

Infections and infectious diseases

A manual for nurses and midwives
in the WHO European Region



World Health Organization
Regional Office for Europe



International Federation of Red Cross
and Red Crescent Societies

ABSTRACT

There is an urgent need to re-establish basic infection control measures, which have been overlooked or played a less important role in controlling the spread of infections since the introduction of antibiotics in the 1940s. This manual has been written with the aim of developing the knowledge, skills and attitudes of nurses and midwives regarding infections and infectious diseases and their prevention and control. It is intended to be used as an interactive learning package for nurses and midwives in the WHO European region, specifically in eastern Europe. There are seven modules. Each module is in two parts: theory and practice. A workbook is provided separately, with opportunities for self-assessment through learning activities. A completed workbook is also available for each module to give further guidance to readers.

Keywords

INFECTION CONTROL
INFECTIOUS DISEASES
PREVENTION
TREATMENT
NURSING CARE

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Foreword

Infections and infectious diseases are a great burden on many societies, including the countries in the WHO European region. To reduce that burden an integrated approach is required, combining health promotion, disease prevention and patient treatment. The prerequisite for success in this fight is the participation of all health care professionals. Nurses and midwives, as major frontline providers of care, are in a position to contribute significantly to reducing the burden.

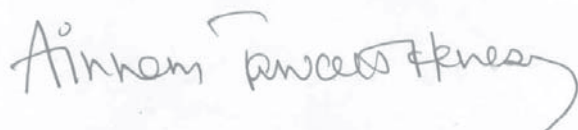
Infections and infectious diseases: A manual for nurses and midwives in the WHO European region has been written with the aim of developing the knowledge, skills and attitudes of nurses and midwives regarding infections and infectious diseases and their prevention and control. It is intended for use as an interactive learning package for nurses and midwives in the WHO European region, specifically in the more eastern part of the region. Mastery of this material will enable nurses and midwives to respond to threats to the community, to teach their patients and members of the community effective ways of preventing infections and infectious diseases, to provide high quality and effective care to people with infectious diseases and to use appropriate measures to ensure safe practice.

The manual comprises seven modules. Each module is in two parts: theory and practice, with opportunities for self-assessment through learning activities and a workbook. The manual should be used as a package to ensure that, after training, nurses and midwives have a broad and up-to-date knowledge of infections and infectious diseases. Each section of the manual can also be used independently to develop knowledge in a specific area, and the manual as a whole can be used as a reference book in health care settings.

The manual is a joint initiative between the Red Cross and the WHO Regional Office for Europe. It has been based on *Communicable disease. Nursing course manual*. Prepared for distance education by the National Nursing Centre of China, 1992. Over the last two years, the Scottish Centre for Infection and Environmental Health has adapted the Chinese manual to make it relevant to nurses and midwives in Europe. The WHO Regional Office for Europe and the Red Cross wish to thank the staff at the Scottish Centre for their work, as well as the many other people who have contributed to making the manual a reality, including the WHO collaborating centres for nursing and midwifery in the European Region and Barbara Stilwell, Scientist at WHO headquarters.



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Introduction

How to use this manual

This manual on infections and infectious diseases is intended for use as an interactive learning package, relevant for nurses and midwives within the European region, and specifically within Eastern Europe. It is intended that each module should consist of theory and also require practice for completion.

Aim

To develop existing knowledge skills and attitudes of nurses and midwives on infections and infectious diseases and their prevention and control, within the European region.

Objectives

On completion of this manual you should have an understanding of:

1. the main concepts of prevention and control of infection;
2. important infections and infectious diseases in the European region, including:
 - definition;
 - modes of transmission;
 - epidemiological summary;
 - manifestations;
 - complications;
 - risk factors / age groups affected;
 - prognosis;
 - diagnosis;
 - methods of treatment;
 - prevention of spread;
 - screening;
 - contact tracing;
 - nursing care;
 - rehabilitation;
 - prevention strategies; and
 - general information on less common infections and infectious diseases; and

3. practical measures that can be taken and implemented into your own practice to prevent the spread of infection.

Format

There are seven modules:

Module 1: The prevention and control of infection

Module 2: The Expanded Programme of Immunization (EPI)

Module 3: Infections spread by food and water

Module 4: Infections spread by animals and insects and less common infectious diseases

Module 5: Diseases spread by person-to-person contact

Module 6: Tuberculosis

Module 7: Infections spread by sexual contact and blood and body fluids; Part I: Infections spread by sexual contact and Part II: Infections spread by blood and body fluids.

Layout of each module

Each module follows the same format and layout.

1. A front title page.
2. An index that indicates which topics are covered and where you can find them.
3. A glossary of terms that explains what terms mean; you should refer to this throughout each module. Some words or terms may be found in more than one module.
4. A brief overall introduction to the module.
5. Stated learning outcomes, indicating what you should achieve on satisfactory completion at the end of each module.
6. Key words, that is, words or terms of particular relevance to an individual module.
7. The main body of the text, containing theory and factual content; the same paragraph headings are used throughout the manual where appropriate.
8. Learning activities, to be carried out when indicated in the text; a workbook is provided

separately for this.

9. Revision points: these indicate that you should stop and note some points or answer a question.

10. The summary of key points is a reiteration of the most important messages to absorb and remember from each module.

11. Bibliography: although numerous sources of information have been used in the production of each module, the authors have tried to use WHO sources whenever possible; only the main sources used for each module are included in the bibliography.

12. Appendices, which are useful sources of further information.

Theory versus practical learning composition

The manual content contains most of the theory required to provide a firm basis of knowledge on infections and infectious disease. The purpose of the revision points is to test your knowledge on material already covered in the manual text. Try to respond to the revision points without referring to the text in the first instance, then compare your response to the information in the manual.

The learning activities are intended to be more practical and are related to nursing or midwifery practice incorporating wider aspects relevant to the module content. For example, you may be asked to visit a laboratory, carry out an audit in your place of work or produce a leaflet to give to patients. The learning activities are designed to further develop your knowledge and are also practical and useful. Depending on your area of practice, some learning activities will be more useful than others.

Assessment of learning activities

It is indicated within the text of each module when you should carry out a particular learning activity. A workbook containing instructions for the

learning activities is provided separately. The workbook is designed to assist you to complete the activities, and there will be instructions. If there is a blank space under an activity, this should be used for notes. On completion of the each module, you can compare your findings with information in the completed workbook. This document is designed to help you find out if you are on the right track with the learning activities. It is recommended that in order to get the most benefit from the manual, you should not refer to this until you have completed all the learning activities for each module.

Further information

The manual is designed to be self-contained. The number of other sources of information in the bibliography of each module has been kept to a minimum; those which have been cited are particularly useful. The information within this manual is only as up-to-date as the date of publication; to obtain the most up-to-date information available, visit the websites mentioned in the bibliography.

Assessment of revision points

You can test this yourself by comparing your response to the information in the manual text.

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MODULE 1

The prevention and control of infection

Stated learning outcomes

Glossary of terms

Introduction

Hospital-acquired, or nosocomial, infection

Microbiology

Cycle of infection

Universal precautions

Additional standard precautions to prevent and control infection

Handwashing

Asepsis

Decontamination

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Disinfection methods

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MODULE 1

The OBJECTIVE of this module is to increase the nurse's and midwife's knowledge of the principles of prevention and control of infection.

STATED LEARNING OUTCOMES:

On completion of this module, you should have a good understanding of:

- the concept of infection control and prevention of infections in healthcare settings;
- a broad overview of microbiology aspects and common terminology used;
- the cycle of infection;
- use of universal and standard precautions;
- use of isolation or transmission-based precautions;
- decontamination techniques;
- infection control in special circumstances; and
- additional considerations, including the functions of the infection control team and occupational health.

KEY WORDS:

Microbiology; cycle of infection; precautions; infection control and prevention; decontamination; healthcare settings; cross infection; handwashing.

