

UK Health Departments

**Guidance for
Clinical Health Care
Workers:**

**Protection Against Infection
with Blood-borne Viruses**

**Recommendations of the
Expert Advisory Group on AIDS
and the Advisory Group on Hepatitis**

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Further copies of this guidance can be obtained from:
Department of Health, PO Box 410, Wetherby, LS23 7LN or it can be photocopied freely provided its source is acknowledged.

It is also available on the Department of Health's Internet website at
<http://www.open.gov.uk/doh/chcguid1.htm>

1: INTRODUCTION

Scope of this guidance

- 1.1 This booklet contains guidance on measures to protect clinical health care workers (HCWs)¹ against occupational infection with blood-borne viruses (BBVs). It is based on the recommendations of the Expert Advisory Group on AIDS and the Advisory Group on Hepatitis. It draws also on work done by the Advisory Committee on Dangerous Pathogens and the Microbiology Advisory Committee.
- 1.2 The booklet may also be used as a basis for drawing up guidelines for those in allied occupations e.g. persons dealing with contaminated equipment, who may be exposed occupationally to a risk of BBV infection. Some advice is given on the disposal of clinical waste, and the labelling and transport of specimens which have implications for the safety of others. Adherence to the recommendations will also provide protection from BBV infection to patients and other persons present in the health care setting.
- 1.3 This document covers known BBVs including human immunodeficiency virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV). There are practical advantages in adopting common infection control policies to prevent the transmission of BBVs, and this is reflected in the guidance.
- 1.4 Other relevant guidance is listed in Annex 1.

Responsibilities of employers

- 1.5 Health Authorities, Health Boards and NHS Trusts should draw up their own detailed local guidelines on prevention of spread of BBVs in the health care setting.
- 1.6 It is recommended that every hospital should have an Infection Control Team which has the primary responsibility for, and reports to the Chief Executive on, all aspects of surveillance, prevention and control of infection in a hospital. Hospitals and other units (eg community hospitals, GP units etc.) which do not have an Infection Control Team should make appropriate arrangements for the services to be provided from a nearby unit. Every hospital should have a Hospital Infection Control Committee as the main forum for regular routine consultation between the Infection Control Team and the rest of the hospital.
- 1.7 Ultimate responsibility for health and safety lies with the Chief Executive of each Health Authority, Health Board, or NHS Trust, who must ensure that all parts of the organisation have a suitable health and safety policy and that its implementation is monitored regularly to ensure its effectiveness.
- 1.8 The Infection Control Team should collaborate with the Occupational Health Service (OH Service) to provide advice to staff on measures to avoid the transmission of infection between staff and patients.
- 1.9 The OH Service should advise managers and employees on a suitable immunisation policy, and, in liaison with the Infection Control Team, should apply the Health Departments' guidelines in drawing up policies on immunisation against infectious disease. These guidelines are set out in the publication, *Immunisation against Infectious Disease* (see Annex 1).

¹ ie any person, including students, trainees and voluntary workers, whose activities normally involve contact with patients' blood or other body fluids and tissues (see Table 1).

Legal requirements

- 1.10 All employers (including general medical and dental practitioners working in the NHS) have a legal obligation under the Health and Safety at Work etc. Act 1974 (HSWA) to ensure that all their employees are appropriately trained and proficient in the procedures necessary for working safely². They also have a responsibility to protect voluntary workers. Furthermore, employers are required by the *Control of Substances Hazardous to Health Regulations 1994* (COSHH), to review every procedure carried out by their employees which involves contact with a substance hazardous to health, including pathogenic micro-organisms. Employers and their employees are also responsible in law to ensure that any person on the premises (eg, hospital patients and visitors) is not placed at any avoidable risk, as far as is reasonably practicable.
- 1.11 Managers, with assistance from the OH Service and health and safety advisers have a statutory duty to:
- prepare and update a written statement of health and safety policy, setting out the local arrangements for complying with health and safety and other workforce legislation (HSWA);
 - provide a safe and healthy working environment for employees, contractors, members of the public, patients and visitors (HSWA and *Environmental Protection Act 1990*);
 - assess and manage risk according to the *Management of Health and Safety at Work Regulations 1992*;
 - identify and assess the risks to health of microbiological and chemical hazards, prevent and control exposure to the risks, inform and train employees, monitor exposure and institute health surveillance where appropriate (COSHH);
 - report incidents, diseases and dangerous occurrences (*Reporting of Incidents, Diseases and Dangerous Occurrences Regulations 1995 - RIDDOR*);
 - help to prevent illness and injuries at work by ensuring that staff are appropriately trained, eg in infection control procedures. Training programmes should be organised to meet the needs of different staff groups especially those with frequent staff turnover such as Accident and Emergency departments.

² Similar legislative controls are in place in Northern Ireland. Details are available on request from the Department of Health and Social Services.

2: VIRAL HAZARDS IN HEALTH CARE SETTINGS

General principles

- 2.1 The BBVs which present most cross-infection hazard to HCWs are those associated with a carrier state with persistent replication of the virus in the human host and persistent viraemia. These include HIV and several hepatitis viruses, considered separately in the following paragraphs. For other rarer potentially blood-borne viruses, specialist virological advice should be sought.
- 2.2 In general, occupational risks of transmission of BBVs to HCWs arise from the possibility of exposure to blood and exceptionally to certain other body fluids or body tissues from an infected patient (see Table 1). Semen and breast milk may pose a risk of BBV infection but exposure of HCWs is considered unlikely in most health care settings.

TABLE 1: Body fluids etc which should be handled with the same precautions as blood

- | | |
|------|---|
| i) | Cerebrospinal fluid
Peritoneal fluid
Pleural fluid
Pericardial fluid
Synovial fluid
Amniotic fluid
Semen
Vaginal secretions
Breast milk |
| ii) | Any other body fluid containing visible blood, including saliva in association with dentistry |
| iii) | Unfixed tissues and organs |

Human Immunodeficiency Virus (HIV)

- 2.3 HIV has been isolated from blood, semen, vaginal secretions, saliva, tears, urine, breast milk, and cerebrospinal, synovial and amniotic fluids. However only blood, blood products, semen, vaginal secretions, donor organs and tissues and breast milk have been implicated in the transmission of infection. There is good evidence from studies of household contacts of infected people that HIV is not spread by close social contact even when this is prolonged, as in a family setting. A small number of cases of "household" transmission of HIV have occurred, but transmission is most likely to have occurred through exposure to infected blood or blood contaminated body fluids.
- 2.4 Although HIV transmission may occur in health care settings, most HIV transmission occurs:
- by unprotected penetrative sexual intercourse with an infected person (between men or between man and woman);
 - by inoculation of infected blood. At present in the UK this results mainly from drug misusers sharing blood contaminated injecting equipment;
 - from an infected mother to her baby before or during birth or through breast feeding.
- 2.5 There is at present no vaccine to prevent HIV infection.

