

HIV POST-EXPOSURE PROPHYLAXIS FOR CHILDREN BEYOND THE PERINATAL PERIOD

I. INTRODUCTION

These guidelines have been developed to help medical providers identify and treat pediatric patients with potential HIV exposures. It is rare that children have exposures that place them at risk for acquiring HIV. Post-exposure prophylaxis (PEP) for a child differs from that for an adult in several important areas, including recommended medications and dosages, and legal and psychosocial issues. Guidelines for HIV PEP following occupational exposure have been developed for adults by the New York State Department of Health (NYSDOH),¹ and the United States Public Health Service (USPHS).² The NYSDOH has just published new guidelines on PEP following non-occupational exposures, including sexual assault in adults and adolescents.³ These guidelines are based on best-practice evidence and constitute the opinion of the NYSDOH Committee for the Care of Children and Adolescents With HIV Infection. There are no clinical trials in the pediatric age group to guide decision-making in the management of pediatric PEP for HIV, and consultation with a pediatric HIV Specialist is recommended (see [HIV Specialist Policy](#)).

II. EVIDENCE OF PROTECTION

A. Human Studies

Limited controlled studies are available on efficacy of PEP in humans. Most data are from clinical studies on prevention of perinatal HIV transmission; however, one study involves PEP in healthcare workers.

1. Pre-Exposure Prophylaxis: Clinical Studies

In 1994, the ACTG 076 study demonstrated a two-thirds reduction in perinatal HIV transmission when a three-part regimen of zidovudine (ZDV) was administered to HIV-infected pregnant women in the second and third trimesters of pregnancy and during labor, and then administered to the newborn for the first 6 weeks after birth.⁴ This clinical trial led to a new standard of care for reducing HIV perinatal transmission in this setting.⁵ Studies of more recent cohorts of pregnant women receiving ZDV alone, ZDV and lamivudine, or combinations including protease inhibitors or nevirapine have shown similar or even greater reductions in transmission.⁶⁻⁸

2. Post-Exposure Prophylaxis: Clinical Studies

An observational study from New York State described a transmission rate of 5.0% when ZDV was initiated in the prenatal period, 5.3% when initiated in labor, and 9.5% when initiated within 48 hours after birth (within this subset, the transmission rate for infants who received PEP within 12 hours after birth was 5.9%, and higher for those who received prophylaxis between 12 and 48 hours). The transmission rate was 31.6% with no ZDV prophylaxis.⁹

A Centers for Disease Control and Prevention (CDC) retrospective case control study of HIV PEP with ZDV in healthcare workers demonstrated a 79% reduction in transmission (95% CI, 43%-94%) after percutaneous exposure to HIV.¹⁰ The risk of HIV transmission was greater when the healthcare worker was exposed to a larger volume of blood.¹¹

To date, all studies of PEP have used a single nucleoside analogue or non-nucleoside analogue. The only data that support the use of combination ARV therapy for PEP are from perinatal studies which show that lower rates of transmission occur when combination therapy is given in the antenatal period.⁶⁻⁸

B. Animal Studies

With limited data available from humans, animal models offer one way to evaluate the efficacy of PEP. PEP regimens have been shown to be effective in preventing infection in animals. More than one dose of PEP is necessary, with most models offering 2 to 4 weeks of PEP. In these studies, PEP has been shown to be effective when initiated early after exposure; when PEP is delayed, efficacy declines. These animal studies demonstrate the efficacy of PEP and confirm the critical time-dependent nature of PEP.

PEP with intravenous ZDV (1, 8, 24, or 72 hours after exposure) was not successful in prevention of transmission of simian immunodeficiency virus (SIV) following an intravenous inoculation in macaques, although it did decrease the level of viral replication.¹²

PMPA, the active ingredient of the nucleotide analogue tenofovir, was protective when given to 24 macaques 4 or 24 hours after an intravenous exposure to SIV and continued for 28 days (all were protected).¹³ When the drug was administered after 24 hours, the protection was less. Also, if treatment was continued for less than 28 days, protection was reduced.

In another study, the nucleoside analogue BEA-005 was protective in macaques when administered subcutaneously within 8 hours of intravenous exposure to SIV and continued for 3 days.¹⁴ Lower doses of drug, initiation of PEP at later time points, shorter duration of PEP, and/or increase in viral inoculum resulted in diminished effect. When initiated 24 hours after inoculation, 1/2 of the macaques were protected; when initiated 3 or 6 days after inoculation, 4/4 of the macaques were not protected.

PEP with ZDV administered subcutaneously to macaques and continued for 14 days after intravenous exposure to SIV protected 1/3 of the macaques at 1 hour; none of the macaques that received the drug starting at 24 or 72 hours were protected. However, death was delayed in one animal in the group that received the drug at 24 hours.¹⁵

In the HIV/SCID-hu mouse model, ZDV PEP initiated at 30 minutes or 1, 2, 8, 24, 36, or 48 hours (and continued for 14 days) after intraperitoneal HIV challenge protected all mice in the group that received the drug within 2 hours, with time-related reduction in protection between 8 and 36 hours. No protection was demonstrated in mice that received ZDV PEP at 48 hours.¹⁶

III. ROUTES OF HIV TRANSMISSION

HIV transmission may occur in the following settings:

- Exposure to blood, visibly bloody fluids, or other potentially infectious body fluid through an open wound, broken skin, or mucous membrane
- Sexual exposure
- Perinatal exposure

Infectious body fluids include blood, semen, breast milk, and vaginal secretions. Tears, saliva, and urine do not contain HIV in significant amounts or inhibit its replication and are considered non-infectious unless they contain visible blood. See Table 1 for estimated risks of transmission following different types of exposures.

