CORE CPD: ONE HOUR

# Needlestick and occupational exposure to infections

A compendium of current guidelines, by **L. Samaranayake**[1] and **C. Scully**.[2]

Needlestick and occupational exposure to infections is a constant threat in dental practice. Many blood-borne infections, including human immunodeficiency virus (HIV) infection, hepatitis B and hepatitis C, may be contracted through this route. This article provides a useful compendium for dental professionals on current guidelines available to prevent such threats, as well as a simple flowchart on prophylactic measures that could be taken after an accidental exposure (Fig. 1).

As the threat of blood-borne and other infections always persists and new infections emerge constantly, it must be stressed that the practitioner needs to keep abreast of the current information through major websites such as those documented at the end of this article.

For this purpose, the HIV post-exposure prophylaxis (PEP) guidance published by the UK Department of Health Expert Advisory Group on AIDS (EAGA) should be read in full.[1] Complementary guidance on PEP following *sexual* exposure is available from the British Association for Sexual Health and HIV[2] and the British HIV Association (BHIVA) and EAGA produced a position statement on the use of antiretroviral therapy (ART) to reduce HIV transmission.[3] A summary of these and other current recommendations in relation to sharps injuries follows.

## BLOOD-BORNE INFECTIONS

Accidental exposure to blood caused by needle injuries or injuries following cutting, biting or splashing incidents carries the risk of infection, particularly by blood-borne microorganisms which can include the following:

### Main blood-borne transmissible agents[4] (not an exhaustive list)

*Viruses:*

- Hepatitis B virus (HBV)
- Hepatitis C virus (HCV)
- Human immunodeficiency viruses (HIV)
- Cytomegalovirus (CMV)
- Epstein-Barr virus (EBV)
- Parvoviruses.

*Bacteria:*

- Treponema pallidum (syphilis)
- Yersinia
- Parasites
- Plasmodium.

