline HIV testing should be carried out to rule out any existing HIV at the time of exposure.
- Health Care Personal (HCP) with occupational exposure to HIV should receive follow-up counselling, postexposure testing and medical evaluation regardless of whether they receive PEP or not.

- PEP should be initiated as soon as possible, preferably within hours rather than days of exposure, for a period of 4 weeks. HCP should be advised of the importance of completing the prescribed regimen.
- 2 and 3-drug PEP regimens that are based on the level of risk for HIV transmission represented by the exposure are recommended.
- If a question exists concerning which antiretroviral drugs to use, or whether to use a 2 or 3-drug regimen, the 2-drug regimen should be started immediately rather than delay PEP administration.
- 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.
- Potential toxicities of PEP must be considered, keeping in mind that the majority of occupational HIV exposures do not result in transmission of HIV.
- The use of rapid HIV tests for evaluation of source patients has increased. Rapid HIV tests result in decreased use of PEP and spare HCP undue anxiety and adverse effects.
- If a source person is determined to be HIV-negative, PEP should be discontinued.
- Follow-up counselling and HIV testing by ELISA should be carried out periodically for more than 6 months after occupational exposure (i.e. at baseline, 6 weeks, 12 weeks and 6 months). Extended follow-up (e.g. for 12 months) is recommended for HCP who become infected with hepatitis C Virus (HCV) after exposure to a source coinfecting with HIV and HCV.

Regimens for PEP

Basic regimen (28 days)	Expanded regimen (28 days)
Zidovudine 300 mg + Lamivudine 150 mg (Twice a day) or Stavudine 30/40 mg + Lamivudine 150 mg (Twice a day)	Basic regimen, plus either Indinavir 800 mg (Twice a day) or Saquinavir 1g (Twice a day) or Efavirenz 600 mg (Once a day)

What about exposures to blood for which the HIV Status of the source person is unknown ? (17)

If the source individual cannot be identified or does not give consent to be tested, decisions regarding follow-up should be based on the exposure risk and whether the source is likely to be a person who is HIV positive. Follow-up HIV testing should be available to



all workers who are concerned about possible HIV infection through occupational exposure.

1. **Basic Regimen** : Zidovudine 300 mg × BD + Lamivudine 150 mg × BD.
2. **Expanded Regimen** : Basic Regimen + Saquinavir 600 mg TDS (or any one protease inhibitor)

How long do the drugs need to be taken (17)?

The optimal course of treatment is unknown; but 4 weeks of PEP appears to provide good enough protection against HIV infection. If tolerated, treatment should be taken for at least 4 weeks.

Should Pregnant Health Care Workers Take These Drugs (17)?

Based on limited information, ZDV taken in 2nd and 3rd trimesters of pregnancy has not caused serious side effects in mothers or infants. There is very little information on the safety of ZDV when taken during the 1st trimester or on the safety of other antiviral drugs taken during pregnancy. If one is pregnant at the time of occupational exposure to HIV, one should consult a physician about the use antiviral drugs for post exposure treatment.

What is known about the safety and side effects of these drugs (17)?

Most of the information known about the safety and side effects of these drugs is based on studies of their use in HIV-infected individuals. For these individuals, ZDV and 3TC have usually been well tolerated except nausea, vomiting, diarrhoea, tiredness, or headache.

Conclusion Occupationally acquired HIV infection represents a health hazard for HCP caring for HIV-positive patients. Although the risk of transmission is low, it is important to institute measures to reduce such risks and also establish protocols for treating exposed HCP.

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