

Post-Exposure Prophylaxis (PEP) Guidelines for children and adolescents exposed to blood-borne viruses

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Following exposure to blood borne viruses, it should be remembered that the risk of transmission is highest for Hepatitis B, then Hepatitis C and then HIV. As this document has been prepared for the CHIVA website it's focus is on HIV.

Background

The risk of community acquired HIV in children is extremely low. However children and adolescents are potentially at risk of contracting HIV from a variety of exposures, including needlestick injury, sexual abuse, consensual sexual activity in adolescence, biting or being bitten by another child, playground or sportsfield injuries, etc¹. There have been no reported school-related transmissions. In the absence of published international guidelines for HIV PEP in children, CHIVA guidelines have been developed.

The HIV status of the source is usually unknown and difficult to establish. Body substances presenting a risk of HIV transmission include blood, breast milk, amniotic fluid, semen or any body fluid if visibly bloodstained.² The risks of HIV being transmitted from a variety of exposures are shown in Table 1. HIV-infected fluids cannot penetrate intact skin. Sexual abuse represents a particular risk because of multiple exposures, mucosal trauma and the cervical ectopy and vaginal epithelial thinness found in children³. In addition, up to 40% of 15 year olds in the UK are sexually active. Following the widespread use of HAART (Highly Active Antiretroviral Therapy) children with perinatally acquired HIV-1 infection are surviving into adolescence, entering sexual relationships with their HIV negative peers who may present for PEPSE (Post Exposure Prophylaxis following Sexual Exposure) please refer to BASHH Guidelines.⁴

Table 1. Risks of HIV transmission from different exposures^{5,6,7,8,9}

Type of HIV exposure	Source HIV status		
	Status unknown		HIV positive
	London	Rest of UK	
Occupational needlestick injury that punctures skin	IVDU:		0.3% or 1 in 333
	0.014% or <1 in 7000	0.0028% or 1 in 36,000	
Man having unprotected receptive anal sex	0.45% or 1 in 222	0.09% or <1 in 1000	3% or 1 in 33
Woman having receptive vaginal intercourse	0.009% or <1 in 10,000	0.0018% or <1 in 55,000	0.2% or 1 in 500

**Risk of HIV transmission = Risk that source is HIV positive x Risk of exposure*

IVDU HIV seropositivity rate in London in 2007 was 3.9% (>5 times higher than rates in rest of UK)⁹. Given a 0.32% risk of transmission if the source was HIV positive, the risk from a community acquired needle stick injury can be assessed as about 1:10,000 in London to less than 1:50,000 elsewhere.

The use of PEP in non occupational HIV exposure is now well established, although there are no randomised controlled trials to assess its efficacy¹⁰. The presumed mechanism for HIV PEP is that shortly after an exposure to HIV a window period exists during which antiretroviral medications may help to diminish or end viral replication. In a small case controlled study, AZT reduced the transmission rate of HIV by 79%¹¹. In addition, a prophylactic effect of AZT alone and in combination has been shown to reduce vertical transmission of HIV from mother-to-child. The Department of Health has recently updated PEP recommendations for adults to Truvada (a combination of tenofovir + emtricitabine) and Kaletra (lopinavir/ritonavir), a reflection of the rapid genital tract penetration of Tenofovir and efficacy of Truvada/Kaletra against most current viral isolates in the UK¹². There are no DOH recommendations for PEP in children.

The risk of transmission of Hepatitis B (HBV) and Hepatitis C (HCV) from a community acquired needle stick injury are significantly higher than for HIV.

UK seroprevalence data for blood borne infections in intravenous drug users in 2007 reported¹³:

	London	Outside London
HIV Prevalence	3.9%	0.6%
HBV Prevalence	27%	13%
HCV Prevalence	60%	35%

The risk of HBV seroconversion following a needle-stick from **known** high risk HBV infected source (HBe Ag +ve) is 37-62%¹⁴ and around 5% following needle-stick from a **known** low risk HBV infected source (HBe Ag –ve). The average HCV seroconversion rate following needle-stick from **known** HCV positive source is 1.8%

Data for risk of transmission of HBV or HCV from single sexual exposure are not robust. HCV is inefficiently transmitted. Risks from high risk HBV infected source may be as high as 50% for seroconversion (lower for clinically symptomatic HBV infection).

Given the safety of HBV vaccination, the risk-benefit ratio favours vaccinating all exposed children, following needle stick injuries or sexual assault. Baseline testing and 3 month serological follow-up testing for HCV and HBV are recommended. It is sufficient to request HCV IgG, and HBV IgM, HBsAg, HBsAb and HBcAb IgG.