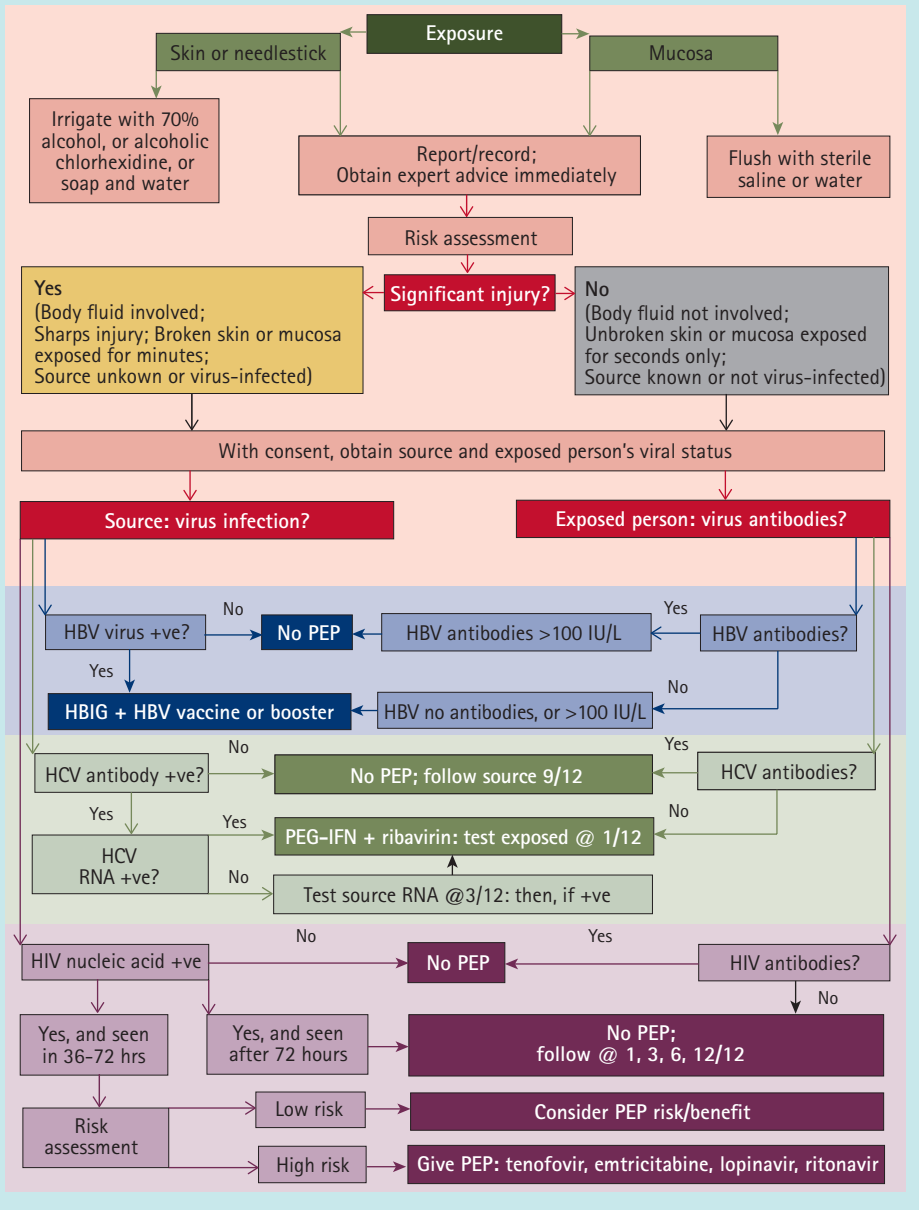
## HEALTH CLEARANCE AND ADDITIONAL HEALTH CLEARANCE FOR NEW HEALTHCARE WORKERS

The UK Department of Health has guidance on health clearance for new healthcare workers (HCWs).[5] Health clearance is now classed as *standard*, and *additional*, for anyone who will be performing exposure prone procedures (EPPs). *Additional health clearance* includes hepatitis C and HIV screening. EPPs, as defined by the UK Department of Health, are those where there is a risk that injury to the HCW may result in exposure of the patient's open tissues to the blood of the HCW.[6]

These procedures include those where the HCW's gloved hands may be in contact with sharp instruments, needle tips or sharp tissues (spicules of bone or teeth) inside a patient's open body cavity, wound or confined anatomical space where the hands or fingertips may not be completely visible at all times. Most procedures in dentistry including dental clinical training are defined as EPPs, with the exception of:

- Examination using a mouth mirror only
- Taking extra-oral radiographs
- Visual and digital examination of the head and neck

**Fig. 1 Guidelines for post-exposure prophylaxis (PEP)**

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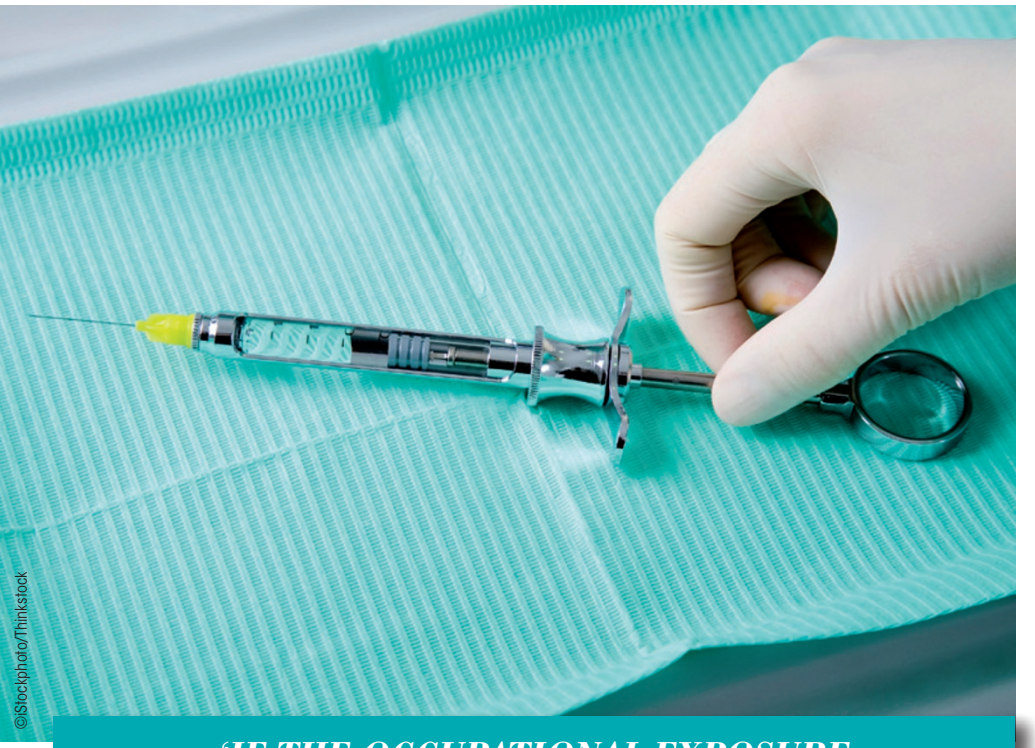
- Visual and digital examination of the edentulous mouth
- Taking impressions of edentulous patients
- Construction and fitting of full dentures.

