

The Management of Occupational Exposures to Blood and Saliva in Dental Practice

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Abstract: Accidental injuries when handling sharp or rotating instruments can allow inoculation of a dental team member by the patient's blood or saliva. The risk of transmission of HIV from occupational exposure among dental workers is low and to date no occupational exposure has resulted in HIV transmission. However, hepatitis B and C have a high morbidity and mortality and are more infectious than HIV. This paper demonstrates how occupational exposures to blood and saliva could be managed in general dental practice and outlines the legal responsibilities of a dentist in the management of these exposures.

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Clinical Relevance: This article outlines the legal and ethical responsibilities of a dentist in the management of occupational exposures to blood and saliva and suggests how these exposures may be managed in general dental practice.

Occupational exposure is defined as:

when blood or other potentially infectious material, such as saliva, comes into contact with non-intact skin, eye or mucous membrane during the performance of a dental practitioner's duties (diagnosis and treatment of patients or when handling non-disinfected orally contaminated dental impressions and prosthetic devices).

It also includes parenteral contact through a needlestick or instrument puncture, a cut or an abrasion.

The strategies that are employed to prevent occupational exposure to blood and saliva in dental surgeries are

generally divided into five categories:¹

- a universal level of infection control;
- careful surgery design;
- safe working practices;
- vaccinations; and
- the use of protective barriers such as gloves, masks and glasses.

A failure in any one of these strategies (despite the best efforts of the dental team) may lead to exposure to blood or saliva.

The risk of accidental injury is one that any member of the dental team may encounter when handling sharp or rotating instruments. The surface of the skin or mucous membrane can be damaged, which would allow inoculation by the patient's blood or saliva.

- Safety glasses and visors prevent splashing or inoculation of the eye by flying debris that may contain blood or saliva.
- Face masks can prevent similar exposure of the mucous membrane of the nose or mouth.

- Gloves provide adequate protection in preventing bacteria or viruses present in the patient's mouth or blood from coming into contact with microabrasions on the hands.² If the glove is penetrated by a needle there is evidence to suggest that gloves can limit the contamination of the underlying skin.³

The occurrence of percutaneous injuries in practising dentists is not uncommon. More than one injury a year on average has been reported in Scottish dentists, with 30% of those labelled at moderate or high risk of transmission,⁴ and similar rates have been reported in American dentists.⁵ Therefore the possibility of an infectious disease being transmitted is real. Those diseases that

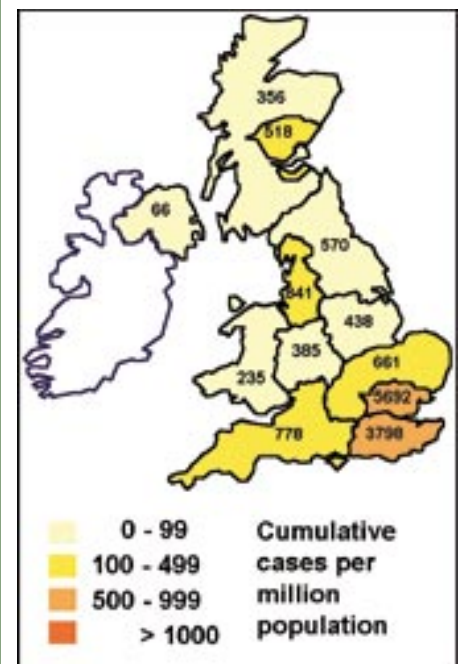


Figure 1. Cumulative AIDS cases in the UK by region of residence to 1997.