Hepatitis B virus (HBV)

- 2.6 Hepatitis B virus surface antigen (HBsAg) may be found in blood and virtually all body fluids of patients with acute hepatitis B and carriers of the virus but blood, semen and vaginal fluids are mainly implicated in the spread of HBV infection. Transmission usually occurs:
- by unprotected sexual intercourse;
 - by injecting drug misusers sharing blood contaminated injecting equipment;
 - perinatally from an infected mother to her baby.
- 2.7 Up to 90% of babies infected perinatally and around 5% to 10% of those infected as adults develop chronic carrier status. The persistence of the 'e' antigen correlates with a high level of viral replication and increased infectivity.
- 2.8 The most important measure whereby HCWs can be protected against HBV is by immunisation, which provides protection in up to 90% of recipients. Immunisation is not a substitute for good infection control practice since it provides no protection against infection with other BBVs.

Hepatitis C virus (HCV)

- 2.9 HCV is the main cause of what was previously known as non-A non-B hepatitis. HCV is most frequently acquired by direct blood to blood contact and the commonest mode of transmission in the UK is the sharing of blood contaminated injecting equipment by injecting drug misusers. Both sexual and perinatal transmission can occur but in general these are less efficient modes of transmission.
- 2.10 There is at present no vaccine to prevent HCV infection.

Hepatitis D virus (HDV)

- 2.11 HDV causes infection only in those who have active HBV infection. HDV infection can occur either as co-infection with HBV or as superinfection of an HBV carrier. Since HDV depends on an HBV-infected host for replication, prevention of HBV infection by immunisation will also prevent HDV infection.

GB virus-type C (Hepatitis G virus)

- 2.12 Recently a further BBV has been described, provisionally designated either as GBV-C agent or hepatitis G virus. The full clinical significance of infection with this virus, whether it is a true hepatotropic virus, and its natural history are as yet unknown.

Risks of transmission of BBVs

- 2.13 The risk of transmission of BBVs is greater from patient to HCW than from HCW to patient. The risk to the HCW for each virus is proportional to the prevalence of that infection in the population served, the infectious status of the individual source patient, which may or may not be known, and the risk of a significant occupational exposure occurring during the procedures undertaken. In the health care setting transmission most commonly occurs after percutaneous exposure to a patient's blood by "sharps" or "needlestick" injury. The risk of transmission to a HCW from an infected patient following such an injury has been shown to be around 1 in 3 when a source patient is infected with HBV and is 'e' antigen positive, around 1 in 30 when the patient is infected with HCV and around 1 in 300 when the patient is infected with HIV.

- 2.14 "Sharps" in this context are needles, sharp-edged instruments, broken glassware or any other item which may be contaminated in use by blood or body fluids and which may cause laceration or puncture wounds. Sharp tissues such as spicules of bone or teeth may also pose a risk of injury.
- 2.15 Most cases of occupationally acquired HIV infection have arisen from percutaneous exposure to HIV infected material, and of these the majority have followed injury from hollow needles in association with procedures where a needle or cannula is placed in a vein or artery eg venepuncture. Others have arisen through exposure of mucous membranes or non-intact skin to blood.
- 2.16 Transmission of BBVs may result from contamination of mucous membranes of the eyes or the mouth, or of broken skin, with infected blood or other infectious material. The transmission risks after a mucocutaneous exposure are lower than those after a percutaneous exposure. The risk of acquiring HIV after a single mucocutaneous exposure is less than 1 in 2000. Mucocutaneous exposures occur more frequently than percutaneous exposure; the majority of both types of exposure are preventable.
- 2.17 BBVs are potentially transmissible by a human bite through mucous membrane exposure if the bite breaks the skin of the person bitten.
- 2.18 There is no evidence that BBVs can be transmitted by blood contamination of intact skin, by inhalation or by faecal-oral contamination.
- 2.19 Not all patients infected with BBVs have had their infections diagnosed. It is therefore important that all blood and body fluids and tissues (see Table 1, page 9) are regarded as potentially infectious, and HCWs should follow precautions scrupulously in all circumstances to avoid contact with them.

3: PRECAUTIONS AGAINST EXPOSURE TO BBV INFECTION

Assessment of risk

- 3.1 Health care staff carrying out clinical procedures should at all times observe written policies produced by their employing authority, which in turn should observe the COSHH Regulations. The Regulations require employers to carry out an assessment of the work to be done and of current procedures in order to be able to prevent or control exposure to substances hazardous to health. Guidance on risk assessment is given in some of the Health and Safety Executive (HSE) documents listed in Annex 1.

Categorisation of risks and appropriate levels of protection

- 3.2 Each team or group of HCWs working together on a task should discuss the hazards involved in their current methods of working and ways of reducing these hazards. This process should include a consideration of the risks to others involved by such activities as the disposal of sharps, bodies, tissues, body fluids, and contaminated disposable items and the maintenance of equipment.
- 3.3 The team should be encouraged to devise safe, and reasonably practicable procedures and routines for performing each task; ensure they are followed after appropriate training and keep them under active review.
- 3.4 The appropriate level of precautions to be taken for any procedure should be determined according to the extent of possible exposure to blood and not because of knowledge or speculation about the infectious status of the patient. All blood, tissues and some body fluids (see table 1, page 9) should be regarded as potentially infectious. This approach is sometimes referred to as "Universal Precautions".

General measures to reduce the risk of occupational exposure

- 3.5 The following measures will help to minimise the risk of exposure to BBVs and are appropriate for all health settings:
- wash hands before and after contact with each patient, and before putting on and after removing gloves;
 - change gloves between patients;
 - cover existing wounds, skin lesions and all breaks in exposed skin with waterproof dressings³. Wear gloves if hands are extensively affected;
 - wear gloves where contact with blood can be anticipated;
 - avoid sharps usage where possible, and where sharps usage is essential, exercise particular care in handling and disposal;
 - avoid wearing open footwear in situations where blood may be spilt, or where sharp instruments or needles are handled;
 - clear up spillage of blood promptly and disinfect surfaces (see Annex 2);

³ Pre-employment occupational health assessment should identify those with damaged skin eg. fissured hand eczema, who may be at higher risk of occupationally acquired infection, and ensure that advice is given about minimising any occupational health risk to which they may be exposed.

- wear gloves when cleaning equipment prior to sterilisation or disinfection, when handling chemical disinfectant and when cleaning up spillages;
 - follow safe procedures for disposal of contaminated waste. The HSE guidance is set out in *Safe disposal of clinical waste* (see Annex 1).
- 3.6 HCWs should be encouraged to follow good practice methods. HCWs and their employers should keep themselves informed of safe methods of working. They may wish to consider the benefits of introducing new safety devices such as needleless intravenous systems, syringes with advanceable needle guards, self-sheathing trocars, blunt suture needles, safety needle holders and surgical gloves with puncture indicators.
- 3.7 Ongoing assessment of newer work practices, operative techniques and equipment, some of which are described later in this chapter, will determine whether they will decrease the rate of percutaneous injury, be acceptable to users, be cost effective and avoid adverse consequences to patients or other HCWs.
- 3.8 Any cost effectiveness assessment should include a consideration of the costs of occupational health follow-up of HCWs after needlestick injuries, the possible morbidity of HCWs in these circumstances and associated costs, and any legal claims against Health Authorities, Health Boards, NHS Trusts or independent practitioners for compensation for occupationally acquired BBV infections.