However, taking impressions from dentate or partially dentate patients would be considered exposure prone, as would the fitting of partial dentures and fixed or removable orthodontic appliances, where clasps and other pieces of metal could result in injury to the dentist.

However, the risks may vary and the main organisms of concern are shown in Table 1.



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***'IF THE OCCUPATIONAL EXPOSURE INVOLVES A KNOWN CARRIER OF A BLOOD-BORNE DISEASE, THIS IS CLASSIFIED AS A DANGEROUS OCCURRENCE AND REPORTING IS THEN NECESSARY.'***

## AVOIDING NEEDLESTICK INJURIES AND AVOIDING INFECTION

Avoiding needlestick injury is the optimal way to avoid infection. Constant vigilance is in order. The single most important measure to prevent needlestick injury is to avoid re-capping and re-sheathing. Use a rigid puncture-proof container close to hand to avoid the temptation of re-capping, for used needles. It is equally important to use proper protective clothing such as gloves, mouth mask and goggles.

Every HCW at risk should be trained in infection control and vaccinated against HBV (there are as yet no preventive vaccines available for HCV or HIV).

## HIV POST-EXPOSURE PROPHYLAXIS (PEP)

HIV post-exposure prophylaxis (PEP) was outlined in 2008 by the UK Department of Health, Social Services and Public Safety.[7]

Action after exposure to potentially contaminated material may include the following. If a skin wound has been sustained, let it bleed and cleanse thoroughly using an ample amount of soap and water followed by 70% alcohol. Free bleeding of puncture wounds should be encouraged gently but wounds should not be sucked. Antiseptics and skin washes should not be used – there is no evidence of efficacy, and their effect on local defences is unknown.

In case of contact with mucous membranes, including mouth or conjunctivae, rinse immediately and thoroughly, using water or a saline solution only, not alcohol, and promptly report the incident to the department or person dealing with occupational accidents. This is critical for appropriate and rapid prescribing of PEP.

Record an occupational exposure to blood or saliva in an accident report Book. It is not usually required under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) to report an occupational exposure to blood or saliva to the Health and Safety Executive (HSE)[8] but, if the occupational exposure involves a known carrier of a blood-borne disease, this is classified as a dangerous occurrence and reporting is then necessary – as it is where acute ill health results.

A risk assessment needs to be made urgently by an appropriately trained doctor *other than the exposed HCW* about the appropriateness of starting PEP. If the source of the blood is known the patient must be asked for permission to sample blood for a HCV and HIV test. If the patient refuses then it must be assumed the patient is a carrier. If the origin of the blood is unknown then any blood present on the needle can be used for a serological examination. A blood sample should be taken as soon as possible after the injury from the exposed person to act as a baseline value in case infection takes place. Further blood samples to test for HBV, HCV and HIV are collected after one, three, six and 12 months.

After a potential infection the actual risk depends on type of contact and on the amount of virus in the contaminated material. The risk of infection following exposure to blood is very small but factors which are associated with a higher risk are:

- Deep wounds (for example, needlesticks, scalpels wounds)
- Visible blood on the instrument
- Needlestick injury by using hollow-bore needles containing blood
- Intravenous or intramuscular injection of contaminated blood
- Blood from a patient with a high virus level (for example untreated or end-stage AIDS patients).

PEP should be considered after an exposure that has the potential to transmit infection, based on type of body fluid or substance involved, and route and severity of the exposure.

