PREVENTING HIV TRANSMISSION IN HEALTH FACILITIES

WORLD HEALTH ORGANIZATION
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EXECUTIVE SUMMARY

HIV has been isolated from blood, semen, vaginal secretions, saliva, tears, breast milk, cerebrospinal fluid, amniotic fluid and urine, and is likely to be present in other body fluids. However, blood is the only fluid known today to be associated with HIV transmission in the health care setting. The risk of transmitting HIV and other bloodborne diseases depends on health personnel practices, the prevalence and transmissibility of the bloodborne organism, and the amount or frequency of exposure.

The occupational risk of acquiring HIV infection from patients in health care settings is low and in most cases is associated with needle-stick injuries from a patient with HIV infection. Patient-to-patient transmission results primarily from contaminated equipment that has been incorrectly disinfected or from blood transfusions. Most patient care does not involve any risk of HIV transmission, and routine HIV testing of health care workers or patients is not recommended.

To minimize the risk of occupational transmission of HIV, all health care workers should adopt appropriate infection control, risk assessment and accident prevention procedures. These can be summarized as follows:

- Universal precautions should be understood and used with all patients at all times by all health care personnel;
- Reducing unnecessary injections, suturing and unnecessary blood transfusions should be a goal for all health care settings;
- All health care settings and health programmes should make available adequate supplies necessary to comply with simple standards of infection control and designed to minimize potential opportunities for occupational HIV transmission;
- Active and locally appropriate policies and guidelines should be adopted for the proper use of supplies and a programme of staff education and supervision initiated.
- Risk assessment and risk reduction should become a regular part of supervision in health care settings.

INTRODUCTION

The HIV/AIDS pandemic has highlighted a number of public health problems, one of which is the transmission of bloodborne viruses in health care settings. Even if limited resources are available, simple infection control measures can be implemented to minimize this risk of transmission.

The primary goal of any infection control policy for the prevention of HIV transmission in the health care setting is to prevent the spread from patient to health care worker, from health care worker to patient and from patient to patient. These infection control measures must be practical to implement and enforce; they must be economically feasible; and they should pose a minimal risk of adverse medical, legal or social consequences for the patient, health care worker, or institution.

Who is the guide for?

This guide is written for health service supervisors responsible for the implementation of effective infection control practices in health care settings.

What is the guide about?

This guide provides:

- a practical and simple approach to infection control in the care of **all patients**, including those who may be infected with bloodborne viruses;
- advice on introducing and initiating a policy for universal precautions;
- information on how to set priorities and plan for supplies to implement universal precautions.

How is this guide organized?

Part 1:
Risk of HIV transmission in the health care setting.
This section provides a general overview of the risk of HIV transmission in the health care setting.

Part 2:
Prevention of HIV transmission in the health care setting.
This section provides practical information on the principles of good infection control practice, which can be applied to different types of health care settings.

Part 3:
Universal precautions: planning, policy and practice
This section provides a step-by-step approach on how to set priorities, establish policies and plan for supplies. It includes suggestions for calculating requirements and ordering supplies.

The principles for the prevention of transmission of HIV are the same as for hepatitis B and other bloodborne pathogens. However, this guide focuses on preventing the transmission of HIV. It does not deal with issues related to possible transmission of bloodborne viruses acquired through blood transfusion, nor the legal and ethical implications of an occupationally acquired infection.

This guide may supplement national guidelines already in use in health care settings.

Part 1: RISK OF HIV TRANSMISSION IN THE HEALTH CARE SETTING

The incidence of HIV infection continues to increase throughout the world. HIV is principally transmitted by sexual intercourse, but may also be acquired through exposure to infected blood or blood products and from an infected mother to her child. There is good evidence that HIV cannot pass through intact skin and that it is not transmitted by close social contact.

Body fluids which can transmit HIV include: blood, semen, vaginal and cervical secretions, wound secretions, cerebrospinal fluid, pleural fluids, synovial, peritoneal, pericardial and amniotic fluids, breast milk, and other body fluids containing visible blood.

1.1 HIV transmission in health care settings

Blood is the single most important body fluid involved in the transmission of HIV infection in health care settings.

HIV can be transmitted in health care settings in the following ways:

- **to patients**
  - contaminated instruments (needles, syringes, scalpels and other instruments used in invasive procedures) that are re-used without being adequately disinfected or sterilized;
  - transfusion with HIV-infected blood;
  - skin grafts, organ transplants or donated semen from an HIV-infected donor;
  - contact with blood or other body fluids from an HIV-infected health care worker.

- **to health care workers**
  - injury with a needle or any other sharp instrument which has been contaminated with blood or other body fluids from an HIV-infected person;
  - exposure of open wounds to blood or other body fluids from an HIV-infected person;
  - splashes of infected blood or body fluids onto mucous membranes, e.g. in the mouth, and the eyes.

1.2 Transmission from patient to patient

In general, transmission of HIV in the health care setting between patients is uncommon. It is usually related to HIV-contaminated blood transfusions where screening of donated blood is not carried out. HIV transmission has also occurred via HIV-contaminated needles and instruments and equipment which are not properly cleaned, disinfected or sterilized between use. In settings with limited supplies and equipment, there may be widespread use of such improperly cleaned and sterilized medical, dental and traditional instruments due to, for example, inadequate boiling time, or repeated use of the same syringe and needle with no sterilization.

There is **no** risk of HIV transmission between patients through casual contact, such as sharing clinic waiting areas, bathrooms, dining rooms or eating utensils.