GLOSSARY OF TERMS

AEROBIC: requiring oxygen to exist

ANAEROBIC: capable of existing without oxygen

ANTISEPTIC: a chemical solution, which will reduce and prevent growth of microorganisms on skin

COHORT NURSING: sharing of an area by a particular group of patients, for example with the same infectious organism

COMMUNICABLE: a disease that can be transmitted from one person to another

CONTAMINATION: the soiling or pollution of inanimate objects or living material with harmful, potentially infectious or other unwanted material, for example organic matter or micro organisms

ENDEMIC: present within a localized area or peculiar to persons in such an area

EPIDEMIC: (of a disease) attacking or affecting many persons simultaneously in a community or area; a widespread occurrence of disease

EPIDEMIOLOGY: the branch of medical science concerned with occurrence, transmission and control of disease

EXUDATE: fluid from a wound, usually made up of serum, leucocytes and wound debris

FOMITES: inanimate objects or material on which disease producing agents may be conveyed, for example bedding and clothes

INCIDENCE: degree, extent or frequency of occurrence; amount

MORPHOLOGY: the science that deals with the form and structure of living things

RESERVOIR: a place where potentially pathogenic microorganisms can survive and may be transferred onto patients

SOILED: term used to describe objects or items contaminated with debris, organic matter, which potentially can harbour pathogenic organisms

SOURCE: is the part of the reservoir which provides the organisms that have infected or colonized patients i.e. where the organisms have come from

VECTORS: an organism, usually an insect, that carries a disease-producing material from one host to another, either within or on the surface of its body

VEHICLE: an object that can carry pathogenic organisms to a patient, for example dust, bedpans, blankets

Introduction

The principles of best practice in infection control are based on extensive research, and should be adopted in order to help prevent avoidable infections and to control existing ones. Infection control is especially important within healthcare settings, where the risk of infection to patients is greatly increased. An understanding of the infection process should lead to appropriate actions which help to protect patients, and healthcare workers themselves. Good infection control techniques adopted during patient care can assist greatly in preventing or reducing avoidable hospital-acquired infections.

There are important public health issues in the prevention and control of infection, including the general health and nutritional status of the public, and their living conditions, such as housing, water and sanitation facilities. These influence the level of infectious disease in the community, which in turn affects the level of infection of those both in and outside of hospitals, thus affecting the burden on healthcare facilities.

Local infection control policy manuals should be produced within individual settings in order to give guidance to staff on the implementation of important measures and procedures. In addition, national and local regulations or guidance should be clearly documented and followed where appropriate. If guidance is not followed, there may be an increased risk of cross infection of both patients and staff.

Hospital-acquired (nosocomial) infections

Hospital-acquired infections, or nosocomial infections, are infections that were not present or incubating on admission of a patient to hospital. These infections can be readily diagnosed in patients who have appeared free of signs and symptoms of infection on admission and have then gone on to develop infection – for example, a surgical wound exuding pus.

These infections can cause unnecessary suffering for the patient and also create unnecessary costs for the health facility. They can lead to:

- complications;
- prolonged treatment;
- increased length of stay in a healthcare facility (which is in itself a risk factor for acquiring nosocomial infections); and
- a need for increased resources.



Credit: WHO/TDR.

History of infection control
Infection control measures help prevent the spread of infection. In the 14th century, the Venetians quarantined ships arriving at their port in order to contain diseases such as plague. In the 19th century, Semmelweiss, a Viennese obstetrician, realized that infection was passed to patients on the hands of healthcare workers. He showed conclusively that infection could be greatly reduced by hand washing. In addition, in the 19th century separate facilities for infectious diseases were first utilized, which came to be known as infectious disease hospitals.

Basic infection control measures are essential in everyday practice today. Antibiotic resistant organisms, such as Methicillin-resistant Staphylococcus aureus (MRSA) and multi-drug Resistant Tuberculosis (MDR TB) are of great concern around the world, due to many years of use and misuse of antibiotics.

The introduction of antibiotics in the 1940s saw a decrease in basic measures, such as cleaning, in everyday hospital practice, which previously had been the only defence measure for patients against microorganisms living in their environment. People thought that the microorganisms that had caused many deaths had been beaten. Unfortunately it was soon discovered that these microorganisms were clever and could quickly adapt and change to fight antibiotics. In addition, they were able to inactivate antibiotics by developing chemicals that rendered the antibiotics ineffective, leading to resistance.

The most important factors in the fight against potentially fatal infections are:

- ensuring antibiotics are used appropriately through controlled prescribing and policies
- reestablishing the basic measures that were once our only defence.

Microbiology

To begin to understand why we must undertake infection control measures we must first consider aspects of microbiology. Microbiology is broadly described as the study of bacteria, fungi, protozoa, viruses, and helminths. We share our world, including our bodies, with millions of microscopic organisms and we need to understand how best we can live with them. In studying these groups of organisms, including their many subgroups and families, we can learn how:

- they live within us;
- they live in our environment;
- they can cause harm; and
- we can treat infections caused by them.

Within healthcare settings, many microorganisms have the perfect living and breeding conditions, due to the numbers of susceptible patients gathered in an ideal environment. For examples of common microorganisms found in healthcare settings, see Appendix 1.

Now carry out Learning Activity 1.

Cycle of infection

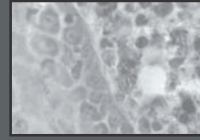
The term cycle of infection is used to describe the processes leading to patients acquiring infection within healthcare settings. Knowledge of this cycle is essential in order to understand how infection can occur. All precautions and measures taken in order to prevent and control infection are based on the interruption of this cycle.

REVISION POINT 1



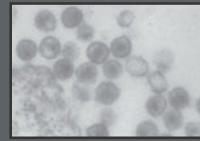
Can you define a nosocomial infection?

(See page 4 for help.)



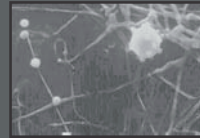
Credit: WHO/TDR.

Bacteria (including mycoplasmas, rickettsiae and chlamydiae) are small microorganisms of simple primitive form. Bacteria can commonly be found living within our bodies and in our environment, for example in animals, soil and water. Bacteria can often be of great use to us.



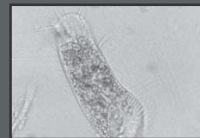
Credit: WHO/TDR.

Viruses are a group of infective agents so small that they are only visible through electron microscopy. Viruses can only survive within other living susceptible cells.



Credit: WHO/TDR.

Fungi are simple plants that are parasitic on other plants and animals. A few can cause fatal disease and illness in animals and humans.



Credit: WHO/TDR.

Protozoa are the smallest single cell animals, many species of which can cause human disease.

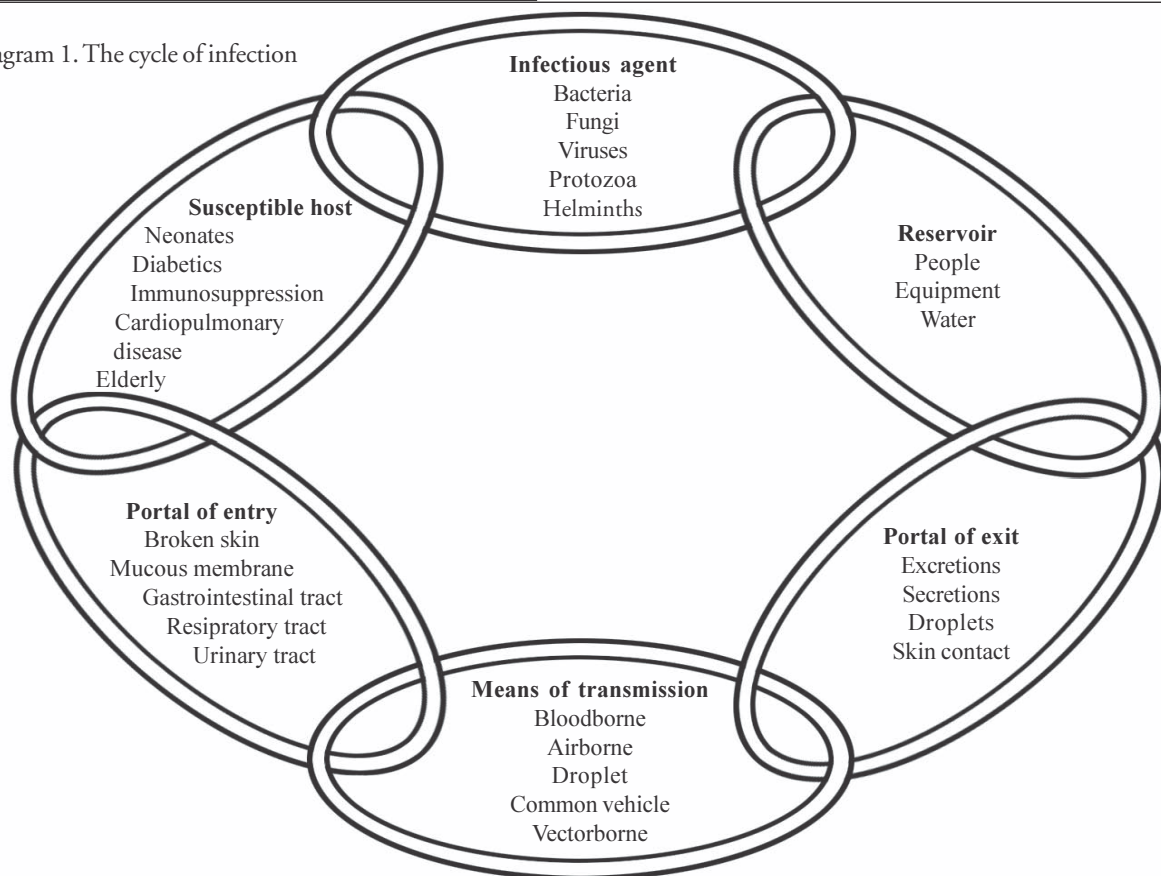


Credit: WHO/TDR.