Other types of contacts are not known to be associated with a risk of HIV transmission. Casual contact that occurs during childhood and household activities is not associated with an increased risk of transmission.

Table 1: Estimated Risk of HIV Transmission Following Different Types of Exposures*

Type of Exposure	Estimated Risk	Reference
Percutaneous exposure to infected blood (in HCWs)	0.3% (1 in 333)	Ref. 2
Mucous membrane exposure to infected blood (in HCWs)	0.09% (1 in 1100)	Ref. 2
Needle-sharing exposure to an infected source	0.67% (1 in 150)	Ref. 17
Anal intercourse with an infected source (receptive/insertive)	0.5%-3.0% (1-6 in 200)/ 0.065% (1 in 1500)	Refs. 18, 19
Vaginal intercourse with an infected source (receptive/insertive)	0.1% (1 in 1000)/0.05% (1 in 2000)	Refs. 19, 20
Oral sex with ejaculation with an infected source	Conflicting data—however, risk is considered to be low†	Refs. 21, 22
<p>* These risk estimates depend on many factors, including source viral load, presence of STDs, and presence of ejaculate. † It is prudent to recommend PEP for receptive oral sex with ejaculation, although discussion about the conflicting data should occur.^{21,22}</p>		

A. HIV Transmission and Casual Contact

Findings from several large cohorts of children emphasize that HIV is not transmitted through casual contact. Rare case reports describe transmission in casual settings that are more likely related to transmission following exposure to infected blood or body fluid than to casual contact.

Two reports describe transmission of HIV from an infected child to another child in a household setting. However, in both instances, the mode of transmission was thought to be unrecognized exposure to the HIV-infected blood of the other child. The first instance involved two children between the ages of 2 and 5 years in the same household. The infected child had frequent nosebleeds, bleeding gums, and purulent otorrhea. The child who became infected had a recurrent papulovesicular excoriated rash. The children had a history of biting, sharing a bed, and sharing toothbrushes.²³ The second report involved two brothers with hemophilia. The older brother contracted HIV through infected cryoprecipitate or Factor VIII. Both boys received repeated infusions of Factor at home and in the hospital. The mode of transmission was thought to be through intravenous or percutaneous exposure to the older sibling's blood, although such exposure was not documented.²⁴ There are only three other reports of possible household transmission, all with presumed but undocumented blood contact.²⁵

These cases emphasize that HIV is transmissible through exposure to infected blood or body fluid in casual settings. However, studies of several large cohorts that document no transmission through casual contact support the conclusion that HIV is not transmitted through casual contact without involvement of blood or infectious body fluids.^{25,26}

B. HIV Transmission Associated With Saliva and Biting

An estimated 250,000 human bites occur annually in the United States. Biting is a common occurrence among young children and in daycare settings. The levels of HIV detected in saliva alone are very low. Although possible, HIV transmission following bites is thought to be extremely rare. The few documented cases of possible HIV transmission following bites were in adults exposed to blood-tinged saliva.^{27,28}

A bite wound that results in blood exposure should prompt consideration of PEP. When a human bite occurs, it is possible for both the person bitten and the biter to have incurred blood exposure. Blood exposure could occur in the following scenarios involving bites:

- *Blood exposure to the biter:* when the biter inflicts a wound that breaks the skin and blood from the bitten person enters the biter's mouth
- *Blood exposure to the bitten person:* when the biter has blood in his/her mouth (e.g., from bleeding gums or lesions) and inflicts a wound that breaks the skin of the person bitten
- *Blood exposure to both parties:* when there is a break in the skin of the bitten person and blood in the mouth of the biter

A bite is not considered a risk exposure to either party when the integrity of the skin is not disrupted.

C. HIV Transmission Following Sexual Exposure

The probability of HIV transmission per episode of consensual sexual contact with an infected source is estimated to be 0.1% (1 in 1000) through vaginal intercourse and 0.5% (1 in 200) to 3.0% (1 in 33) per episode of receptive anal intercourse (see Table 1).¹⁸⁻²¹ HIV transmission has been reported in the absence of ejaculation as a result of the virus being present in pre-ejaculatory fluid.

Risk of transmission at the time of sexual assault with associated trauma, bleeding, and tissue injury may be significantly higher than that observed through consensual sexual contact. Sexually transmitted diseases, as well as HIV, may be transmitted during sexual assault. No data exist regarding the frequency of HIV transmission at the time of sexual assault; however, HIV transmission has been described in children who have been sexually abused.

HIV transmission through oral sex has been described, although the per-episode risk is not well quantified. HIV transmission has occurred in orogenital sex from male to female, female to male, and male to male.

D. HIV Transmission Through Blood/Needle Exposure

HIV transmission through exposure to blood in a contaminated needle is a common source of transmission among injection drug users (IDUs); however, transmission rarely occurs among healthcare workers through an accidental needlestick or among others with accidental exposure to a needle. The risk of transmission from a needlestick/blood exposure has been estimated at 95% following blood transfusion,²⁹ 0.67% per episode of exposure to a shared intravenous needle or syringe,¹⁷ and 0.3% per episode of exposure to a needlestick from an HIV-infected person.³⁰ Body piercing, tattooing, and acupuncture are all potentially risky exposures if appropriate precautions for sterility of the needles are not followed.

Risk of transmission from discarded needles is thought to be a low-risk exposure. Two cohorts (59 children and 249 children) of children exposed to needlesticks from discarded needles were tested for HIV. HIV transmission did not occur in any of the children in either cohort.²⁵ HIV could not be isolated from the washings of 28 discarded needles from public places and 10 needles collected from a needle exchange program.²⁵ These studies, as well as the intolerance of HIV to environmental conditions (exposure of HIV to air over time), provide reassuring data regarding the low risk of transmission from this type of exposure.

