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The continuing increase in HIV infection has brought a new dimension to some of the most complex problems in our health delivery services and social systems and emphasizes the need for a structured and consistent system of prevention and control, as well as the care of people with HIV infection.

The World Health Organization Global AIDS Strategy has established basic principles for national and international HIV prevention and control based firmly on a knowledge of virology and epidemiology, and derived from broad practical experience with infectious disease control programmes. The Global AIDS Strategy provides the necessary framework within which individual countries can develop their own strategies of particular relevance to their own needs.

This book emphasizes the prevention of HIV transmission within the health care setting and will enable nurses to take appropriate precautions to prevent the spread of the infection to other patients and themselves. It will also prepare them to act as a role model for their community by providing compassionate and respectful care and will enable them to teach individuals and groups the facts about HIV infection.

There is a crucial and ongoing need for nursing services to respond to the health needs presented by the HIV pandemic. Nurse managers and nurse educators must participate actively in health policy formulation and planning to organize a framework for the prevention and control of HIV. Such a comprehensive plan requires intervention in three distinct areas: human resources management, community development and provision of health and social services.

The World Health Organization recognizes that the current challenge of the HIV pandemic demands the energy and continued commitment of nurses who, as a profession, have traditionally provided skilful and empathetic health services to individuals, families and communities.
ACKNOWLEDGEMENTS

This series has benefited from the expertise and dedication of many nurse researchers, writers, educators and administrators who developed much of the material, as well as consultants and participants to several WHO Western Pacific Regional workshops in 1988 and 1989.

The WHO Regional Office for the Western Pacific HIV/AIDS Reference Library for Nurses was the result of efforts by nurses in the Western Pacific Region and other health care workers around the world in their attempt to stop the spread of HIV infection through the improvement of their understanding of the problem, its control and management.

It is our hope that these books will contribute to nursing services throughout the Western Pacific Region in the prevention and control of AIDS.
1. INTRODUCTION

This book emphasizes the prevention of HIV transmission within the health care setting.

Although fears and myths concerning Human Immunodeficiency Virus (HIV) abound, the fact remains that the virus is extremely fragile and is spread by specific, preventable behaviour. HIV is similar to hepatitis B Virus (HBV) in that epidemiological investigations have shown that both are transmitted by three major routes: by blood, during sex and at, or immediately after, birth.

Since HBV is a much more hardy virus than HIV, these guidelines are more than adequate to cover both viruses.

It is important to recognize that persons infected with HIV embark on a disease continuum which commences with an asymptomatic carrier ranging through various levels of cellular immune system and/or neurological impairment which finally cause symptoms of opportunistic diseases resulting in a diagnosis of AIDS.

HBV has been referred to throughout these guidelines because of the similarity in transmission to HIV and the seriousness of the disease it causes, hepatitis. In view of the fears of both health care workers and the general public, it is important that nurses learn how HIV is and is not transmitted. This will enable them:

- to take appropriate precautions to prevent the spread of the infection to other patients and themselves;
- to act as a role model for their community by providing compassionate and respectful care; and
- to teach individuals and groups the facts of HIV.

The following guidelines supplement other WHO publications on HIV infection control and prevention. Because of variations in national resources and other factor, these guidelines may need to be adapted to individual country situations.
People with HIV infection or AIDS need to be touched and given compassionate nursing care. They can be cared for without fear.
2. TRANSMISSION OF HIV

HIV is transmitted sexually, parenterally and perinatally. This transmission has been documented through contact with blood, semen, vaginal/cervical secretions and, on rare occasions, through breast-milk. While HIV has been isolated from saliva, tears, sweat and other fluids, it has never been shown to be transmitted via these fluids.

Ways HIV is not transmitted

HIV is not transmitted from one human to another during casual social contact where there is NO exchange of blood, semen or other body fluid: (Figure 1). This is demonstrated by the fact that HIV infection and AIDS are not found equally in all age groups or types of people, but only in those with specific risk behaviours. Several studies were conducted on family members of people with AIDS who were not sexual partners and who did not share injecting drug equipment with the AIDS-infected person. These family members took no special precautions. They engaged in touching, hugging and kissing, and living in the same household which included sharing kitchens, drinking glasses, towels, beds, toilets and toothbrushes. They were involved in the personal care of the person with AIDS, including bathing, feeding and dressing. None of these family members became infected with HIV.

HIV is not transmitted when donating blood. HIV cannot be transmitted to a person who is donating blood, provided that the needle and blood collection set are sterile.

HIV is not transmitted by vaccines or immune serum globulin. Laboratory evidence has shown that neither immune serum globulin (gamma globulin) nor hepatitis B vaccine will transmit HIV. Blood products which have been used to manufacture these items have been treated so that HIV and HBV cannot survive. No one who has been injected with these products has become infected with the virus as a result of the injection. HIV cannot be transmitted through immunization, provided that the needle and syringe used to inject the vaccines are properly sterilized or disinfected between use.
HIV is not transmitted by insects. Extensive epidemiological and laboratory surveys have shown that mosquitos and other biting insects do not transmit HIV.

