10.5005/jp-journals-10039-1042

REVIEW ARTICLE

Post-exposure Prophylaxis for Occupational Exposure to HIV

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ABSTRACT

Post-exposure prophylaxis (PEP) is a medical response given to prevent the transmission of pathogens after potential exposure. The PEP for human immunodeficiency virus (HIV) refers to a set of comprehensive services to prevent HIV infection in exposed individuals where the exposure can be occupational or nonoccupational (nPEP). Although the principles of exposure management remain unchanged, recommended HIV PEP regimens have been changed. This review emphasizes adherence to HIV PEP when it is indicated for an exposure, expert consultation in management of exposures, follow-up of exposed workers to improve adherence in PEP and monitoring of adverse events, including seroconversion. To ensure timely post-exposure management and administration of HIV post-exposure prophylaxis, clinicians should consider occupational exposures as urgent medical concerns.

Keywords: HIV, Post-exposure prophylaxis, Antiviral drugs, Occupational exposure, HCP, HCW.

How to cite this article: Aggarwal A, Naik S, Arora S, Sharma S. Post-exposure Prophylaxis for Occupational Exposure to HIV. J Dent Sci Oral Rehab 2014;5(4):183-190.

Source of support: Nil

Conflict of interest: None

INTRODUCTION

Ever since its inception, medical profession has been vulnerable to occupational exposure to infectious materials and at risk of acquiring life-threatening infections. Preventing exposures to blood and body fluids (i.e. primary prevention) is the most important strategy for preventing occupationally acquired human immunodeficiency virus (HIV). Both individual healthcare providers and the institutions that employ them should work to ensure adherence to the principles of standard precautions, including ensuring access to and consistent use of appropriate work practices, work practice controls, and personal protective equipment. For instances in which an occupational exposure has occurred, appropriate post-exposure management is an important element of workplace safety.[1]

Healthcare workers, including doctors, are normally at a very low risk of acquiring bloodborne infection during management of infected patients. However, in spite of low statistical acquisition of exposure infections the absence of vaccine or effective curative treatment makes the health-care workers apprehensive to treat HIV/AIDS/HBV/HCV patients. In 1997 (last updated 2005) the laboratory center of disease control (LCDC) published a protocol for managing exposure to blood borne pathogens in HCW.

The use of post-exposure prophylaxis (PEP) against HIV infection dates back to the early 1990s, when only limited antiviral treatment for chronic infection was available. A case control study in 1997 showed that health care workers who received zidovudine after needle stick exposures were 81% less likely to undergo seroconversion to positivity for HIV.[2]

AIM

This article aims to recommend PEP regimen in case of occupational exposure to HIV and to help educate the healthcare personnel (HCP) about the universal precautions and safe practice while treating the HIV positive patients.

DEFINITION OF HCP AND EXPOSURE

The term HCP refers to all paid and unpaid persons working in healthcare settings who have the potential for exposure to infectious materials, including body substances (e.g. blood, tissue and specific body fluids), contaminated medical supplies and equipment, and contaminated environmental surfaces. HCP might include but are not limited to emergency medical service personnel, dental personnel, laboratory personnel, autopsy personnel, nurses, nursing assistants, physicians, technicians, therapists, pharmacists, students and trainees, contractual staff not employed by the healthcare facility, and persons not directly involved in patient care but potentially exposed to blood and body fluids (e.g. clerical, dietary, housekeeping, security, maintenance and volunteer personnel).[3,4]

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Type of Exposure

Occupational Exposure

An occupational exposure is defined as a percutaneous, mucous membrane or nonintact skin exposure to blood or body fluids that occurs during the course of an individual's employment.[5] The risks for occupational transmission of HIV vary with the type and severity of exposure[6,7] (Table 1).