Theoretically, the risk of transmission would be greater for an exposure to a newly discarded needle, one with a hollow bore (as opposed to a solid bore), one with visible blood, or one from an area with high HIV seroprevalence or an area frequented by IDUs.

IV. ASSESSMENT TO DETERMINE WHETHER PEP IS INDICATED

Recommendations:

Following an exposure, the clinician should ascertain whether the exposure is associated with a potential risk of HIV transmission (see Table 2) and whether it has occurred within the previous 36 hours.

Once the clinician has determined that a potential risk exposure has taken place, the clinician should:

- **Clean the HIV-exposed wound with warm water and soap. If the mouth or eyes are involved, they should be irrigated copiously with tap water.**
- **Notify the parent or legal guardian unless the child/adolescent refuses parental notification and is deemed competent to make such decisions and can legally request that his/her parents not be notified.**

- **Refer the child to a medical facility or emergency department for immediate further evaluation of the risk of exposure and the need for PEP.**
- **Obtain a confidential baseline HIV antibody test.**
- **Assess the risk of exposure to other pathogens, including hepatitis B virus (HBV) and hepatitis C virus (HCV), tetanus, sexually transmitted diseases, and bacterial infections, and treat as necessary** (see Section IX: *PEP Following Exposures to Other Infectious Agents*).

Table 2: Consideration of PEP According to the Type of Risk Exposure*

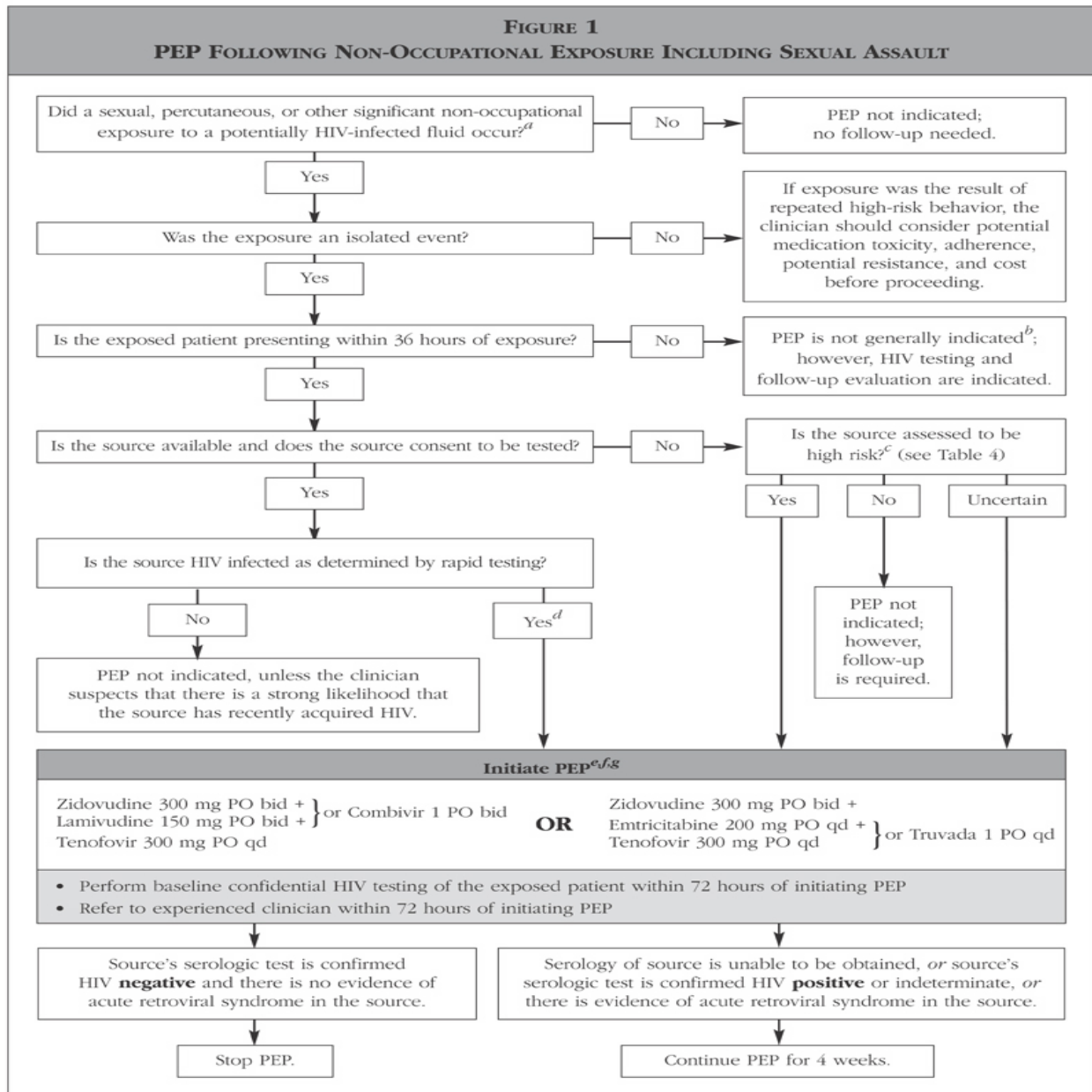
Types of Exposures That Do Not Warrant PEP	Types of Exposures That Should Prompt Consideration of PEP
<ul style="list-style-type: none"> • Kissing • Oral to oral contact without mucosal damage (mouth-to-mouth resuscitation) • Human bites not involving blood • Exposure to needles or sharps that have not been in contact with an HIV-infected or at-risk person • Oral sex without ejaculation or blood exposure 	<ul style="list-style-type: none"> • Unprotected vaginal or anal intercourse • Oral sex with ejaculation or blood exposure • Needle sharing • Injuries with exposure to blood from a source known to be HIV-infected • Injuries with exposure to blood from a source of unknown HIV status (including needlesticks, human bites, accidents)*
<p>* Table 1 provides risk calculations for specific exposures.</p>	