Procedure for Children and Adolescents presenting with possible exposure to HIV

1. Risk assessment

Careful history and examination to assess the risk of exposure to HIV. Establish whether exposure occurred within the last 72 hours.

a) **No risk** e.g.

- intact skin visibly contaminated with blood or body fluids
- kissing
- casual touching

Action

- Reassure parents and child
- Discharge

b) **Low risk** e.g.

- mucous membrane or conjunctival contact with blood or body fluids
- superficial injury that does not draw blood
- associated with needle/instrument

Action

- Counsel family about risks of HIV, HBV and HCV transmission
- Discuss risks of HIV PEP drug side effects (see table 2) outweighing the extremely low risk of HIV transmission
- **PEP not recommended**
- **Recommend standard HBV immunisation:** Day 0, 1 month 6 months. (or booster if already immunised).

c) **Moderate risk** e.g.

- skin penetrating injury that draws blood by needle/instrument contaminated with blood or body fluid
- wound causing bleeding and produced by sharp instrument visibly contaminated with blood
- sexual intercourse with assailant of unknown HIV status.

Action

- Counsel family about risks of HIV, HBV and HCV transmission
- Discuss risks of HIV PEP (see table 2)
- **Consider HIV PEP but on balance the risk of drug side effects from PEP probably out weigh the benefit. However, it is generally considered that transmission of HIV is likely to be increased following aggravated sexual intercourse, such as that experienced during sexual assault. Clinicians may therefore consider recommending PEPSE more readily in such situations**

d) **High risk** e.g.

- Significant exposure to blood or body fluids from source known to be HIV, HCV or HBV infected

Action

- Counsel family about risk of HIV, HBV and HCV transmission
- Discuss risks of HIV PEP (see table 2)
- **Recommend starting Standard HIV PEP** (later modifications may be required dependent on source's current viral load, treatment history and viral resistance)
- **Recommend accelerated HBV immunisation** (or booster if already immunised)
Consider HBV Ig if source is a highly infectious HBV carrier and child is susceptible.

2. Investigations

Source

If source material, such as a discarded needle and syringe, is presented this may be packaged and labelled safely and sent to Virology. In practise the laboratory probably needs 0.5ml blood for accurate HIV testing to be helpful, as a negative result on smaller volumes may be unreliable. In rare situations the source may be known and if the individual gives consent HIV, HBV and HCV serology may be tested. If the source is already known to be HIV positive obtain details of present and past antiretroviral medications and consider resistance testing, although the latter should not delay commencement of PEP.

Child/Adolescent

Obtain baseline HCV, HBV and HIV antibody status. If antiretroviral therapy is to be started also request FBC, U&E and LFTs. Ascertainment that the child / adolescent is not already HIV infected is important, as treatment with PEP in that circumstance would be inappropriate. The baseline HIV test result on the child/adolescent should be available at the first follow up visit. Baseline Point of Care testing (POCT) is not recommended in this situation.

3. Management

HIV PEP

HIV PEP is most effective if started within 1 hour of exposure, but may be beneficial up to 72 hours after. The child's family should be counselled about likely side-effects (Table 2) and given contact phone numbers in case of concerns during or after the treatment period. An appointment to see a paediatrician/HIV physician within 72 hours of starting HIV PEP should be made. Initially 5 days of PEP should be prescribed with a further prescription given at consultant review. PEP regimens may rarely need modification if the index case is known to/ or likely to harbour drug resistant virus. Seek expert help but do not delay starting PEP.

Regimens

Accurate weight and height measurements should be used to calculate doses.

$$\text{Surface Area Calculation (m}^2\text{)} = \sqrt{[(\text{weight (kg)} \times \text{Height (cm)})]}$$

3600

Children under 40kg (and adolescents >40kg unable to swallow tablets): triple therapy with Zidovudine, Lamivudine and Kaletra

Children and adolescents over 40 kg (able to swallow tablets): triple therapy with Truvada (Tenofovir and Emtricitabine) and Kaletra. An alternative for Truvada, for a child with renal insufficiency is Combivir (Zidovudine and Lamivudine).

Table 2 HIV PEP Drugs, Doses and Side effects.