Nonoccupational Exposure (nPEP)

Nonoccupational exposure is any direct mucosal, percutaneous or intravenous contact with potentially infectious body fluids that occurs outside perinatal or occupational situations, e.g. unprotected sexual exposure, sexual exposure involving a broken or slipped condom, injecting drug users (IDUs) sharing equipment, accidental needle stick injuries, bite wounds, mucosal exposure, cases where a patient is exposed by a healthcare worker (HCW) or another patient, etc.[8,9]

PREVENTION OF OCCUPATIONAL AND NOSOCOMIAL EXPOSURE[10-13]

The importance of primary prevention in any setting where bloodborne infections can be transmitted should be reinforced in every program that provides PEP. HCW and other exposed workers should receive appropriate information on PEP availability and the reference centers. It is important to underline that PEP is not ever likely to be 100% effective and thus it should always be integrated into a larger exposure prevention strategy based on standard precaution principles.

Table 1: Estimated per-act risk for acquisition of HIV, by exposure route

Exposure route risk	*Percentage*
Blood transfusion	92.5
Mother to child transmission	5-30
Needle sharing	0.80
Sexual intercourse	
• Receptive penile-vaginal intercourse	1.01-0.15
• Insertive penile-vaginal intercourse	0.1-0.01
• Receptive anal intercourse	0.50
• Insertive anal intercourse	0.065
Receptive oral intercourse	0.01
Insertive oral intercourse	0.005
Mucous membrane exposure	0.10
Percutaneous needle stick	0.30
• Hollow bore needle	0.18
• Scalpel injury/solid needle	0.28
Nonintact skin	<0.1
Intact skin	Nil

Universal precautions should be followed that include the following:

- Wash hands immediately if contaminated with body fluids.
- Wear gloves when contamination with body substances is anticipated.
- Protective eyewear and mask should be worn when splashing with body substance is anticipated.
- All HCW should take precautions to prevent injuries during procedures and when cleaning or during disposal of needles and other sharp instruments.
- Needle should not be recapped.
- Needles should not be purposely bent or broken by hand, nor removed from the disposable syringe or manipulated by hand.
- After use, disposable syringes and needles, scalpel blades and other sharp items should be placed in a puncture-resistant container.
- HCW who have exudative lesions or dermatitis should refrain from direct patient care and from handling equipment.
- Clean and disinfect blood/body substances' spills with appropriate agents.
- Adhere to the disinfection and sterilization standards.
- Regard all waste soiled blood/body substance as contaminated and dispose off according to relevant standards.
- Vaccinate all clinical and laboratory workers against hepatitis B, other measures like double gloving, changing surgical techniques to avoid 'exposure prone' procedures use of needle-less systems and other safe devices should be encouraged.

Healthcare workers at all levels are occupationally exposed to hazards of infections, like HIV, HBV, HCV. With an increasing HIV positive population and nonfeasibility of subjecting all cases to HIV testing, risk of HIV transmission through occupational exposures is a real threat.

DEFINITION OF POST-EXPOSURE PROPHYLAXIS[14]

Post-exposure prophylaxis refers to medications given to prevent infection after exposure. The prophylactic treatment offers both benefit and risk to the exposed person. This policy provides a recommendation about when to take PEP and describes how PEP should be administered but does not mandate that PEP be taken when recommended, or not taken when not recommended. The exposed person must be advised of the risks and benefits and make their own decision whether or not to take PEP.

Exposure to Blood/Body Fluids

Potentially Infectious Body Fluids

Blood and visibly bloody body fluids are considered as potentially infectious.[15] These include amniotic fluid, cerebrospinal fluid, breast milk, pericardial fluid, peritoneal fluid, pleural fluid, saliva in association with dentistry (likely to be contaminated with blood), synovial fluid, unfixed human tissues and organs, exudative or other tissue fluid from burns or skin lesions, vaginal secretions and semen. High concentration of free infectious virus and virus-infected cells have been reported in blood, genital fluids and cerebrospinal fluid.[16] Faeces, nasal secretions, saliva, sputum, sweat, tears, urine and vomitus are not considered potentially infectious unless they contain visible blood.

MANAGEMENT OF OCCUPATIONAL EXPOSURE TO HIV

Initial Management Guidelines

General Measures

- Allow the wound to bleed freely.
- Cleanse the wound thoroughly with soap and water.
- If contact is with mucous membranes (eyes, nose, or mouth), flush well with water.
- Remove clothing that is contaminated with blood or body fluids.