Figure 1 is a general guide that can be followed when deciding whether to initiate PEP. The following factors should be considered:

- *Type of exposure:* The probability of HIV transmission based on the description of the exposure. HIV transmission is only known to occur after exposure to blood, visibly bloody body fluid, or other infectious body fluid, including during sexual exposure (see Table 2).
- *Time since exposure:* If the exposure occurred more than 36 hours before presentation, PEP is unlikely to be beneficial in reducing transmission. The sooner PEP is initiated the better. Earlier administration of PEP in experimental animal models correlates with greater efficacy.
- *Risks and benefits of preventive therapy.*

Based on this assessment of risk, the clinician should discuss with the child/parent(s)/guardian(s) the potential risk of HIV exposure. When the risk of exposure does not warrant HIV PEP, the clinician should recommend forgoing PEP and should counsel the family accordingly. If the clinician and family feel that the risk is sufficient to warrant PEP, a careful discussion of the PEP regimen and follow-up care should take place.

Figure 1: PEP Following Non-Occupational Exposure Including Sexual Assault



^a See Tables 2 and 3.

^b Decisions should be individualized, weighing the likelihood of transmission against the potential benefits and risks of treatment.

^c In cases of sexual assault, the decision to initiate PEP is based on whether a significant exposure has occurred during the assault rather than on the risk behavior of the alleged assailant.

^d If the source is known to be HIV infected, information about his/her CD4 count, viral load, ARV medication history, and history of ARV drug resistance should be obtained when possible to assist in selection of a PEP regimen.²¹

^e The two regimens listed are essentially the same regimen because lamivudine and emtricitabine are interchangeable. The zidovudine + Truvada option has been added to increase access to the recommended PEP regimen and allow faster initiation of PEP, when indicated, based on the institution's availability of medications.

^f If a sexual assault survivor is too distraught to engage in a discussion about the drug regimen or make a decision about whether to initiate treatment at the initial assessment, the clinician should offer a first dose of medication and make arrangements for a follow-up appointment within 24 hours to further discuss the indications for PEP.

^g See Appendix A for dosing recommendations in patients with renal impairment.

When the HIV status of the source is unknown, speculation that the source is at low risk for HIV should not lessen support for a clinician's decision to initiate PEP. When the source is known to be at higher risk for HIV, this may factor into the decision to recommend HAART. Sources who may be at higher risk include those with a history of multiple sexual partners, needle-sharing behavior, or trading sex for money or drugs; men who have sex with men; and those with a sexually transmitted disease, particularly ulcerative diseases.

V. SPECIAL CONSIDERATIONS FOR EVALUATION OF SEXUAL ASSAULT EXPOSURE

Recommendations:

Evaluation of and treatment for sexual assault should be managed by a multidisciplinary team that is experienced in the care of children or adolescents who have been sexually assaulted.

A Sexual Assault Forensic Examiner (SAFE) who is trained to perform pediatric examinations should be included on the team whenever possible to assist in the medical examination, coordination of care, and discussions about treatment regimen (see Appendix A). A rape crisis counselor and/or child advocacy team should be involved in all cases of sexual assault to assist the child and the family in dealing with the trauma and to assist with referrals.

Children and adolescents who are sexually assaulted should be managed in an emergency department or other setting where appropriate resources are available to address the medical, psychosocial, and legal issues of such an offense.

Children who are sexually assaulted should be assessed for the risk of acquiring other sexually transmitted diseases, including gonorrhea, syphilis, chlamydia, hepatitis B, herpes simplex virus, human papillomavirus, bacterial vaginosis, and trichomoniasis. Laboratory evaluation and possible antimicrobial prophylaxis should be considered depending on the nature of the assault.

The multidisciplinary team should consist of medical providers with expertise in dealing with childhood sexual assault, child protective services who are mandated by law to conduct an initial assessment and investigation of reported assault/abuse, law enforcement officials to gather evidence and determine whether evidence indicates that a law has been broken, rape crisis counselors or victim advocates to provide support to the child and family, and mental health workers to provide immediate and long-term follow-up of the child and family, if appropriate (see Appendix B).

Children who present for care following sexual assault may have been the victim of multiple exposures over time. A child should be considered for PEP when the most recent exposure occurred within the preceding 36 hours. The need for HIV testing may be indicated even if exposure took place >36 hours prior to the examination.

For survivors of sexual assault, the decision to initiate PEP should not be based on the likelihood that the perpetrator is infected. Every perpetrator should be considered at risk until his/her HIV status is established. Initiation of PEP should not be delayed pending source HIV status determination.

Providers with experience in managing childhood sexual assault should assist in evaluating children/adolescents who have been sexually assaulted to best assess the comprehensive needs of the child or adolescent. PEP for HIV following sexual assault follows the same guidelines that are outlined in Section VI: *Implementing Post-Exposure Prophylaxis*.

Guidelines for the evaluation and treatment of children/adolescents who have been sexually assaulted are well detailed in the NYSDOH manual, Child and Adolescent Sexual Offense Medical Protocol.³¹ The manual addresses the medical, psychosocial, and legal aspects of management of the child/adolescent following sexual assault.