1.3 Transmission from patient to health care worker

The majority of health care workers experience some kind of needle-stick injury each year, and for many these incidents occur frequently. A certain proportion of these exposures are to HIV-infected blood. The greatest risk of HIV infection is from sharps injuries with HIV-contaminated hollow needles. Injuries from suture needles, lancets, scalpels or other sharp items also carry some risk.

It is clear that exposure to blood presents the greatest risk to health personnel.

Although the risk of infection following percutaneous exposure is real, it is small. Indications are that the risk from a sharps injury with HIV-positive blood will result in HIV infection ranges from 1 in 250 (0.4%) cases to 1 in 300 (0.3%) cases. A susceptible health care worker who is exposed to hepatitis B virus following a needle-stick injury has a much higher risk of acquiring hepatitis B infection. However, protection against hepatitis B virus disease can be offered through vaccination (see the following table 1).

Risk of transmission of bloodborne viruses to health care workers

Human immunodeficiency Virus (HIV)	
Percutaneous exposure	0.4% (low)
Mucocutaneous exposure	0.05% (lowest)
Hepatitis B virus (HBV)	
Percutaneous exposure	9 – 30% (high)
Hepatitis C virus (HCV)	
Percutaneous exposure	3 – 10% (moderate)

Very few cases of occupational HIV transmission have been reported after exposure of mucous membranes (mouth and eyes) or broken skin to infected blood. The risk of acquiring HIV infection by this route is much lower than the risk from percutaneous exposure, and work-related HIV infection is believed to be uncommon. Nevertheless, continuing efforts must be made to minimize any possible transmission from patient to health care worker.

While wearing gloves may reduce the risk of being infected by a needle-stick injury, it is very important to note that the use of gloves does not prevent sharps injuries or cuts. Therefore, efforts to prevent HIV transmission from such accidents must focus first on preventing injury from needles and other sharp objects, and second on the safe handling and disposal of these items.

1.4 Transmission from health care worker to patient

The majority of routine procedures in the health care setting present no risk of HIV transmission and the risk of transmission from HIV-infected health care workers to patients is remote. Provided health care workers properly use the standard infection control measures, the circumstances in which HIV could be transmitted to a patient are restricted to exposure-prone procedures, where an injury to the health care worker could cause his/her blood to enter the patient's tissues.

HIV-infected health care workers should therefore avoid performing exposure-prone procedures. They may perform other procedures which do not pose a risk of transmission to patients, where the hands and fingertips of the worker are visible and outside the patient's body at all times, or where sharp instruments are not required, e.g. assisting in childbirth, internal examinations, taking blood and insertion of intravascular catheters.

In midwifery practice, normal vaginal delivery in itself is not an exposure-prone procedure. However, HIV-infected health care workers should avoid procedures involving the use of sharp instruments, since the fingertips may not be visible at all times and the risk of injury to the worker is greater. Instrumental delivery requiring infiltration of local anaesthetic or internal suturing presents the same increased risk of transmission.

> A health care worker with HIV infection who **does not** perform exposure-prone procedures **does not** pose any risk to patients, provided that the worker complies with universal precautions.

1.5 Reporting exposures

Health care workers should be encouraged to report exposures to the appropriate authority in the institution immediately after they occur; however, many health care workers fail to report work-related accidents or HIV exposures. There are many reasons offered for not reporting such accidents: they are too busy; the reporting procedure requires attendance at a distant office at difficult times; they may feel that it will not make a difference to the outcome. However, health care workers who do report work-related accidents or exposures stand a better chance of benefiting from insurance, health care and other provisions related to the terms and conditions of work. Failure to report occupational exposures creates a false impression about the degree of risk faced by health personnel and the frequency of these exposures.

The record should contain the following information:

- employee identification;
- date, time and place of the exposure;
- details of the exposure, including amount and type of fluid or material and severity of exposure (see Annex 1);
- circumstances surrounding the exposure;
- actions taken, including counselling and medical evaluation for any acute illnesses that occur during the follow-up period.

The record should be made and kept in a manner that protects confidentiality and is in accordance with national and institutional regulations.

Part 2:
PREVENTION OF HIV TRANSMISSION IN THE HEALTH CARE SETTING

The risk of transmission of bloodborne pathogens in the health care setting cannot be eliminated but can be minimized by preventing exposure to infected blood and body fluids. Universal precautions are a set of particular recommended practices which when used correctly will minimize unnecessary exposure to blood and body fluids.

Universal precautions aim to ensure that the accidental exposure of patients and health care workers to potentially infectious blood is reduced to the absolute minimum.

2.1 Universal precautions in practice

Universal precautions are based on the assumption that all blood is potentially infectious, regardless of whether it is from a patient or health care worker, regardless of their known HIV antibody status, and should be applied in the care of all patients.

The precautions apply to the body fluids which may contain HIV. Other body fluids such as faeces, urine, sputum, vomit, saliva, while not associated with the transmission of HIV, may contain other pathogens and the risk of cross-infection may be reduced if simple infection control practices are applied.

Universal precautions consists of 5 standard practices:

- safe handling and disposal of sharps;
- safe decontamination of instruments and other contaminated equipment;
- handwashing;
- use of protective barriers to prevent direct contact with body fluids;
- safe disposal of waste contaminated with body fluids.

2.2 Safe handling and disposal of sharps

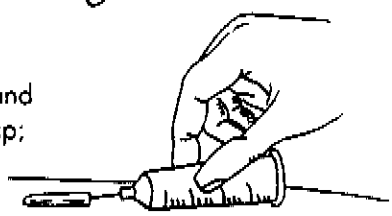
The greatest risk of bloodborne pathogen transmission in health care settings is through percutaneous exposure. Efforts to prevent transmission must focus on preventing injury from contaminated sharp instruments by encouraging safe handling and disposal of sharps. Most sharps injuries associated with HIV transmission involve deep injuries with hollow-bore needles. These injuries frequently occur when needles are recapped, cleaned, disposed of, or inappropriately discarded, e.g. used needles left on trolleys or beds.