Evaluate the Significance of the Exposure

Body fluids capable of transmitting HIV from an infected source include the following:

- Blood, serum, plasma and all biological fluids visibly contaminated with blood.
- Laboratory specimens, samples or cultures that contain concentrated HIV.
- Semen and vaginal fluids.
- Amniotic, pleural, peritoneal, pericardial, synovial and cerebrospinal fluids.
- Saliva (for HBV, HCV and HIV if it is contaminated with blood and for HBV if it is not contaminated with blood).
- Organs and tissues.

Note: Feces, nasal secretions, sputum, tears, urine and vomitus are not implicated in the transmission of HBV, HCV and HIV unless visibly contaminated with blood.

To be considered significant, one of the potentially infectious fluids listed above must come into contact with tissue in one of the following ways:

- Percutaneous injury: needle stick or puncture/cut with a sharp object.
- Contact with mucous membranes: splash to eyes, nose or mouth.
- Contact with nonintact skin: prolonged or extensive contact with exposed skin, which is chapped or abraded, with blood or other potentially infectious body fluids.
- Bites resulting in blood exposure to either person involved.

If a significant exposure has occurred, further investigation of the source is warranted[3] (Tables 2 and 3). If the source is known to be HIV positive or believed to be high risk and the risk of transmission is a real possibility then PEP should be initiated. Patients with significant recent exposures to blood or body fluids should be immediately referred to the nearest emergency department. The emergency physician should be informed of the case prior to referral and made aware of the urgency of the matter.

Serologic Testing for HIV

Serologic testing of the source patient for HIV is the most reliable method to assess risk of exposure and should be strongly encouraged.

Test the source person

- If possible, perform serologic testing for HIV in the source person.
- Informed consent must be obtained from the source prior to testing and the source must be aware that the results will be disclosed to the exposed person.
- If the source patient tests positive for HIV, the medical officer of health must be notified.
- If the source refuses to be tested follow the mandatory blood testing Act, 2006.

Mandatory Blood Testing Act, 2006: In all cases where the source is known and informed consent cannot be obtained for testing, protocols in the Mandatory Blood Testing Act, 2006, may be implemented. A person may apply to a medical officer of health to have a blood sample of another person analyzed if the applicant came into contact with a bodily substance of the other person in any of the following circumstances:

- As a result of being the victim of a crime.
- While providing emergency healthcare services or emergency first aid to the person, if the person was ill, injured or unconscious as a result of an accident or other emergency.
- In the course of his or her duties, if the person belongs to a prescribed class.
- While being involved in a prescribed circumstance or while carrying out a prescribed activity.

The diseases listed as communicable disease under the act are as follows:

- HIV/AIDS
- Hepatitis B
- Hepatitis C

Table 2: Categorization of source patient

Adult case	*Pediatric case**	*Category of source patient*
Asymptomatic HIV or known viral load <1500 RNA copies/ml has never taken antiretrovirals	No pediatric case in this category	HIV-positive class 1
Symptomatic HIV infection, AIDS, acute seroconversion, or known high viral load, or is taking/has taken antiretrovirals	Infant/child <18 months: positive HIV DNA PCR test Infant/child >18 months: positive rapid HIV test or positive HIV DNA PCR test.	HIV-positive class 2
Cannot test for HIV but has clinical signs and symptoms consistent with HIV/AIDS, including but not limited to: oral thrush, wasting and recurrent illnesses or clinical signs and symptoms of primary HIV infection, including flu-like syndrome with fever, ± rash, lymphadenopathy oral ulcers	Infant with positive rapid HIV test (or whose mother has a positive rapid HIV test) for whom no HIV DNA PCR test has been done OR who have a negative HIV DNA PCR test but were still exposed (*in utero*, during birth, or through breastfeeding) within 6 weeks prior to that test.	HIV unknown, high risk
Cannot test for HIV, but has no clinical signs consistent with HIV/AIDS	No pediatric case in this category.	HIV unknown, lower risk
HIV test negative, but possible exposure within the test's window period	Infants with negative rapid HIV or HIV DNA PCR tests whose mothers have a negative rapid HIV or HIV DNA PCR test, but who have been exposed to the mother during the window period of the test used to test the mother.	HIV-negative, at risk for false negative
HIV test negative and no possible exposure within the test's window period	Infants or children of any age with negative HIV DNA PCR test or negative rapid HIV test who have had no exposure to mother within the window of the test used and not sexually active.	HIV-negative
Exposure to a potentially infectious fluid from a person who cannot be identified for evaluation	(same as left)	Unknown source

*Assuming vertical transmission, i.e. transmission in early infancy, children infected via an exposure at a later stage in development can be assessed by using the criteria in the adult column

Test the exposed person: Obtain consent from the exposed worker to do baseline and follow-up serologic testing for HIV irrespective of whether or not prophylaxis is initiated.