Helminths are large parasites - worms, which can be a major cause of morbidity in some countries.

Understanding the cycle of infection

Diagram 1. The cycle of infection



Portals of entry are the same as the portals of exit and are either natural or artificial.

Means of transmission:

1. Bloodborne: through sexual transmission, injury or inoculation. The main concerns in healthcare settings are the transmission of HIV, Hepatitis B and C through sharp injuries or blood splashes.
2. Airborne: through inhalation of small particles that remain suspended in the air for long periods of time and can be widely dispersed by air currents.
3. Droplet: also through inhalation. Droplet transmission differs as the particles are larger and therefore do not remain suspended in the air. Spread is therefore through close contact with infected persons who may be sneezing, coughing, talking, or undergoing airway procedures such as intubation or bronchoscopy.
4. Contact: through direct or indirect contact. Direct is the transfer of organisms by contact with contaminated hands. Indirect is the transfer of organisms through fomites
5. Common vehicle: through food, water, drugs, blood or other solutions
6. Vectorborne: usually through arthropods such as mosquitoes and ticks but cockroaches, ants and flies can also transmit infection.

(Note: certain organisms can be transmitted through more than one of the above routes. Examples of organisms that can be spread by all of these routes are found in Appendix 1).

Reservoir: where microorganisms can be found. Within healthcare settings this may include:

1. the environment e.g. dust, bedding, equipment, furniture, sinks or washbowls, bedpans, surfaces)
2. humans, including patients, staff and visitors, especially from hands.

Susceptible host: Factors that affect the body's natural ability to fight infection include:

1. presence of underlying disease (diabetes)
2. immunocompromised status (HIV, chemotherapy treatment)
3. nutritional status
4. age (the very young and the very old)

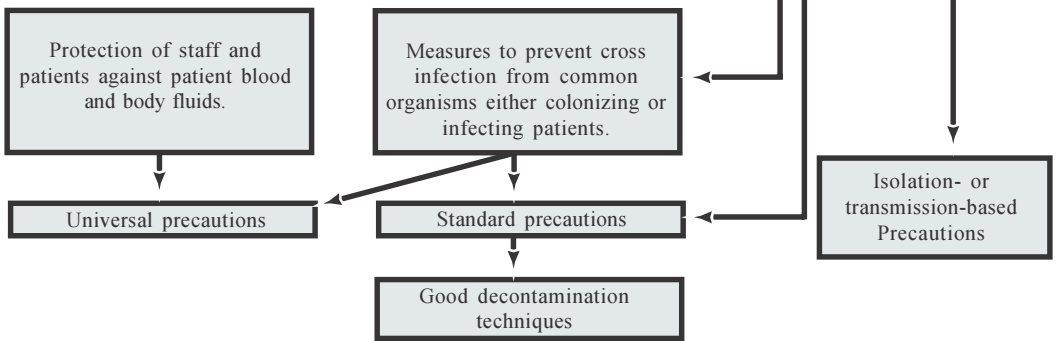
Portals of exit are required for microorganisms to be transmitted from human sources. Portals of exit within healthcare settings include: intravenous lines, urinary catheters, wound sites, open skin lesions, invasive devices, the respiratory system, skin, and mucous membranes.

Essential measures should be taken to help prevent and control this cycle of infection, including limiting sources, preventing the routes of transmission, minimising portals of entry, and protecting susceptible patients. If measures are not taken, patients and staff may be exposed unnecessarily to pathogenic microorganisms.

Prevention of infection in healthcare settings

The Centers for Disease Control and Prevention (CDC) recommends two tiers in the prevention of infection within healthcare settings. The first tier includes universal precautions and other standard precautions. Both are intended to reduce the risk of transmission of bloodborne viruses and other common organisms found within healthcare settings, and therefore should be utilized at all times. The second tier is the use of isolation, or transmission-based precautions, which will be described later. These are implemented only when more pathogenic organisms are of concern. (Examples of organisms and the precautions that should be taken are found in Appendix 1.)

Diagram 2. Precautions used in healthcare settings to prevent and control infection



Universal precautions

The CDC adopted the term universal precautions and devised the recommendations in 1987, largely in response to the HIV epidemic. The recommendations state that blood and body fluid precautions should be implemented consistently for all patients regardless of their bloodborne infection status, as this would not always be known. All healthcare workers, staff, patients, and visitors are encouraged to undertake universal precautions at all times. In addition, these measures can also help to minimize cross infection of other organisms. (A list of body fluids to which universal precautions apply can be found in Appendix 2.)

Precautions

Universal precautions measures include the following:

1. **Gloves**, which should be well-fitting and available for use wherever contact with blood or body fluids is anticipated. Although gloves cannot prevent penetrating injuries from sharp instruments and equipment, they can reduce the incidence of hand contamination from blood and body fluids. In addition, any broken skin on the hands of health staff – for example, cuts – should be covered, ideally with an effective barrier that is both waterproof and

breathable. Gloves should be changed immediately if contamination with blood or body fluids occurs, or if they are no longer intact. They should also be changed between patients. If gloves are not changed under these circumstances the

risk of exposure to bloodborne viruses is greatly increased, as is the risk of cross infection. Gloves should ideally be single use and be made of latex or vinyl, depending on the task (latex substitutes such as nitrile may be used if latex allergies are of concern).

Sterile surgical gloves, which fit more tightly than ordinary latex gloves, should also be available for procedures involving sterile areas of the body. Ideally these gloves should not be washed or disinfected as these can cause deterioration or disintegration, causing holes which may not be visible. (Disinfecting used gloves in circumstances where single use is not feasible will be discussed later under decontamination).

2. **Mucous membranes** of healthcare workers (for example, eyes and mouth) should be protected from blood or body fluid splashes. Glasses, visors or shields can be used for the eyes and should be available for use, especially during procedures with increased risk of splashes, for example, surgical procedures, intravenous line insertions, irrigation, airway suctioning or bronchoscopy.

Masks should also be worn during any procedures with an increased risk of splashes. Masks must be changed if they become contaminated or if they are not intact. Decontamination of reusable visors should be carried out frequently.

3. **Protective clothing** (for example, impermeable plastic aprons or gowns) should be worn where there is a risk of blood or other body fluids splashing onto clothing or bare skin.



Health staff in protective clothing.
Credit: WHO/TDR.

4. **Proper handling of contaminated instruments**

• Needles, blades, scalpels, intravenous devices, and other sharp instruments should be handled with care in order to avoid inoculation injuries or contamination onto mucous membranes.

• Care should be taken during the use, cleaning and on disposal of sharp instruments.

• Needles should never be recapped with their covers, never be removed from the syringes, and never be bent or broken by hand. If needles have to be recapped, recapping should be done using a one handed scoop technique or by using a mechanical device.

• The number of sharp instruments should be kept to a minimum during procedures, and should always be kept in sight.

• After use, all single use sharps should be placed in puncture resistant containers such as sharps boxes. These containers should be marked as sharps boxes, be made of a puncture-proof material, and have a lid that cannot be removed and which can be sealed tightly. Containers should be kept close to where sharps are used, ensuring minimal handling of contaminated objects and safe and quick disposal of them. Hands should never be put inside a container, nor should any items in the container be retrieved from it. The containers should be changed whenever they become two thirds full, or if they become contaminated on the outside, to avoid potential inoculation injuries or contamination on disposal.



Sharps container

• Disposal of all sharp instruments should be by incineration.

The above measures will help to limit the potential exposures of healthcare workers to bloodborne pathogens.