Single-handed capping

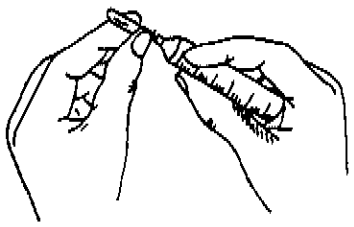
Recapping needles is sometimes unavoidable, and in this case the single-handed scoop method should be utilized. Recapping a needle with two hands increases the likelihood of sustaining a sharps injury. To recap a needle, using a single hand:

(a) Place needle cap on a hard flat surface and remove hand;

(b) With one hand, hold syringe and use needle to scoop up the cap;



(c) When the cap completely covers the needle, use the other hand to place cap firmly on the needle hub.



All sharps should be handled with extreme care at all times and their use should be kept to the minimum. Puncture-resistant disposal containers must be available for the disposal of sharps and must be located as close to the point of use as possible. Sharps disposal containers can be made of easily available objects, e.g. a tin with a lid, a thick plastic bottle, or a heavy cardboard box.

Syringe incinerator boxes are boxes that protect the health worker from contaminated equipment. Used plastic syringes and needles must be placed carefully in the boxes, which are then burned. Alternatively, the boxes can be used to transport used equipment to an incinerator.

Sharps containers are often overfilled, with sharps sticking out from the top. In order to reduce risk of transmission when discarding disposable sharps, health personnel should always:

- empty sharps containers when three-quarters full;
- wear heavy-duty gloves when transporting sharps containers;
- incinerate used equipment at a sufficient temperature to melt the needles;
- bury the sharps container after incineration.

See also the following box.

Good practice for the safe handling and disposal of sharps

- **ALWAYS** dispose of your own sharps. **NEVER** pass used sharps directly from one person to another; this practice should be followed by **all** health care workers;
- During exposure-prone procedures, the risk of injury should be minimized by ensuring that the operator has the best possible visibility, e.g. by positioning the patient, using as good a light source as possible and controlling bleeding;
- Protect fingers from injury during suturing by wearing gloves and using a gauze or cotton wool pad;
- Never recap, bend or break disposable needles.
- Directly after use, store needles and syringes in a rigid container until ready for decontamination;
- Locate sharps disposal containers close to the point of use, e.g., patient's room, on the medicine trolley, treatment room;
- Dispose of, and transport sharps in a puncture-resistant container. **NEVER** place used sharps in other waste containers;
- Keep all sharps and sharps disposal containers out of the reach of children;
- Prevent overflow by sending sharps disposal containers for incineration when three-quarters full.

Sharps accidents

Each health facility should develop standard operating procedures to be followed by all health personnel in the case of sharps injury or other exposure. An example of a standard operating procedure can be seen in Annex 2.

Most experts agree that the larger the volume of blood involved in the exposure, the greater the risk of infection. Therefore first aid must begin as soon as possible after the exposure and aim to flush away as much inoculum as possible. Where there is minor bleeding, the wound should be allowed to bleed briefly. Then the wound and surrounding skin should be washed with soap and clean water, preferably running water. Exposed mucous membranes should be washed with large amounts of water. The use of antiseptic solutions as substitutes for water has not been proved to have any advantage and is not recommended because of the possible caustic effect. In the absence of water, antiseptic solutions would have some merit.

If the same accidental exposure occurs more than twice, the working procedure should be reviewed. For example, staff training may be required, or more sharps disposal containers may need to be made available.

Evaluating sharps practices

Risk of injury should be assessed when evaluating sharps practices to establish if there is a safer way to undertake procedures. These could include using skin staples for skin closure, using adhesive tape or skin closure strips for suturing superficial lacerations, giving medication orally rather than by injection and avoiding making unnecessary incisions, e.g. routine episiotomy.

2.3 Safe decontamination of instruments and other contaminated equipment

As HIV can be transmitted via needles, syringes and other equipment contaminated with body fluids, these items should be cleaned and sterilized, or appropriately disinfected before each use. The method of decontamination for instruments and equipment depends on what they are used for and the associated level of risk of transmission (see the table below).

Selecting the method of decontamination

Level of risk	*Items*	*Decontamination method*
High –	Instruments which penetrate the skin/ body	Sterilization Single use of disposable
Moderate –	Instruments which come into contact with mucous membranes or non-intact skin	Sterilization Boiling Chemical disinfection
Low –	Equipment which comes into contact with intact skin	Thorough washing

Efficient cleaning with detergent and hot water removes a high proportion of any microorganisms present. All equipment should be dismantled for thorough cleansing.

Heavy-duty gloves should be worn for cleaning instruments to reduce the risk of injury. If splashing of body fluid is likely, additional protective clothing should be worn, e.g. plastic aprons and protective spectacles.

Sterilization

All forms of sterilization will destroy HIV and hepatitis B and C viruses. The recommended methods of sterilization are described in the table below.

Recommended methods of sterilization	
* Steam under pressure (e.g. autoclave, pressure cooker) Required pressure: ⇒ 15 psi (101 kPa)	
Temperature	***Time***
115°C	30 minutes
121°C	15 minutes
126°C	10 minutes
134°C	3 minutes
* Dry heat (e.g. electric oven)	
Temperature	***Time***
160°C	120 minutes
170°C	60 minutes
180°C	30 minutes

Instruments that are unwrapped for sterilization quickly become contaminated with microorganisms on removal from the autoclave. Consequently, these instruments should either be used immediately following sterilization or stored in clean, dry conditions and re-sterilized when required for an invasive procedure.