Safe handling and disposal of sharps

- 3.9 Many percutaneous injuries are preventable. Such injuries may occur while hollow bore needles are being prepared for disposal, eg whilst attempting to resheath a needle manually after venepuncture. Implementation of the following procedures for the safe handling and disposal of sharps will reduce the risks:
- place all disposable sharps in sharps containers immediately after use. The containers should be placed safely out of reach of children as near as practicable to sites of use, be puncture resistant, of adequate depth and capacity, suitable for incineration and conform to British Standard 7320 if they are for use where on site disposal takes place. If sharps containers are to be transported off site for disposal they must be of a type approved under the requirements of the *Carriage of Dangerous Goods (Classification, Packaging and Labelling)* and *Use of Transportable Pressure Receptacles Regulations 1996*.
 - provide sharps containers in adequate numbers and never overfill. They should be disposed of as clinical waste after closing securely, and replaced promptly;
 - avoid resheathing needles manually. Only resheath needles if a device is available to allow this to be done using one hand only. If such a device is not immediately accessible, the single handed scoop method may be used, i.e. the HCW holds the barrel of the syringe and scoops the needle cap from a hard, flat surface on to the end of the needle. Only when the needle tip is covered should resheathing be completed with the other hand. Resheathing devices should be decontaminated regularly;
 - discard disposable syringes and needles wherever possible as a single unit, into sharps containers;

- remove needles from syringes only when essential eg when transferring blood to a container, or when the needle is disposable but the syringe is not, eg local anaesthetic syringes as used in dentistry. Needle forceps or other suitable devices should be readily available;
- remove needles and attach blind hubs to syringes containing arterial blood which are to be sent to the laboratory. Intravascular guidewires and glass slides must be disposed of as sharps.

Useful guidance is given in the Medical Devices Agency's Safety Action Bulletin No 102, *Use and Management of Sharps Containers (1993)* and the British Medical Association's *Safe Use and Disposal of Sharps (1993)*.

Gloves and venepuncture

- 3.10 Gloves cannot prevent percutaneous injury but may reduce the risk of acquiring a BBV infection. Although punctured gloves allow blood to contaminate the hand, the wiping effect can reduce the volume of blood to which the worker's hand is exposed and in turn the volume inoculated in the event of percutaneous injury.
- 3.11 Some HCWs with long experience of performing venepuncture without gloves may prefer not to wear them to avoid a perceived reduction of manual dexterity and possible consequent increased risk of percutaneous injury.
- 3.12 The following is advised:
- gloves should be available to all HCWs who wish to wear them for venepuncture;
 - inexperienced venepuncturists including medical students, should become accustomed to the wearing of gloves from the beginning of their training, and should not take blood from patients known to be infected with BBVs until trained and considered competent;
 - all venepuncturists, including those who are experienced, should wear gloves if there are cuts or abrasions on the hands and it is not practical for them to be covered by waterproof dressings alone, or if the patient is so restless that the risk of injury to the HCW is increased.
- 3.13 Single use medical gloves (ie surgical gloves and examination/procedure gloves) should conform to the requirements of European Standard 455. If latex gloves cannot be worn because of the possibility of an allergic reaction, gloves produced from synthetic materials to the above standard should be used. (See Medical Devices Agency Device Bulletin, *Latex Sensitisation in the Health Care Setting (Use of Latex Gloves)* (see Annex 1).

Measures to reduce risks during surgical procedures

- 3.14 The advice which follows is applicable to surgery and all areas of medicine, midwifery and dentistry where surgical procedures are performed, including general practice. Risk reduction strategies are of particular relevance to obstetrics and gynaecology, where the highest rates of occupational exposure of health care workers to the blood of patients have been recorded. Such strategies are also of particular relevance to workers who provide emergency care.
- 3.15 Most percutaneous injuries in the operating theatre or during obstetric/midwifery procedures are caused by sharp suture needles. The risk of percutaneous injury to the operator has been found to be associated with the type and duration of the procedure, and the use of fingers rather than instruments to hold tissue whilst suturing. The rate of injury has been noted to vary from 4% for

orthopaedic procedures to 10% for gynaecological procedures. For hysterectomy alone, the rate of percutaneous injury may vary from 10% for abdominal hysterectomies to 21% for vaginal hysterectomies. More than 50% of percutaneous injuries sustained by surgeons have been to the non-dominant index finger and 20% of injuries are caused by the operator to the assistant.

- 3.16 Perforations of surgical gloves are common, increase in number according to the length of the surgical procedure and often go unnoticed. Gloves can also become porous during prolonged procedures due to hydration of latex. Double gloving does not "prevent" sharps injury, but has been shown to effect up to a six-fold decrease in inner glove puncture. In the event of percutaneous injury, the volume of blood transmitted may also be reduced due to the enhanced wiping effect of two layers of glove.
- 3.17 The use of blunt-tipped needles can further reduce the incidence of glove puncture and of percutaneous injury. Although unsuitable for suturing skin and bowel, they can be used effectively for all other components of abdominal closure. For skin and bowel closure, stapling devices are a safer alternative to sharp suture needles.
- 3.18 A US multicentre study of occupational exposure has shown that approximately 25% of vaginal and 35% of Caesarian deliveries are complicated by contact of the skin or mucous membranes of the HCW with the patient's blood. Blood-skin contacts pose a risk of BBV transmission to the HCW if the skin surface is not intact. Non-intact skin on hands is common in surgical personnel because of dermatitis from frequent scrubbing, as are cuts and abrasions incurred during other activities.

The information given above draws on the following sources:

Prevention of transmission of blood-borne pathogens. Ed. Rhodes RS and Bell DM; *Surg Clin North Am* 1995 75 1047-1217

Gerberding JL, Littell C, Tarkington A, Brown A, Schecter WP. Risk of exposure of surgical personnel to patients' blood during surgery at San Francisco General Hospital, *N Engl J Med* 1990; **322**:1788-1793.

Tokars JI, Bell DM, Culver DH, et al. Percutaneous injuries during surgical procedures. *JAMA* 1992; **267**:2899-2904.

Hartley JE, Ahmed S, Milkins R, Naylor G, Monson JL, Lee PW. Randomised trials of blunt vs cutting needles to reduce glove puncture during mass closure of the abdomen. *Brit J Surg* 1996 **83**: 1156-7

Thomas PB, Falder S, Jolly M, Saunders StN, Smith JR. The role of blunt-tipped needles and a new needle holder in reducing needlestick injury. *J Obstet Gynaecol* 1995; **15**:336-7

Tokars JI, Culver DH, Mendelson MH, et al. Skin and mucous membrane contact with blood during surgical procedures:risk and prevention, *Infect Control Hosp Epidemiol* 1995; **16**: 703-711.

- 3.19 In order to minimise the risk of injury, the tasks of each member of the surgical team should be outlined. Specific hazards, and measures to reduce the risks from these should be identified for each team member and should be reviewed periodically.

