MODULE 6

PREVENTION OF OPPORTUNISTIC INFECTIONS

Contents

Learning Objectives

When you have completed this module you should:

- Understand that with effective combinations of antiretroviral drugs and chemoprophylaxis with cotrimoxazole many opportunistic infections may be prevented
- Be able to list the infections that may be prevented with long-term cotrimoxazole chemoprophylaxis
- Be able to list the vaccinations that are permissible and those that are not permissible in persons with HIV infection
- Be able to list the preventable infections
- Understand what is meant by universal precautions and safe practices

Chemoprophylaxis against opportunistic pathogens and highly active antiretroviral therapy have led to a substantial reduction in the incidence of opportunistic infections in persons with HIV infection. The best strategy for reducing opportunistic infections is by using antiretroviral drugs.

6.1 INTRODUCTION

Persons with HIV infection and AIDS are prone to life threatening infections as a result of their immune suppression. With the advent of effective antiretroviral drugs, and their appropriate use in combinations, it is possible to delay the onset of AIDS and the development of opportunistic infections and also to allow PLHA to enjoy a better quality of life. With antiretroviral therapy cell mediated immunity gradually improves and as the HIV

plasma viral load decreases the peripheral blood CD4+ lymphocyte counts increase. Individuals with HIV infection and immunosuppression develop, and often succumb to, a number of bacterial, viral, protozoal and fungal infections. Many of these are treatable with appropriate antimicrobial agents. A large number of infections that commonly occur in immunosuppressed individuals may be prevented with antimicrobial agents used on a long-term basis.

With the introduction of ART it has become evident that chemoprophylaxis for opportunistic infections need not be a lifelong process. The period of susceptibility to opportunistic infections correlates well with CD4+ lymphocyte levels. With successful ART, the levels of peripheral blood CD4+ lymphocytes gradually increase. Though studies are limited it is generally felt that chemoprophylaxis be continued while the peripheral blood CD4+ lymphocyte counts remain less than 200/mm^{-3}.

Infections such as tuberculosis, *Pneumocystis* pneumonia (PCP), toxoplasmosis, bacterial lower respiratory tract infections, recurrent meningitis and septicaemia, chronic diarrhoeal diseases including cryptosporidiosis and bacterial skin infections occur commonly in PLHA. Studies have shown that a number of infections may be prevented with chemoprophylaxis.

Activity 6.1

This is a group exercise

In your place of work list all the places that you consider are possible sources where a health worker may become exposed to HIV

How may health workers prevent becoming infected with HIV themselves?

There will be a discussion when this exercise has been completed

6.2 COTRIMOXAZOLE CHEMOPROPHYLAXIS

Long-term chemoprophylaxis with cotrimoxazole can potentially prevent the following life-threatening infections:

- ***Streptococcus pneumoniae*** **pneumonia**
- ***Pneumocystis*** **pneumonia**
- **Non-typhoid salmonelloses**
- **Cerebral toxoplasmosis**
- **Nocardiosis**
- **Isosporiasis**

It is therefore recommended that all adults with symptomatic HIV infection and those with CD4+ lymphocyte counts of less than 200/mm^3 should receive:

Sulphamethoxazole 800 mg and trimethoprim 160 mg once daily orally. This may be given in the form two tablets of the regular strength or one tablet of the double strength orally daily. Treatment is continued indefinitely or until such a time that the CD4+ lymphocyte counts are greater than 200 / mm^3.

Cotrimoxazole is a relatively inexpensive drug; it is uncommonly associated with side effects (except in persons who are allergic to sulphonamides) and is easily administered orally. The effect of long-term cotrimoxazole prophylaxis has been the improvement of quality of life, prolongation of life and the reduction in the incidence of opportunistic infections.

This is an intervention that has been shown to work and programmes for the provision of cotrimoxazole to persons with HIV infection who have evidence of immunosuppression should be developed and implemented as a priority.

Cotrimoxazole chemoprophylaxis may also be used in pregnant women in the doses stated. In children the dose is based on the trimethoprim dose of 15mg/kg/day.

The success of this intervention in preventing infections is dependent upon adherence to the treatment regimen. Hence all patients with HIV infection should be educated, counseled and supported to comply with the treatment.