Disinfection

Disinfection will usually inactivate HIV. Two commonly employed methods are boiling and chemical disinfection.

- Boiling is an effective way to disinfect equipment, e.g., needles and syringes, if autoclaving facilities are not available. Equipment which has first been cleaned should be boiled for 20 minutes.
- Chemical disinfection is used for heat-sensitive equipment that is damaged by high temperatures. Most disinfectants are effective against a limited range of microorganisms and vary in the rate at which they destroy microorganisms. Items must be dismantled and fully immersed in the disinfectant. Care must be taken to rinse disinfected items with clean water so that they do not become recontaminated. Chemical disinfectants are unstable and chemical breakdown can occur. They may also be corrosive and irritating to skin. Protective clothing may be required. Chemical disinfection is not as reliable as boiling or sterilization. However, the following will inactivate HIV:
  - Chlorine-based agents, e.g., bleach
  - 2% glutaraldehyde
  - 70% ethyl and isopropyl alcohol.

Cleaning

Detergent and hot water are adequate for routine environmental cleaning, e.g. floors, walls, toilets, beds, rubber draw sheets. Disinfectants are not necessary for routine cleaning.

Following a **spillage of body fluids**, heavy-duty rubber gloves should be worn and as much of the body fluid as possible removed with some disposable absorbent material, e.g. paper towels. This can then be discarded safely into a leak-proof container and incinerated. The area of spillage should be cleaned with a chlorine-based disinfectant and the area thoroughly washed with hot water and detergent.

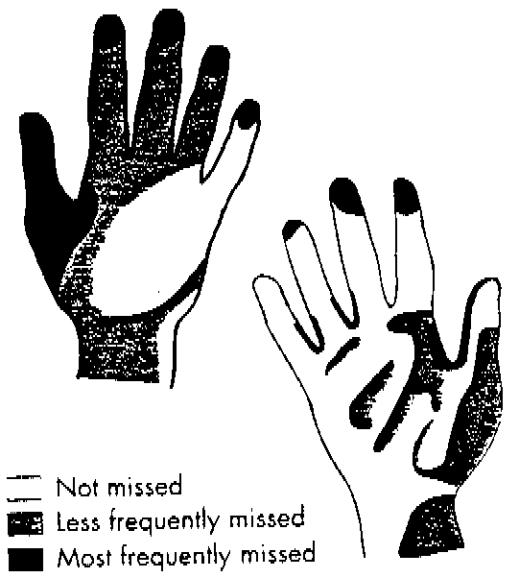
All **soiled linen** should be handled as little as possible, bagged at the point of collection and not sorted or rinsed in patient care areas. If possible, linen soiled with large amounts of body fluid should be transported in leak-proof bags. If leak-proof bags are not available, the linen should be folded with the soiled parts inside and handled carefully, wearing gloves.

Linen can be decontaminated by washing with hot water (minimum temperature 71°C or 160° F) and a detergent. If soiled linen is to be washed by hand, then heavy-duty gloves should be worn.

2.4 Handwashing

The hands of health care workers are frequently responsible for the transmission of various infections between patients. Microorganisms acquired on the hands by contact with body fluids or contaminated surfaces can be readily removed by washing with soap and water. See also the following figure.

Areas most commonly missed in handwashing



Under ideal circumstances, hands should be washed at a basin with running water. However, handwashing, using a bowl of water and soap is still effective. If a re-usable towel is used to dry the hands, then it should be washed regularly.

HIV cannot pass through intact skin, but it is possible for infection to be acquired when blood is in contact with damaged skin. Hands should therefore be washed immediately if they become contaminated with body fluids. Cuts, abrasions or other damaged skin should be covered with a waterproof material while working in clinical areas. Since gloves often have invisible tears, hands should always be washed once gloves have been removed.

2.5 Use of protective barriers

Protective clothing should be worn where exposure to significant amounts of blood is anticipated. The protection selected will depend on the type of exposure anticipated. Where supplies of protective clothing are limited, priority should be given to procedures involving a high risk of exposure to blood. See also the following table.

Selection of protective clothing

Type of exposure	*Protective clothing required*	*Examples*
Low risk of contact with small amount	* gloves helpful but not essential	injections, minor wounds
Contact with blood probable, splashing unlikely	* gloves * apron may be necessary to protect clothing	vaginal examinations, insertion or removal of intravenous cannula, handling laboratory specimens, large open wounds, venepuncture, spills of blood
Contact with blood probable, splashing uncontrolled bleeding likely	* gloves * fluid resistant gown or apron * eye protection * mask	major surgical procedures, oral surgery, vaginal delivery

Gloves

For most patient contact, if the amount of blood is small enough to be completely contained by a gauze or cotton swab, gloves are not necessary.

Latex or vinyl gloves should be worn for direct contact with blood or other potentially infected body fluids. Gloves should be worn when sharps are used. Although gloves will not prevent a sharps injury, wearing gloves has been shown to reduce the volume of the infectious material and may significantly reduce the risk of exposure to a patient's blood. For invasive procedures, gloves should be sterile, but for most other procedures gloves can be non-sterile.

Gloves should be discarded after each patient. If this is not possible, certain kinds of gloves can be washed and/or sterilized before re-use. Gloves with visible holes or tears should be discarded.

Heavy-duty rubber gloves should be worn for cleaning instruments, handling soiled linen or dealing with spills of body fluid. They can be washed and re-used many times.