Drug	Formulation	Dose	Side Effects*
Zidovudine (AZT, ZDV) (for child < 40Kg)	Cap: 100mg(white with blue line)/250mg (White/Blue) Liq: 10mg/ml	180mg/m ² /per dose BD to a maximum dose of 250mg BD	Granulocytopenia and/or anaemia, nausea, headache, myopathy, hepatitis, nail pigmentation, neuropathy.
Lamivudine (3TC) (for child < 40Kg)	Cap: 100mg (orange), 150mg (white) Liq: 10mg/ml	4mg/kg / per dose BD to a maximum dose of 150mg BD	Peripheral neuropathy, nausea, diarrhoea, headache,
Combivir (3TC, ZDV) (for child >40kg)	Combined Tab: ZDV 300mg/3TC 150mg (white)	ONE (1) tablet BD	As for ZDV and 3TC
Truvada (TDF+FTC) (for child >40kg)	Combined tablet: Tenofovir 245mg & Emtricitabine 200mg (blue)	ONE (1) tablet OD	Headache, diarrhoea, nausea, vomiting, renal tubular dysfunction, bone demineralization Do not use if known renal impairment
Kaletra (LPV/rvt)	Adult tablet: Lopinavir 200mg & Ritonavir 50mg (orange) Paediatric tablet: Lopinavir 100mg & Ritonavir 25mg (yellow) Liq: Lopinavir 80mg/ml +Ritonavir 20mg/ml	Lopinavir 230mg/m ² /per dose BD to a maximum dose of 5mls liquid BD, or 2 adult tablets BD, or 4 paediatric tablets BD. Dose in ml = $\frac{230 \times SA}{80}$	Diarrhoea, abdominal pain nausea, vomiting, headache

*This list of side effects is not exhaustive – refer to product datasheet for detailed information on side effects, interactions with other medicines and other cautions for use.

Table 3. Kaletra Dosing by surface area

Body Surface Area (m ²)	Recommended number of tablets 100/25 mg (Paediatric) tablets 200/50 mg (Adult) tablets
0.5 to < 0.9 m ²	2 paediatric tablets (2 x 100/25 mg) BD
0.9 to < 1.4 m ²	3 paediatric tablets (3 x 100/25 mg) BD
1.4 m ² or greater	4 paediatric tablets (4 X 100/25 mg) BD Or 2 adult tablets (2 X 200/50 mg) BD

In addition an anti-emetic such as domperidone and an anti-diarrhoeal such as loperamide should be prescribed for prn use in the event of GI side effects (see BNFC).

HBV

For a significant exposure to an unknown source an accelerated course of HBV immunisation (0, 7 and 21 days) should be offered. The HPA recommends the use of intramuscular hepatitis B immunoglobulin only if the source is known to be HBV infected, although would agree to its use with an unknown source if compelling circumstances existed.

NB: For those children / families with difficulty accessing services, vaccinating at the HIV PEP follow-up, 0, 14 and 28 days checking the serological response at 3 months, is a reasonable compromise (expert opinion).

HCV

There is no recognised PEP for HCV. Families may be counselled that, in the event of HCV seroconversion, therapy is increasingly successful.

Tetanus

The need for Tetanus injection/booster should be assessed per usual practice.

4. Emergency Contraception and Screening for sexually transmitted Infections

Following sexual exposure it is important to consider emergency contraception (pubertal girls) and the need for screening/prophylaxis for other sexually transmitted infections. See Local/BASHH Guidelines⁴.

NB: Children under 16 presenting with non-consensual sexual activity should be referred to the Child protection Co-ordinator.

5. Follow-up

Prior to discharge from A&E families embarking on HIV PEP should have the following:

- An outpatient appointment, preferably within the succeeding 72 hours to see a named clinician with experience in antiretroviral drugs.
- Contact telephone numbers in case of concerns about any aspect of the HIV PEP.
- 5 days of Antiretroviral therapy (with anti-emetic and anti-diarrhoeal for prn use).
- A letter for their GP, with patients/parents consent.

Outpatients Visits

Within 72hrs: Review in clinic, assess adherence and toxicity, decide whether PEP should continue. Document and give baseline HIV, HBV, HCV Ab results. Arrange psychological support as necessary.

Day 14: Review in clinic, assess adherence and toxicity, check FBC, U&E, LFTs,

Day 28: Review in clinic, assess adherence and toxicity, check FBC, U&E, LFTs,

1 month and 3 months AFTER PEP completion: Follow-up HIV testing should be undertaken with a fourth generation combined HIV antibody/ antigen assay. Antibody screening for Hepatitis B and C is also recommended. If further HBV vaccination required arrange appropriate follow up either clinic or GP based.

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