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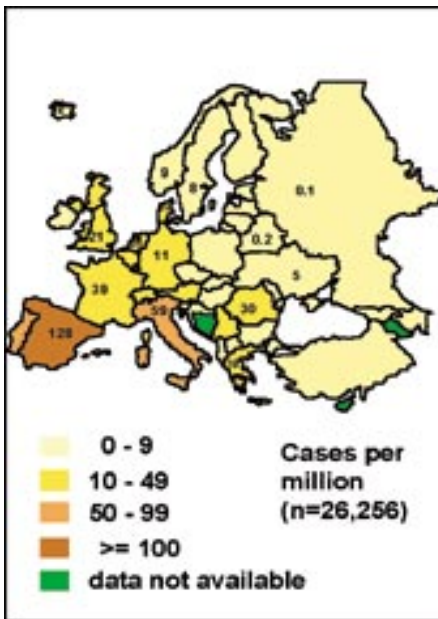


Figure 2. AIDS incidence per million of population, WHO European region 1997.

have high morbidity and mortality – hepatitis B (HBV), hepatitis C (HCV) and human immunodeficiency virus (HIV) – pose the most serious health risk. Between 5 and 10% of people infected with HBV¹ and 70–80% of those infected with HCV will become carriers – with the associated risk of liver disease, including hepatocellular carcinoma.⁶

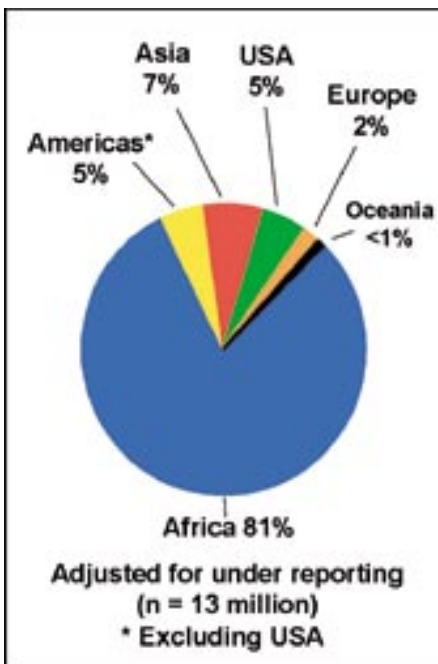


Figure 3. Cumulative AIDS cases world-wide to the end of 1997.

PREVALENCE OF HBV, HCV AND HIV

The risk of anyone having an infection depends mainly on:

- sexual behaviour;
- recreational intravenous drug use;
- receipt of an unscreened blood transfusion or blood product;
- geographical location (where the above activities have occurred).

The importance of these factors for transmission varies according to the disease. The overall prevalence in adults of HBV surface antigen (0.37%), HCV antibody (0.28%) and HIV (0.09%) remains low in the UK,⁷⁻⁹ although the prevalence within selected populations is higher. For example, in London 4.2% of homosexual men attending a genitourinary clinic were positive for hepatitis B surface antigen,¹⁰ 0.9% of patients attending a general medical practitioner for minor non-hepatitis-related complaints were positive for HCV antibody¹¹ and 9% of homosexual/bisexual men attending a genitourinary clinic had HIV.¹⁰ Other selected populations with a high risk for these diseases include intravenous drug users and those from parts of the world with high endemic levels of disease. Areas of Asia and Africa may have up to 8% carriers of these viruses with selected populations within these regions having a substantially higher prevalence. Pictorial representations of the prevalence of HIV, with an AIDS diagnosis are shown in Figures 1–5. The decision on whether an individual is at risk of HIV infection, if they have some of the above risk factors, is complex.

The prevalence of HBV in dentists was high before the introduction of immunization and the routine wearing of gloves for dental procedures. Testing for seroprotective levels of antibody to hepatitis B surface antigen after immunization is essential, as vaccine failures are associated with age, weight, male gender, smoking, or chronic ill health.¹² However, mutations of hepatitis B have been reported in Asia, for which the hepatitis B vaccine is now ineffective.¹³ It has been reported in the