Fluid-resistant gowns and aprons

Aprons should be worn to protect health care workers during procedures where splashing of blood or body fluids is anticipated, e.g. childbirth. During surgery, where there is a high likelihood of splashes with blood, the surgeon should wear a fluid-repellent gown or a sterile cloth gown with a plastic apron underneath.

Masks and protective eyewear

Although splashes to mucous membranes are relatively common, they do not represent a significant risk for HIV transmission and seroconversion is unlikely. The amount of exposure can be reduced through the use of masks and protective eyewear.

Protective eyewear should be washed if it becomes contaminated. Ordinary spectacles will provide adequate protection in most situations. Any re-usable protective clothing contaminated with body fluids should be washed thoroughly after use.

2.6 Safe disposal of waste contaminated with body fluids

Safe disposal of waste is an important infection control practice and is frequently poorly managed.

The following recommendations should be followed with all waste from health care settings. Heavy-duty gloves should be used by anyone transporting waste to the site of disposal. Eye protection should be used when disposing of liquid waste. Waste not contaminated with body fluids can be disposed of as general waste. See also the following table.

Waste category	End disposal
* Waste that is contaminated with body fluids should be placed in a leak-proof bag or container * Laboratory/pathology waste and placentae should be placed into leak-proof containers	Incinerate or bury in a 7 feet deep pit at least 30 feet away from a water source
* Liquid waste, e.g. blood	Pour down a drain connected to an adequately treated sewer or into a pit latrine

2.7 Safe handling of specimens

The principles of universal precautions apply equally in laboratories and for specimen handling. All specimens should be treated as potentially infectious, and transported in leak-proof containers with the request form protected from contamination. All personnel who transport specimens should know how to handle specimens safely and should have a practical understanding of universal precautions.

Part 3: UNIVERSAL PRECAUTIONS: PLANNING, POLICY AND PRACTICE

The use of universal precautions will minimize the risk of transmission of HIV and other bloodborne pathogens. However, each health care setting will vary in the level and type of risk, the available equipment and resources, and standards of practice. Health care workers tend to use universal precautions selectively and intermittently, and compliance with universal precautions is generally lower than is acceptable or desirable. It is the responsibility of the manager or supervisor to ensure that there is:

- consistent and strict use of universal precautions;
- constant modification of work practices to assure optimum safety in the workplace;
- all equipment is safe and operational.

3.1 Responsibility for universal precautions

A broad participatory base is essential to achieve better levels of compliance and comprehension regarding universal precautions. Even smaller health units such as health centres should comply with universal precautions and should have a degree of responsibility and a sense of ownership regarding the unit policy. To introduce and support the use of a policy of universal precautions, it is helpful to establish a group of individuals who can represent the entire health facility. The group should meet regularly and more than once a year.

This committee or group will be able to decide what the policy should be and how it should be implemented. These decisions may be influenced by practical issues, such as the available budget, equipment and personnel.

3.2 Risk assessment

It is clear that the practices of health care workers significantly affect the degree of risk of HIV transmission to patients and themselves. Needle-stick injuries are frequently related to both training and experience, with the type and frequency of injuries altering as staff increase their practical skill levels but also their exposure. Health care workers are also more liable to injuries when staffing levels are inadequate, when supervision is lacking or inadequate and when staff are tired or working in an unfamiliar area. Each manager and/or supervisor must be aware of the various areas of risk for their staff and patients. Some kind of risk assessment procedure should be carried out, and repeated at regular intervals. This can be done using simple checklists based on the five standard practices recommended for universal precautions (see Annex 3).

Risk assessment cannot rely simply on exposure incidents reported by health care workers. It is known that health care workers frequently under-report exposure for a variety of reasons. This means that supervisors and service managers often have a very unreliable picture of the types, causes and frequency of exposures. Therefore, surveys of practitioners and their practices need to be carried out. These need not be complicated or large but should adequately indicate the risks to be found in the health care settings.

3.3 Risk reduction strategies

There are three different strategies for reducing risks of transmission and they differ in cost, feasibility and impact.

(1) **Increase the safety of the technology used**. By increasing the safety of equipment, such as introducing new equipment and dispensing with old or damaged equipment, the risk to other patients and to health care workers is significantly reduced. By introducing sharps containers, the risk of needle-stick injury is significantly reduced, and this could have high impact at a low cost.

(2) **Control work practices.** This is more difficult to achieve than increasing the safety of the equipment used. Work practices vary tremendously and expose some health care workers to greater personal risk than others. There is also a situational element such as time of day, case load, or emergencies, which supervisors cannot always control. However, supervisors can try to keep occupational stress and fatigue to a minimum. Supervision can be increased in quantity and improved in quality, and result in improved work practices. Controlling work practices need not involve extra cost, and can have significant impact on reducing risk.

(3) **Provide personal protection equipment.** The introduction of this level of protection will have the least impact on reducing the risk of HIV transmission. Many institutions and organisations focus on this strategy without adequate consideration of the relative impact and associated costs.

3.4 Setting policy

Setting policy is different from establishing procedures for a department or clinical area. A policy is usually a general statement about a course of action, and involves achieving agreement or consensus about how important universal precautions are to be in the work setting, who are to be the primary beneficiaries, and which risk reduction strategies are to take priority. A good policy statement evolves out of participatory processes based on sound evidence. The policy group or committee need to discuss who is at most risk in their facility, what is the cause of this level of risk, and what risk reduction strategy is going to have greatest impact, least cost and is most feasible. The policy should reflect the outcome of these discussions.