Reducing the risk of percutaneous exposure: methods, procedures and equipment

- 3.20 The following measures may reduce the risk of percutaneous exposure and should be considered where practicable:

- have no more than one person working in an open wound/body cavity at any time (unless essential to the safe and successful outcome of an operation);
- use a "hands-free" technique where the same sharp instrument is not touched by more than one person at the same time, avoid hand to hand passing of sharp instruments during an operation;
- assure safer passage of necessary sharp needles and instruments via a "neutral zone", announce when a sharp instrument or needle is placed there. The "neutral zone" may be a tray, kidney basin or an identified area in the operative field;
- ensure that scalpels and sharp needles are not left exposed in the operative field, but always removed promptly by the scrub nurse having been deposited in the neutral zone by the operator or assistant;
- use instruments rather than fingers for retraction, and for holding tissues while suturing;
- use instruments to handle needles and to remove scalpel blades;
- direct sharp needles and instruments away from own non-dominant, or assistant's hand;
- remove sharp suture needles before tying suture; tie suture with instruments rather than fingers.

- 3.21 Alternative equipment and procedures should be considered where practicable:

- eliminate any unnecessary use of sharp instruments and needles, eg by appropriate substitution of electrocautery, blunt-tipped needles (see 3.16) and stapling devices;
- opt for alternative less invasive surgical procedures where practicable and effective;
- avoid scalpel injuries associated with assembly/disassembly, by using scalpels which are either disposable, have retractable blades or which incorporate a blade release device;
- avoid the use of sharp clips for surgical drapes; blunt clips are available as are disposable drapes incorporating self-adhesive operating film;
- consider double gloving with a larger pair of gloves innermost for optimum comfort.

Reducing risk of blood-skin contact

- 3.22 The following measures may reduce the risk of blood-skin contact and should be considered:

- if a glove puncture is suspected or recognised, rescrub if possible and reglove as soon as safety permits;
- change gloves regularly if performing, or assisting with a prolonged surgical procedure even if no glove puncture is suspected or recognised;

- the need for protection of body, eyes and face;
- choose waterproof gowns, or wear a surgical gown with waterproof cuffs and sleeves and a plastic apron underneath if blood contact and therefore "strike-through" is considered a risk - such as procedures anticipated to involve high blood loss;
- if legs or feet may be contaminated (as in obstetric and some other procedures performed in the lithotomy position), ensure that impermeable gown/apron covers legs and wear impermeable footwear. Wellington or calf length overboots are preferable to shoes or clogs. Surgical drapes with "catch-basins" are available to reduce the risk of leg and foot contamination;
- wear protective headwear and surgical mask. Male HCWs should consider wearing hoods rather than caps to protect freshly shaven cheeks and necks;
- ensure that all blood is cleansed from a patient's skin at the end of an operation before patient leaves theatre;
- remove protective clothing including footwear on leaving the contaminated area. All contaminated reusable protective clothing, including footwear, should be subjected to cleaning and disinfection or sterilisation, with appropriate precautions for those undertaking it. Footwear should be adequately decontaminated after use.

Measures to reduce eye and other facial exposure

- 3.23 Protect mucous membrane of eyes with protective eyewear. This should prevent splash injuries (including lateral splashes) without loss of visual acuity and without discomfort. Face shields may be considered appropriate for procedures which involve a risk of splatter of blood including aerosols or other potentially infectious material. Various forms of combined eye and face protection are available. Guidance on the choice of eye wear is given in *BS7028: (1988) Guide for Selection, Use and Maintenance of Eye Protection for Industrial and other uses*. *BS EN 166: 1988* lays down requirements for eye protectors.
- 3.24 Eye wash should be available in case of accidental exposure. Contact lenses should be removed prior to eyewashing.

4: OTHER MEASURES TO PREVENT BBV TRANSMISSION

Hepatitis B immunisation

- 4.1 All HCWs, including students and trainees, who have direct contact with patient's blood or other potentially infectious body fluids or tissues should be immunised against HBV. Advice should be obtained from the OH Service (see 1.9) Further information on immunisation is available in the Health Departments' Handbook, *Immunisation against Infectious Diseases* (see Annex 1).
- 4.2 In 1993 the Health Departments issued guidance, *Protecting health care workers and patients from Hepatitis B*, and an addendum was issued in 1996 (see Annex 1). Under this guidance all HCWs who perform exposure prone procedures (EPPs)⁴ should be immunised and have their response to the vaccine checked; non-responders to vaccination should be investigated for HBV infection to identify those who may pose a risk of infection to their patients during EPPs. HCWs whose hepatitis B carrier status is not known should be tested before carrying out EPPs.
- 4.3 The OH Service is responsible for keeping accurate written health and immunisation records for each employee.

Decontamination and waste disposal

- 4.4 Many occupational exposures to BBVs result from failure to adhere to basic rules concerning decontamination, waste disposal etc. The following general guidance should be drawn to the attention of all staff who come into contact with blood contaminated material.
- 4.5 It is recommended that a member of senior management is designated as clinical waste control officer whose function it will be to oversee the operation of the clinical waste policy. This is particularly important in order to protect third parties, such as ancillary staff, and anyone else present in the health care setting, such as patients and their visitors, from preventable exposure.
- 4.6 The Infection Control Team should collaborate with relevant staff over the implementation and monitoring of routine procedures such as disinfection or sterilisation of instruments and equipment, production of sterile supplies and safe collection and disposal of clinical waste.

Equipment and materials

- 4.7 Single use equipment should be used where appropriate, particularly where decontamination cannot be carried out effectively. Any reusable equipment which is to be reused and which has been employed for a procedure involving potential contact with a patient's blood must be sterilised or disinfected before it is reused (see Annex 1). Such equipment includes items which may not necessarily be in direct contact with the patient eg manual self inflating resuscitation bags and dental handpieces.
- 4.8 Reusable equipment must be of a type that is readily decontaminated without distortion or damage to its function. The manufacturer's instructions must be consulted to ensure compatibility of materials with the methods of decontamination employed.
- 4.9 When selecting suction and aspiration equipment, apparatus which will discharge directly into a waste outlet is to be preferred in order to reduce the potential for accidental spillage. High speed aspirators used for dentistry should exhaust externally in order to avoid the spread of potentially infectious material within the surgery.

Decontamination of equipment

- 4.10 Thorough physical cleaning of instruments in warm water with detergent to remove blood and debris is essential prior to disinfection or sterilisation, for either procedure to be effective. Neither cold nor hot water should be used for this purpose; the former may harden fats and the latter may cause proteinaceous material to adhere.

⁴ **Exposure Prone Procedures** are those where there is a risk that injury to the worker may result in the exposure of the patient's open tissues to the blood of the worker. These include procedures where the worker's gloved hands may be in contact with sharp instruments, needle tips and sharp tissues (spicules or 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.

4.11 Advice on sterilisation and disinfection is given in Annex 2.

Disposal of clinical waste (sharps - see page 10)

4.12 All waste which is contaminated with blood, tissues and other potentially infectious body fluids (see Table 1, page 9) should be treated as "clinical waste"⁵ in accordance with the Health and Safety Commission's Health Services Advisory Committee's document, *Safe disposal of clinical waste* (see Annex 1).

4.13 Attention is drawn to the duties of the employer under the HSWA which extends to employees working in the home environment. The employer must ensure that adequate arrangements are made for safe disposal of clinical waste in the community as well as in the hospital setting.