Inquiries regarding child/adolescent sexual assault can be directed to Child and Adolescent Sexual Assault Medical Protocol, Rape Crisis Program, NYSDOH, ESP Corning Tower, Albany, NY 12237, or to request a copy of the protocol, call 518-474-3664.

VI. IMPLEMENTING POST-EXPOSURE PROPHYLAXIS

Recommendations:

The clinician should discuss key issues about PEP with the family and child as soon as possible (see Table 3).

When parental or legal guardian consent cannot be obtained to initiate HIV PEP in a minor, the treatment may be initiated. Parental/legal guardian consent is strongly recommended to continue PEP beyond the first few hours/days. Emancipated minors, married minors, and minors who are parents may provide consent for medical care and treatment.

Before initiating PEP, the clinician should obtain complete blood count (CBC) and serum liver enzymes.

The prophylactic medication regimen should be started as soon as possible (ideally within 2 hours and not more than 36 hours following exposure) and should be continued for 28 days.

Medications should be made available to the patient in sufficient supply to complete a course of prophylaxis.

Minors are defined as individuals <18 years of age. Minors may consent for or refuse HIV testing when they understand the nature and meaning of the test. Minors may also consent for emergency care if they are in need of immediate medical attention and when delay in treatment could risk their life or health. New York State Public Health law §2504 states that “medical, dental, health and hospital services may be rendered to persons of any age without the consent of

a parent or legal guardian when, in the physician’s judgment, an emergency exists and the person is in immediate need of medical attention and an attempt to secure consent would result in delay of treatment, which would increase the risk to the person’s life or health.”³² HIV PEP following a risky exposure may be considered an emergency situation. When parental/legal guardian consent cannot be obtained to initiate HIV PEP in a minor, the treatment may be initiated with a continuing attempt to gain parental consent, if possible.

Table 3: Key Issues to Discuss With Family and Child Before Initiating PEP

- Potential benefits of HIV PEP
- Potential toxicities associated with medications
- Instructions on how and when to give the medications
- Importance of adherence to the medication regimen
- Nature and duration of medication regimen and monitoring schedule

If the patient does not have insurance and the patient is not eligible for special payment programs, the treating institution has the ethical responsibility for ensuring a timely, uninterrupted supply of medications for the patient. Sources of coverage for medications for PEP include the patient’s health insurance, the New York State Crime Victims Board, Medicaid, and the treating institution.

VII. RECOMMENDED REGIMENS FOR HIV-POST EXPOSURE PROPHYLAXIS

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Recommendations:

Clinicians should initiate a three-drug ARV regimen for significant exposures to HIV. The preferred regimens for children/adolescents 13 years or older and children <13 years of age are shown in Table 4. Alternative agents may be used in the setting of drug intolerance, toxicity, or known HIV resistance (see Appendix C).³³

When the source is known to be HIV-infected and information regarding previous ARV therapy, current level of viral suppression, or genotypic/phenotypic resistance profile is available, the clinician, in consultation with an experienced HIV provider, should individualize the regimen to more effectively suppress viral replication. However, initiation of the first dose and continuation of PEP should not be delayed while awaiting this information. If indicated, the regimen can be changed when information becomes available.

The PEP regimen should be continued for 4 weeks. Arrangements should be made to supply the patient with sufficient medications to complete a 28-day course of PEP.

No clinical studies are available to determine the best regimens for prophylaxis. The recommendations for drug choices and dosages presented here follow current NYSDOH guidelines for [occupational](#) and [non-occupational](#) PEP and the guidelines for [Pediatric Antiretroviral Therapy](#). The recommended regimens for children/adolescents 13 years and older provide potent antiviral activity with a low pill burden and minimal side effects.

Factors that may affect adherence, such as ARV drug intolerance, regimen complexity, and expense, should be considered when choosing a PEP regimen. Although the NYSDOH recommends a three-drug regimen for PEP, clinicians may change the regimen if the exposed child is unable to tolerate it due to toxicity. Use of antiemetics to ease side effects should be encouraged. Medications that should not be used for PEP without consultation with an experienced pediatric HIV provider are shown in Table 5.

For assistance with questions regarding PEP, clinicians can consult with an expert at the National Clinicians' Consultation Center PEP line at 1-888-HIV-4911 (1-888-448-4911).

TABLE 4 RECOMMENDED REGIMENS FOR PEDIATRIC POST-EXPOSURE PROPHYLAXIS^a	
Children >6 mo-13 y of age and >10 kg^b <i>or</i> For those who cannot swallow pills	Zidovudine 10 mg/mL syrup 9 mg/kg q12h, up to 300 mg PO twice daily Plus Lamivudine 10 mg/mL syrup 4 mg/kg q12h, up to 150 mg PO twice daily Plus Lopinavir/ritonavir ^c 80/20 mg per mL elixir Lopinavir 10 mg per kg/RTV 2.5 mg per kg twice daily, Up to 400/100 mg (5 mL) PO twice daily
Adolescents ≥13 y of age	Zidovudine 300 mg PO twice daily + Lamivudine 150 mg PO twice daily [may administer as Combivir 1 tablet PO twice daily] Plus Tenofovir ^d 300 mg PO once daily OR^e Zidovudine 300 mg PO twice daily Plus Emtricitabine 200 mg PO once daily + Tenofovir ^d 300 mg PO once daily [may administer as Truvada ^d 1 tablet PO once daily]
<p>^a The recommended medications should be taken at the same time. Consult Appendix C and package inserts for full dosing recommendations, drug interactions, and side effects. The predominant adverse effects of 28-day PEP treatment are malaise, nausea and vomiting, and diarrhea; other listed adverse effects are rare.</p> <p>^b For children <6 mo of age, or <10 kg, further dosing modifications may be necessary. See Appendix C and individual package inserts.</p> <p>^c Lopinavir/ritonavir (LPV/r) elixir must be taken with food. Nelfinavir may be used as an alternative to LPV/r if LPV/r is not tolerated. Dosing recommendations for nelfinavir: >2-13 y: 45-55 mg/kg q12h <i>or</i> 20-35 mg/kg tid (Max: 2500 mg per day) ≥13 y: 1250 mg q12h <i>or</i> 750 mg tid</p> <p>^d Not FDA approved for children under the age of 12 or <35 kg. TDF has been shown to decrease bone mineral density in children.^{34,35}</p> <p>^e The two regimens listed are essentially the same regimen because lamivudine and emtricitabine are interchangeable. The zidovudine + Truvada option has been added to increase access to the recommended PEP regimen and allow faster initiation of PEP, when indicated, based on the institution's availability of medications.</p>	