Studies on family members of HIV-infected persons demonstrate transmission only to sexual parties; further research demonstrates no correlation between the prevalence of HIV infection and the prevalence of malaria.
2. Transmission of HIV

Figure 1. HIV is not transmitted by casual social contact
The chain of infection

The chain of infection in Figure 2 depicts factors in the transmission of disease-producing organisms (pathogens) from one person to another. Each link represents an opportunity for interruption of the process. It is vital to understand this in order to prevent transmission and teach others what is required for transmission to occur. The links of the chain are defined and described specifically for HIV and HBV in Figure 3. Figure 4 depicts the cycle of HIV transmission. The remainder of this book emphasizes the prevention of transmission within health care settings.
Figure 2. The chain of infection
**Figure 3. The chain of HIV and HBV infection**

<table>
<thead>
<tr>
<th><strong>Link in chain</strong></th>
<th><strong>Definition</strong></th>
<th><strong>HIV and HBV</strong></th>
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<tr>
<td>Agent</td>
<td>Microorganism which causes infection. Agents include bacteria, viruses, fungi and parasites.</td>
<td>The agent causing HIV infection is human immunodeficiency virus. The agent causing hepatitis B infection is hepatitis B virus.</td>
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<tr>
<td>Reservoir</td>
<td>A place where microorganisms live, such as in humans and animals, in soils, food, plants, air or water.</td>
<td>HIV and HBV live inside humans.</td>
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<td>Place of exit</td>
<td>Where the microorganism leaves the reservoir.</td>
<td>HIV and HBV leave the human body via the penis in semen, vaginal secretions in blood through breaks in skin and the breast (breast-milk).</td>
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<tr>
<td>Method of transmission</td>
<td>How the microorganism travels from place to place.</td>
<td>HIV and HBV are transmitted via: - sexual contact and semen donation - through blood in use of contaminated needles and syringes - blood or blood products - from an infected mother to her unborn infant during delivery or shortly after birth</td>
</tr>
<tr>
<td>Place of entry</td>
<td>Where the microorganism enters the next host, usually the same way as it left the old host.</td>
<td>HIV and HBV enter the host via the penis, vagina, rectal lining, breaks in skin, blood transfusion and rarely breast-feeding.</td>
</tr>
<tr>
<td>Susceptible host</td>
<td>A person who may become infected.</td>
<td>HIV and HBV infection can occur in anyone who has sexual or blood contact with an infected person, and in infants of HIV-infected mothers.</td>
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</table>
Figure 4. The cycle of HIV transmission
3. PREVENTION OF HIV TRANSMISSION IN A HEALTH CARE SETTING

Risk of HIV transmission in a health care setting

Transmission of HIV in a health care setting can occur from patient to health care worker, between patients, or from health care worker to patient.

Patient to health care worker transmission. HIV transmission from patient to health care worker can occur when the health care worker is exposed to the blood of an HIV-infected person. An example of this is parenteral exposure, such as a needle-stick injury. HIV transmission can also occur through mucous membrane contact, such as a splash of blood into the health care worker's eye or mouth. Non-intact skin contact can be a point of HIV entry such as a splash of blood on to open wounds or broken skin due to dermatitis, acne or chapped skin.

The incidence of HIV infection is very low in those who have had exposure to HIV-seropositive blood. Studies in the United States have indicated that the rate of infection after exposure to HIV from a needle-stick injury is less than 1%, while the risk of infection after needle-stick exposure to HBV has ranged from 6% to 30%. The infection risk after exposure to HIV via mucous-cutaneous contact is so low that it is near zero. Nearly all cases of HIV transmission to health care workers have occurred through preventable accidents. These are needle-stick injuries, cuts from broken blood collection tubes, and contact with blood on non-intact skin which was not protected by barriers such as gloves. Prevention of HIV transmission from patient to health care worker is reviewed in more detail in the section Universal Precautions (page 12).
3. Prevention of HIV Transmission in a Health Care Setting

Patient-to-patient transmission. Patient-to-patient spread of HIV infection is usually by an indirect route. This transmission can occur through blood-contaminated needles, syringes or other equipment which has not been properly sterilized or disinfected before use.

Patients can also be infected when they receive a transfusion with contaminated blood or blood products. HIV infection by blood transfusion can be greatly reduced by screening blood (the donated blood is HIV-screened and blood products heat-treated) for HIV and by requesting potential donors who have engaged in risk behaviours not to give blood. Sometimes only specific cells from the donated blood are administered to the patient. One example is Factor VIII, a blood product which helps blood to clot. These blood products are heat-treated in a way which inactivates HIV and HBV.