Contaminated linen

4.14 As with all other contaminated items, clothing and linen stained with blood or other potentially infected body fluids which is to be reused should be handled with care and placed in suitable bags for safe storage and transportation for laundering.

4.15 The recommended temperatures for thermally disinfecting linen are contained in the Department of Health's guidance *Hospital laundry arrangements for used and infected linen* (see Annex 1). In the community setting or elsewhere without access to specialist services, contaminated clothing or linen should be:

- washed with detergent using the hot wash cycle of a domestic washing machine to a temperature of at least 80°C; or
- dry cleaned at elevated temperatures, or dry cleaned cold followed by steam pressing; or
- incinerated.

Overloading of washing machines should be avoided. If washing by hand is unavoidable, household rubber gloves must be worn.

Labelling, transport and reception of specimens

4.16 Any person responsible for handling specimens or other potentially hazardous material has duties under the HSWA and the COSHH Regulations to conduct the work safely.

4.17 Other regulations which apply are: *The Carriage of Dangerous Goods (Classification, Packaging and Labelling) and Use of Transportable Pressure Receptacles Regulations 1996*.

4.18 Specimens from patients with known or suspected BBV infection should be conspicuously labelled or marked "danger of infection". Accompanying paperwork should be similarly labelled. For reasons of patient confidentiality the diagnosis, if known, should not be specified.

4.19 Specimens for transportation by hand or by local transport should be despatched in individual sealable transparent plastic bags. A suitable means of containing request forms, e.g. a separate pocket on the bag, should be provided. The request form should give sufficient information to the laboratory staff receiving it to assess what special precautions may be required in the laboratory. Such information is confidential and is only available to those who "need to know". It should not be available to porters and others transporting specimens.

4.20 More detailed information on collection, labelling, despatch and transport of specimens is available in the guidance used by the Advisory Committee on Dangerous Pathogens (ACDP), *Protection against blood-borne infections in the workplace* (see Annex 1).

5 Clinical waste, as defined in the HSAC document, is considered to be 'waste arising from medical, nursing, dental, veterinary, pharmaceutical or similar practice; investigation, treatment, care, teaching or research which by nature of its toxic infectious or dangerous content may prove a hazard or give offence unless previously rendered safe and inoffensive. Such waste includes human or animal tissue or excretions, drugs and medical products, swabs and dressing, instruments or similar substances and materials'.

Postage of specimens within the UK

- 4.21 Clinical material which may contain BBVs may be sent by post provided that the conditions of the Post Office are met. It is recommended that screw-capped plastic containers are used in order to minimise the possibility of leakage or breakage. The Post Office guide should be consulted for the latest instructions for posting pathological material. At the time of this publication the Post Office requirements are, briefly, that:
- *only FIRST CLASS LETTER post or DATAPOST is used;*
 - *exclusive use is made of the range of packaging types acceptable to the Post Office;*
 - *every specimen is contained in a primary container hermetically sealed or otherwise securely closed;*
 - *the capacity of the primary container hermetically sealed or otherwise securely closed does not exceed 50ml (although multiple packs are acceptable provided that each container is separated from the next by soft absorbent material to prevent contact);*
 - *the primary container is wrapped in sufficient absorbent material to absorb all possible leakage in the event of damage and this is sealed in a leakproof bag. This primary packaging must then be placed in one of several alternative types of outer packing specified in the guide. The outer wrapper must be conspicuously labelled 'PATHOLOGICAL SPECIMEN -FRAGILE, WITH CARE' and show the name and address of the sender;*
 - *where it is known or suspected that the material may contain a Hazard Group 3 agent, then the inner wrapping should bear a hazard warning, eg a "danger of infection" label, to alert laboratory staff;*
 - *pathological specimens may not be sent by post by members of the public unless it is at the specific request of a medical practitioner, a registered dental practitioner, a veterinary surgeon, a registered nurse or a recognised laboratory or institution. In each case, the person or organisation making this specific request must supply the approved or specified packaging and clear instructions on its use.*

Body handling and disposal

- 4.22 When there is any risk of contact with blood and body fluids in handling bodies for any purpose, gloves should be worn and other protective clothing as necessary.
- 4.23 Drainage tube sites and open wounds should be covered by waterproof dressings. Those despatching a body for storage, post mortem examination or embalming should ensure there are no sharps remaining in it.
- 4.24 Wherever a person who is known or suspected to be infected with a BBV dies, it is the duty of those with knowledge of the case to ensure that those who need to handle the body, including funeral personnel, mortuary and post-mortem room staff are aware that there is a potential risk of infection. Making those who may be at risk aware of a known or suspected hazard is a statutory duty under the HSWA. Although the diagnosis should be kept confidential, the discreet use of "danger of infection" or similar labelling is appropriate, always making clear what type of precautions are needed.
- 4.25 Any body which is externally contaminated with blood, or known or suspected to be infected with a BBV should be placed in a disposable plastic body bag as soon as possible. Absorbent material may be needed when there is leakage, e.g. from surgical incisions or wounds.
- 4.26 Mortuary staff should ensure that good liaison is maintained between themselves and those who submit bodies for post-mortem examination or storage and those who collect bodies for disposal.

Post-mortem examination

- 4.27 Those undertaking post-mortem examination should adopt similar precautions to those recommended in this document for invasive procedures on living patients.
- 4.28 Further guidance is provided by the Health and Safety Commission Health Services Advisory Committee in *Safe working and the prevention of infection in the mortuary and post-mortem room*, and by the ACDP in *Protection against blood-borne infections in the workplace* (see Annex 1).

5: MANAGEMENT OF BLOOD EXPOSURE INCIDENTS

General principles

- 5.1. Needlestick and other exposures to blood in the health care setting are unnecessarily common at present. Many result from a failure to follow recommended procedures, and from careless disposal of waste. Strict adherence to the guidance earlier in this document should reduce the incidence of these exposures.
- 5.2. There will remain occasions where exposure occurs despite careful attention to the correct procedures. All exposure incidents should be reviewed to consider how recurrence might be prevented.
- 5.3. All HCWs in hospital and elsewhere (eg general medical and dental practice) should be informed and educated about the possible risks from occupational exposure and should be aware of the importance of seeking urgent advice following any needlestick injury or other possible exposure. Training should ensure that all staff know how and to whom to report, and that confidentiality is guaranteed.
- 5.4. Although the risk of acquiring a BBV through occupational exposure is low, the consequences are serious. Occupational exposure to known or suspected BBV infected material is always stressful, and for some, extremely so.
- 5.5. HCWs or any other person in the health care setting exposed to HBV or HIV infected blood or body fluids should be offered appropriate post-exposure prophylaxis. HCWs particularly at risk of exposure to HIV should be encouraged to consider in advance, whether in the event of an occupational exposure to HIV, they would wish to take prophylaxis.
- 5.6. At present, there is no effective post-exposure prophylaxis against HCV infection.