5. **Handling and disposal of linen**

Linen contaminated with blood or body fluids should be handled carefully. The use of protective clothing is advised. Contaminated linen (for example, bed sheets, pajamas, and towels) is usually described as infected or soiled. Such linen should be disposed of immediately, normally into a water-soluble bag, and clearly identified as contaminated. Identification of contaminated linen can be made by using a bag of an agreed-upon colour, or labelling the bag clearly. If no bags are available and a non-disposable bucket is used, the bucket

must also be clearly marked and must be disinfected frequently. Clear identification will inform all other staff that precautions should be taken when handling the bag or the linen inside it. If the soiled objects are not to be decontaminated immediately, the bags should be stored safely where they can be easily recognized.

To decontaminate linen, it should be washed at a high temperature (at least 70° C), or on a heat disinfection cycle. Water-soluble bags are useful, as they allow staff to avoid handling the contaminated linen. A temperature of 70° C will kill most common organisms and will also facilitate the dilution of the particles in the water. If a temperature of 70° C is not possible, thorough washing, rinsing and drying, at lower temperatures (preferably using a disinfectant) should be carried out. Minimal handling of body fluids or moist body substances while washing is essential. Disinfectants will be discussed under decontamination.

6. Proper handling of clinical wastes

Clinical waste includes any materials generated from patient care. This includes waste that could potentially transmit microorganisms. Such clinical waste can include soiled dressings, cotton swabs, and catheter bags. Disposal of clinical waste, including waste contaminated with blood or body fluids, should be carried out immediately, with the wastes put into clearly marked bags. Gloves and protective clothing should always be used when handling clinical waste. If bags are not available and non-disposable buckets are used, the buckets must be disinfected frequently, as they could be a source of



Patient dressings are potential sources of infection. Credit: WHO/TDR.

infectious material. Bags or buckets should have a covering lid, and should be kept close to where contaminated waste will be generated. Bags and buckets should never be overfilled and should be closed securely as soon as they are full. They should be sent for incineration, and stored until they are out of the healthcare setting. If incineration is not possible, burial should be in deep holes to avoid animal scavenging or exposure to the public.

7. Cleaning of spillages of blood and body fluids

Spillages of blood and potentially infected body fluids onto the floor, on equipment, or other surfaces must be cleaned as soon as they occur, in order to prevent further unnecessary exposure. It is important for health staff to wear gloves and other protective clothing during cleanup. Spillage kits are often available in healthcare settings; if not, the preferred method for cleaning spillages is disinfection granules (for example, hypochlorite) sprinkled onto the spillage and left for a few minutes, before being cleaned up with disposal cloths and disposed of into a clinical waste bag. The area should then be cleaned. Cleaning and disinfectants will be discussed later. If no disinfection granules are available, disposable paper towels or rags should be placed on the spillage to absorb it, to prevent its spreading, and to make it easier to remove. Again, hands must be gloved when cleaning up spills of infected waste.

REVISION POINT 2

Can you list 6 means of transmission for the spread of organisms? (If not, see page 6 for help.)

Additional standard precautions

Cross infection of organisms can be greatly reduced when additional precautions are used. These simple measures include:

- handwashing;
- asepsis; and
- decontamination.

Handwashing

Handwashing is the single most important infection control measure in healthcare settings. Proper handwashing can limit both cross infection of microorganisms and contamination from bloodborne pathogens.

Research has shown that type and availability of handwashing facilities influence how often and how adequately healthcare workers wash their hands. When procedures or tasks are finished, it is essential that health staff go directly to available handwashing facilities with running water, preferably hot. Running water from a tap or pitcher is preferred, as microorganisms can breed in stagnant water. Hands should never be dipped into bowls of water, as this may recontaminate the bowls. The potential contamination of available water should be considered whenever using water for any patient tasks.

The six steps that must be carried out during handwashing, to ensure that they are thoroughly cleaned or disinfected, can be seen in the following diagram.

If handwashing is not carried out properly, areas of the hands may remain contaminated.

Why do we wash our hands?

Because effective handwashing can:

- remove visible soiling;
- remove transient organisms picked up during procedures or tasks within healthcare settings, or

from the healthcare workers themselves; and

- reduce resident organisms that live on healthcare workers hands. This is especially important during surgical scrub for which the same hand washing technique is used, with



Washing hands to prevent infection.

the addition of the wrists and forearms. A surgical scrub should be carried out for 3–5 minutes and there should be utilization of a sterile disposable nailbrush and sterile towel for drying. Resident organisms can never be permanently removed and therefore no-touch techniques and sterile gloves are essential in surgical situations.

When should we wash our hands?

Hands should be washed:

- before and after any aseptic technique or invasive procedure;
- before contact with any susceptible patient or site, for example, intravenous sites or wounds;
- after contact with any body fluids, this also includes contact with toileting facilities;
- after handling contaminated equipment, waste or laundry;
- before and after contact with any patient being nursed under isolation or transmission-based precautions;
- before serving meals or drinks;
- after using the toilet; and
- at the start and end of work.



Washing with running water is preferable.

What solution should we use to wash our hands?

Soap can be used for routine decontamination of hands. However, bars of soap sitting in stagnant water should be avoided. Liquid soap dispensers are suitable but topping up of these dispensers should be avoided. If dispensers will be reused, they should be cleaned out frequently and thoroughly dried.

Antiseptic hand cleansers should be used:

- before and after touching mucous membranes; for contact with skin that is not intact, including wounds;
- before invasive procedures;
- when caring for high risk patients, for example, patients in critical care areas; and
- when no water or soap is available.

Antiseptic cleansers usually have a residual effect and reduce the number of resident organisms and

transient organisms. An effective antiseptic hand cleanser will contain any of the following antiseptics:

- Chlorhexidine gluconate 2–4%
- 70% ethyl alcohol and 70–90% isopropyl alcohol
- Iodophor 2.5%; 2–3.5% chloroxylenol (PCMX) 1.5–3.5%; triclosan 0.3–1%

Large containers of antiseptics are not recommended, as contamination of the contents can occur over time. Containers being reused should be cleaned out frequently and thoroughly dried.

Other important points in handwashing

- The wearing of gloves does not replace the need for handwashing between procedures. Hands should always be washed after gloves are removed.

Diagram 3. Correct handwashing technique

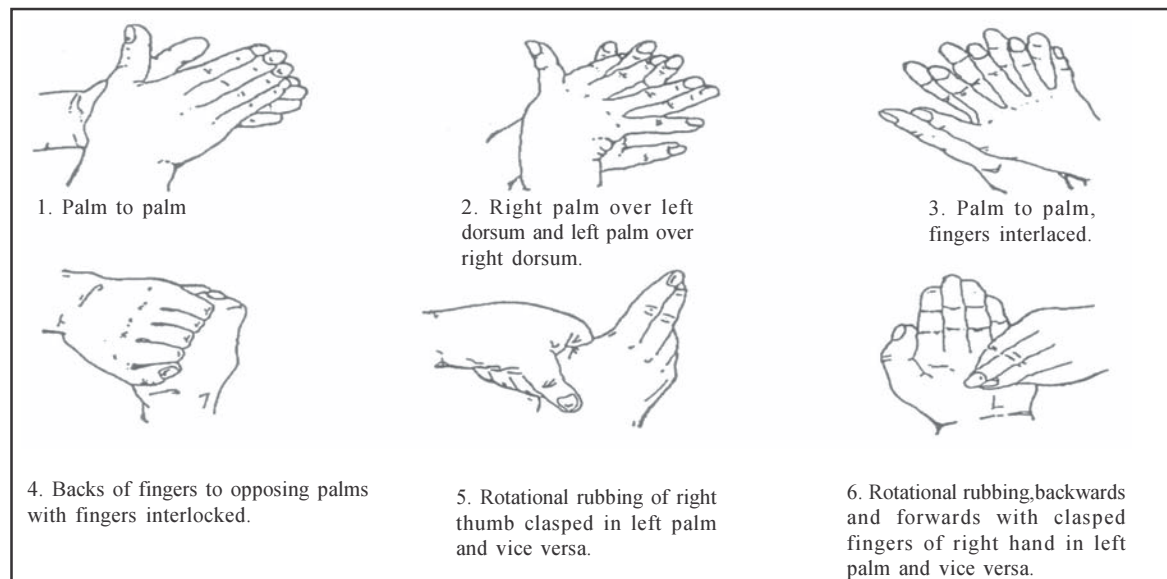
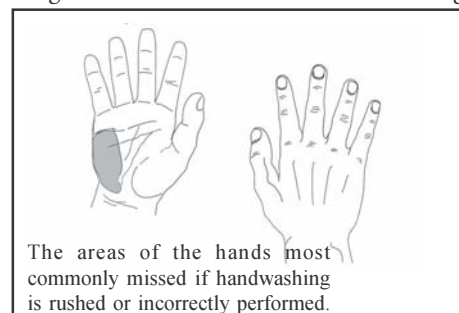


Diagram 4. Result of incorrect handwashing



- Over-compliance with hand washing requirements is not advised, as it may lead to broken skin and disturbance of helpful organisms that protect the hands from pathogenic organisms. Additionally, excessive washing of hands can increase the risk of picking up transient organisms that can cause cross infection.