Activity 6.2

This is an individual exercise

List all the side effects of cotrimoxazole

There will be a discussion when this exercise has been completed

6.3 CHEMOPROPHYLAXIS FOR TUBERCULOSIS

Tuberculosis occurs very commonly in persons with HIV infection. The infection is easily treated with the standard anti-TB drug regimens and all efforts need to be made to identify and treat persons with possible HIV-TB co-infection. In offering chemoprophylaxis for TB all attempts should be made to exclude active TB first. Active TB may be excluded by carrying out a thorough clinical examination and by performing a chest x-ray and microscopic examination of sputa. If active TB is discovered then the patient should be treated for TB according to the TB guidelines developed by the TB programme and described in Module 3.

The World Health Organization recommends that in all HIV positive persons a tuberculin skin test (Mantoux test) should be performed. If the tuberculin test is positive, i.e., equal to or greater than 5mm using 5TU in a Mantoux test, patients should have a chest x-ray and sputum examinations. Those that have a positive tuberculin test and no clinical, microbiologic or radiologic evidence of TB should be considered to have **Latent TB**. Such patients may be treated for latent TB as described below. Care should be taken not to treat active TB with one or two anti-TB drugs only.

Please note that currently in Zimbabwe it is <u>not</u> the policy to treat latent TB with one or two drugs, as suggested, and such patients should be referred to a specialist for assessment and advice. This policy may be revised at a later date.

Treatment of Latent TB

Follow the National TB Guidelines. Some countries recommend that all persons with a positive tuberculin test and no other evidence of active TB and all HIV-positive persons who are contacts of persons with TB, should be given

- Isoniazid (INH) 300mg daily for 9 months together with pyridoxine (Vitamin B6) 50mg daily, OR
- Rifampicin 600mg daily PLUS pyrazinamide 2g daily for 2 months.

6.4 SECONDARY PREVENTION OF CRYPTOCOCCAL MENINGITIS AND PREVENTION OF OTHER MYCOSES

In persons with HIV infection who have had an episode of cryptococcal meningitis it has been demonstrated that this life-threatening infection may be suppressed through the long-term use of fluconazole after the initial episode has been adequately treated appropriately with antimycotic agents, such as amphotericin B, flucytosine and fluconazole or itraconazole. For preventing the recurrence of cryptococcal meningitis give the patient:

- Fluconazole 200mg orally daily for life

For preventing oro-pharyngeal candidiasis and oesophageal candidiasis and histoplasmosis, give the patient:

- Fluconazole 200mg orally daily for 14 days

Other antifungal agents have also been shown to be effective in the secondary prevention of fungal infections. These include itraconazole given in a dose of 200mg orally daily.

Activity 6.3

This is a group exercise

How would you go about initiating a screening programme for TB in a population with a high HIV prevalence rate?

There will be a discussion when this exercise has been completed

6.5 VACCINATIONS IN PERSONS WITH HIV INFECTION

Babies born to mothers with HIV infection should be immunized according to the **National guidelines of the Expanded Programme on Immunizations (EPI).** These children will receive BCG vaccination at birth and vaccination against polio, pertussis, diphtheria, tetanus and measles during the first nine months of life. This policy should be encouraged and continued. Hepatitis B vaccine, *Haemophilus influenza B* vaccine and the conjugate pneumococcal vaccine may also be given.

BCG vaccine should not be given to symptomatic HIV/AIDS patients and a booster should not be given to the pre-school child until the child's HIV status is known. Vaccination against Yellow Fever should be avoided.

Children with HIV infection and AIDS may be vaccinated in accordance with the National EPI guidelines provided that live vaccines are avoided in symptomatic children. Table 6.1 summarises the vaccination recommendations.

Table 6.1: Vaccination of children who have HIV infection

Vaccine	Recommendation in	
	Asymptomatic child	Symptomatic child
Bacille Calmette Guerin (BCG)	Yes	No
Diphtheria Pertussis Tetanus	Yes	Yes
Oral Polio Vaccine	Yes	Yes
IM Polio Vaccine	Yes	Yes
Measles	Yes	Yes
Hepatitis B Virus	Yes	Yes
Haemophilus influenzae B	Yes	Yes
Yellow fever	No	No
Influenza	No	No

Activity 6.4

This is a group exercise

1. What is the current vaccination schedule of the Expanded Programme n Immunizations (EPI) in Zimbabwe?
2. How would you alter this in view of the high prevalence rates of HIV infection in the community?

There will be a discussion when this exercise has been completed

6.6 PREVENTABLE INFECTIONS

Table 6.2 summarizes the infections that may be preventable and the methods of prevention. This includes the vaccines used in the Expanded Programme of Immunization (EPI).