**Table 1 Blood-borne viruses**

| | HBV | HCV | HIV |
|---|---|---|---|
| Estimated % risk of transmission by needlestick injury | 30 (5-40%) | 3 (3-10%) | 0.3 (0.2-0.5%) |
| Prevalence of infection and risk is higher than average in people who | Are intravenous drug users, men who have sex with men (MSM), or are from developing countries | Have had multiple blood transfusions, in dialysis patients, and intravenous drug users | Are MSM, in intravenous drug users, or from areas where the condition is endemic |

## ASSESSMENT AND TESTING OF THE SOURCE PATIENT

If initial assessment indicates an exposure has been significant, consideration should then be given to the HIV status of the source patient. Since HIV PEP is most likely to be efficacious if started within the hour, an urgent preliminary risk assessment should assess if it is appropriate to recommend taking the first dose of PEP. A more thorough risk assessment should then be undertaken to inform a decision about whether to continue the PEP regimen.

The designated doctor should ensure that appropriate arrangements are made to approach a source patient whose HIV status is not known and ask for their informed agreement to HIV testing. As stated above, this approach should not be undertaken by the exposed HCW. A universal approach to asking source patients to agree to have an HIV test avoids the need to make difficult judgements, simplifies and normalises the process and avoids potential discrimination. Finally, in this context, starting PEP, where appropriate, should not be delayed to await the result of source patient testing.

## EXPOSURE TO DISCARDED NEEDLE/ UNKNOWN SOURCE

Where it is not possible to identify the source patient (for example, needlestick injury caused by a discarded needle), a risk assessment should be conducted to determine whether the exposure was significant. PEP is unlikely to be justified in most such exposures.

Management is based on determining the level of a risk of contracting HBV, HCV or HIV, a decision made from whether or not the injured person is non-immune, partially or fully immune for HBV (from vaccination or otherwise). If there is only a limited immunity, then 5 ml intramuscular hepatitis B immunoglobulin (HBIG) should be given within 48 hours of the injury. After a potential HCV infection, combination treatment of pegylated interferon and ribavirin is the treatment of choice. A liver specialist should be consulted.

Some HCWs may have had occupational exposures which, after careful assessment, are not considered to have the potential for HIV transmission. Such HCWs should be advised that the potential adverse effects and toxicity of taking PEP probably outweigh the negligible risk of transmission posed by the type of exposure because it is considered insignificant, whether or not the source patient is known or considered likely to be HIV-infected.[1]

PEP should not be offered after exposure through any route with low-risk materials (for example, urine, vomit, saliva, faeces) unless they are visibly bloodstained (for example, saliva in association with dentistry); where testing has shown that the source is HIV negative; or if risk assessment has concluded that HIV infection of the source is highly unlikely.

PEP should be recommended to HCWs if they have had a significant occupational exposure to blood or another high-risk body fluid from a patient or other source either known to be HIV infected, or considered to be at high risk of HIV infection, but where the result of an HIV test has not or cannot be obtained. If the HIV status of the source cannot be established, the exposed HCW should have the opportunity to consider whether or not to continue PEP. Their decision should be informed by all that is known about the source patient in terms of past exposure to risk of HIV infection and also the nature and severity of the exposure. These aspects should be considered together with the potential for unpleasant short-term adverse effects and unknown long-term effects of taking PEP drugs. The relative risk of HIV transmission may be increased considerably if the source patient has a high plasma viral load (for example, at the time of seroconversion or in the later stages of HIV disease).[1]

All exposed HCWs should be encouraged to provide a baseline blood sample for storage and a follow-up sample for testing. PEP is not a licensed indication for any antiretroviral drugs, which are therefore prescribed on an 'off-label' basis.

PEP against HIV has been estimated to reduce the risk of transmission by 75% but should be carried out within one hour for maximum effect, so an initial assessment must be performed as soon as possible. Even if there is a delay however, it is still worth considering PEP within 24-72 hours of the exposure.[1]

PEP should be continued for at least 28 days. All HCWs occupationally exposed to HIV should have follow-up counselling, post-exposure testing and medical evaluation whether or not they have received PEP. EAGA recommends, as a minimum, that follow-up should be for at least 12 weeks after the exposure or, if PEP was taken, for at least 12 weeks from when PEP was stopped.[1]

## ANTIRETROVIRAL AGENTS FOR PEP

### *Anti-HIV (antiretroviral agents)*

Antiretroviral agents from three classes of drug are currently licensed for first-line treatment of HIV infection, namely: nucleoside/nucleotide analogue reverse transcriptase inhibitors (NRTIs); non-nucleoside reverse transcriptase inhibitors (NNRTIs); and protease inhibitors (PIs).