Standard handwashing procedures

- Remove wrist watches, jewellery and nail polish.

Nails should be clean and short.

- Always use wrist/elbow/foot operated taps where available to turn on water and dispense soap or antiseptic.



Using liquid antiseptic hand cleaner.

- Wet the hands first and then apply enough cleanser to produce a good lather.
- Approximately five rubs at each step of the hand washing technique should be carried out.
- Always rinse hands thoroughly.
- If there are no wrist-, elbow-, or foot-operated taps, taps should be turned off using clean, disposable towels.
- Hands should be dried thoroughly using a clean disposable towel. If disposable towels are not available a clean towel must be used and replaced with a fresh one whenever it becomes contaminated or soiled, or at the end of each day.
- When disposing of disposable towels, care should be taken not to recontaminate hands by touching waste receptacles. Waste receptacles should be operated by foot action.
- Alcohol-based hand rubs can be used for rapid decontamination of clean hands. However, soiled or contaminated hands must be fully washed as already described. Alcohol-based hand rubs can be particularly useful when handwashing facilities are not near to where patient procedures are carried out. Alcohol-based hand rubs should be applied using the same technique as hand washing, with approximately 3 ml of the solution rubbed into hands until dry. Alcohol should not be used on broken skin.
- Hand creams can be used to alleviate dryness, as

dryness can lead to increased risk of contamination from microorganisms. Communal creams should not be used unless they have a pump dispenser system.

Healthcare workers must make it their priority to ensure that hand washing is carried out strictly and should encourage others within their settings to do the same.

Now carry out Learning Activity 2.

REVISION POINT 3



Can you list the 7 universal precautions to reduce risk of infection?
(If not, see pages 7–10 for help.)

Asepsis

Decontamination of the skin or mucous membranes at the site of a procedure is of vital importance, as is the subsequent care of such sites. In addition to correct handwashing technique or surgical scrub before a procedure, other measures can be taken to provide an aseptic environment. Aseptic technique is a method of preventing microorganisms from reaching vulnerable sites.

Effective antiseptics for aseptic procedures include alcohol, iodophor, chlorhexidine and triclosan. Large containers and “topping up” of containers should be avoided. Alcohol solutions should not be used on mucous membranes as they cause irritation. Benzalkonium chloride is ineffective and should not be used.

When preparing a site for a procedure, the site should be fully covered with the antiseptic, in order to thoroughly disinfect the area and substantially reduce the normal flora on the skin. The antiseptic should be applied vigorously and left to dry, particularly alcoholic solutions. Drying takes approximately 30 seconds. Intravenous sites should not be repalpated after disinfection has taken place. Sterile gloves are required for some aseptic procedures, for example, the insertion of central venous catheters and cavity wound dressings. Sterile gloves are not routinely required for procedures such as venepuncture or urinary catheter insertion. However, if sterile gloves are not used, non-sterile hands must not contaminate sterile devices before insertion, and a no-touch technique must be adopted. Sterile gloves are expensive. Therefore, it is important to regulate their use appropriately, without increasing the patient's risk of infection.

The following are examples of standard aseptic techniques for specific procedures

Preparing sites for intravenous cannulation or venepuncture

Intravenous devices should be made of high quality material and should be sterile. Once lines are inserted, covering dressings are important, as lines must remain dry, free from contamination, and secure. Dressings should be changed if they become



Inspecting a urinary catheter.
Credit: WHO/TDR.

wet, soiled or loose, for example, after contact with blood or intravenous fluids. Dressings that give visual access to the site are ideal; if this is not possible dressings must be removed to observe for signs of infection.

Intravenous infusions

Lipid infusions should be completed within 12 hours. Fluids to be administered should be observed for foreign materials before being given. Administration sets should be changed if they become damaged or disconnected or routinely at 72-hour intervals. However, sets for blood, blood products or lipid transfusions should be changed every 24 hours. These changes must be made in order to prevent infection. However, too-frequent changes are not only costly but can actually increase the risk of contamination due to frequent breaks in the intravenous circuit. Changes should always be carried out using a no-touch, clean technique.

Preparing for urinary catheter insertion

Catheters should be sterile and a closed system should be put in place with a sterile catheter collection bag in order to prevent organisms from entering the system to infect the bladder or urinary tract. Systems with a port for collection of urine specimens should be used, in order that the circuit

not be broken. If these systems are not available, specimens should be obtained by aspirating urine from the catheter using a needle and syringe. Urine should not be drained from the collection bag into a common collection container for all patients. This task should be carried out using a no-touch technique, with urine directed into a clean receptacle each time. Patients should be observed for signs of infection.

Preparing sites for surgical incision

Avoid the shaving of sites before disinfection and incision, as shaving has been shown to increase the risk of infection. However, if shaving must take place, it should happen as close to the procedure time as possible.

Cavity wound dressings

The trolley or cart used should be thoroughly disinfected between patients to prevent cross contamination. Any other surfaces used during the procedure must also be disinfected. Supplies used for wound dressings must be sterile for each patient, and wounds should be dressed as quickly as possible in order that they have minimal exposure time. Sterile gloves or a no-touch technique should be used when cleaning or dressing wounds. A no-touch technique allows only sterile materials to touch the body tissues. Therefore the handling of any supplies that will contact the patients' tissues should be avoided. The frequency of dressing changes is determined by the severity of the wound, how clean it is, and how much exudate it has. Dressings can be changed less frequently as the wound becomes cleaner and starts to heal, again reducing the risks of contamination or cross infection.

The number of invasive devices used on a patient must be kept to a minimum as far as possible. As

discussed in the cycle of infection, it is necessary to have minimal portals of entry for microorganisms, especially since patients who require invasive devices are often already susceptible. If they must be inserted they should be in place for the minimal amount of time.



REVISION POINT 4

When should we
wash our hands?
(See page 10 for help.)

Decontamination

In addition to the precautions taken by all staff at all times, standard decontamination techniques are also essential. Decontamination procedures, when carried out appropriately, play an important part in preventing and controlling nosocomial infections. Unfortunately, the consequences of failed decontamination – for example, an outbreak of infection – can be very serious. Thus, it is essential that all healthcare workers realise the importance of ensuring that items are safe for patient use.

Decontamination includes the following:

- **Cleaning** means the removal of all visible dust, soil, other foreign material and removal of sufficient numbers of microorganisms to reduce risks for those who handle the object or an area. Effective methods of cleaning and drying have been proven to limit cross infection in all healthcare settings, and should be performed on all items before disinfection and sterilization.
- **Disinfection** is a process that eliminates many, or all, microorganisms on inanimate objects. Disinfectants may damage living tissue and are not intended for use as antiseptics. Some disinfectants may be inactivated by soilage found on objects and therefore soilage must be cleaned off first. Disinfection is of three types: chemical, moist heat, and pasteurization. (See further notes.)
- **Sterilization** is the complete elimination or destruction of all types of microbial life. Sterilization is accomplished by a variety of methods, including: steam under pressure or moist heat (autoclaving); gas (ethylene oxide); dry heat (hot air oven), and low temperature steam and formaldehyde. (See further notes.)

Items that require decontamination are divided into three categories, based upon the degree of risk involved in their use:

- **Critical items** are those which come into close contact with a break in the skin or mucous membranes, or those which are introduced into a sterile body area, for example, into tissues or the vascular system. Any items used for these purposes should be purchased sterile and sterilized subsequently before further use, using methods already described.
- **Semi-critical items** are items that come into contact with intact skin, mucous membranes, or body fluids, particularly if the items are used on immunocompromised patients or those being cared for under isolation or transmission-based precautions.
- **Non-critical items** are those that come into contact with healthy skin or mucous membranes, or have no contact with patients at all. These items include general equipment and the patient's environment. Cleaning is usually adequate for non-critical items.



REVISION POINT 5

What 3 activities are included in the decontamination process?
(See page 15 for help.)