Table 6.2: Preventable infections

	Infection	Method of prevention
Viruses	Hepatitis B	Vaccination
	Influenza	
	Polio	Vaccination EPI Programme
	Measles	
Bacteria	Diphtheria	
	Pertussis	
	Tetanus	
	Tuberculosis	BCG Vaccination at birth (EPI Programme) Chemotherapy with INH
	Haemophilus influenza B	Vaccination
	Streptococcal pneumonia	Vaccination with conjugated vaccine Chemotherapy with cotrimoxazole
	Non-typhoid salmonellosis	Chemotherapy with cotrimoxazole
	Nocardiosis	
Protozoa	Isosporiasis	
	Toxoplasmosis	
Fungi	Pneumocystis pneumonia	
	Candidiasis	Chemotherapy with fluconazole
	Histoplasmosis	
	Cryptococcosis	

6.7 SAFE PRACTICES

HIV infection and infection with the hepatitis B and C viruses may be transmitted to health workers managing persons with these infections. Safe practices and guidelines for universal precautions should be strictly adhered to in order to minimize the risk.

UNIVERSAL PRECAUTIONS – COMPONENTS

The principles of infection control remain constant whether HIV, HBV, HCV or other infectious agents are the cause for concern. The components of Universal Precautions include:

1. Personal protective equipment e.g. wearing gloves, gowns, eye protection and other protective gear,
2. Hand washing,
3. Decontamination e.g. appropriate cleaning methods to decontaminate surfaces, objects, etc and
4. Waste disposal, e.g. liquid or non –liquid form, double bagging and labeling.

TREAT ALL HUMAN BLOOD AND POTENTIALLY INFECTIOUS BODY FLUIDS AS CONTAGIOUS

1. Treat all human blood and potentially infectious fluids as if they are known to contain blood borne pathogens. Those potentially infectious body fluids are:

POTENTIALLY INFECTIOUS BODY FLUIDS

- blood
- vaginal secretion
- semen
- any body fluid that you cant identify
- fluid that has visible blood present

2. Precautions should be taken when handling stool, urine, nasal secretions and vomitus

Instructor's Note:
Before putting up the next 2 overheads, give the participants an opportunity to respond to the following two questions.)

What are some tasks in childcare that may pose a risk to infection with blood borne pathogens?

EXPECTED RESPONSES

Expected responses: Bleeding injuries, biting, loose tooth, changing band-aids or dressing, handling breast milk, any task that involves visible blood and performing CPR.

The Following is a note to assist in answering questions:

1. Biting is not a common way of transmitting HIV. In fact there are numerous reports of bites that did not result in HIV infection. This information is from the Center for Disease Control (CDC) fact sheet, HIV and its Transmission, 1997.
2. Although Universal Precautions do not apply to human breast milk, gloves may be worn by health care workers in situations where exposure to breast milk might be frequent, e.g. in breast milk banking. CDC, May "95.
3. Saliva, tear and sweat: HIV has been found in saliva and tears in very low quantities from some AIDS patients. It is important to understand that finding a small amount of HIV in a body fluid does not necessarily mean that HIV can be transmitted by that body fluid. HIV may not be recovered from the sweat of infected persons. Contact with saliva, tears or sweat has never been shown to result in transmission of HIV.

What are some ways to protect yourself while performing these tasks?

Expected responses: wearing gloves, washing hands, using bleach or other approved disinfecting solutions, using available resuscitation masks (CPR)

HANDWASHING

The second component of Universal Precautions is hand washing. Hand washing is one of the most important defenses against the spread of infectious disease.

Children's hands and adults hands should always be washed with soap and running water following contact with blood or other potentially infectious body secretions, as described above, even if gloves have been used for the task.

Do remember that hand washing is the most effective way to reduce the spread of disease.

Lets take a few minutes to review the method of hand washing:

Use soap. Liquid is best and warm running water.
Rub hands together vigorously for at least 30seconds.
Remember all surfaces including thumbs, wrists, back of hands, between fingers and around and under nails.
Rinse hands well, letting water drain from wrists to fingers – don't turn off faucet.
Dry hands with paper towel, then use the same towel to turn off faucet.
Discard towel.

Remember, the use of bar soap is discouraged as bacteria can grow on the bar and the soap dish.

Products such as moistened towelettes and antiseptic hand cleaners do not replace the need for hand washing as soon as possible following exposure. Antiseptic hand cleaners are

effective alternatives if running water is not available e.g. field trips.

ALWAYS WASH HANDS

Remember: The times to always wash hands are:

When you arrive at the childcare center

Before and after giving medications

Before beginning care/first aid

Before and after using the bathroom

In-between delivery of care/first aid

Before handling clean equipment and after handling dirty equipment

Before and after eating

Before handling food

Before leaving the building

PERSONAL HYGIENE

Personal hygiene as well as eating or drinking should not take place where there is a possibility of exposure. There should be no eating, drinking, smoking, applying make-up, handling contact lenses, etc, in areas in which first aid is provided.