TABLE 5 ANTIRETROVIRAL DRUGS NOT RECOMMENDED FOR PEDIATRIC PEP REGIMENS EXCEPT IN CONSULTATION WITH AN EXPERIENCED HIV PROVIDER^a	
Antiretroviral Drug	Rationale
Nevirapine^b	Reports of nevirapine-induced hepatotoxicity among individuals receiving PEP. Females with CD4 counts >250 cells/mm ³ are at considerably higher risk (12-fold) for hepatic events. ³⁶
Abacavir	Serious and sometimes fatal hypersensitivity reactions have been associated with abacavir. Abacavir should be promptly discontinued when a hypersensitivity reaction is suspected and should never be re-started. Re-challenge may result in an anaphylactic reaction with associated hypotension or death.
Efavirenz^c	Should not be used as part of a PEP regimen in females of childbearing age because of reported fetal toxicities.
<p>^a See Pediatric Antiretroviral Therapy for more information.</p> <p>^b Although the mechanism by which nevirapine causes more serious hepatotoxicity in some individuals rather than others is unknown, and it is not known whether all the individuals who experienced serious adverse effects from nevirapine followed the recommended gradual step-up dosing, the potential risk of nevirapine as part of a PEP regimen generally outweighs its anticipated benefits. Use only in situations when there are no other options (e.g., the source's resistance profile dictates its use).</p> <p>^c Bristol-Myers Squibb Company. Package insert. 2010. Available at: http://packageinserts.bms.com/pi/pi_sustiva.pdf</p>	

For PEP drugs to avoid during pregnancy, see Section VII: Non-Occupational PEP for the Pregnant Patient in [HIV Prophylaxis Following Non-Occupational Exposure Including Sexual Assault](#).

VIII. FOLLOW-UP MONITORING FOR PATIENTS RECEIVING PEP

Recommendations:

Initial follow-up of the exposed child should occur within 2 to 3 days to review medication regimen, assess psychosocial status of child and family, and arrange appropriate referrals (e.g., psychosocial counseling after sexual assault).

Clinicians should closely monitor patients receiving PEP to detect ARV-induced toxicities. Arrangements should be made for clinical follow-up at 2 weeks and 4 weeks; CBC and serum liver enzymes should be repeated at 4 weeks (see Table 6).

HIV testing should be repeated at 1, 3, and 6 months after exposure.

Because of the complexity and potential adverse effects of the PEP regimens, longitudinal care of the exposed patient should be provided either directly by or in consultation with a pediatric HIV Specialist.

Post-exposure care involves simultaneous attention to multiple issues: the emotional state of the exposed patient and the patient’s family, adherence to the PEP regimen, monitoring for potential adverse effects, and sequential HIV testing to exclude acquisition of infection.

Table 6: Monitoring Recommendations After Initiation of PEP

	Clinic Visit*	CBC with Differential	Serum Liver Enzymes	HIV Anitbody*
Baseline	X	X	X	X
Week 1	X			
Week 2	X †			
Week 3	X			
Month 1	X	X	X	X
Month 2	X			X
Month 3	X			X

*Recommended even if PEP is declined.
† Either clinic visit or phone call.

IX. PEP FOLLOWING EXPOSURES TO OTHER INFECTIOUS AGENTS

Recommendations:

If the exposed child/adolescent is not fully immunized against hepatitis B, the child/adolescent should complete the hepatitis B vaccine series, with the next scheduled vaccine dose being given immediately. If the source is known to be HbsAg(+), the child should receive hepatitis B immune globulin in addition to completing the hepatitis B vaccine series.

If the child has been previously vaccinated against hepatitis B, the child’s serostatus should be determined. If the child has serologic immunity to hepatitis B, no further action is necessary. If the child does not have serologic immunity but there is documentation of previous vaccination, the clinician should administer a booster vaccine and reevaluate serologic status in 1 month to determine whether full revaccination is necessary.

The baseline hepatitis C serologic status of the exposed child should be determined in cases of percutaneous exposure. There are currently no recommendations for prophylaxis for HCV. Repeat testing for hepatitis C serologic status should be performed at 6 months. Repeat testing for hepatitis C serologic status or PCR for HCV may be considered at 2 to 4 weeks after exposure.

The tetanus vaccination status of the exposed child should be assessed in cases of percutaneous exposure or bite wound. Tetanus toxoids and tetanus immune globulin should be given if the child’s vaccination status is not up-to-date.

Bite wounds should be cleansed, and antibiotics should be initiated in cases of severe wounds, deep puncture wounds, and wounds to the face, genitals, or extremities.