In HIV-infected patients, triple therapy has proved more effective than mono- or dual-therapy in suppressing HIV replication and avoiding the emergence of viral resistance. In the UK, a potent three-drug PEP regimen is preferred because resistance to antiretroviral drugs is found at significant levels in both treated and untreated infected individuals in the UK. PEP starter packs: generic regimen of two NRTIs plus boosted PI recommended for PEP following non-occupational exposure are: One Truvada tablet (245 mg tenofovir and 200 mg emtricitabine [FTC]) once a day *plus* two Kaletra film-coated tablets (200 mg lopinavir and 50 mg ritonavir) twice a day.

### PEP for Hepatitis B

A course of hepatitis B vaccination with or without immunoglobulin may be recommended as PEP following exposure to hepatitis B.

### PEP for Hepatitis C

No PEP agent is currently available for hepatitis C. However, early treatment of acute hepatitis C infection may prevent chronic hepatitis C infection. Follow-up of exposed patients should follow that described in management for occupational exposure to hepatitis C.

**'PEP SHOULD BE RECOMMENDED TO HEALTHCARE WORKERS IF THEY HAVE HAD A SIGNIFICANT OCCUPATIONAL EXPOSURE TO BLOOD OR ANOTHER HIGH-RISK BODY FLUID FROM A SOURCE KNOWN TO BE HIV INFECTED…'**

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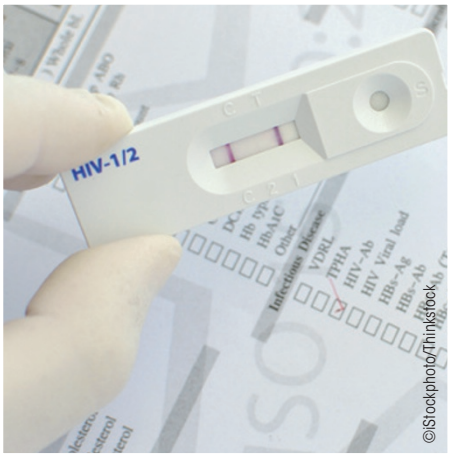


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### DIALOGUE WITH THE INJURED PARTY

If PEP is advisable then it is important to discuss with the injured individual the advantages and disadvantages of PEP and follow-up examinations that are necessary (of liver and kidneys) after two weeks, one, three and six months as well as follow-up examination for infection itself (after one, three and six months), and finally the importance of avoiding transmission to sexual partner(s) (such as use of condoms). These aspects fall into the province of a trained clinician rather than the dental practitioner.


1. Department of Health. HIV post-exposure prophylaxis guidance from the UK Chief Medical Officers' Expert Advisory Group on AIDS. Online information available at www.dhsspsni.gov.uk/hivpep.pdf (accessed 7 July 2014).
2. British Society for Sexual Health and HIV. BASHH Clinical Effectiveness Group Guidelines (last updated 7 July 2014). Online information available at www.bashh.org/BASHH/Guidelines/Guidelines.aspx (accessed 7 July 2014).
3. Department of Health. BHIVA and EAGA position statement on the use of antiretroviral therapy to reduce HIV transmission. Online information available at www.gov.uk/government/publications/the-use-of-antiretroviral-therapy-to-reduce-hiv-transmission (accessed 7 July 2014).
4. Samaranayake L. *Essential microbiology for dentistry*, 4th ed. Churchill Livingstone, 2012.
5. Department of Health/Public Health England. *Health clearance for tuberculosis, hepatitis B, hepatitis C and HIV: New healthcare workers.* London: Department of Health, March 2007.
6. Department of Health. *HIV infected health care workers: guidance on management and patient notification. Annex A: Guidance of UKAP advice on exposure-prone procedures.* 2005. Online information available at http://webarchive.nationalarchives.gov.uk/+/www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/Browsable/DH_5368137 (accessed 7 July 2014).
7. Department of Health. *HIV post-exposure prophylaxis. Guidance from the UK Chief Medical Officers' Expert Advisory Group on AIDS.* Revised September 2008. www.dhsspsni.gov.uk/hss-md-34-2008-attachment-1.pdf (accessed 7 July 2014).
8. Health and Safety Executive. RIDDOR - Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995. http://www.hse.gov.uk/riddor/ (accessed 7 July 2014).


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