Health care worker-to-patient transmission. Transmission of HIV from health care worker to patient appears remote and at time of writing (1993) has only been suggested in one instance. While there is substantial scientific evidence that HIV was transmitted to five patients from a dentist with AIDS, it should be emphasized that it is believed that routine standards of hygiene were not observed in the dental surgery. No other cases have been reported since then, even in hundreds of patients operated on by three surgeons known to have been infected with HIV, and to have developed AIDS.

Because transmission from health care worker to patient is unlikely, changes in work assignments should be based only on the worker's ability to do the job, and not on the workers medical diagnosis. If the worker becomes very fatigued, another work
assignment may need to be made. Decisions should be made on an individual basis including measures to protect patients and health care workers. These measures should be compatible with civil and employment rights.

Like other HIV-infected persons, the HIV -infected health care worker has an impaired immune response, and must be counselled about the risks of acquiring other infections from patients with whom he or she is in contact. HIV -infected health care workers like all health care workers must be encouraged to apply existing precautions very strictly like everybody else.

It is not advisable for an HIV antibody positive health care worker who has a significant degree of immune deficiency to be involved in the care of patients who are immunosuppressed, have immature immune systems or have an infectious disease (such as tuberculosis), because of the potential risk of transmission of secondary infections from the health care worker to patients with defective immune systems.

**Universal precautions**

**Application of universal precautions means that all patients' body fluids should be treated as infectious, since it is not known who is infected with HIV.**

The purpose of universal precautions is to prevent transmission of infection from body fluid and blood-borne pathogens. All health care workers should adopt universal precautions with blood and body fluids of all patients when there is a risk of direct exposure to any blood or body fluids, regardless of whether HBV, HIV or any other infection has been diagnosed in the patient. Universal precautions should be applied because the health care worker may not know who is and is not infected.
Although the actual number of asymptomatic, HIV-infected persons is not known, it is much larger than the number of reported cases of AIDS. Patient history-taking and examination cannot identify the majority of patients infected with HIV, HBV or other body fluid or blood-borne pathogens. However, even though there are no signs, infections can still be transmitted. It is, therefore, essential to implement a programme of infection control precautions that is used consistently with all patients and in all health care settings.

Universal blood and body fluid precautions involve:

• wearing gloves if there is a risk of contact with blood and body fluids;

• wearing eye glasses or goggles, mask and/or gown if there is a risk of splashing of blood or body fluids; and

• always washing hands before and after patient contact and on removal of gloves.

Infection control precautions are intended to isolate the virus and the body fluids, not the patient.
Figure 5. Universal precautions for infection control

UNIVERSAL PRECAUTIONS

Avoid Exposure of Skin & Mucous Membranes to Blood & Body Fluids

IF IN CONTACT
Wear gloves if in contact with blood and body fluids

RISK OF SPLASHING
Wear goggles, mask or gown when there is risk of splashing

ALWAYS WASH HANDS
Wash hands before and after patient contact and on removal of gloves
Important points to remember in preventing HIV transmission

Health care organizations must develop policy to ensure that all health care workers are aware of effective and practical infection control practices.

Prevent injuries with "sharps", such as needles, scalpels, blades and razors (Figure 6). Health care workers can prevent injury by taking time with procedures involving "sharps". Remember that the more a needle or intravenous line is manipulated, the greater the risk of a needle stick injury.

- Do not manipulate needles prior to their disposal and avoid recapping needles before they are discarded, since this is a common cause of puncture Injury.
- Do not bend, break or remove the needle from the syringe prior to its disposal.
- Place disposable "sharps" in puncture-resistant containers made of thick cardboard, plastic or metal, after use.
- The precise location of puncture-resistant containers is important. They should be kept as close as possible to the area where the sharp item is to be used, such as in patient, treatment or utility rooms.
- When washing sharp instruments and needles, wear heavy gloves, and handle with extreme care.
- If the same accidental exposure happens more than twice, review of the working procedure is recommended.
Figure 6. Do not recap, bend or break used needles
Remember to wash hands and skin thoroughly, immediately after contact with body fluids. This is important to prevent disease transmission to you and other patients (Figure 7). Hands should be thoroughly washed, even if gloves are worn. Also wash your hands:

- before and after eating, preparing food or feeding;
- after using the toilet;
- after blowing your nose, coughing or sneezing into your hands;
- before invasive procedures;
- before and after contact with wounds;
- before providing care to patients whose immune system is deficient;
- after contact with a patient;
- after handling soiled linen or waste.

**Cleaning spills.** When blood or other fluids which can transmit HIV are spilled, always wear gloves to clean the spill (use a plastic bag over the hands if gloves are not available). HIV is easily decontaminated by common disinfectants and rapidly killed by household bleach.