Recommended testing is as follows:

- Baseline: antibody to HIV
- Liver function testing (i.e. ALT if prophylaxis is being offered for HIV)
- Repeat HIV serology at 6 weeks, 3 and 6 months (if baseline testing at time of exposure is negative)
- It is also recommended that for those with high-risk exposures (exposures where HIV PEP is recommended) be tested again at 12 months post-exposure[17] (The Laboratory Centre for Disease Control 1997 protocol does not recommend testing at 12 months because there is 'low probability of seroconversion after 6 months'. However, the BC Centre for Excellence in HIV/AIDS recommends testing at 12 months because antibody formation can be delayed when PEP fails to prevent infection. Their policy was based on unpublished case of a healthcare worker who was started on PEP and seroconverted 9 months after the exposure).

A theoretical potential exists for prophylaxis to delay the HIV seroconversion event. However, the vast majority of persons infected with HIV will seroconvert within 3 months of exposure.

Table 3: Baseline recipient investigations prior to prescribing PEP

Safety bloods	FBC, U&E, LFTs, bone profile	Must be reviewed prior to discharge home
Pregnancy test	Urine strip	
Urinalysis	Dipstick for proteinuria	
HIV testing	HIV Ag/Ab	
Hepatitis	HBsAg, anti-HBc, anti-HCV	
Syphilis	If sexual exposure	

Note: Without baseline data, any future claim for compensation for occupationally acquired bloodborne illnesses could be jeopardized

Post-exposure Management: HIV

Risk of HIV Infection Post-exposure

The average risk of acquiring HIV infection following a percutaneous exposure to an infected source is currently estimated at 0.3 to 0.4%. The risk of HIV transmission following a mucocutaneous exposure is 0.1%. These figures represent only an average risk and the risk may actually be higher depending on other factors. Factors that increase the risk of HIV transmission include the following:

- High viral load in the source patient (source in seroconversion illness or late AIDS disease).
- Deep injury.
- Injury with a device previously placed in the source patient's vein or artery or with a device visibly contaminated with blood.

Importance of Timing

Information about primary HIV infection indicates that systemic infection does not occur immediately, leaving a brief window of opportunity during which post-exposure ARV intervention might modify or prevent viral replication. In a primate model of simian immunodeficiency virus (SIV) infection, infection of dendritic cells occurred at inoculation site during the 24 hours. Over the subsequent 24 to 48 hours, migration of virus to regional lymph nodes occurred and virus was detectable in the peripheral blood within 5 days.[18] Theoretically, initiation of PEP soon after exposure might prevent or inhibit systemic infection. The PEP should be initiated within hours of exposure-ideally within 2 hours and not later than 72 hours after exposure and should not be delayed while waiting for test results and should be administered for 4 weeks if tolerated.[19]

Medication Availability

The use of PEP for HIV is recommended, offered or not offered depending on the characteristics of the source patient and the exposure (Tables 4 to 7).

Table 4: PEP regimen prophylaxis after exposure to human immunodeficiency virus (adapted from CDC-MMWR—recommendations and reports). Updated US Public Health Service Guidelines for the Management of Occupational Exposures to HIV and Recommendations for PEP