The risk of transmission of HBV from either percutaneous or sexual exposure is significantly greater than the risk of transmission of HIV. The risk of transmission following percutaneous exposures to healthcare workers has been reported to be from 6% to 30% depending on the presence of the hepatitis e antigen. The risk of transmission from a discarded needle may lessen according to how much time has elapsed since the needle was discarded, although HBV is more resistant to environmental conditions than HIV. In addition, most children have been fully immunized against hepatitis B as infants and are not at risk for acquisition of the infection. Determination of the child's antibody status (HBsAb) or verification of the vaccination history should be performed.

The transmission of HCV is less likely than the transmission of HBV and is very unlikely in the setting of a sexual exposure or bite wound. Prophylaxis has not been demonstrated to be effective in preventing the transmission of hepatitis C. Some data from adult studies show that early treatment of hepatitis C may be beneficial.

X. PREVENTING EXPOSURES

Recommendations:

Children should be instructed in school and at home about potentially risky exposures and how to avoid them.

The clinician should discuss reduction of potentially risky behaviors with all children in a manner that is appropriate to their age and developmental stage as a routine component of pediatric care.

Children should be cautioned about the potential dangers of touching another person's blood, of body piercing and tattooing, and about the more common routes of transmission, such as sexual exposure and intravenous drug use. Children should be taught about inappropriate sexual exposure and encouraged to report such exposures to a trustworthy adult. Coaches and children engaging in sports should be aware of protective measures for all players, including the use of mouth guards. Gloves and first aid equipment should be available at all sports activities as well as in classrooms and at other school and social activities.

REFERENCES

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APPENDIX A

SEXUAL ASSAULT FORENSIC EXAMINER (SAFE) PROGRAM

The Sexual Assault Forensic Examiner (SAFE) program is a collaborative effort in which the Rape Crisis Center works with healthcare providers, law enforcement, and the prosecutor's office to provide a team approach to meet the needs of the sexual assault survivor.

There are three general objectives for sexual assault forensic examiner programs:

1. To provide the survivor of sexual violence with victim-centered, sensitive care and treatment.
2. To ensure quality evidence collection by a trained healthcare practitioner.
3. To provide expert testimony when needed.

Sexual assault forensic examiners are on-call for survivors of sexual assault. They have special education in the following areas:

- forensic interviewing techniques;
- cultural sensitivity;
- elderly, male, and child victims;
- health care of sexual assault survivors (e.g., emergency contraception, treatment for possible exposure to sexually transmitted diseases, and coordination of follow-up services); and
- forensic techniques (e.g., use of the colposcope, forensic photography, screening for the presence of "date rape drugs").

Together, with the sexual assault victim advocate, this team approach provides comprehensive and holistic health care.

To find out about the availability of sexual assault forensic examiner care in your community, contact your local Rape Crisis Center or Victims Services Agency.

For more information about sexual assault forensic examiner programs in New York State, contact:

New York State Coalition Against Sexual Assault
79 Central Avenue
Albany, New York 12206
phone (518) 482-4222
fax (518) 434-1581

APPENDIX B

[RAPE CRISIS PROGRAM](#)

APPENDIX C

ANTIRETROVIRAL AGENTS RECOMMENDED FOR PEDIATRIC HIV POST-EXPOSURE PROPHYLAXIS

Updated June 2010

For complete dosing recommendations for antiretroviral agents that are not part of the recommended regimen, see [Pediatric Antiretroviral Therapy, Appendix C](#).

NUCLEOSIDE AND NUCLEOTIDE REVERSE TRANSCRIPTASE INHIBITORS: PREPARATIONS AND DOSING	
Emtricitabine, FTC (Emtriva)	
Form	200-mg capsules 10 mg/mL oral solution
Dosing Recommendations	≥3 mo: 6 mg/kg/dose/day Max: 240 mg oral solution <i>or</i> 200-mg caps q24h (Capsules may be used if BW >33kg)
Adverse Events	<i>More common:</i> Headache, insomnia, diarrhea, nausea, rash, and skin discoloration (hyperpigmentation on palms and/or soles, predominantly observed in non-Caucasian patients). <i>Less common (more severe):</i> Neutropenia. Lactic acidosis and severe hepatomegaly with steatosis, including fatal cases, have been reported. In patients co-infected with HIV and HBV, exacerbations of hepatitis have occurred when changes have been made from FTC-containing regimens to non-FTC-containing regimens.
FDA Pregnancy Category	B
Lamivudine, 3TC (EpiVir)	
Form	150-, 300-mg tablets 150-mg scored tablets 10-mg/mL oral solution (Also available as EpiVir HBV, 100-mg tablets and 5 mg/mL oral solution) ^a
Dosing Recommendations	If using 150-mg scored tablet: 14 to 21 kg: ½ tablet AM and PM (total dose 150 mg) >21 to <30 kg: ½ tablet AM, 1 tablet PM (total dose 225 mg) ≥30 kg: 1 tablet AM and PM (total dose 300 mg) Max: 150 mg q12h or 300 mg q24h
Adverse Events	<i>More common:</i> Headache, fatigue, and nausea, which generally decrease over time; decreased appetite, diarrhea, skin rash, and abdominal pain. <i>Less common (more severe):</i> Pancreatitis (primarily seen in children with advanced HIV infection receiving other additional medications), peripheral neuropathy, anemia, decreased neutrophil count, increased liver enzymes, and fat redistribution. Lactic acidosis and severe hepatomegaly with steatosis, including fatal cases, have been reported. In patients co-infected with HIV and HBV, exacerbations of hepatitis have occurred when changes have been made from 3TC-containing regimens to non-3TC-containing regimens.
FDA Pregnancy Category	C