- If the spill is small, remove the visible material and then decontaminate the area with an appropriate disinfectant.
- If the spill is large, flood the area with appropriate disinfectant before cleaning, then clean the area and flood again with fresh disinfectant.
Figure 7. Handwashing
3. Prevention of HIV Transmission in a Health Care Setting

**Barrier precautions**

A protective barrier breaks the chain of infection by providing a physical barrier through which the virus (or fluids containing the virus) cannot pass. This includes use of gloves, gowns, masks and goggles.

**Gloves.** Gloves should be worn when touching blood and body fluids, mucous membranes and non-intact skin or when there is a risk of contact with blood and/or body fluids. They should also be worn when drawing blood from a patient.

If a limited number of gloves is available, priority should be given to the following situations:

- when a health care worker has lesions or broken skin on his/her hand;
- when the patient is uncooperative, e.g. an adult with AIDS dementia;
- when the health care worker is doing a fingerstick or heel stick on an infant;
- when the person drawing blood is a student or is unskilled; and
- when the health care worker is performing aseptic or unclean procedures.

A separate pair of gloves should be used for each patient. Gloves should be discarded after each use. It is preferable to use new gloves but reusable gloves can be washed and sterilized, or disinfected before reuse. Gloves that are peeling, cracked, discolored or have visible tears or holes must be discarded. Most invisible holes can be detected by filling gloves with air, and holding them under water; bubbles will appear if tiny holes are present.

**Mask and eye cover (eyeglasses or goggles)** (Figure 8). A mask and eye cover must be used when there is a risk of droplets or splashes of blood or other body fluids. Examples of situations where this might occur are surgery, vaginal deliveries, suctioning, and during chest physiotherapy or when attending to wounds of an accident victim.

**Gowns and aprons** (Figure 9). A gown or apron of plastic, cloth or water-resistant paper should be worn when there is a risk of splashes of blood or other applicable fluids. This may occur during surgery or vaginal deliveries, when lifting a patient with weeping or bleeding wounds, during first aid and emergency care.
Figure 8. Wear a mask and eyeglasses or goggles when there is a risk of splashes of blood or other body fluids.
Figure 9. A gown should be worn when there is a risk of splashes of blood or body fluids
Special circumstances

Resuscitation. There is no evidence that HIV transmission has occurred while performing mouth-to-mouth resuscitation. However, devices such as a pocket mask or resuscitation bag are recommended for use.

Health care workers with skin lesions. Lesions, weeping dermatitis or open cuts should be completely covered in waterproof material (e.g. gloves) before contact with patients or equipment.

Pregnant health care workers. Universal precautions must be strictly followed. Although pregnant health care workers are not known to be at increased risk of exposure, once infected, they carry a substantial risk of transmitting HIV and HBV to their unborn infant.

Infection control in the home. As the number of persons with AIDS continues to climb, hospitals may be unable to meet the demand for care. Thus, more patients will be cared for in the home. This has the advantage of being less costly, and is often preferred by patients because of the added comfort they receive from familiar surroundings.

It is the nurse’s responsibility to teach patients, family members and care providers about HIV infection. Persons with an HIV infection may receive visitors and be cared for without endangering others. Family members should be taught how the virus is and is not transmitted, how to protect themselves, and how to protect and care for the patient.

Persons who belong to conventional high risk groups or who have been diagnosed HIV positive should always use condoms as a precautionary measure in sexual relationships; never share needles or syringes, never donate blood, and should be aware that pregnancy carries substantial risk to the mother and the infant.
The following are guidelines that all caregivers and family members should know and practice:

- **Precautions should be taken in contacts with blood, stools, semen or vaginal secretions.** If gloves are too expensive or in short supply, plastic bags, moisture-resistant paper and other items can be used.

- **HIV is inactivated by bleach, isopropyl alcohol, povidone iodine and soap.** For more information about chemical disinfectants, see the section on "Cleaning, Sterilization and Disinfection", page 33.

- **Since the HIV-infected person’s immune system is deficient and increases the likelihood that the patient will get ill, it is important to protect the latter from microbes that cause disease.** This can be done by teaching the patient and family to practice good hygiene in the home (Figure 10) and will protect both patient and family.

For example:

- cover the mouth when coughing or sneezing;

- wash the hands before eating, after blowing the nose and sneezing, and after using the toilet;

- bathe regularly; and

- maintain personal cleanliness.
Figure 10. Maintaining personal cleanliness
A common situation calling for precautionary measures and application of the information presented above is when the patient has diarrhoea. In such a case, wear gloves and clean the patient with warm water and soap. Rinse the skin well with clean water. Place the linen in a plastic or other leakproof bag until it can be laundered. If a bag is not available, fold the linen with the soiled parts inside. Wash dirty surfaces with hot water and soap and follow this with a bleach and water solution consisting of one part household bleach to 10 parts of water. Hands should be washed after patient contact.