Percutaneous injuries (i.e. needle stick injury)					
Exposure type	*HIV positive Class 1**	*HIV positive Class 2***	*Source of unknown HIV status*[+]	*Unknown source*[€]	*HIV negative*
Less severe (i.e. solid needle or superficial injury)	Recommend basic 2-drug PEP	Recommend expanded ≥ 3-drug PEP	Generally, no PEP warranted; however, consider basic 2-drug PEP for source with HIV risk factors[††]	Generally, no PEP warranted; however, consider 2-drug PEP in settings in which exposure to HIV infected person is likely	No PEP warranted
More severe (large bore hollow needle, deep puncture, visible blood on devise or needle used in patient's artery or vein	Recommend expanded 3-drug PEP	Recommend expanded ≥ 3-drug PEP	Generally, no PEP warranted; however, consider basic 2-drug PEP*** for source with HIV risk factors[††]	Generally, no PEP warranted; however, consider basic 2-drug PEP*** in settings in which exposure to HIV-infected persons is likely	No PEP warranted
Mucosal contacts and nonintact skin exposures (i.e. eyes or exposed skin that is chapped abraded or afflicted with dermatitis has contact with blood, tissue or other infectious body fluids)					
Exposure type	*HIV positive Class 1**	*HIV positive Class 2***	*Source of unknown HIV status*[†]	*Unknown source*[‡]	*HIV negative*
Small volume (i.e. few drops)	Consider basic 2-drug PEP	Recommend basic 2-drug PEP	Generally, no PEP recommended	Generally, no PEP recommended	No PEP warranted
Large volume (i.e. major blood splash)	Recommend basic 2-drug PEP	Recommend expanded ≥ 3-drug PEP	Generally, no PEP warranted; however, consider basic 2-drug PEP for source with HIV risk factors	Generally, no PEP warranted; however, consider basic 2-drug PEP*** in setting in which exposure to HIV-infected persons is likely	No PEP warranted

*HIV positive class 1—asymptomatic HIV infection or known low viral load (e.g. < 1,500 ribonucleic acid copies/ml); **HIV positive class 2—symptomatic HIV infection, acquired immunodeficiency syndrome, acute seroconversion or known high viral load. Initiation of PEP should not be delayed, pending expert consultation and because expert consultation alone cannot substitute for face-to-face counseling. Resources should be available to provide immediate evaluation and follow-up care for all exposures; [+]For example, deceased source person with no sample available for HIV testing; [€]For example, a needle from a sharps disposal container; [‡]For example, slash from inappropriately disposed blood; ***The recommendation 'consider PEP' indicates that PEP is optional; a decision to initiate PEP should be based on a discussion between the exposed person and the treating clinician regarding the risks *vs* benefits of PEP; [††]If PEP is offered and administered and the source is later determined to be HIV negative, PEP should be discontinued

Table 5: Antiretroviral regimens and drugs for PEP

Basic regimen (2 drug NRTI) for 28 days	*Expanded regimen (2 NRTI and PI) for 28 days*
Zidovudine (300 mg bd)/ Stavudine (30 mg bd)/ Tenofovir (300 mg od) and Emtricitabine (200 mg od)/ Lamivudine (150 mg bd)	Basic regimen and one of the following: Nelfinavir (1250 mg bd) Indinavir (800 mg tds) Indinavir/r (800/100 mg bd) Lopinavir/r (400/100 mg bd) Saquinavir/r (1000/100 mg bd) Atazanavir/r (300/100 mg od) FPV/r (700/100 mg bd) Efavirenz (600 mg HS)

Serologic Testing (if Antiretrovirals are indicated)

If HIV PEP therapy is started, drug toxicity monitoring including a complete blood count, renal and hepatic function tests should be completed initially, at week 1, and again 2 weeks after the patient begins taking the medications. If toxicity is suspected, the treating physician should consult with an infectious disease specialist (Tables 8 and 9).

Post-exposure Counseling

All exposed persons should receive initial counseling in the emergency department setting. Initial counseling should concentrate on initiating antiretroviral therapy and reducing the risk of secondary spread from the exposed person to others. Repeat counseling with the family physician and as needed is critical, as anxiety may limit comprehension in the emergency department setting. Follow-up counseling should include more in-depth counseling and emotional support for this critical incident. The following are general guidelines for follow-up counseling (Table 10). It is recommended that an infectious disease specialist follow-up all pregnant, breastfeeding and pediatric patients being treated for a possible HIV exposure.

The health unit will provide persons with psychological support, counseling and educational resources after a reported puncture wound, mucous membrane or non-intact skin exposure, if requested.

Risk of Infection Post-exposure

The exposed patient should be counseled thoroughly about the risks of infection and about the potential risks and benefits of antiretroviral chemoprophylaxis.