Standard environmental cleaning

Environmental cleaning is an essential every day practice in healthcare facilities. Whether performed by nursing or housekeeping staff, environmental cleaning should be carried out frequently and thoroughly, making sure that staff members are protected with appropriate clothing. Although microorganisms from the environment are not regarded as a major concern in transmission of nosocomial infections, some organisms survive in the environment better than others, for example, *Clostridium difficile*, enterococci, MRSA, Hepatitis B and *Pseudomonas aeruginosa*. At certain times, for example when patients are being cared for under isolation or transmission-based precautions, additional decontamination measures will be required. However, general cleaning routines are also important and schedules should be set up and followed.

Routine cleaning

Floors, toilets, and any equipment or furniture that is frequently handled by staff or patients should be cleaned daily with a general detergent, hot clean water, clean cloths, and/or mops. Additionally, any contaminated sites should be cleaned immediately; items should be cleaned between patients. General detergents should be dispensed from their containers for use each day and kept covered to prevent contamination and to keep the solution fresh. Routine disinfection is not required and is more costly than using a general detergent.

Periodic cleaning

Periodic cleaning using the above-mentioned materials, is recommended for ceilings, walls, curtains, blinds, windows, shelves, cupboards, containers, and any other areas not cleaned daily. Any dust stirred up during this cleaning can also be a source of microorganisms (*Staphylococcus aureus* or MRSA). However, cleaning of some of these items is necessary and provides an aesthetically

pleasing environment for patients. Any containers for reuse should be cleaned and thoroughly dried. Spillages of fluids, including urine that does not have visible signs of blood, should first be cleaned by soaking them up using clean cloths and then by general cleaning with hot water and detergent. Sinks and other receptacles for fluids should be dried. For spillages of blood and other body fluids, see universal precautions.

Daily cleaning and cleaning between patients is recommended for operating and procedure rooms. Cleaning of all surfaces, furniture, and fittings is essential to keep the area free from contamination with microorganisms.

Periodic cleaning of other sites close to patient areas such as ward kitchens and staff areas is also important.

Equipment and surfaces that are hard to clean due to their poor condition can be a source of potentially pathogenic organisms. Maintenance and repairs are therefore essential.

Disinfection methods

Chemical disinfection

There are many different chemicals that can be used for disinfection. Their effects on microorganisms vary. Thus, making the correct choice in specific circumstances is essential. A chemical disinfectant is a compound or mixture capable of destroying microorganisms. Most chemical disinfectants come in liquid form.

Effective chemical disinfectants include:

- clear soluble phenolic compounds;
- quaternary ammonium compounds;
- chlorine releasing agents;
- iodophors;
- alcohols;
- glutaraldehyde 2%;
- demand-released chlorine dioxide;
- stabilized hydrogen peroxide 6%;
- peracetic acid; and
- hypochlorites.

It should be noted that some disinfectant products are designated for specific use, for example, skin disinfectants, environmental disinfectants, or instrument disinfectants. Use disinfectants only for the disinfection tasks for which they are intended. A careful assessment should be made to ensure that the appropriate disinfectant is used. Follow the manufacturer's instructions for the solution and for instruments.

Moist heat disinfection and pasteurization

These two methods kill most bacteria and viruses. A typical cycle in an appropriate disinfectant is at 73° C for a period of not less than 10 minutes. Moist heat disinfection by boiling is also a common and effective method, which will kill susceptible microorganisms. A typical process is exposure to soft water boiling at 100° C for 5 minutes or more. Suitable items for this process

are metal instruments including specula and sigmoidoscopes. Washer/disinfectors are another method, which use wet heat at temperatures of around 80° C. Items disinfected by this method must be able to withstand powerful water jets and alkaline detergents, for example reusable anaesthetic tubing and masks. This process is also used on soiled objects before sterilization to make them safe for handling.

Sterilization methods

Autoclaving, or steam under pressure, is one of the most effective disinfection measures, rendering bacteria, their spores, and viruses non-infectious and non-viable. Time/temperature combinations are: 121° C for 15 minutes and 138° C for 3 minutes at 101 kPa (kiloPascals). Many items cannot withstand such high temperatures, and are thus not suitable for autoclaving.



Autoclave. Credit: WHO/TDR.

Hot air oven: recommended time/temperature combinations for this are 160° C for 2 hours, 170° C for 1 hour and 180° C for 30 minutes. This method is not as effective as autoclaving. However, it can be used when items may be damaged by autoclaving.

Ethylene oxide is a highly penetrative, non-corrosive disinfection agent, effective against bacteria, spores, and viruses. Time/temperature combinations vary from 20–60° C over periods of 2–24 hours. This method is useful for unwrapped delicate items that are heat sensitive, such as fibre-optic endoscopes and reusable anaesthetic equipment. There are many hazards associated with use of ethylene oxide including its toxicity. It is also an expensive sterilization method.

There are many additional factors to consider when choosing the type of decontamination method:

- A central sterilizing department, where disinfection activities can be supervised by trained technical personnel, provides convenience and simplifies quality control efforts.
- Guidelines from manufacturers and national

guidance protocols should be followed. Many different types of sterilizers and disinfectant receptacles are available from manufacturers and the manufacturer's instructions must be followed.

- Frequent testing and monitoring of decontamination devices is essential to ensure that the devices are able to fulfil their purpose and are being used appropriately. Receptacles used for chemical disinfection should always have covering lids. Compliance of health staff with regulations must be monitored. Maintenance of equipment is also essential.
- Chemical indicator tape is used to identify sterilized items. However this does not indicate sterilization efficacy. Biological indicators are required to show this.
- Contact and exposure times, as well as the pressures used and temperatures reached by disinfection equipment, are very important to ensure effective decontamination. Instructions specifying the dilution of liquid disinfectants to the proper concentration should be followed closely. Note that wet items may produce over-dilution when added to solutions. Fresh solutions should be made up each time they are required for use. Proper exposure of items to solutions or steam through correct positioning within disinfection equipment must be achieved. It is also important not to overload autoclaves.
- The potential toxicity of disinfection methods must be addressed in order to prevent unnecessary exposure to patients and healthcare workers. Risk assessments must be carried out and manufacturers' guidelines closely followed, with appropriate procedures put in place to protect patients and health staff.

- Where required, the disinfection of potentially infected linen should be carried out using a combination of high temperatures and appropriate disinfectants. Autoclaving of surgical linen, such as drapes, is essential in order to make them sterile before use.

General concerns and points related to decontamination:

- Use of clean water for all patient care procedures is essential, including decontamination. Boiling or filtration of water may be required. Water filters must be effective and changed frequently. Sterile water should be used if available, especially for the rinsing of items after disinfection has been carried out.
- Decontaminated items should be stored in such a way that recontamination will not occur before they are used; for many items, this can be achieved by adequate wrapping or covering. The items should then be stored in a clean area and dated so that if they are not used by a set time, they can be reprocessed for disinfection.
- Protection of healthcare workers while carrying out any method of decontamination is extremely important. Health workers should be instructed in the minimal handling of contaminated items and the use of protective clothing.

**REVISION POINT 6**

List 7 factors to be considered when choosing a decontamination method.
(See pages 18–19 for help.)

As mentioned earlier, medical items are generally classified as:

- reusable and intended for decontamination processes; or,
- disposable, that is, usually made of inexpensive materials and intended for single use only.

Unfortunately, in some healthcare settings, material and financial resources are limited and thus items intended for single use must be reused, and thus must be decontaminated. It must be recognised that such practices will most probably not make these items free of organisms. Therefore, there is great risk of cross infection. Decontamination procedures themselves can also affect the integrity and function of single use items, making them unsuitable for their original intended purpose. Items should only be used for the purpose intended by their manufacturer.

The activities carried out in limited resource situations include:

Disinfection of used gloves

Good quality gloves must first be rinsed and turned inside out. Healthcare workers must wear gloves when disinfecting gloves. Soak the infected gloves in a container for 10 minutes to decontaminate them, and then remove them and wash them inside and out with a cleaning solution. They should then be rinsed in clean water. Once dry, the gloves should be packaged in clean boxes or bags. Chemical disinfection or autoclaving may also be suitable for some types of gloves. Tests for leaks should be carried out by inflating the gloves. If holes or tears are found, the gloves should be discarded as they will not provide adequate protection for healthcare workers.

Reprocessing of needles and syringes

It is strongly recommended that needles and syringes be used only once. There have been documented cases of HIV and viral hepatitis transmission through improperly processed needles and syringes. The risk of exposure through accidental needlestick injuries to bloodborne pathogens to healthcare workers is also of great concern.

It would be difficult to discuss the decontamination of every item used within healthcare settings. Therefore, the principles discussed should be carefully considered and common sense applied to individual areas in order to prevent nosocomial transmission through unsafe practices.