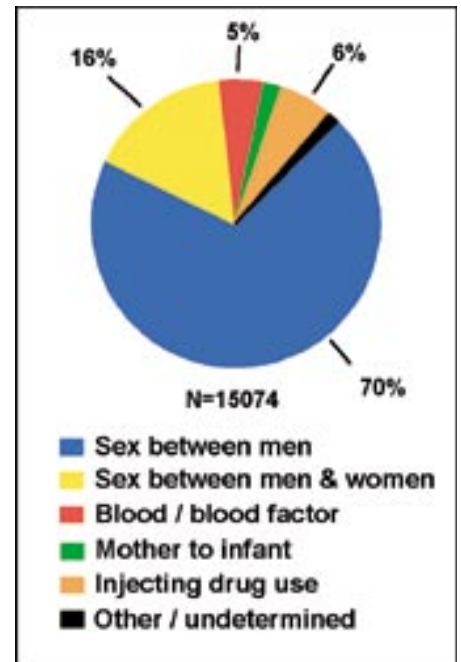


Figure 4. Reports of AIDS cases by exposure category. UK to the end of 1997.

UK that there is no difference between the rates of HCV infection in healthcare workers and blood donors⁸ but in New York there are indications that the risk of HCV infection is increased among dentists, particularly oral surgeons.¹⁴ There are no confirmed reports that HIV has been transmitted in the dental surgery and prevalence rates in dentists are low.¹⁵ HCV¹⁶ and HIV¹⁷ are viruses for which no immunization is available and which have high morbidity and mortality.

Hepatitis G is a newly discovered but common virus (for example, it is carried in 2.25% of Scottish blood donors⁸), although there is no evidence that it can cause any recognizable disease.¹⁹ Interestingly, it has been found in the saliva of over 85% of carriers.¹⁸

There may be other equally infectious agents that can be transmitted by occupational exposure to blood or saliva but whose relevance in the aetiology of diseases has not yet been recognized.

This article is aimed at the general dental practitioner who will not have the luxury of an on-site occupational health department, which is normally attached to a hospital, on whom to call for immediate advice. It outlines the legal responsibilities of a dentist in the management of occupational exposures to blood and saliva and describes how

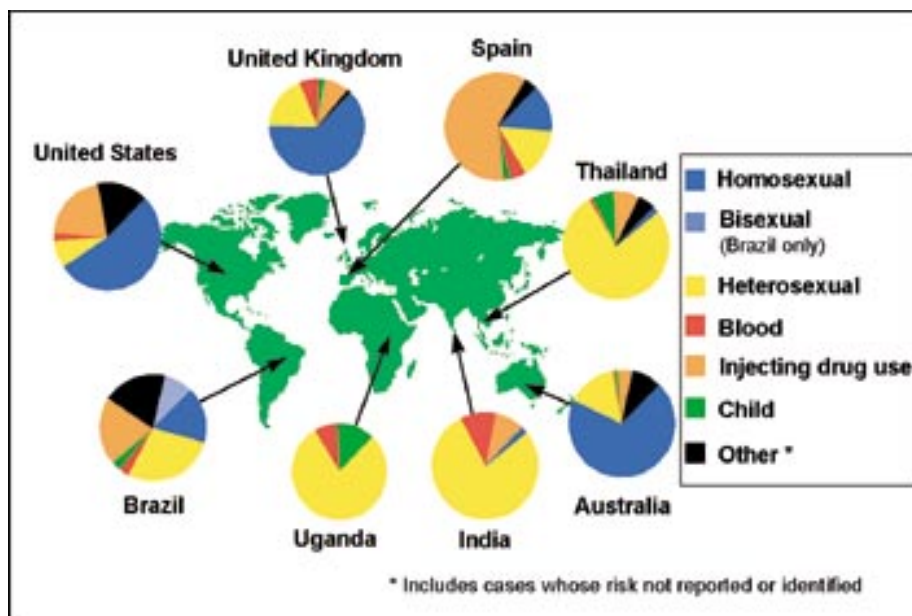


Figure 5. Exposure category of reported AIDS cases in selected countries during the mid 1990s.

such exposures may be managed in general dental practice. The rationale would be equally suitable for a hospital environment. The management is illustrated graphically in Figure 6.