Reporting Illness in the Follow-up Period

Patients should be counseled to report to the physician any illness during the 6-month follow-up period as follows:

- Following a possible HIV exposure counsel to report any fever, aches, rashes, swollen glands, fatigue and general malaise.

Secondary Spread

- For counseling recommendations regarding secondary spread (Table 10).

Table 7: Kaletra preparations and dosing for children (adapted from CHIVA guidelines 2011)

Drug	*Formulation*	*Dose*
Kaletra® (lopinavir/ ritonavir)	Liq: Lopinavir 80 mg/ml and ritonavir 20 mg/ml	Kaletra® liquid**: Child: (≥2 years): 230 mg/ m^2 bd or (0.6-0.8 m^2): 200 mg bd; (0.8-1.2 m^2): 300 mg bd; (1.2-1.7 m^2): 400 mg bd; (≥1.4 m^2): 400 mg bd Dose in mls = 230 × BSA/80 Max dose: 5 ml bd
	Pediatric tablet: Lopinavir 100 mg and ritonavir 25 mg (pale yellow)	Kaletra® tablets 100/ 25 mg (Paed): 0.5-<0.9 m^2: 2 x 100/25 mg tablets bd 0.9-<1.4 m^2: 3 x 100/25 mg tablets bd ≥1.4 m^2: 4 x 100/25 mg tablets bd [or 2 adult tablets (2 x 200/50 mg) bd] **All doses based on lopinavir** NB: Kaletra® tablets must not be cut or crushed

Table 6: HIV PEP preparations, dosing for children (adapted from CHIVA guidelines 2011)

Drug	*Formulation*	*Dose*
Zidovudine (AZT, ZDV) (for child <40 kg)	Cap: 100 mg (white with blue line)/ 250 mg (white/blue) Liq: 10 mg/ml	180 mg/m^2/per dose bd to a maximum dose of 250 mg bd
Lamivudine (3TC) (for child <40 kg)	Cap: 100 mg (orange), 150 mg (white) Liq: 10 mg/ml	4 mg/kg/per dose bd to a maximum dose of 150 mg bd
Combivir® (3TC, ZDV) (for child >40 kg)	Combined tablet: ZDV 300 mg/3TC 150 mg (white)	One tablet bd
Truvada® (TDF and FTC) (for child >40 kg)	Combined tablet: Tenofovir 245 mg and emtricitabine 200 mg (blue)	One tablet bd

Table 8: Serological investigations

Time after exposure	*Taking PEP*	*Not taking PEP*
Initial visit as soon as possible after exposure	Rapid HIV test, urine hCG, ALT, AST, FBC. Consider utility of sending Hep B SAb	Rapid HIV test, ALT, AST, urine hCG. Consider untility of sending Hep B, S, Ab
2 weeks	Rapid HIV test, urine hCG, ALT, AST, FBC	
6 weeks	Rapid HIV test, urine hCG, ALT, AST, FBC	Rapid HIV, urine hCG, if at risk for pregnancy
12 weeks	Rapid HIV test, urine hCG, ALT, AST, FBC	
6 months	Rapid HIV test, ALT, AST, FBC, Hep C, Hep B SAg, Hep B CAb, Hep B SAb	Rapid HIV, Hep C, Hep B, S, Ag. Hep B, CAb Hep B, SAb