All of the measures discussed this far (universal precautions, standard precautions and decontamination) are essential practices within healthcare settings. There are times, however, when the risk of nosocomial infections is greatly increased, due to the type of infection found. Under such a scenario, it is important to understand the second tier of CDC's recommendations.

Since the mid 1990s the CDC have recommended the use of isolation or transmission-based precautions as the second tier in preventing nosocomial infections. CDC's guidance on isolation techniques was updated at that time, based upon the latest epidemiological data on the transmission of infections within acute care settings. Isolation precautions are now based on the means of transmission rather than the disease. In addition, this updated information highlighted the fact that many patients who have been infected or colonized with certain organisms could be cared for under universal or standard precautions alone (see Appendix 1). While the recommendations may need to be adapted for specific settings, the principles relating to prevention of organism transmission still apply.

Precautions

Isolation or transmission-based precautions are intended to prevent organisms from cross infecting via the routes of transmission discussed earlier in the cycle of infection. (Bloodborne transmission has already been discussed under universal precautions).

Airborne precautions

Since organisms transmissible through the air can be widely dispersed, specific air ventilation is required to manage their dispersion. Techniques include the use of monitored negative airflow ventilation with at least six air changes per hour and filtration of direct exhaust to the outside. If such a system is not available, there is an increased risk that susceptible patients, even some distance away, may inhale the organisms. Surgical masks that cover the mouth and nose should be worn by staff caring for such patients, and by the patient themselves, should they need to leave their designated area. The use of respiratory protection devices is extremely important for patients who have infectious pulmonary tuberculosis (see Module 5).



Masks which cover both nose and mouth. Credit: WHO/TDR.

CDC-recommended devices include the N95 respirator/surgical mask made by 3M. Additionally, there is the 3M 6000 series, which is reusable. These devices ensure that these airborne particles are not inhaled. Other masks do not provide this specific protection. Although it may be difficult to obtain these specialized devices, they are imperative for healthcare workers' and patients' protection. The cost and inconvenience of treating cases of cross infection is much higher.

Droplet precautions

Organisms transmitted by droplet require close contact. Measures to limit cross infection include placing the patient in a single room or having at least three feet between patients; wearing of surgical masks by staff coming within three feet of the patient, and the wearing of a mask by the patient, when they leave their designated area.

Contact precautions

Certain pathogenic organisms such as MRSA, *Clostridium difficile*, and Vancomycin-resistant enterococci can be transmitted directly through contact with infected or colonized patients, or indirectly through contact with potentially contaminated items or surfaces. Isolation of the patient is essential and can limit the transmission of organisms. In addition protective clothing, including gloves and aprons, should be worn by health staff.

Common vehicle transmission

Common vehicle transmission can be prevented by utilizing aseptic, sterile or clean techniques whenever fluids or medications are being made up or given to patients, and by utilizing good principles of food hygiene.

Vectorborne transmission can be avoided by keeping healthcare facilities free of arthropods and insects.

The CDC recommendations for isolation precautions concentrate on contact, airborne transmission, and droplet transmission as the most significant risks within healthcare facilities. Examples of organisms, their routes of transmission, and management strategies can be found in Appendix 1.

General recommendations for all isolation or transmission-based precautions include the following:

- Precautions should be put in place immediately, even if results are not yet known and the infectious organism is only suspected. (There are common clinical conditions which may lead to suspicion of an infectious organism, examples of which are found in Appendix 1.)
- Put the patient in a single room. If this is not possible, cohort nursing of patients colonized or infected with the same organism should be carried out.
- Place a sign on the room door or entrance to the patient area in order to alert all staff and visitors to the precautions. Patient confidentiality should be maintained, if possible.
- Doors to the single room or designated area should be kept closed to create a barrier and prevent especially susceptible people from entering.
- Patients should leave their room or ward only if absolutely necessary. If they must visit other areas, staff in those areas should be informed.
- Hands of health staff and visitors should be washed after contact with the patient and his/her immediate surroundings.
- If protective clothing such as gloves or aprons is worn by healthcare staff, it should be disposed of before hands are washed. Protective clothing should be kept at the entrance to the patient area so that everyone entering wears it.
- Clinical waste should be disposed of in the patient's room, and then double-bagged when removed.
- Linen from the patient should be identified as infected. Individual bags should be kept for each infected patient and once filled double bagged to prevent contamination.
- Minimal equipment and supplies should be taken



Working within a sterile hood. Credit: WHO/TDR.

into the patient area. Items should be decontaminated before being used on other patients.

- Environmental decontamination should be through disinfection rather than through use of a detergent. Disinfectants should be made up freshly and supplies should not be shared with other areas. All items, surfaces, and equipment, including toileting facilities and bedding, should be thoroughly disinfected. There is no evidence to show that walls can harbour organisms; consequently, walls do not need to be disinfected. Terminal disinfection of the entire room, once the patient has left, will greatly reduce the risk of cross infection of other patients in the same room. Such disinfection should be conducted thoroughly and it includes the proper disposal of items that cannot effectively be decontaminated, and of cleaning materials once they have been used.
- There is no evidence to indicate that “fogging” of rooms with disinfectants is effective.
- There is no evidence to show that crockery, cutlery, or meal trays are a source of cross infection. These can be used and washed as normal.
- Persons susceptible to certain organisms, for example, measles and varicella, should not be allowed to enter the patient area.
- Appropriate treatment of the patients' infections is essential. In some cases, the patient may be allowed out of the isolation room once antibiotics have been given. Further screening of patients may be required to ensure that they are no longer a source of infection.



REVISION POINT 7

Give an example of a precaution to prevent cross infection through each of the 5 common routes. (See pages 21–22 for help.)

MRSA

In addition to the precautions listed, other specific measures are necessary to limit the risks of cross infection with MRSA (methicillin-resistant staphylococcus aureus). MRSA is commonly seen in many healthcare settings. Shedding of skin scales from infected or colonized patients and contaminated hands are the main routes of transmission. Patients with MRSA are normally isolated, and cared for under contact precautions. Although it is not any more virulent than Methicillin-sensitive Staphylococcus aureus, MRSA can cause serious infection, particularly in patients with burns, in intensive care, following cardiac surgery and elderly patients. Strict measures are essential where such patients are cared for. Long-term colonization is common with MRSA and certain strains can spread widely before being detected.

Measures required to prevent cross infection with MRSA include:

- strict handwashing;
- environmental and equipment decontamination;
- use of gloves and aprons when working with patients or their immediate environment is essential; and
- infected or colonized lesions or wounds should be covered with bacteria-impermeable dressings wherever possible.

Treatment of patients will vary. However, daily washing with an antiseptic is recommended, with particular attention given to commonly contaminated sites, such as the axillae and groin. Nasal carriage should be treated using mupirocin ointment three times a day for five days. Mupirocin may be applied to infected lesions (but not large areas such as pressure sores) for up to five days. Use of topical antibiotics is forbidden.

If a patient with MRSA must be transferred to another hospital, the hospital must be informed and the patient's notes clearly marked for MRSA. Further examples of organisms and their transmission routes are given in Appendix I. Through an understanding of the route of transmission of an organism, the appropriate precautions can be taken regarding patient care. This is not an exhaustive list; healthcare settings may have to produce similar lists to cover their needs. In addition to the organisms listed, drug resistant organisms (particularly organisms resistant to Vancomycin) should be managed according to the appropriate precautions specific to their route of transmission. For example, patients infected with drug resistant *Pseudomonas aeruginosa* in a wound site should be cared for under contact precautions.

Now carry out Learning Activity 3.

Infection control in special circumstances

There are certain areas within healthcare settings where additional infection control measures must be considered. These include intensive or critical care units and units where immunocompromised patients get nursing care (for example, transplant units).

Management of patients in such units often requires the use of invasive devices. These devices should only be used where absolutely necessary and should be removed as soon as possible. The risk of infection is greatly increased in such units, due in part to the presence of various pieces of invasive equipment. All methods of decontamination are extremely important and must be conducted thoroughly.



Proper bed spacing in wards. Credit: WHO/TDR.

The units themselves should be adequately ventilated, clean, dry, and well-maintained. Bed spacing is also an important factor, a distance of approximately 10 feet between patients being appropriate. The number of visitors may need to be limited and they must be advised on the precautions to be followed. Thorough, correct handwashing is the most important measure that can be carried out to prevent nosocomial infections.

Other considerations

It is recommended that infection control teams are placed within healthcare settings. These teams, consisting of an infection control doctor and infection control nurse, should be consulted on all infection-related matters. The team should regularly conduct surveillance, and audit and recommend best practice to prevent or control nosocomial infections. The team should also

manage, control, and investigate any outbreaks, and provide feedback and advice to health staff. Producing and implementing local and national standards and policies are also important parts of the team's function.