Tenofovir, TDF (Viread)	
Form	300-mg tablets
Dosing Recommendations	<12 y or <35 kg: Not yet approved; clinical trials data support 8 mg/kg q24h for age <8y, and 210 mg/m ² q24h for 8-12 y of age (Max: 300 mg q24h) ≥12 y and ≥35 kg: 300 mg q24h
Adverse Events	<i>More common:</i> Nausea, diarrhea, vomiting, and flatulence. <i>Less common (more severe):</i> Lactic acidosis and severe hepatomegaly with steatosis, including fatal cases, have been reported. TDF caused bone toxicity (osteomalacia and reduced bone density) in animals when given in high doses. Decreases in bone mineral density have been shown in both adults and children taking TDF for 48 weeks; the clinical significance of these changes is not yet known. Evidence of renal toxicity, including increases in serum creatinine, blood urea nitrogen, glycosuria, proteinuria, phosphaturia, and/or calciuria and decreases in serum phosphate has been observed in animal studies at high exposure levels. Numerous case reports of renal tubular dysfunction have been reported in patients receiving TDF; patients at increased risk of renal dysfunction should be closely monitored.
FDA Pregnancy Category	B
Zidovudine,^b ZDV, AZT (Retrovir)	
Form	100-mg capsules 300-mg tablets 10-mg/mL oral solution
Dosing Recommendations	1.5 mo-13 y: 180-240 mg/m ² /dose 12h (Max: 300 mg q12h) ≥13 y: 300 mg q12h or 200 mg q8h (Max: 300 mg q12h) Or by body weight: 4 to <9 kg: 12 mg/kg q12h 9 to <30 kg: 9 mg/kg q12h ≥30 kg: 300 mg q12h
Adverse Events	<i>More common:</i> Hematologic toxicity, including granulocytopenia and anemia, and headache. <i>Less common (more severe):</i> Myopathy, myositis, and liver toxicity. Lactic acidosis and severe hepatomegaly with steatosis, including fatal cases, have been reported.
FDA Pregnancy Category	C
Combination NRTI	
Name Agents Strength	Combivir ZDV/3TC (300/150)
Dosing Recommendations	≥13 y: 1 tablet twice daily

Name Agents Strength	Truvada TDF/FTC (300/200)
Dosing Recommendations	≥18 y: 1 tablet once daily
PROTEASE INHIBITORS: PREPARATIONS AND DOSING	
Lopinavir/ritonavir,^{c,d} LPV/r (Kaletra)	
Form	100/25-, 200/50-mg film-coated tablets 80/20-mg/mL oral solution (contains 42% alcohol)
Dosing Recommendations	<p>LPV/r liquid must be given with food LPV/r tablets may be given with or without food</p> <p>Without concurrent nevirapine (NVP), efavirenz (EFV), fosamprenavir (FPV), or nelfinavir (NFV):</p> <p><i>Oral solution</i> 6 mo-8 y: <15 kg: 12 mg per kg LPV/3 mg per kg RTV q12h >15 to 40 kg: 10 mg per kg LPV/2.5 mg per kg RTV q12h</p> <p><i>Tablets</i> 6 mo-18 y: 15 to 25 kg: 200 mg LPV/50 mg RTV q12h ≥25 to 35 kg: 300 mg LPV/75 mg RTV q12h ≥35 kg: 400 mg LPV/100 mg RTV q12h</p> <p>>18 y: 400 mg LPV/100 mg RTV q12h</p> <p>With concurrent (NVP), efavirenz (EFV), fosamprenavir (FPV), or nelfinavir (NFV) (dose scaled up because of induction of LPV metabolism):</p> <p><i>Oral solution</i> 6 mo – 18 y: <15 kg: 13 mg per kg LPV/3.25 mg per kg RTV q12h >15 to 40 kg: 11 mg per kg LPV/2.7 mg per kg RTV q12h</p> <p><i>Tablets</i> 6 mo-18 y: 15 to 20 kg: 200 mg LPV/50 mg RTV q12h ≥20 to 30 kg: 300 mg LPV/75 mg RTV q12h ≥30 kg: 400 mg LPV/100 mg RTV q12h</p>
Adverse Events	<p><i>More common:</i> Diarrhea, headache, asthenia, nausea and vomiting, and rash in patients receiving LPV/RTV with other antiretroviral drugs; lipid abnormalities.</p> <p><i>Less common (more severe):</i> Fat redistribution. Rarely, new onset diabetes mellitus, hyperglycemia, ketoacidosis, exacerbation of preexisting diabetes mellitus, hemolytic anemia, spontaneous bleeding in hemophiliacs, pancreatitis, elevation in serum transaminases, and hepatitis (life-threatening in rare cases).</p>
FDA Pregnancy Category	C

^a Epivir HBV oral solution and tablets contain a lower amount of lamivudine than Epivir oral solution and tablets. Epivir HBV is only FDA approved for use in treatment of HBV infection or HIV/HBV co-infection. The Epivir

HBV tablet is appropriate to use in the treatment of HIV in a child requiring the 100-mg dose when a tablet formulation is preferred.

^b Stavudine and zidovudine should never be given together because of drug interactions.

^c Saquinavir, darunavir, and tipranavir must be given with ritonavir. Indinavir, atazanavir, and, to a lesser-degree, fosamprenavir are generally given with ritonavir-boosting to enhance pharmacokinetics and allow lower and less frequent dosing. Lopinavir is already coformulated with ritonavir.

^d Dosing should be based on the mg/kg recommendations in the [manufacturer's tables](#) for each individual child.