**Cleanliness in the home.** The usual regular maintenance and cleaning of the home environment is adequate to prevent the spread of disease (Figure 11). The following are guidelines for maintaining a safe environment.

- Kitchen and bathroom facilities can be shared with others.
- Dishes, glasses and silverware can be shared after being washed in hot, soapy water.
- Wash the inside of the refrigerator each week to remove bacteria and mould and prevent their growth.
- Clean floors and surfaces regularly, and as spills occur, to keep household bacteria and fungi to a minimum. Sponges used to clean the floor or mop up body fluid spills should not be used on dishes or on food preparation counters.
- If bed linen is soiled, place it in a leakproof container, such as plastic, or fold it with the soiled parts inside. Wash in hot water with soap, if possible. Tissues or dressings should also be placed in a leakproof bag, which should be tied up prior to disposal.
- If government-regulated garbage collection is not available, contaminated wastes should be incinerated, burned or buried.
Figure 11. Regular household cleaning prevents the growth of bacteria and fungi, which can cause disease.
4. UNIVERSAL PRECAUTIONS IN SPECIAL SITUATIONS

Measures can be taken to protect patients from HIV transmission via contaminated equipment. Unnecessary injections can be avoided by giving oral medicines. When injections are necessary, new needles and syringes should be used and discarded after use. When new equipment is not available, needles, syringes and equipment used for previous invasive procedures must be sterilized or appropriately disinfected before each use.

Care must be taken to choose appropriate solutions, and autoclaves should be checked regularly.

Laboratories

Nurses may frequently have to work in laboratories or handle specimens in preparation for laboratory analysis. Laboratory workers are at risk of infection because they handle large amounts of blood and other fluids which can transmit HIV, HBV and other blood-borne pathogens. Thus, it is extremely important that laboratory workers be informed of precautions which can prevent transmission of these pathogens. The following guidelines should be followed.

- Treat all specimens as potentially contaminated. Use one pair of gloves to process all specimens. Rubber gloves can be washed and re-used later.
- Collect, transport and hold all specimens in leakproof containers. Request slips should be protected from contamination.
- Wash hands after removal of gloves, and immediately after contact with blood or other applicable fluids.
- Do not pipette specimens by mouth. Use mechanical pipetters.
Incinerate contaminated solid wastes (microbiological and pathological waste), or autoclave before disposal. Buming or burial in a pit which is seven feet deep and at least 30 feet from a water source can also be done, but is less desirable.

Pour liquid wastes down a sink into a closed sewer system. If there is no working sewer, treat potentially contaminated liquid wastes the same as solids.

Clean up spills with bleach.

Personnel who transport specimens should be trained in safe handling practices and in decontamination procedures in case of a spill.

**Housekeeping**

There are no special housekeeping precautions for the prevention of infection from HIV, HBV or other blood-borne pathogens. However, certain important points should be remembered.

The greatest risk of housekeepers’ exposure to HIV and HBV is via needlestick injury from trash which has not been properly packaged for disposal. As noted in Figure 12, all sharp instruments and equipment, including needles and syringes, must be disposed of in puncture-resistant containers, which should be burned or buried.

Housekeepers and cleaners should carry waste in containers which are small enough to be easily held away from the body to avoid injuries.

Do not put hands into waste baskets.

Do not clean by hand under cupboards, but use cleaning equipment.

Do not use disinfectant fogging of a room, following patient discharge or in any patient care area. Disinfectant fogging is toxic and expensive. Thorough cleaning is the most effective way to remove soil and microorganisms.
Figure 12. Needles must be disposed of in puncture-resistant containers
Laundry

There are no special precautions for laundering to prevent the transmission of HIV. The following guidelines will help prevent transmission.

- Handle soiled linen as little as possible. Wear gloves when handling it.
- Place wet linen in leakproof bags. If no leakproof containers are available, fold the linen with the wet parts inside, and surround with dry linen for carrying.
- Bag linen at the location where it is used. Do not sort linen in patient areas.
- Wash laundry in hot water (at least 71°C or 160°F). If only cold water is available, use special chemical detergents for this purpose or add bleach.
- Injuries from concealed "sharps" in linen must be eliminated.

Waste disposal

There are no special precautions for waste disposal to prevent transmission of HIV. When handling waste, the following guidelines should be followed.

- Place wet waste, such as used dressings, in leakproof bags or containers.
- Identify infective waste (such as microbiological, pathological waste, blood, etc.).
- Incinerate infective waste, or autoclave it before disposal. If incinerators or autoclaves are not available, burn or bury in a pit which is seven feet deep and at least 30 feet away from a water source.
- Blood and other liquid wastes may be poured down a sink into a working sewer system. If there is no working sewer system, use a latrine.
4. Universal Precautions in Special Situations

**Dentistry**

Nurses may be involved in providing dental care. Blood and body fluids should be considered infective in all dental patients. HIV has not been shown to be transmitted via saliva. However, dental procedures often result in small amounts of blood mixing with oral fluids. Thus, universal precautions should be followed for contact with blood and saliva.