LEGAL RESPONSIBILITIES

All employers, including dentists, have a legal obligation under the Health and Safety at Work Act (1974) to ensure that their employees are properly trained and are able to carry out their work safely.

The Management of Health and Safety at Work Regulations (1992) require assessment of the work environment and practices to determine the action that is necessary to safeguard the health and safety of employees. An action plan is needed when occupational exposure to blood or saliva occurs.

The Control of Substances Hazardous to Health Regulations (1994) require an employer to assess the risks of using hazardous substances in the workplace. Blood-borne viruses are classified as a hazardous substance. The regulations include a requirement that the employer provides health surveillance where necessary. That surveillance is necessary when an exposure occurs.

It is not usually required under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations

(1995) to report an occupational exposure to blood or saliva to the Health and Safety Executive. However, if the occupational exposure involves a known carrier of a blood-borne disease this is classified as a dangerous occurrence and reporting is necessary. Reporting is also required where acute ill health has resulted from exposure to, or transference of, a biological pathogen.

Recording of occupational exposure to blood or saliva in an Accident Report Book is strongly advised. In the unlikely event of an occupationally acquired disease occurring through an exposure, then such a record would be valuable to employees seeking remuneration through the NHS Injury Benefits Scheme, the Industrial Injuries Disablement Benefit or the Industrial Injuries Scheme.

MANAGEMENT OF EXPOSURES TO BLOOD AND SALIVA

First Aid

A splash to the eye or mucous membrane of the nose or mouth should be irrigated and washed thoroughly with sterile water or a saline solution.

Percutaneous injuries should be encouraged to bleed and washed with

70% alcohol or chlorhexidine solution or soap and water. The wound should not be scrubbed.²⁰ A waterproof plaster should be applied to the wound if the clinical procedure is to be completed.

It is essential to determine at this stage whether the injury is severe enough to carry a risk of HIV transmission. Post-exposure prophylaxis (PEP) against HIV should be carried out within 1 hour for maximum effect, so this initial assessment must be performed as soon as possible.²¹ Even if there is a delay it is still worth considering PEP within 24 hours of the exposure: PEP against HIV has been estimated to reduce the risk of transmission by 75%.²² Active or passive immunization against HBV is also available according to the level of immunization of the recipient,²³ but the timing before prophylaxis is not as critical as that for HIV.

Decision One: Is the Exposure Severe Enough to Carry a Risk of HIV Transmission?

The risk of HIV-transmission from an occupational exposure to HIV-infected blood is dependent upon the titre of HIV in the blood (viral load), the volume of the blood that is transmitted and whether the virus is still infective.¹⁵ The highest reported risks occur with:

- devices that are visibly contaminated with blood;
- hollow-bore needles that have been in an artery or vein;
- deep injuries;
- exposure to blood from patients with terminal illness.²²

Accidents involving surgical instruments such as scalpels would also be considered high-risk injuries.

In the case of a splash, the volume of exposure should be assessed as it has been reported that both HIV and HCV have been transmitted through only 0.5 ml of blood to the conjunctiva.²⁴ In the unlikely event of a splash to a mucous membrane then the exposure would be classed as a significant injury (see below).