Sources of advice

- 5.7. Every employer should draw up a policy on the management of exposures. Each Health Authority, Health Board or NHS Trust should designate one or more doctors to whom health care staff may be referred immediately for advice if they have been exposed to potentially infected blood. Local policies should also specify who will be responsible for provision of post-exposure prophylaxis and follow up. Doctors in OH Services should be considered for this role. Sources of expert advice may also include consultants in virology, microbiology, infectious diseases, HIV disease, hepatology, genito-urinary medicine and public health medicine.
- 5.8. The OH Service should advise managers and staff on the management of injuries sustained at work, eg needlestick injuries, and in cases where entitlement to NHS or industrial injuries benefits is under consideration.
- 5.9. General medical and dental practitioners should also ensure that provisions are in place for themselves and their staff, including access to urgent occupational health advice.
- 5.10. Information, counselling and psychological support should be made available to any employee who reports an exposure and potential risk of a BBV infection. This may include encouragement to provide a baseline sample for storage and follow up samples for testing as appropriate for HIV, HBV or HCV infection, and advice about treatment. While testing earlier might be appropriate in some cases, testing at 6 months after the exposure will usually exclude the possibility of transmission of these infections. Pre-test discussion should reflect the importance of any test procedure and the implications of the results. Discussion after the tests should provide the necessary support.
- 5.11. The designated doctor(s) must maintain awareness of the latest developments in post-exposure prophylaxis including the use of hepatitis B immunoglobulin and hepatitis B vaccine and the use of anti-retroviral drugs following occupational exposure to HIV infection.

Post-exposure procedures

- 5.12 Action after a HCW has been exposed to blood or other potentially infectious body fluids should take account of the interests of both the worker and the source patient. The circumstances which led to the exposure should be identified and all possible steps taken to prevent recurrence.
- 5.13 Immediately following any exposure, the site of exposure ie. wound or non-intact skin should be washed liberally with soap and water but without scrubbing. Exposed mucous membranes including conjunctivae should be irrigated copiously with water, after first removing contact lenses if present. If there has been a puncture wound, free bleeding should be encouraged gently but the wound should not be sucked.
- 5.14 HCWs who sustain an occupational exposure should report the exposure promptly and seek urgent advice on further management and treatment.
- 5.15 Provision should be made for an appropriate person to be available outside normal working hours to advise and treat health care workers who sustain significant occupational exposures. This person must be provided with a written version of the Health Authority, Health Board or NHS Trust's policy on the management of exposures.

Testing and counselling

- 5.16 The designated doctor will need, where possible, to obtain information from or about the source patient concerning possible indicators of BBV infection, including risk factors and results of previous tests for HIV and hepatitis, medical history suggestive of such infection; and details of past and current antiviral therapy in patients known to be HIV infected. The source patient should be asked to consent to testing for BBV infections including HIV, HBV and HCV. This will entail pre-test discussion and obtaining fully informed consent. If the source patient is approached in a sensitive manner, it is understood that consent to testing is rarely withheld.
- 5.17 A situation may arise exceptionally where it is necessary to balance the health interests of the exposed health care worker and others against those of the source patient in deciding whether or not a blood sample which has already been obtained from the patient for other purposes should be tested for evidence of infection. In such cases the doctor should have regard to the guidance in *Serious Communicable Diseases* issued by the General Medical Council. A doctor must be able to justify a particular course of action taken in exceptional circumstances.

Post exposure prophylaxis

HBV

- 5.18 If the HCW may have been exposed to HBV infected blood post-exposure prophylaxis should be considered. Guidance from the Public Health Laboratory Services (PHLS) Hepatitis Sub-committee is given in, *Exposure to hepatitis B virus; guidance on post exposure prophylaxis (Communicable Disease Report, Vol 2, Review No 9, August 1992)*. A summary is given in table 2.

**Table 2:
HBV prophylaxis for reported exposure incidents**

HBV status of person exposed	Significant Exposure			Non-significant exposure	
	HBsAg positive source	Unknown source	HBsAg negative source	Continued risk	No further risk
≤ 1 dose HB vaccine pre-exposure	Accelerated course of HB vaccine* HBIG x 1	Accelerated course of HB vaccine*	Initiate course of HB vaccine	Initiate course of HB vaccine	No HBV prophylaxis Reassure
≥ 2 doses HB vaccine pre-exposure (anti-HBs not known)	One dose of HB vaccine followed by second dose one month later	One dose of HB vaccine	Finish course of HB vaccine	Finish course of HB vaccine	No HBV prophylaxis Reassure
Known responder to HBV vaccine (anti-HBs ≥ 10 miU/ml)	Consider booster dose of HB vaccine	Consider booster dose of HB vaccine	Consider booster dose of HB vaccine	Consider booster of HB vaccine	No HBV prophylaxis Reassure
Known non-responder to HB vaccine (anti-HBs <10 miU/ml 2-4 months post-vaccination)	HBIG x 1 Consider booster dose of HB vaccine	HBIG x 1 Consider booster dose of HB vaccine	No HBIG Consider booster dose of HB vaccine	No HBIG Consider booster dose of HB vaccine	No prophylaxis Reassure

*An accelerated course of vaccine consists of doses spaced at 0, 1 and 2 months. A booster dose may be given at 12 months to those at continuing risk of exposure to HBV

Source: PHLS Hepatitis Subcommittee. CDR Review 1992:2;R97-R101. (Further details and explanation of terms used are contained in this article.)

HCV

- 5.19 At present no post-exposure prophylaxis is available for HCV.

HIV

- 5.20 If the source patient is known to be infected with HIV or is considered to be at risk but has not been tested, the UK Health Departments' advice in *Guidelines on post-exposure prophylaxis for health care workers occupationally exposed to HIV* (see Annex 1) should be followed. These guidelines developed by the Expert Advisory Group on AIDS (EAGA) offer advice on: assessment of the risk to a health care worker of acquiring HIV infection after occupational exposure; when post-exposure prophylaxis (PEP) should be recommended; the choice of anti-retroviral drugs; how to ensure that all health care workers have immediate, 24 hour access on advice to PEP, to drugs and to appropriate support; and the setting up of local PEP policies and protocols. Decisions about prescribing PEP should follow a risk assessment of the incident, based on the circumstances of the exposure and the source patient.

Work practices during follow up

- 5.21 Pending serological follow up after occupational exposure to HIV, a HCW need not avoid performing exposure prone procedures (EPPs - see footnote page 23). This is because the risk of the HCW having become occupationally infected, combined with the even smaller risk of that infection then being transmitted to a patient during an EPP is of such small order as not to merit such a restriction. Advice should be given about safer sex and avoiding blood donation during the follow up period. However in the event of the HCW seroconverting and having established HIV infection, performing EPPs must cease in accordance with EAGA's recommendations in *AIDS/HIV infected health care workers: guidance on the management of infected health care workers*.
- 5.22 Adherence to the recommendations on immunisation (see paragraph 4.1-4.3) should minimise the risk of health care workers being occupationally infected with HBV. However, should infection occur the Health Departments' guidance in *Protecting Health Care Workers and Patients from Hepatitis B* should be followed.