- Wear gloves when in contact with oral mucous membranes.
- Wear a mask and eye covering when splashes of blood or body fluids are likely.
- Sterilize or disinfect instruments after use with each patient and clean surfaces with a suitable disinfectant.

**Postmortem procedures**

Religious and cultural traditions concerning the handling of the body must be respected. Some cultures embalm the body. One culture may prefer burial, another cremation. Family members may wish to touch or kiss the body as part of the funeral ritual. In all these situations, people will have questions about what is and is not safe in terms of HIV transmission.

It is important for nurses to be culturally sensitive when dealing with the death of a patient. Since not all cases of HIV infection may be known, the nurse should inform those handling the body about appropriate precautions to cover all bodies.

Precautions for handling dead bodies are the same as those for preventing the transmission of HIV in a health care delivery situation. They are as follows.

- All persons should be considered to be HIV-infected.
- Precautions are not needed if there is no contact with blood, semen, vaginal secretions or other fluids. For example, moving a body from the hospital room to the mortuary or home docs not require special precautions.
• All persons performing autopsies or assisting in postmortem procedures (e.g. embalming) which involve contact with blood, semen, vaginal secretions or tissues should take the following precautions.

a. Wear gloves to avoid contact with body fluids.

b. Wear gown, mask and eye protection (goggles or eyeglasses) if spraying of these fluids is expected.

c. Disinfect contaminated instruments and surfaces following postmortem procedures.
5. CLEANING, STERILIZATION AND DISINFECTION

This section provides basic information on cleaning, sterilization and disinfection of needles, syringes and other equipment.

HIV is transmitted via needles, syringes and other invasive equipment contaminated with blood, semen, vaginal secretions or fluids containing the blood of an infected person. Such equipment includes sharp instruments used by traditional healers and birth attendants, and instruments used in tribal ceremonies and tattooing. To protect patients from infection, these items should be cleaned and sterilized or appropriately disinfected before each use.

Cleaning

Cleaning is the physical removal of organic material or soil from objects and is done with water and detergents. Usually, cleaning does not kill or inactivate microorganisms.

Cleaning should be done to remove dirt, dust and debris from items which will later be sterilized or disinfected. If microbes are protected by dirt or protein aqueous material such as blood, chemical disinfectants and moist heat will not inactivate them. Environmental surfaces such as floors, walls, tables and countertops should also be cleaned.

Always clean and rinse items before sterilizing or disinfecting them. If items are grossly contaminated after use, decontaminate by soaking in disinfectant, clean with soap and water, then sterilize or disinfect again before use.
Sterilization

Sterilization is the complete destruction of all microorganisms and is carried out by steam under pressure, dry heat, and gas or liquid chemicals. Sterilize objects which enter the bloodstream (needles, syringes, catheters and surgical instruments) or other sterile areas of the body.

HIV is a fragile virus and is easily inactivated by standard sterilization and disinfection procedures for patient care equipment.

All forms of sterilization will inactivate HIV and HBV. Methods include:

1. Steam under pressure
   Autoclave or pressure cook at 15 pounds pressure for 20 minutes at 121°C

2. Dry Heat
   170°C (340°F) for 2 hours

3. Chemical
   Use 2 per cent glutaraldehyde for at least 10 hours; or 3 per cent hydrogen peroxide for at least 2-1/2 hours

Disinfection

Disinfection kills or inhibits most, but not all, microorganisms through the use of chemical disinfectants or boiling. Disinfect objects and equipment which touch mucous membranes (respiratory equipment), items which cannot be sterilized (laparoscopes), and items which must be decontaminated but do not need to be sterile.
bedpans). Under adverse conditions when sterilization equipment is not available, disinfection may be used. Boiling is a form of high-level disinfection.

The following methods of disinfection are known to inhibit HIV. Be sure that all parts of the equipment are separated and completely immersed in the water or chemical disinfectant. The liquid must touch all surfaces of the object in order to be effective.

- **Boiling** is an effective way to disinfect instruments and equipment (such as needles and syringes) when sterilization is not possible.

  To disinfect, boil in water for 20 minutes.

- **Chemical disinfection.** Do not use chemical disinfection for needles and syringes used for vaccinations. Chemical disinfection for other invasive equipment should only be used as a last resort.

  For chemical disinfection - Soak clean intruments in disinfectant for 20 minutes and then, for all disinfectants except alcohol, rinse thoroughly in sterile or boiled water.