Ideally a third party (such as another member of the dental team within the

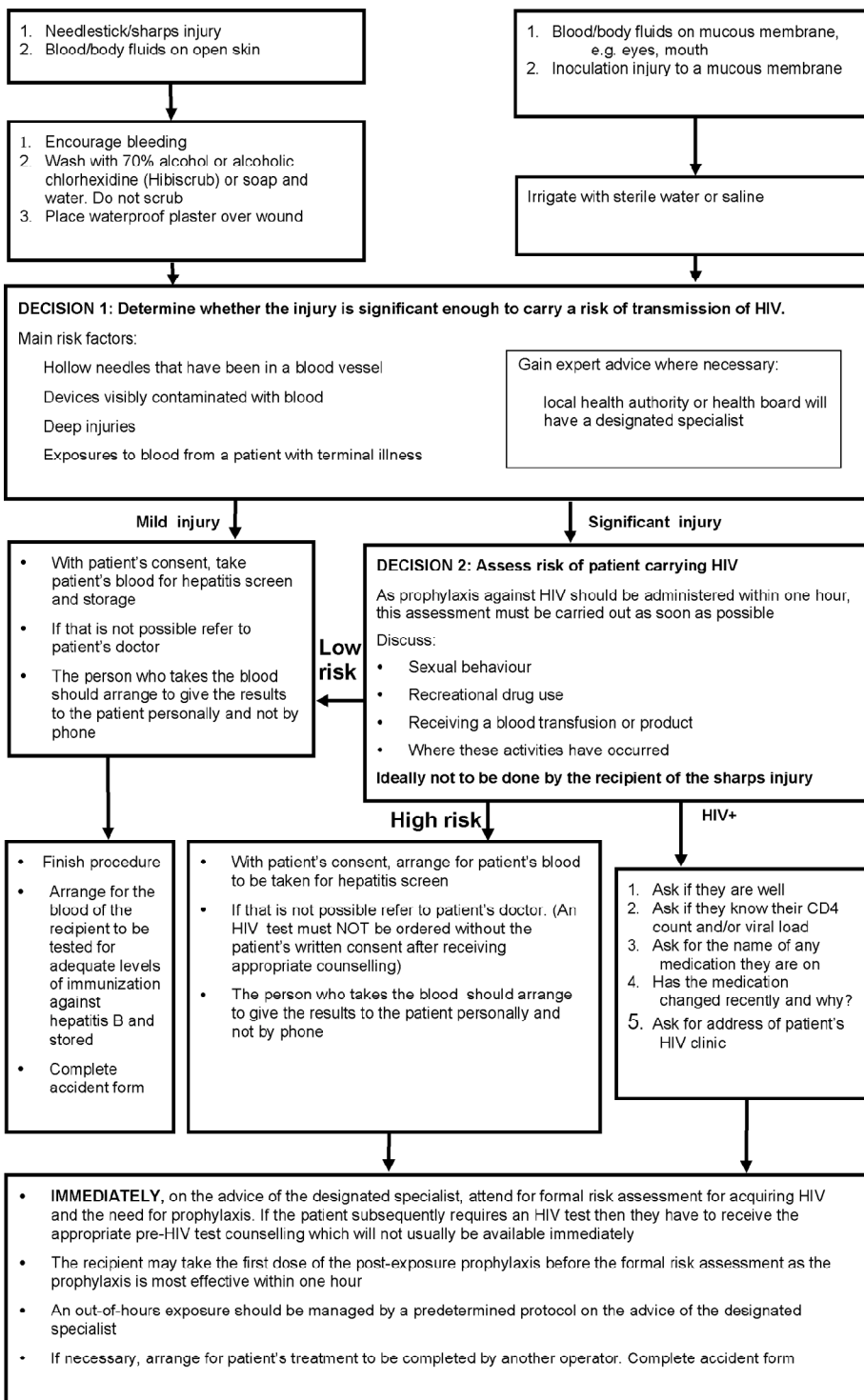


Figure 6. A graphical illustration of the management of sharps injuries.

clinical environment) should assess the significance of the injury, as the recipient may be too anxious to make an informed judgement.²⁵

The injury may then be classified as:

- a mild injury that would involve a

low or negligible risk of HIV transmission and not require PEP; or ● a significant injury with a higher risk of transmission which may require PEP.

This can be a difficult decision to make

and if there is any doubt about the severity advice should be obtained from an experienced professional working in this field.

Who Can Help?