PERSONAL PROTECTIVE EQUIPMENT

This equipment always includes disposable latex or vinyl gloves that should be worn only once. Staff members allergic to latex gloves will have alternative gloves available for their use.

Additional protective equipment e.g. masks, aprons, gowns, face shields may be required in a program serving special needs children whose care requires suctioning, catheter care, nasogastric or gastric feeding tubes. Gloves must be provided in each classroom and diaper changing area, with first aid supplies and on transportation vehicle(s**). Gloves must be discarded after one use. NEVER use gloves twice**. Hands must be washed each time gloves are discarded.

Instructor's Note: This is a good time to demonstrate how to remove gloves.

SHARPS

All sharps must be disposed of in a container that is closeable, puncture resistant, leak proof on sides and bottom and labeled with a biohazard label or color-coded red. All needled, broken glass, etc, should be discarded into this container.

Needles or other contaminated sharps will not bent, recapped, removed or purposely broken.

Sharps containers should be located in areas away from children's reach**.**

BLEACH SOLUTIONS

All surfaces, especially those contaminated with visible blood or other potentially infectious body fluid should be washed and disinfected immediately with a solution consisting of 1 part bleach to ten parts water. Wear gloves and use paper towels during this procedure.

The 1:10 bleach solution is the solution most often recommended for the decontamination of surfaces because it is effective, inexpensive and readily available.

Carpets contaminated with blood or other body fluids are satisfactorily decontaminated with standard carpet-cleaning chemicals.

LAUNDRY PROCEDURES

Clothing and linens stained with blood should be handled with gloves and placed in a plastic bag and labeled and color coded in accordance with OSHA regulations until they can be laundered in hot, soapy water. Appropriate personal equipment should be worn when laundering contaminated laundry. Responsibility for laundering these items may vary e.g. parents, program, or a professional laundry may do them**.**

1. The employer is responsible for cleaning employees contaminated clothing at no expense to the employee.
2. The child's clothing needs to be double plastic bagged and sent home.

3. Center items may be laundered at the center or at a Laundromat.

Launder in hot water (165º) for 25minutes. If using cooler water, add bleach or other laundry disinfectant according to instructions to the instructions on the container.

WASTE DISPOSAL

Items that are visibly contaminated or are potentially infectious must be disposed of in a separate sealed, double plastic bag before being discarded. The location of your program may determine the steps for appropriate waste disposal.

Regulated (bio-hazardous) waste is defined as:

1. Liquid or semi-liquid blood or other potentially infectious material;
2. Contaminated items that would release blood and other potentially infectious materials if compressed;
3. Items caked with dried blood or other potentially infectious material that are capable of releasing these materials during handling; and
4. Contaminated sharps (needles, broken glass contaminated with blood).

TWO TYPES OF WASTE

There are two types of waste that need special attention. Early childhood programs usually generate an amount of "contaminated waste" that is not regulated.

1. Contaminated waste includes diapers, sanitary napkins, used band-aid (not saturated with blood), discarded gloves or other personal protective equipment (not saturated with blood), vomit etc.

Contaminated waste should be double bagged in plastic, and disposed of in covered trash containers that are not accessible to children.

2. Regulated (bio-hazardous) waste includes items that are saturated with fluids

containing blood, or items caked with dried blood. This waste must be placed in special containers, and handled by a hazardous waste disposal company.

In all cases, follow local regulations carefully concerning disposal procedures.

Now we are going to consider what happens following an exposure to blood or other potentially infectious materials.

All programs should have policies in place to provide guidance in the event significant exposure to potentially infected blood or body fluid has occurred to an adult or child. These policies should include the following:

Hepetitis B vaccination must be offered to an employee within 24hours following a first aid incident in which blood or other body fluids were present. If employee refuses, the employee must sign a form declining the offer of the Hepatittis B vaccine.

WHAT IS AN EXPOSURE INCIDENT

An exposure incident means a specific eye, mouth, other mucous membrane, non-intact skin or parental (needle or sharp object) with blood or other potentially infectious material that result from the performance of an employee's duties.