Reporting of incidents

- 5.23 Any blood exposure must be reported promptly to the person designated to record such accidents. A full record must be prepared and preserved and the HCW referred to the doctor previously designated by the Health Authority, Health Board, or NHS Trust (see paragraph 5.7).
- 5.24 Under the RIDDOR Regulations, employers may be required to report to the HSE significant occupational exposure to BBVs. The most likely requirement, if any, may be the need to report a dangerous occurrence, namely "any accident or incident which resulted or could have resulted in the release or escape of a biological agent likely to cause severe human infection or illness". Cases of BBV infection resulting from exposure in the health care setting will also normally be a reportable disease within the meaning of RIDDOR. More detailed guidance on requirements of RIDDOR can be obtained from the HSE.
- 5.25 Occupational health physicians and clinicians involved in the care of HCWs are encouraged to report (in complete confidence) incidents involving occupational exposure to BBVs, and their outcome, to CDSC or SCIEH. Such reporting is voluntary but is necessary in order to provide the most up-to-date information on risks of HIV transmission and on the side effects and benefits of prophylaxis where relevant.

Management of HCWs infected with BBVs

- 5.26 Those who have acquired BBV infections should be referred to an appropriate specialist for assessment and any further clinical management.
- 5.27 Recommendations from the Expert Advisory Group on AIDS and from the Advisory Group on Hepatitis on the management of HCWs infected with blood-borne viruses are given in other guidelines. These are kept under continuing review and updated in the light of emerging epidemiological evidence. Those providing occupational health advice should be aware of the latest

recommendations. In some workers infected with blood-borne viruses a modification of working practices will be necessary to avoid performing EPPs where injury to the HCW could result in the worker's blood contaminating a patient's open tissues.

- 5.28 If doubts exist about the need for modification of working practices, or a change in work area, the UK Advisory Panel for Health Care Workers Infected with BBVs (UKAP) can be asked to advise. Contact should be made through the UKAP's DH, secretariat on an anonymous basis⁶. Where changes are necessary, employers should make every effort to make available suitable alternative work or retraining opportunities or both, in accordance with good general principles of occupational health practice.

Compensation for occupationally infected HCWs

- 5.29 The NHS Injury Benefits Scheme provides temporary or permanent benefits for all NHS employees who lose remuneration because of an injury or disease attributable to their NHS employment. The scheme is also available to medical and dental practitioners providing general medical and dental services in the NHS.
- 5.30 Industrial Injuries Disablement Benefit can be paid where an employed person contracts viral hepatitis, known as prescribed disease B8, which includes hepatitis B and C. As part of the qualification the claimant must have worked in an environment where they have had contact with human blood or blood products, or a source of viral hepatitis. HIV is not a prescribed disease under the Social Security Acts. However, HCWs who have acquired HIV because of exposure to HIV infected material in the workplace may be able to claim compensation under the Industrial Injuries Scheme where there has been an accident arising out of and in the course of employment, eg a needlestick injury.
- 5.31 The occupational health service, as well as advising managers and staff on the management of injuries sustained at work, should also provide advice in cases where entitlement to benefits for occupationally acquired infection is under consideration. Details of the NHS scheme can be obtained from the NHS Pensions Agency, Injury Benefits Manager, 200-220 Broadway, Fleetwood, Lancs SY7 8LG. Leaflets and advice on the Industrial Injuries Disablement Scheme can be obtained from local Benefits Agency Offices.

ABBREVIATIONS

ACDP	Advisory Committee on Dangerous Pathogens
AGH	Advisory Group on Hepatitis
BBV	blood-borne virus
CDSC	Communicable Disease Surveillance Centre
COSHH	Control of Substances Hazardous to Health Regulations 1994
EAGA	Expert Advisory Group on AIDS
EPP	exposure prone procedure
HBV	hepatitis B virus
HCV	hepatitis C virus
HCW	health care worker
HIV	human immunodeficiency virus
HSE	Health and Safety Executive
HSWA	Health and Safety at Work etc Act 1974
OH Service	occupational health service
PEP	post-exposure prophylaxis
PHLS	Public Health Laboratory Service
RIDDOR	Reporting of Incidents, Diseases and Dangerous Occurrences Regulations 1985
SCIEH	Scottish Centre for Infection and Environmental Health

OTHER RELEVANT GUIDANCE PRODUCED BY THE UK HEALTH DEPARTMENTS OR HEALTH & SAFETY EXECUTIVE (HSE).

AIDS/HIV Infected health care workers: Guidance on the management of infected health care workers. UK Health Departments 1994. (revision to be published during 1998).

A guide to risk assessment requirements: common provisions in health and safety law. HSE 1996.

Decontamination of Equipment, Linen or Other Surfaces Contaminated with Hepatitis B and/or Human Immunodeficiency Viruses. Microbiology Advisory Committee, Department of Health, HC (91)33, 1991.

Five steps to risk assessment: a step by step guide to a safer and healthier workplace. HSE 1997.

Guidance on decontamination from the Microbiology Advisory Committee to the Department of Health Medical Devices Agency, Part 1 Principles (1993) and Part 2 Protocols (1996).

Guidance on the microbiological safety of human tissue and organs used in transplantation. Committee on the Microbiological Safety of Human Tissues and Organs Used in Transplantation (MSBT). Department of Health, HSG(96)26, 1996.

Guidance on post-exposure prophylaxis for health care workers occupationally exposed to HIV. Department of Health PL/CO(97)1 available from Department of Health, Room 719, Wellington House, 133-155 Waterloo Road, London SE1 8UG.

Hospital Infection Control: Guidance on the control of infection in hospitals. Prepared by the Hospital Infection Working Group of the Department of Health and Public Health Laboratory Service. 1995.

Hospital Laundry Arrangements for Used and Infected Linen, Department of Health, HSG (95)18, 1995.

Immunisation against Infectious Disease. 1996, HMSO, UK Health Departments ISBN 0 11 321815-X.

Information to Undertakers: Infectious Diseases Department of Health, PL/CMO(88)7, 1988.

Latex Sensitisation in the Health Care Setting (Use of Latex Gloves). Medical Devices Agency MDA DB9601, 1996.

The management of staff health and welfare issues for NHS staff. Department of Health (to be published during 1998).

Protecting health care workers and patients from hepatitis B: recommendations of the Advisory Group on Hepatitis. Department of Health, HSG(93)40 1993. Addendum was issued under cover of EL(96)77, 1996.

Protection against blood-borne infections in the workplace: HIV and hepatitis (ACDP) 1995, HMSO, ISBN 0 11 321953 9

The purchase, operation and maintenance of benchtop steam sterilisers: Medical Devices Agency DB9605, June 1996.

Safe disposal of clinical waste. HSE, HMSO, 1992. ISBN 0 11 886355X.

Safe working and prevention of infection in clinical laboratories. HSAC, HMSO, 1991 ISBN 0 11 885446-1.

Safe working and prevention of infection in clinical laboratories - model rules for staff & visitors. HSAC, HMSO, 1991 ISBN 011 88544 29.

Safe working and the prevention of infection in the mortuary and post mortem room. HSAC. HMSO,1991, ISBN 011 885448-8.

Sterilisation, Disinfection and Cleaning of Medical Equipment: Guidance on Decontamination from the Microbiology Advisory Committee to the Department of Health Medical Devices Agency, Part I Principles (1993) and Part 2 Protocols (1996).