The local health authority or health board will have at least one designated specialist, normally a consultant in virology, microbiology, genitourinary medicine, infectious diseases or occupational health, who can be contacted for advice on whether the injury is significant enough for HIV transmission to occur.²⁶

Mild Injury

A mild injury requires only that blood is taken from the patient and screened for hepatitis B and C. The patient's consent must be obtained for these tests. Serum (both that of the patient and that of the recipient of the injury) is also stored for possible further analysis. This might be required if the injured person subsequently feels that a diagnosis of an infection may have resulted from the previous injury. The patient's serum can then be analysed to confirm the source of the infection. At a later date the recipient's serum may be used to confirm the absence of any infections that may have been transmitted at the time of the injury. The recipient's blood is also screened to confirm adequate levels of immunization against hepatitis B.

It is not always possible to take the patient's blood in general practice, as the dentist may not have the facilities. In this event, the patient's general medical practitioner should be contacted for assistance. The doctor should also be given a written explanation of the incident and a request for an immediate blood test to confirm the absence or presence of a hepatitis infection. It is important to determine the patient's HBV status because, if the recipient's immunization is inadequate, urgent prophylaxis against HBV may be indicated. The recipient should also attend their own medical practitioner for blood to be taken if it is not possible within the practice. Finally, the injury should be recorded in an Accident Report Book.

Significant Injury

The risk of the patient carrying HIV must

Parenteral risk	Significance
Transfusion	A small risk of infection between the mid 1970s and 1985.
Intravenous drug risk	Large risk if needles are shared.
Haemophilia	Before 1985 recipients of Factor VIII products had an infection rate of 80%.
Needlestick injury	Small risk (0.3%) but dependant on type of injury, volume of blood transmitted and infectiousness of the blood.

Table 1. Parenteral risk factors for acquiring HIV.

be assessed. He or she should be informed that the injury is significant enough to carry the risk of transmission and their permission should be obtained to review their social and medical histories.

Decision Two: Is Your Patient at Risk of Carrying HIV?

The patient may not know the risk activities associated with transmission of the HIV infection. A social and medical history can determine whether HIV transmission is likely to have occurred and the associated degree of that risk. Questions asked will relate to the patient’s sexuality and lifestyle and, ideally, questioning should take place in a private room. The patient needs to be reassured that the discussion will remain confidential. The recipient of the injury should not ask the questions because he or she may be too anxious²⁵

When assessing the risk factors for acquiring HIV the operator should concentrate on the high-risk activities (Tables 1 and 2) that increase the potential for transmission of the infection rather than concentrating on the main risk groups. The patient should be informed that there are guidelines laid down by the UK health departments for the management of occupational exposures to blood or saliva and that some questions need to be asked that relate to the risk of the patient having acquired HIV.

Some of the questions will relate to aspects of the patient’s life that the questioner might find embarrassing to ask. It may help if the patient reads the statements laid out in Table 3 and then asked if there are any questions that they have about the statements. They should

then read the questions in Table 4 and respond with an answer. The questions are simple and open-ended, to enable an accurate history to be taken.

In most cases it will be readily apparent that the patient has low or no risk factors. For example, people who regularly donate blood are unlikely to carry one of the main blood-borne viruses as all blood is screened for HBV, HCV and HIV. However, if the questioning leads you to think that there is a possibility of your patient having HIV then you should seek advice from the local designated specialist. He or she will identify the patient as being at low or high risk of HIV infection.

Why Should I Ask The Questions?

The dentist does not have to question the patient personally: many practitioners feel that it is more appropriate for the questioning to be undertaken outside the dental surgery setting. However it is not always possible to arrange this, especially at short notice, and the patient might not be happy to go to a different site. Where the practitioner arranges for a third party to carry out the patient assessment for HIV, he or she should be sure that the questioner is aware of the factors that surround the geographical prevalence of

HIV infection and is prepared to ask the necessary questions.

What is important is that there is a policy/protocol in place which allows for prompt management of any occupational exposure.

Low Risk

If it is decided that the patient is in the low risk category for HIV then the procedure outlined under ‘Mild Injury’ is followed.

High Risk

If the patient admits to having experienced a high risk activity in an area with a high prevalence of HIV then the specialist may recommend an HIV test. The test must *not* be carried out until trained healthcare advisors have counselled the patient about the consequences of such a test. This cannot be undertaken within only an hour and the specialist may advise the recipient to attend a local hospital to be given initial doses of post-exposure prophylactic drugs.