**Chlorine compounds** (bleach). HIV is rapidly killed by liquid chlorine (household bleach), making it ideal for decontaminating large surfaces.
For general disinfection of surfaces soiled by blood or body fluids use:

- 0.05 per cent (500 ppm available chlorine) for areas that have been previously cleaned with a detergent solution and most of the soiling has been removed. Benches, floors, walls and other inanimate objects likely to be contaminated but not visibly soiled should also be disinfected with this strength of solution.

- 0.5 per cent (5 000 ppm available chlorine) for areas that cannot be adequately cleaned prior to disinfection, for example porous surfaces.

The solutions should be left in contact with the surface for ten minutes. (Liquid household bleach usually contains approximately 5% sodium hypochlorite or 50 000 ppm available chlorine. A dilution with tap water 1: 100 provides 500 ppm available chlorine and 1: 10 provides 5 000 ppm available chlorine.)

Gloves must be worn and materials used to absorb blood and body fluid must be placed in leak-proof bags and disposed of appropriately. Sodium hypochlorite at the above concentrations is irritating to skin, and may corrode metal.

- Other disinfectants which are active against HIV include 70% ethyl or isopropyl alcohol, 2% glutaraldehyde, 3% phenol (or lysol), 2.5% povidone iodine, 4% formaldehyde, and 3% to 6% hydrogen peroxide.

A summary of the definition and methods of cleaning, sterilization and disinfection is given in Figure 13.

**Storage**

All items and sterile packs must be stored in a clean, dry place, preferably under cover to protect from dust. Disassembled items should not be reassembled until ready for use. Sterile items should be separated from clean or disinfected items.
### Figure 13. Cleaning, sterilization and disinfection

<table>
<thead>
<tr>
<th></th>
<th>Definition</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaning</td>
<td>Physical removal of organic material or soil</td>
<td>- Water and detergent</td>
</tr>
<tr>
<td>Sterilization</td>
<td>Complete destruction of all microorganisms and spores</td>
<td>- Steam under pressure. Autoclave or pressure cook at 15 pounds pressure for 20 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Dry heat</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Gas</td>
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<tr>
<td></td>
<td></td>
<td>- Liquid chemicals</td>
</tr>
<tr>
<td>Disinfection</td>
<td>Kills or inhibits most, but not all microorganisms</td>
<td>- Chemical germicides (alcohol, bleach). Soak clean instruments for 20 minutes then for all disinfectants except alcohol rinse in boiled or sterile water.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Boiling in water for 20 minutes.</td>
</tr>
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</table>
6. INFECTION CONTROL PROGRAMME

The following guidelines outline steps for the successful implementation and management of an infection control programme to prevent the transmission of HIV, HBV and other body fluid and blood-borne pathogens in the health care setting.

Administration

To implement and support the use of universal precautions, and to review problems related to HIV/HBV transmission (Figure 14) it is essential to identify and bring together key individuals within the health agency. This committee should include representatives from various departments providing care to the patient, such as nursing, medicine, laboratory, administration and pastoral care. The committee should decide which precautions can be implemented in the facility. Decisions should be based on available equipment, budget, personnel and administrative support. When making decisions, it is important to be practical and consistent. For example, infection risks should be evaluated and ranked as follows:

- type of fluid with which there may be contact. Blood, which has a greater concentration of the virus, is of much greater concern than breast milk.
- volume of blood involved. Emergency care after a traumatic injury can be very bloody, whereas dressing a small cut involves little risk of contact with blood.
- probable risk of exposure. Needlestick injuries are much more likely to transmit HIV than contact with soiled linen.
After infection precautions have been approved by the committee, they should be included in a procedure manual for the health care facility. The manual should be distributed to each unit where health care workers may have contact with blood or body fluid secretions. The guidelines should be reviewed on a regular basis.

Protective equipment and clothing should be provided on the basis of the available resources and according to a priority ranking system. This equipment should be made available where it will be used.

Good communication with all levels of health care workers is the key to developing the support needed for a successful programme. Inform workers about what you are and why you are doing it, share ideas and materials with them, and be ready to listen to their point of view.

**Training and education**

The main way to prevent the transmission of HIV is through education and behavioural change. Both health care workers and patients must understand the risk of HIV and HBV transmission and the purpose of infection control precautions in the health care setting.
Figure 14. Key individuals should be involved in implementing an infection control programme
All levels of health care workers, including students, should receive an orientation regarding universal precaution guidelines. Support staff or workers who have little contact with patients, such as kitchen or clerical staff, should be included since they may be unnecessarily concerned about the risk of HIV infection to themselves. This fear may ultimately have a negative effect on patient care.

This orientation should include content on the epidemiology of HIV and HBV as follows:

- routes of transmission;
- methods of preventing transmission;
- difference between HIV infection and AIDS;
- prevalence of AIDS;
- universal precautions; and
- action to be taken when potential exposure occurs.