Table 9: Side-effects and toxicity

Class and agent	*Side effect and toxicity*
Nucleoside reverse-transcriptase inhibitor (NRTI)	Class warning: all NRTIs have the potential to cause lactic acidosis with hepatic steatosis.
• Zidovudine	Anemia, neutropenia, nausea, headache, insomnia, muscle pain and weakness
• Lamivudine	Diarrhea, nausea, abdominal pain, pancreatitis and rash
• Stavudine	Diarrhea, nausea, anorexia, pancreatitis, anemia, neutropenia, elevated liver function test
• Didanosine	Diarrhea, nausea, abdominal pain, pancreatitis and rash. Skin discoloration (mild hyper-pigmentation on palms and soles), primarily among nonwhites.
Nucleotide analog reverse-transcriptase inhibitor (NtARTI)	Class warning: all NRTIs have the potential to cause lactic acidosis with hepatic steatosis.
• Tenofovir	Diarrhea, nausea, vomiting, flatulence and headache
Non-nucleoside reverse-transcriptase inhibitor (NNRTI)	Rash (including cases of Stevens-Johnson syndrome), insomnia, somnolence, dizziness, trouble in concentrating, abnormal dreaming and teratogenicity
• Efavirenz	
Protease inhibitor (PI)	
• Indinavir	Nausea, abdominal pain, nephrolithiasis and indirect hyperbilirubinemia
• Nelfinavir	Diarrhea, nausea, abdominal pain, weakness and rash
• Ritonavir	Diarrhea, nausea, abdominal pain, weakness, circumoral paresthesia, taste alteration and elevated cholesterol and triglycerides
• Saquinavir	Diarrhea, nausea, abdominal pain, hyperglycemia, elevated liver function test
• Fosamprenavir	Nausea, diarrhea, rash, circumoral paresthesia, taste alteration and depression
• Atazanavir	Diarrhea, nausea, abdominal pain, weakness and rash, vomiting and indirect hyperbilirubinemia
• *Lopinavir/ritonavir*	Diarrhea, fatigue, headache, nausea and increased cholesterol and triglycerides
Fusion inhibitor	Local injection site reactions, bacterial pneumonia, insomnia, depression, peripheral
• Enfuvirtide	neuropathy and cough

Medication (PEP) Compliance and Medical Follow-up

- Patients should be advised not to adjust the dose or stop the medications without consulting with a physician.
- Advise patients that a doctor must be consulted before taking any other medication; this includes any medications prescribed by a doctor and any over the counter medications.

Counsel the exposed patient to report any side effects that develop.

CONSIDERATIONS FOR VULNERABLE POPULATION

Pregnant Women and Women of Childbearing Potential

Because of potential teratogenicity, Efavirenz should not be used in any nPEP regimen during pregnancy or among women of childbearing age at risk for becoming pregnant during the course of ARV prophylaxis. A protease inhibitor or nucleoside reverse transcriptase inhibitor-based regimen should be considered in these circumstances. Because the effect of Efavirenz on hormonal contraception is unknown, women using such contraception should be informed of the need to use an additional method (e.g. barrier contraception). Because of the observed association with hyperbilirubinemia, Indinavir should not be administered before delivery.[20]

Table 10: Post-exposure counseling

HIV	Should be advised to practice safer sex for a 6-month period and advise sexual partners of the potential risk. • Pregnancy should be avoided for 6 months • Breastfeeding should be stopped (consult an infectious diseases physician) • Do not donate blood, semen, organs or tissues for 6 months • Do not share razors, toothbrushes or needles

Children

Potential HIV exposures in children occur most often by accident (e.g. needle sticks in the community, fights or playground incidents resulting in bleeding by an HIV-infected child) or by sexual abuse or assaults. Adherence to the prescribed medications will depend on the involvement of and support provided to parents or guardians. Medication dosage must be altered according to the weight of the child and acceptable pediatric formulations should be prescribed so as to increase adherence.[5]

CONCLUSION

Prophylaxis is recommended after occupational exposure to bloodborne infections. Observational data suggest that such intervention are effective in averting subsequent seroconversion, but they are not a guarantee of protection. PEP regimen should be initiated as early as possible after exposure and continued till 28 days. The need of the hour is to emphasize the potential of HIV transmission in hospital set up and to create awareness about PEP among HCW. Its of utmost importance to correctly and consistently follow universal precautions.