The Reuse of Medical Devices Supplied for Single use only. Medical Devices Agency, DB 9501, January 1995.

Use and Management of Sharps Containers. Medical Devices Agency, Safety Action Bulletin No 102, 1993.

Copies of Department of Health Guidance and Medical Devices Agency Guidance can be obtained from: Department of Health, PO Box 410, Wetherby, LS23 7LH.

For copies of HSE guidance telephone HSE Books (01787 881 165).

General principles

1. In clinical practice, contaminated equipment, clothing etc. may harbour a wide range of micro-organisms of varying susceptibility to inactivation. Sterilisation inactivates even resistant bacterial endospores. The disinfection methods recommended here may not inactivate resistant spores but should be adequate to inactivate the range of organisms likely to be encountered. Thus although the following guidance deals specifically with HIV and HBV it is emphasised that other pathogens may be present and sterilisation by heat is the preferred method of decontamination. Instruments used to penetrate skin and enter normally sterile body areas must be sterile. For large sterilisers and washer/disinfectors reference should be made to *Health Technical Memorandum 2010, Part 3: Validation and Verification Sterilisation*.
2. In **all** cases, thorough cleaning must precede sterilisation or disinfection of instruments or equipment. Workers undertaking this should wear suitable protective clothing including household gloves.
3. Manufacturers' instructions must be consulted on compatibility of materials with the method of sterilisation or disinfection preferred. Equipment used for sterilisation or disinfection must be commissioned on installation, regularly serviced and maintained and tested in accordance with the manufacturers' instructions and Department of Health advice (Medical Devices Agency, *Device Bulletin DB 9605, June 1996, The purchase, operation and maintenance of benchtop steam sterilisers*). For large sterilisers and washer/disinfectors reference should be made to *Health Technical Memorandum 2010 Part 3: Validation and Verification Sterilisation*. Reference should also be made to the Medical Devices Agency Safety Notice *SN9619: Compatibility of Medical Devices and their accessories Reprocessing Units with Cleaning Disinfecting and Sterilising Agents, June 1996*.

Sterilisation

4. HIV and Hepatitis viruses are susceptible to heat. **Wherever possible** equipment must be sterilised by conventional procedures employing moist or dry heat (*Sterilisation, disinfection and cleaning of medical equipment : guidance on decontamination from the Microbiology Advisory Committee to the Department of Health. Part 1, Principles 1996*). The highest sterilising temperature compatible with the equipment to be sterilised should be used. Recommended minimum temperatures and hold times for achieving sterility in steam sterilisers are 134°C for 3 minutes or 126°C for 10 minutes, or 121°C for 15 minutes, or 115°C for 30 minutes. The correct use of hot air sterilisers requires the load to achieve and maintain a temperature of either 180°C for 30 minutes or 160°C for 120 minutes. Whichever method is in use the recommended temperature must be achieved within the load to ensure sterilisation, and thus adequate time must be allowed for the goods under treatment to heat up before timing starts. Manufacturers instructions for effective and safe use of steam and hot air sterilisers must be followed.

Disinfection - physical methods

5. Viruses may be inactivated by immersion in boiling water although it is stressed that boiling cannot be relied upon as a means of sterilisation. It may not inactivate bacterial spores. If boiling is employed, cleaned instruments should be completely immersed in water at 100°C and any air bubbles dislodged. The water should be allowed to reboil and the item left for a minimum of 5 minutes. A purpose made instrument boiler should be used. This should incorporate an electrically heated unit, a hinged lid and a perforated shelf for raising and lowering instruments. The water should be removed at the end of each day and the boiler left empty until re-used.

Disinfection - chemical methods

6. For heat labile articles and surfaces which cannot be sterilised or boiled it will be necessary to employ methods of chemical disinfection. The use of chemical agents is restricted by many factors, including their variable effects on different micro-organisms, incompatibility with various surfaces, reduced efficacy in the presence of organic matter, susceptibility to deterioration with storage and toxic potential. Chemical disinfection must only be undertaken in the absence of a satisfactory alternative. Recommendation of disinfectants for the purpose of inactivation of HIV and hepatitis viruses is restricted by lack of adequate data for many chemical agents. Although various publications have claimed efficacy against HIV for a wide range of disinfectants and detergents, the evidence for some claims is equivocal. Furthermore, in any clinical situation where it may be

necessary to inactivate HIV it will also be necessary to inactivate HBV which is generally regarded as more resistant.

7. The methodology for evaluating the activity of compounds against HIV and hepatitis viruses is complex, not least because of the need to simulate "real life" conditions where organic contamination is likely to be present. Research in this field is on-going but, pending publication of further results the following agents should be used for disinfection:

Hypochlorite

- Fresh aqueous solutions of sodium hypochlorite (bleach) or sodium dichloroisocyanurate tablets or granules are recommended for general surface disinfection. For cleaning surfaces contaminated with blood and for mopping up blood spillages, the concentration used must be equivalent to 10,000 parts per million (ppm) available chlorine. In general, this corresponds to a 1:10 dilution of household bleach but it is emphasized that the strength of individual proprietary brands of bleach may vary and that hypochlorite may deteriorate on storage. Granular sodium dichloroisocyanurate may be used to disinfect blood spillages (see below). Hypochlorite has the disadvantage of corrosion of metals and of bleaching fabrics.

Glutaraldehyde

- For non-corrosive disinfection of delicate items such as fibreoptic endoscopes freshly activated 2% alkaline glutaraldehyde may be employed following thorough washing. Endoscopes which will enter sterile body cavities must be immersed for a minimum of 3 hours and other endoscopes for a minimum of 30 minutes or one hour if the presence of *Mycobacterium tuberculosis* is suspected. Glutaraldehyde has irritant and sensitising properties and must be handled with great care.

Alcohol

- Alcohol is not recommended for disinfecting the surfaces of equipment or work-benches. It should only be used as a final choice for materials which are incompatible with the above disinfectants. In these cases the items should be immersed in 70% Isopropanol or Industrial Methylated Spirits for a minimum of one hour.

Cleaning work surfaces

8. It is recommended that work surfaces liable to become contaminated are covered with sterilisable trays or disposable impermeable coverings. In either case, the covering must be changed at the end of each procedure and the underlying surface cleaned using a solution of 1000ppm available chlorine. Any blood contamination of the surface must be cleaned and disinfected with a solution containing 10,000 ppm available chlorine (see above).

Spillages

9. If blood is spilled - either from a container or as a result of an operative procedure - the spillage should be dealt with as soon as possible. The spilled blood should be completely covered, either by sodium dichloroisocyanurate granules or by disposable towels which are then treated with 10,000 ppm sodium hypochlorite solution. A few minutes must elapse before the towels etc. are cleared and disposed of as clinical waste. The worker who deals with the spillage must wear appropriate protective clothing. This will include household gloves and a disposable apron and in the case of extensive floor spillages protective footwear.

**ADDRESSES OF COMMUNICABLE DISEASE SURVEILLANCE CENTRE (CDSC) AND
SCOTTISH CENTRE FOR INFECTION AND ENVIRONMENTAL HEALTH (SCIEH)**

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