Once the initial doses have been taken, a formal risk assessment for HIV may be carried out and a decision taken as to whether to continue PEP until the HIV test result is known. If the injury occurs outside normal working hours an alternative source of advice – and, if necessary, the first few doses of PEP – needs to be obtained. The designated specialist would be able to give guidance on this and it is probable that the local accident and emergency department would be the first contact for advice and PEP. A dental practice should therefore have out of hours contact numbers within the action plan that is drawn up for these injuries.

Sexual risk	Significance
Anal intercourse	The sexual activity with the highest risk, especially for the receptive partner. Condoms can reduce the potential risk.
Vaginal intercourse	A risk to both partners but an increased risk for the female. Properly lubricated condoms offer protection.
Oral sex	Transmission has been documented but the risk is low.
Prostitution	There is a high risk associated with unprotected intercourse with a prostitute.

Table 2. Sexual risk factors for acquiring HIV.

HIV Positive

A final set of questions must be asked if the patient is known or admits to be HIV positive (Table 5). The answers to these questions will indicate to the specialist whether PEP is required and the type of drugs to be administered. The risk of HIV transmission from a patient with an undetectable viral load is considered to be low and after taking into account the severity of the injury PEP may not be required.

The CD4 count refers to the number of helper T-cell lymphocytes which are depleted as the HIV infection progresses and the patient becomes increasingly immunosuppressed. The number and rate of decline of CD4 cells is important only when the viral load is not known. The normal CD4 count in asymptomatic HIV-seronegative and seropositive men was 890 ($\pm 320 \times 10^3/\text{ml}$) and 540 ($\pm 220 \times 10^3/\text{ml}$), respectively.²⁷ Patients who are not on modern anti-HIV drug therapy and have a low CD4 count or a high rate of decline of the count may be expected to have a higher viral load.²⁸ If the patient's drug regimen has changed then permission to consult with the doctor managing their HIV infection is needed as the patient may not be aware of the true reasons for the change. One reason is that HIV can become resistant to a combination of anti-HIV drugs, which would need to be changed to find a more effective combination. The recommended

- HIV infection in Britain is mainly concentrated in three main groups:
- Intravenous drug users who share needles.
 - People who have unprotected heterosexual sex with a partner who has lived in or is from Africa.
 - Men having sex with men.
- HIV may also be contracted by:
- Having a blood transfusion where the blood is not screened for HIV.
 - Having sex without a condom with a prostitute. The risk is greatest in Africa and the Far East.
 - Having sex without a condom with a partner who is either a bisexual male or an intravenous drug user.

Table 3. Checklist for assessing the risk of contracting HIV.

Respond to the following questions:

- Do you donate blood?
- Have you ever had sex with a partner from abroad?
- Have you ever had a partner who is bisexual or uses intravenous drugs?
- Have you ever had sex with anyone that you did not know well?
- Have you ever exchanged money or drugs for sex?
- Have you ever injected non-prescription drugs (recreational drugs like heroin, cocaine, speed, etc.) or used injectable steroids?
- Have you ever lived in or visited Africa?
- Have you ever had tattoos or body piercings?
- Have you attended a clinic for sexually transmitted diseases?
- Have you been tested for HIV?

Table 4. Checklist for assessing the risk of contracting HIV.

drug regimen for PEP²¹ would need to be altered if the strain of HIV had been previously shown to be resistant to a drug used in PEP.

Irrespective of the decision whether to receive PEP as a result of the formal risk assessment, the procedure outlined under 'Mild Injury' for the assessment of the hepatitis viruses still needs to be followed for both the patient and the recipient of the injury.

What Happens if the Patient Refuses to be Tested?

A patient cannot be forced to give consent for the taking and testing of blood. The designated specialist can evaluate the history taken and give advice on whether the patient is at risk of a blood-borne disease. The patient can be asked to give permission for the practitioner to consult with his or her general medical practitioner for additional information. The incident should be recorded in detail in an Accident Report Book.