REFERENCES

1. Siegel JD, Rhinehart E, Jackson M, et al. 2007 Guideline for isolation precautions: preventing transmission of infectious agents in health care settings. Am J Infect Control 2007;35(10 Suppl 2):S65-S164.
2. Cardo DM, Culver DH, Ciesielski CA, Srivastava PU, Marcus R. A case control study of HIV seroconversion in health care workers after percutaneous exposure. N Engl J Med 1997 Nov 20;337(21):1485-1490.
3. Centers for Disease Control and Prevention. Updated US. Public Health Service guidelines for the management of occupational exposures to HBV, HCV and HIV and recommendations for postexposure prophylaxis. MMWR Recomm Rep 2001;50(RR-11):1-52.
4. Panlilio AL, Cardo DM, Grohskopf LA, Heneine W, Ross CS. US Public Health Service. Updated US Public Health Service guidelines for the management of occupational exposures to HIV and recommendations for postexposure prophylaxis. MMWR Recomm Rep 2005;54(RR-9):1-17.
5. Occupational and nonoccupational post-exposure prophylaxis for HIV infection (HIV-PEP): Joint ILO/WHO Technical Meeting for the Development of Policy and Guidelines: Summary report. WHO:Geneva; 2005. Available at: http://www.who.int/entity/hiv/topics/arv/HIV-PEPflyer081606.pdf [Last accessed on 2007 Oct 28].
6. Roland ME, Elbeik TA, Kahn JO, Bamberger JD, Coates TJ, Krone MR, et al. HIV RNA testing in the context of nonoccupational postexposure prophylaxis. J Infect Dis 2004;190: 598-604.
7. Fisher M, Benn P, Evans B, Pozniak A, Jones M, Maclean S, et al. UK Guideline for the use of post-exposure prophylaxis for HIV following sexual exposure. Int J STD AIDS 2006;17:81-92.
8. Almeda J, Casabona J, Simon B, Gerard M, Rey D, Puro V, et al. Proposed recommendations for the management of HIV postexposure prophylaxis after sexual, injecting drug or other exposures in Europe. Euro Surveill 2004;9:35-40.
9. Preventing nosocomial infections. In: Tietjen L, Bossemeyer D, McIntosh N, editors. Infection prevention guidelines for healthcare facilities with limited resources. JHPIEGO: Baltimore, USA; 2003 [Last accessed on 2007 Nov 17]. Available at: http://www.reproline.jhu.edu/english/4morerh/4ip/ip_manual/20_nosocomial.pdf.
10. Wilburn SQ, Eijkemans G. Preventing needle stick injuries among healthcare workers: A WHO- ICN collaboration. Int J Occup Environ Health 2004;10(4):451-456.
11. Wilburn SQ. Needlestick and sharp injury prevention online. Online J Issues Nurs 2004;9(3):5-7.
12. Maitra A, Rattan A, Kishore K, Jaber M, Gupta A, Malhotra R, et al. Universal precautions a critical review. J A cad HospAdm 1993;5(1):47-53.
13. Byahuka E. Protection of health workers from HIV infection. Med Bull Uganda 1994;1(2):18-19.
14. Medicines Sans Frontieres postexposure prophylaxis policy; 2005 February.
15. Panlilio AL, Cardo DM, Grohskopf LA, Heneine W, Ross CS. US Public Health Service. Updated US Public Health Service guidelines for the management of occupational exposures to HIV and recommendations for postexposure prophylaxis. MMWR Recomm Rep 2005;54:1-17.
16. Virology and immunopathology of HIV/AIDS. Specialist's training and reference module. National AIDS control organization (NACO): New Delhi; 2000. p. 32-46.
17. Sinha AK. NACO Guidelines. Postexposure Prophylaxis for Occupational Exposure Prophylaxis for Occupational Exposure (PEP) to HIV/AIDS. Available at: http://medicos82egkmc.org/pdf/2007%20NACO%20Ashoke% 20Sinha.pdf. Accessed on November 2009.
18. Spira AI, Marx PA, Patterson BK, Mahoney J, Koup RA, Wolinsky SM, et al. Cellular targets of infection and route of viral dissemination after an intravaginal inoculation of simian immunodeficiency virus into rhesus macaques. J Exp Med 1996;183:215-225.
19. Postexposure prophylaxis for HIV infection: Clinical Protocol for the WHO European Region. In: Eramova I, Matic S, Munz M, editors. HIV/AIDS treatment and care clinical protocols for the WHO European Region: Denmark; 2006. p. 13.
20. Smith DK, Grohskopf LA, Black RJ, Auerbach JD, Veronese F, Struble KA, et al. Antiretroviral postexposure prophylaxis after sexual, injection-drug use, or other nonoccupational exposure to HIV in the United States: Recommendations from the US Department of Health and Human Services. MMWR Recomm Rep 2005;54:1-20.