**Evaluation and monitoring**

Monitoring the effectiveness of an infection control programme can indicate topics which require further discussion or review. This can be done by conducting a surveillance of the workplace. Assess whether the recommended precautions are being observed and whether protective clothing and equipment are available and are being used properly.

An investigation of known or suspected cases of exposure to blood or other body fluids should be conducted to determine whether exposure could have been prevented. Changes in training, work practices or provision of protective equipment can help to prevent a similar incident from occurring. Based on the findings of the monitoring, future educational topics can be identified. In addition, workers who fail to implement protective measures should be counselled.
Infection control procedures for preventing HIV transmission are the same as for all bloodborne pathogens. It is the fear of AIDS, the perceived deadliness of the disease and the social stigma which make HIV / AIDS infection control seem different.

Success in implementing and managing an infection control programme to prevent transmission of HIV, HBV and other bloodborne pathogens in the health care setting depends upon the knowledge, creativity and energy of the health care worker and on the resources available to each facility.
7. MANAGEMENT OF EMPLOYEE HEALTH AND HIV EXPOSURE

All health care facilities should develop a system for monitoring, reporting, recording and evaluating cases of possible HIV exposure among health care workers. A central employee health department or the worker’s personal physician could perform these tasks. In the absence of an employee health department, these tasks could be performed by unit supervisors or by a designated staff member. When managing employees who have been exposed to HIV or who are HIV-infected, it is important to treat them with respect and care. All health records should be kept confidential.

Management of suspected exposure to HIV

In developing a protocol for the management of exposure to known or unknown cases of HIV infection, the following points should be considered.

- The confidentiality of both the health care worker and the source patient must be maintained. This is vital because of the fear and prejudice associated with HIV / AIDS infection, which may result in discrimination.

- In deciding whether or not to use the HIV antibody test, a cost-benefit ratio should be determined. Factors include the accuracy of the test result and the benefit to the individual of knowing the test results, including the importance of a baseline test for securing insurance benefits.

- Counselling for the employee and the source patient should be provided, if he/she is available. The person should understand the meaning of the test and its results. Referral to other care providers may be necessary.
National policies on testing exposed health care workers and patients should be established.

National policies and legislation may be helpful with regard to HIV testing. Policies concerning the protection of human rights for both the suspected source patient and the exposed health care worker will give guidance concerning such tests. In countries where such policies have not yet been developed, it is important that this issue be raised.

_Suggested guidelines for the management of health care workers exposed to HIV_

If a health care worker suspects that he/she has been exposed to HIV, the following action is recommended:

1. promptly wash away the contaminating blood or fluid;
2. encourage bleeding, then wash with soap and water or large amounts of water;
3. if there is no puncture, wash with soap and water;
4. if the eyes are contaminated gently rinse, while open, with tap water or saline;
5. if blood gets in the mouth, spit it out and then rinse the mouth with water;
6. report the incident to ensure appropriate follow up;
7. high risk exposures should be evaluated as soon as possible by a physician with expertise in the area. This may necessitate referral to a specialist centre;
8. evaluate and record the type of exposure, e.g. needlestick injury, cut with a sharp instrument, splash onto mucous membranes or non-intact skin
9. if HIV testing is available: With his/her permission, test the source patient (if known) for HIV;

   a. If the test is negative, there is no need for a follow-up.

   b. If the test is positive, if the patient refuses to be tested or if the source of exposure is unknown:

      - counsel the health care worker about the risks of HIV and HBV infection and about subsequent risks to the community. Recommend safer sex, delaying pregnancy and not donating blood.

      - ask the health care worker to report any febrile episodes within 12 weeks after the exposure. Rashes, fever or swollen lymph glands should be noted during this period.

      - with his/her consent, test the health care worker at the time of exposure for a baseline result, then at 6 weeks, 12 weeks, 6 months and 12 months after exposure. Most seroconversions will occur within 6 to 12 weeks.

   c. If HIV testing is not available or is prohibitively expensive:

      - evaluate the source patient for risk factors for HIV infection.

      - counsel the employee if it is determined that he/she has been exposed.

      - monitor the worker for signs of infection such as fever, rashes or swollen lymph glands within 12 weeks after exposure.

      - perform testing at 6 months, since nearly all sero-conversions will occur within this time period. If testing cannot be performed, continue to monitor the employee for illness for one year or until testing can be performed.

      - contact the national AIDS committee for information.
Nurses, being frontline care providers, are instrumental in preventing the spread of HIV and other viruses or microbes. By becoming informed and applying this knowledge in practice, nurses can prevent the spread of HIV infection to patients and themselves. In doing so, nurses can provide care to the infected person with compassion and without fear.

If you would like more information on this and related topics, contact your national AIDS committee.
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