What Happens if the Source Patient is not Known?

Exposure may occur while cleaning instruments from several patients. In this case, the patients should be identified and

their medical histories reviewed. If the patients are no longer on the premises then this may not be of concern – if the injury can be assessed as of low risk for the transmission of HIV – because the immediate administration of PEP against HIV is not necessary. The procedure outlined under 'Mild Injury' should be followed, with the patients being contacted and asked to give blood for a hepatitis screen.

If the injury is significant then the designated specialist should be asked for advice as to whether PEP is necessary until the patient's medical histories can be reviewed.

Blood Test Results

The person who gains the formal permission from the patient and takes the blood for hepatitis testing should give the results back to the patient on a face-to-face basis. The reason for this is that, should the test be positive, it is likely the patient will require post-test counselling as to the health implications of the result to themselves, their family and their friends. This could be difficult over the telephone. It is likely that in general practice it will not be the dentist who will conduct the test. However, when that does occur the dentist should give reassurance and arrange a prompt referral to the patient's general medical practitioner.

PSYCHOLOGICAL ASPECTS

The recipient of occupational exposure to

- Is he or she generally well?
- Do they know their CD4 (T-helper cell) count and/or viral load, when it was taken and if the level has changed recently?
- Are they on any medication? If so, what?
- Has their medication changed recently and why?
- What is the name of their general medical practitioner, and the address and telephone number of the HIV clinic they are attending?

Table 5. Checklist for assessing the need for post-exposure prophylaxis (PEP) and the most suitable drug regimen.

blood or saliva should be aware of the significance to their health of blood-borne viruses. As a result they may become anxious and distressed about the possibility of developing an infection, however small the risk. A policy of prompt management of such exposures will help to alleviate such feelings. If necessary, arrangements should be made for the recipient to attend an occupational health advisor for reassurance. If the patient has been found to have a blood-borne infection, it may take several months to confirm that no infection has been transmitted. The recipient may have profound feelings of anxiety during this period.

The patient may also be distressed at the thought of being tested for an infection and at the possibility of a positive result. They may require counselling by a healthcare advisor before giving consent for blood tests. Sensitive and understanding management of the patient's and recipient's feelings will help in this difficult situation. If a test should prove positive, then the patient should be offered treatment within the practice. It is unethical and illogical to refuse treatment to a patient who only carries a blood-borne virus.

SUMMARY

The risk of transmission of HBV, HBC and HIV by needlestick injury is reported to be 30%, 3% and 0.3%, respectively.²⁰ Consequently, the risk of transmission of HIV from an occupational exposure among dental workers is low: no occupational exposure has as yet resulted in HIV transmission to a member of the dental team.¹⁵

Although this paper outlines how the management of occupational exposures might occur in practice, there is always a possibility that a patient with a high risk of being HIV positive has been assessed incorrectly. Most needles that are used in the dental practice are used for local analgesia. They are of fine bore and do not usually enter an artery or vein. Therefore the risk through a needlestick injury of transmitting enough HIV for infection is low. However, it must be remembered that HBV and HCV are

more infectious and transmission could result in severe health problems.

Clinicians must remember that they have an ethical responsibility to obtain medical advice if they believe they, or a member of their dental team, could have been infected with a blood-borne virus.

Some practitioners, especially those in areas where they consider the prevalence of blood-borne infections to be low, may feel that the disruption to their working day in correctly managing occupational exposures to blood and saliva does not warrant the effort. However, if they should find themselves in a situation where transmission has been alleged to occur to one of their staff, and they cannot demonstrate that they have an acceptable policy for managing occupational injuries, then they could have to answer to the Health and Safety Executive, the General Dental Council or to the civil courts. Likewise, an infected general practitioner, or dental hygienist, may not be awarded compensation for loss of income unless he or she could show that the correct procedures had been followed.

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