AFTER EXPOSURE

Responsibilities and procedures after a significant exposure to blood or other potentially infectious materials include:

1. Wash the affected area and remove contaminated clothing;
2. Protect others from exposure (cleanup, decontaminate, and follow disposal procedures);
3. Report the event to your supervisor as soon as possible.
4. Seek medical care within 2 hours if the exposure warrants.
5. The physician/clinician will determine significance of the exposure as well as dictate follow-up medical care.
6. If consent for testing is obtained from the source of the exposure, only the physician and exposed worker are entitled to those results.
7. Confidentiality of the source and exposed worker must be maintained.
8. Document the exposure before the end of the day;

Documentation of the exposure must include: the name of the individual, date and time of the exposure, type of exposure, what happened and, if it is not prohibited by local or state regulations, the name of the person whose blood (body fluid) was the source of the exposure. Suggestions that might help to prevent a future accident of this kind should be documented at this time. (See sample Exposure handout).

9. Provide the healthcare professional with information and secure a confidential medical evaluation if necessary; and
10. Provide the health care professional's written opinion.
Confidentiality will be maintained. Medical records will be kept confidential.
Remember, in order for Universal Precautions to be effective, it must be practiced as a matter of routine, not only in particular situations. All staff must be instructed annually in the procedures used by their program, and monitored on their application on a regular basis.

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

The Occupational Safety and Health Administration (OSHA) is a division of the US Department of Labor. OSHA regulates workplace health and safety standards. Blood borne pathogen standards are included in OSHA regulation and early childhood staff are protected by these standards.

OSHA blood borne pathogen standards include the requirement for training of all individuals who may have contact with blood and other potentially infectious materials during the course of their jobs.
OSHA does not specifically identify all occupations considered to be at risk for exposure. Risk determination is often left to the discretion of the employer.

Training is to be provided by the employer prior to the new employees first assignment and every year during work hours. The training is to familiarize staff with signs and symptoms of blood borne diseases, e.g., HIV/AIDS and Hepatitis B and is to include review of site policies and procedures that address potential blood borne pathogen exposure.

All programs should have an exposure control plan to guide them is an exposure to blood or other potentially infectious material occurs. This plan needs to be part of the training.

Training records must include:
1. Dates of training sessions
2. Summary of training sessions
3. Names and qualifications of persons conducting trainings
4. Names and job titles of those attending trainings.
5. Records must be maintained for 3 years from the date of training

HIV is not spread through droplet inhalation but a health worker may become infected by the accidental introduction of infected material obtained from an infected person parenterally through needle stick and scalpel blade injuries. The average risk of transmission of HIV through a needle stick is about 0.3%. The risk is higher if the injury was a deep intramuscular stab, if the needle had been used in a patient with advanced HIV infection, if the needle had been used to draw venous or arterial blood or if blood was visible on the needle.

It is important to prevent the introduction of infected material into the body and certain safe practices should always be adhered to. These include:

- Developing a policy for the prevention of occupational accidental exposure to blood borne pathogens
- Implementing universal precautions for the prevention of exposure to potentially infectious material
- Educating all personnel of the risks involved in improper handling of such material and the steps necessary for preventing exposure should be clearly displayed in posters
- Training of all employees in the handling and disposal of infectious material
- Training all personnel on how to safely handle sharp objects and how to safely dispose of them
- Messages should promote avoiding re-capping of needles, using "sharps bins" for disposing of sharps, and taking care in performing procedures
- Ensuring an uninterrupted supply of education materials, disposable needles and syringes and sharps bins

Hand washing is an important method of preventing transmission of infection. When carrying out procedures it is advisable to wear a rubber apron under the gown and a facemask should be worn. If there is likelihood of splashing occurring then goggles should also be used. Health personnel should also be conscious that blood and secretions from patients may be infectious and that simple contamination of unbroken skin does not comprise a significant risk but contamination of intact mucous surfaces of the mouth and eyes does.

All needlestick injuries should be reported and post-exposure prophylaxis should be commenced.

Activity 6.5

This is a group exercise

1. What universal precautions are advised in your place of work?
2. Do you have a system of reporting needlestick injuries at work? If so describe the system.

There will be a discussion when this exercise has been completed

Important points to remember

- Immunosuppressed persons are prone to life-threatening infections and usually die of these if not treated adequately
- A number of infections are preventable using a single antimicrobial agent
- Cotrimoxazole if taken regularly has been shown to prevent a number of infections that occur frequently in HIV infected persons including, streptococcal infection, PCP, toxoplasmosis, nocardiosis, non-typhoid salmonelloses and isosporiasis
- TB may be prevented through vaccination and through prophylactic treatment of latent infection
- A number of other infections may be prevented through routine vaccination as detailed in the EPI programme
- Safe and hygienic practices in the health care facility and in the home may prevent the transmission of infections