The following is a sample of a workplace policy statement on HIV transmission in the health care setting.

> Risks related to patient-to-patient transmission will receive the highest priority. Strong emphasis on infection control practices in all staff appraisal. Staff who are HIV-positive should voluntarily avoid exposure-prone invasive procedures. Records on exposures will be introduced and reporting of accidents will be compulsory and confidential. Infection control will be a part of the continuing education programme for all staff. All staff are encouraged to work with the infection control committee to achieve greater workplace safety.

Policy statements need to be regularly reviewed and updated in the light of advances in research, changing circumstances and new technologies. Policies that are out of date can hinder high standards of infection control, and can increase the risk of HIV transmission in the health care setting.

3.5 Setting priorities

It is not always possible to fully implement universal precautions; therefore those precautions intended to protect the greatest number of patients from the greatest risk of infection should take priority. Priorities should be based on the estimated level of risk, and the estimated impact of any risk reduction strategy. The greatest risk of HIV transmission is from patient to patient, and measures that reduce that risk should take priority. Patient to health care workers offers the next most significant risk, and therefore should be the next priority.

Examples of setting priorities

The following examples illustrate what different supervisors considered important when setting priorities for the implementation of universal precautions in different departments.

Example: Universal precautions in a busy maternity unit

The unit conducts 200 deliveries on average each month. A risk assessment revealed the following results: 75% of midwives in the survey reported at least one needle-stick injury in the last month; only 15% of midwives had voluntarily reported any exposure, and those were all mucocutaneous splashes to the eye; there is no light source for suturing. As midwives/birth attendants have significant contact with blood and perform exposure-prone procedures, this department gives high priority to the provision of personal protective equipment to implement universal precautions. The supervisor decides that they need enough gloves to use for suturing, soap and water for handwashing, eye protection and an appropriate light source for suturing and a review of routine use of episiotomy. She discusses ways of implementing this with the staff. The staff are requested to record details of any needle-stick injury over a one-month period, when the supervisor will return to discuss their injuries, study their work practices, and decide how to change them.

Example: Universal precautions in an immunization clinic

On average, 30 infants and children are immunized each session. There are two health staff relying on boiling re-usable instruments. The main risk of infection in this clinic appears to be through the use of re-usable needles and syringes. The supervisor gives priority to improving disinfection and sterilization practices through the purchase of a new pressure cooker type sterilizer.

Example: Universal precautions in a hospital ward

As ward staff have contact with blood and other body fluids and handle used sharps, priority is for supplies of water and soap for handwashing and containers for the safe disposal of sharps. There may be potential for saving resources, for example, by using detergent for general cleaning rather than disinfectants. Cheaper, heavy-duty utility gloves, which can be re-used many times, can be introduced for general housekeeping and handling contaminated linen or equipment.

3.6 Staff training

The success of a universal precautions policy depends to a large extent on the quality of staff practices. Successful implementation therefore is dependent upon all staff knowing about and understanding the precautions they are expected to take. It should be acknowledged that staff may be working in difficult environments and emphasis should be on improvements to practices, not negative evaluation and criticism. Regular training sessions could be organized to update staff and orient new employees. Providing information to small groups of staff facilitates discussion of their problems and concerns. Staff may also be able to provide useful ideas and suggestions for improving the policy. Where possible, any training should be supplemented by local guidelines readily available in each clinical area, and effective supervision.

However well organized these approaches may be, only a minority of staff are reached in this way, and education is usually successful only in combination with audit and other sound infection control practices. Another way of achieving this is for infection control specialists or supervisors to visit each clinic or department regularly.

3.7 Estimating supply needs

The success of a universal precautions policy also partly depends on the provision of adequate and appropriate supplies. Accurate projections about future needs increase the chances of adequate supplies without interruption. Once the annual minimum requirements have been established, a decision is needed about how best to allocate resources for particular supplies. Further prioritization may be necessary if there is insufficient money in the budget. It should be noted that a small change in institutional practice can have a major impact on the demand for supplies, either upwards or downwards. Estimating supplies can be based on demand or on the supply available. The first task is to collect information about the numbers of procedures or tasks performed and the numbers of staff involved.

Demand-based model:

This model is demand-driven, that is, supplies are calculated on the basis of demand.

List the type of supplies needed and the minimum amount required per procedure. Then estimate the number of procedures per month or year, and calculate the supplies needed for one year. The following examples show how demand-based supplies could be calculated.

Example 1: A dental department

Each dentist needs a pair of gloves for each procedure, as well as masks, eye protection and plastic aprons. It is decided that the plastic apron and mask need only be changed when contaminated, with an estimated usage of one per session of treatments, but with additional supplies to be made available for unexpected events.

To calculate the minimum requirements for protective clothing it is necessary to determine how many dental procedures are performed in a month and how many sessions of treatment and how many dentists there are. The calculation would then be as follows:

Number of dental procedures per session per month multiplied by one pair of gloves for each procedure equals the total number of gloves needed per month (+ 10% for emergencies): 24 x 8 x 1 = 192 + 19.2 = 211.

Number of dental sessions per month multiplied by one plastic apron for each session equals the total number of plastic aprons needed per month (+ 10% for emergencies): 24 x 1 = 24 + 2.4 = 27.

Number of dental sessions per month multiplied by one face mask for each session equals the total number of masks needed per month (+ 10% for emergencies): 24 x 1 = 24 + 2.4 = 27.

Number of dentists and dental assistants in the department multiplied by two sets of eye protection (e.g. eye shields) for each equals the total number of eye protection devices needed per year: 3 x 2 = 6.

Example 2: A maternity department

The committee has decided that a minimum of two pairs of gloves should be available for each normal delivery. This allows for one pair for vaginal examination and a second pair for delivery of the infant and removal of the placenta. Midwives need a clean apron for each delivery, but these can be cleaned and re-used and last approximately 6 deliveries. Eye shields and masks need to be available in each delivery room.

The minimum requirement for protective clothing can then be calculated using the following information:

Number of deliveries each year multiplied by two pairs of gloves equals the total number of gloves needed for each year: 500 x 2 = 1000.

Number of delivery rooms multiplied by two pairs of eye protection devices (e.g. eye shields) equals the total number of eye shields needed for each year: 3 x 2 = 6.

Number of deliveries each year divided by six equals the total number of aprons needed for each year (+ 10% for emergencies): 500 ÷ 6 = 84 + 8 = 92.

Supply-driven model

Provision of supplies may be determined by annual budget figures which set a maximum ceiling on what can be spent on necessary supplies for implementing universal precautions. Alternatively, an institution or facility may issue certain supplies on the basis of bed capacity or population size in the district, or percentage of the total centre budget. It is necessary to select the priority precautions to be implemented, some of which may be low-cost or cost-free, such as provision of sharps containers, and allocate on the same basis as used when calculating demand. Continuous or repeated setting of priorities may be necessary. Where there is a problematic gap between available supplies and level of demand, supervisors and managers need to be innovative and creative in problem-solving. Increasing supplies is not always the solution to improving universal precautions and reducing risk.

3.8 Obtaining supplies through various channels

When possible, order just what you need until the next supply date so that supplies are used "just in time". Damage can be prevented if supplies, for example gloves, are used promptly, instead of being stored for several months.

Institutional supply: Find out what can be obtained through regular institutional distribution systems. Enough needs to be ordered to allow regular operations within one supply period, that is, the time interval between deliveries of supplies. Reserve stocks should be maintained to allow for late deliveries. The WHO Global Programme for Vaccines and Immunisations generally estimates necessary reserve stocks at 10% of the equipment needed for one supply period, or one month's supply.

Non-institutional supply: Regular distribution channels can be supplemented through less formal channels, such as community action groups, self-help groups, local businesses and consumer groups. These supplies tend to be less regular and more difficult to coordinate but can be a valuable addition to the stocks. Sometimes exchanges with another hospital or health clinic are possible if there are surplus supplies. It may be possible to buy items and charge nominal fees, or ask users of a service to purchase from private merchants. A local shopkeeper might expand stock to include basic health supplies.

3.9 Monitoring compliance and standards of practice

Compliance and work practices can be evaluated in clinical areas to assess whether staff are observing the recommended precautions. For example, the observer could check to see if sharp instruments are being discarded or re-processed correctly, that protective clothing is available and being used appropriately, and that water and soap are available for handwashing. It is also important to identify inappropriate use which results in waste and indicates a poor

understanding of the policy, such as double-gloving or wearing gloves to change linen. Where staff fail to implement the precautions properly, a review of equipment provision and training needs can help to resolve the problem. Monitoring should be carried out regularly. It may help to develop checklists of required standards for the use of equipment and infection control practices to be monitored. Actual clinical practice can then be evaluated against these standards. An example is available in Annex 3.

3.10 Quality assurance

It is important to consider the quality of the supplied protective equipment and other items. Quality can be affected by storage conditions and supplies must be stored properly to ensure that they are available as and when needed. In general, high temperatures, humidity and sunlight contribute to rapid deterioration. Store supplies so they will be used on a "first in – first out" basis, that is, so that "older" supplies will be used before those newly received. It is important to monitor whether the storage system is being correctly followed. It will be fairly easy to improve on incorrect procedures. Supervisors can also regularly sample gloves and other items in use, to ensure that they do not show obvious signs of deterioration.

3.11 Record-keeping

Maintain accurate records of supplies related to infection control. These records can be used to estimate future supply needs and to identify problems in the flow and frequency of use of this equipment. If stocks exceed demand or demand exceeds stocks, it may be useful to conduct an audit to see why this discrepancy exists. If this is something you can change, decide on the appropriate action.

Records of occupational exposures may be important for administrative, insurance and legal decisions. The records form part of any management information system and it is essential that records are accurate, kept safely and can be retrieved as necessary.

GLOSSARY

Cleaning	The physical removal of most microorganisms and contamination, using detergent and water
Disinfection	The inactivation of vegetative bacteria, viruses and fungi, but not spores
Exposure-prone procedures	Procedures where there is a risk that injury to the health care worker may result in the exposure of the patient's open tissues to the blood of the worker. For example, where the worker's hands may be in contact with sharp instruments, or sharp tissues (teeth, bone) inside a patient's open body cavity, wound or confined anatomical space (e.g., perineal repair), where the hands may not be completely visible at all times
Health care workers	The people involved with providing health care services, including nurses, midwives, doctors, dentists, laboratory workers and others
Inoculation	Injection of a substance through the skin
Mucocutaneous exposure	Exposure of the mucous membranes (mouth and eyes) or non-intact (broken) skin to infected blood
Policy	A written statement used to guide and determine present and future decisions about standard operating procedures

Percutaneous exposure	Exposure occurring as a result of piercing the skin
Sharps	Any object which can penetrate the skin, including needles, scalpels, lancets, broken glass
Sharps injury	Any injury sustained by a health care worker which has been caused by a used sharp instrument
Sterilization	The complete destruction of all microorganisms, including spores

Annex 1: CLASSIFICATION OF EXPOSURES

Exposure is contact with blood (or body fluids contaminated with blood). Exposure may be classified as follows:

Non-parenteral exposure

- Intact skin visibly contaminated with blood or body fluid.

Doubtful parenteral exposure

- Intradermal ("superficial") injury with a needle considered not to be contaminated with blood or body fluid;
- A superficial wound not associated with visible bleeding produced by an instrument considered not to be contaminated with blood or body fluid;
- Prior wound or skin lesion contaminated with a body fluid other than blood and with no trace of blood, e.g. urine.

The following exposures should be taken seriously and appropriate care and follow-up provided.

Possible parenteral exposure

- Intradermal ("superficial") injury with a needle contaminated with blood or body fluid;
- A wound not associated with visible bleeding produced by an instrument contaminated with blood or body fluid;
- Prior (not fresh) wound or skin lesion contaminated with blood or body fluid;
- Mucous membrane or conjunctival contact with blood.

Definite parenteral exposure

- Skin penetrating injury with a needle contaminated with blood or body fluid;
- Injection of blood/body fluid not included under "massive exposure";
- Laceration or similar wound which causes bleeding and is produced by an instrument that is visibly contaminated with blood or body fluid;
- Any direct inoculation with human immunodeficiency virus (HIV) tissue or material likely to contain HIV, hepatitis B virus (HBV) or hepatitis C virus (HCV) not included above – this refers to accidents in laboratory settings.

Massive exposure

- Transfusion of blood;
- Injection of large volume of blood/body fluids (>1 ml);
- Parenteral exposure to laboratory specimens containing high titre of virus.

Adapted from *American Nurses Association Position Statement on Post Exposure Programs in the Event of Occupational Exposure to HIV/HBV*. Washington 1993.

Annex 2: EXAMPLE OF A STANDARD OPERATING PROCEDURE FOR SHARPS INJURIES

SHARPS INJURIES OR EXPOSURE TO BLOOD AND BODY FLUID

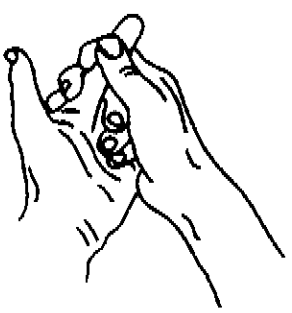
In case of injury with a used needle or other sharp or if bloody/body fluid is splashed into mouth, eyes or onto broken skin, carry out the following procedure.

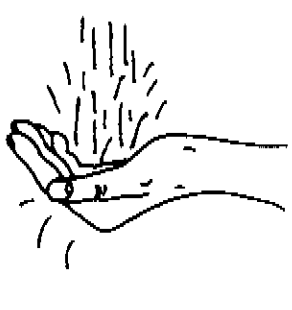
1. Needlepricks, cuts, bites or scratches.

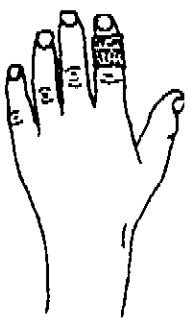
a) Encourage bleeding by squeezing.

b) Wash thoroughly with soap and water.

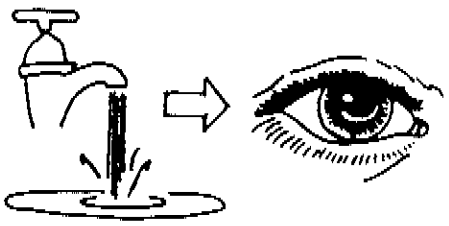
c) Cover with a waterproof dressing.







2. Splashes to mouth or eyes. Rinse thoroughly with plenty of running water.



3. Inform your manager immediately.
4. Complete the Accident/Incident Form. If known, include the name of the patient fro whom the sharp/body fluid came.
5. Report to the Accident and Emergency department for further advice.

It is the responsibility of the member of staff involved and the manager to see that this procedure is carried out.

Annex 3:
EXAMPLE OF AN INFECTION CONTROL STANDARDS CHECKLIST (AUDIT TOOL)

Standard 1	***Sharps are handled safely to minimize the risk of sharps injury*** Appropriate puncture-proof sharps container Container less than three-quarters full Sharps are not protruding from container One-handed recapping
Standard 2	***Instruments decontaminated fully*** Sterilizer available and in good working order Equipment thoroughly cleaned after use Clean instruments in store cupboards
Standard 3	***Hands are washed appropriately to prevent cross infection*** Soap and clean water available Clean towels available Staff observed to wash and dry hands after contact with body fluid, removal of gloves, contact with patients

cont'd...

Standard 4	***Protective clothing is worn to prevent exposure to blood*** The following protective clothing is available for use by staff (depending on the clinical area and risk of exposure): – Disposable gloves – Heavy-duty gloves – Masks – Aprons
Standard 5	***Waste disposed of safely*** Evidence of deep burial or burning regularly No contaminated waste visible

ADDITIONAL READING

Detailed information about cleaning and sterilizing equipment is available in the following WHO publications:

EPI/PHW/84.2/Rev.1 (1987) "Immunization in Practice: A Guide for Health Workers Who Give Vaccines, No. 2: Syringes, Needles and Sterilization"

WHO/EPI Booklet CCXT/1/Rev. (1990) "How to Boil Needles and Syringes Properly"

WHO AIDS Series 2, (2nd edition, 1989), "Guidelines on Sterilization and Disinfection Methods Effective against Human Immunodeficiency Virus (HIV)"

EPI Update 5, 1987. Sterilization Alert

EPI Update 27, 1994. Safe Injection Practices

HIV/AIDS Reference Library for Nurses, Vol. 3. Infection Control. WHO. Manila 1993.