Audit of practice is essential to ensure that infection control measures are carried out properly and effectively. Health staff should be aware of the importance of audit and always be involved. Other areas where audits may be useful include:

- handwashing;
- environmental cleanliness;
- decontamination procedures; and
- patient outcomes, for example, postoperative wound infections.

Education programmes are essential for increasing awareness of nosocomial infections and to improve appropriate infection control practices. Sessions on orientation programmes must be given to alert all new staff to policies and procedures. Informal education on a daily basis can also be very effective. Documentation of patient infections and of the measures taken to prevent and control spread of infection are essential in everyday practice. Such documentation will alert healthcare workers to the recommended precautions and in turn help to control nosocomial infections.

Occupational health staff and infection control staff often work closely together to provide protection to staff from infectious diseases. Immunizations which should be made available include hepatitis B. In addition, occupational exposures to patient blood or body fluids should always be reported, as steps must be taken to protect and reassure exposed healthcare workers. This can be done swiftly and effectively by trained occupational health and infection control staff.

The health status of the staff is clearly an important factor in limiting cross infection to susceptible patients, particularly in high-risk areas such as intensive care units and theatres/operating rooms. Illnesses (coughs and colds) as well as conditions (eczema and psoriasis) among healthcare staff must be reported. Occupational health and infection control officers should work closely together when outbreaks of infection occur, and to determine if staff need to be screened, for example, during an outbreak of MRSA.



REVISION POINT 8

List 5 precautions to be taken to prevent cross infection with MRSA.
(See pages 23–25 for help.)

- The principles of infection control and prevention are essential in the everyday care of patients within healthcare settings.
- We continually share our environment with many different microorganisms. Understanding them and their pathogenicity is extremely important for healthcare workers.
- Knowledge of the cycle of infection, along with utilization of appropriate precautions and adequate decontamination procedures, is vital.
- Nosocomial infections within healthcare settings can be prevented, thereby protecting both patients and staff.
- The quality and quantity of available resources and facilities can affect how we carry out infection control. However, every possible step must be taken to minimize infection.
- Basic infection control measures are the best defence against very resilient organisms.

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www.cdc.gov

www.phls.co.uk

APPENDIX 1. Type and duration of precautions needed for selected infections and conditions

Infection/condition	Precautions	
	Type	Duration
Abscess		
Draining major	C	DI
Draining minor or limited	S	
Acquired immunodeficiency syndrome	S	
Actinomycosis	S	
Adenovirus infection, in infants and young children	D, C	DI
Amebiasis	S	
Anthrax		
Cutaneous	S	
Pulmonary	S	
Antibiotic-associated colitis (see Clostridium Difficile)		
Arthropodborne viral encephalitides (eastern, western, Venezuelan equine encephalomyelitis; St Louis, California encephalitis)	S	
Arthropod-borne viral fevers (dengue, yellow fever, Colorado tick fever)	S	
Ascariasis	S	
Aspergillosis	S	
Babesiosis	S	
Blastomycosis, North American, Cutaneous or pulmonary	S	
Botulism	S	
Bronchiolitis (see respiratory infections in infants and young children)		
Brucellosis (undulant, Malta, Mediterranean fever)	S	
Campylobacter gastroenteritis (see gastroenteritis)		
Candidiasis, all forms including mucocutaneous	S	
Cat-scratch fever (benign inoculation lymphoreticulosis)	S	
Cellulitis, uncontrolled drainage	C	DI
Chancroid (soft chancre)	S	
Chickenpox (varicella; see F for varicella exposure)	A, C	
Chlamydia trachomatis		
Conjunctivitis	S	
Genital	S	
Respiratory	S	

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Infection/condition	Precautions	
	Type	Duration
Cholera (see gastroenteritis)		
Closed-cavity infection		
Draining, limited or minor	S	
Not draining	S	
Clostridium		
C botulism	S	
C difficile	C	DI
C perfringens		
Coccidioidomycosis (valley fever)		
Draining lesions	S	
Pneumonia	S	
Colorado tick fever	S	
Congenital rubella	C	
Conjunctivitis		
Acute bacterial	S	
Chlamydia	S	
Gonococcal	S	
Acute viral (acute hæmorrhagic)	C	DI
Coxsackievirus disease (see enteroviral infection)		
Creutzfeldt-Jakob disease	S	
Croup (see respiratory infections in infants and young children)		
Cryptococcosis	S	
Cryptosporidiosis (see gastroenteritis)		
Cysticercosis	S	
Cytomegalovirus infection, neonatal or immunosuppressed	S	
Decubitus ulcer, infected		
Major	C	DI
Minor or limited	S	
Dengue	S	
Diarrhoea, acute-infective etiology suspected (gastroenteritis)		
Diphtheria		
Cutaneous	C	CN
Pharyngeal	D	CN

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Infection/condition	Precautions	
	Type	Duration
Ebola viral haemorrhagic fever	C	DI
Echinococcosis (hydatidosis)	S	
Echovirus (see enteroviral infection)		
Encephalitis or encephalomyelitis (see specific etiologic agents)		
Endometritis	S	
Enterobiasis (pinworm disease, oxyuriasis)	S	
Enterococcus species (see multidrug-resistant organisms if epidemiologically significant or vancomycin resistant)		
Enterocolitis, Clostridium difficile	C	DI
Enteroviral infections		
Adults	S	
Infants and young children	C	DI
Epiglottitis, due to Haemophilus influenzae	D	U
Epstein-Barr virus infection, including infectious mononucleosis	S	
Erythema infectiosum (also see Parvovirus B19)	S	
Escherichia coli gastroenteritis (see gastroenteritis)		
Food poisoning		
Botulism	S	
Clostridium perfringens or welchii	S	
Staphylococcal	S	
Furunculosis-staphylococcal		
Infants and young children	C	DI
Gangrene (gas gangrene)	S	
Gastroenteritis		
Campylobacter species	S	
Cholera	S	
Clostridium difficile	C	DI
Cryptosporidium series	S	
Escherichia coli		
Enterohæmorrhagic 0157:H7	S	
Diapered or incontinent	C	DI
Other species	S	
Rotavirus	S	

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Infection/condition	Precautions	
	Type	Duration
Gastroenteritis (continued)		
Diapered or incontinent patients	C	DI
Salmonella species (including <i>S typhi</i>)	S	
Shigella species	S	
Diapered or incontinent patients	C	DI
Vibrio parahæmolyticus	S	
Viral (if not covered elsewhere)	S	
Yersinia enterocolitica	S	
German measles (rubella)	D	
Giardia lamblia	S	
Giardiasis (see gastroenteritis)		
Gonococcal ophthalmia neonatorum (gonorrhœal ophthalmia, acute conjunctivitis of newborn)	S	
Gonorrhœa	S	
Granuloma inguinale (donovanosis, granuloma venereum)	S	
Guillain-Barre syndrome	S	
Hand, foot, and mouth disease (see enteroviral infection)		
Hantavirus pulmonary syndrome	S	
Helicobacter pylori	S	
Haemorrhagic fevers (for example, Lassa and Ebola)	C	DI
Hepatitis, viral		
Type A	S	
Diapered or incontinent patients	C	
Type B-HbsAg positive	S	
Type C and other unspecified non-A, non-B	S	
Type E	S	
Herpangina (see enteroviral infection)		
Herpes simplex (Herpesvirus hominis)		
Encephalitis	S	
Neonatal (see F for neonatal exposure)	C	DI
Mucocutaneous, disseminated or primary, severe	C	DI
Mucocutaneous, recurrent (skin, oral, genital)	S	
Herpes zoster (varicella-zoster)		
Localized in immunocompromised patient,		

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Infection/condition	Precautions	
	Type	Duration
or disseminated	A, C	DI
Localized in normal patient	S	
Histoplasmosis	S	
HIV (see human immunodeficiency virus)	S	
Hookworm disease (ancylostomiasis, uncinariasis)	S	
Human immunodeficiency virus (HIV) infection ³	S	
Impetigo	C	U
Infectious mononucleosis	S	
Influenza	D	DI
Kawasaki syndrome	S	
Lassa fever	C	DI
Legionnaires' disease	S	
Leprosy	S	
Leptospirosis	S	
Lice (pediculosis)	C	U
Listeriosis	S	
Lyme disease	S	
Lymphocytic choriomeningitis	S	
Lymphogranuloma venereum	S	
Malaria	S	
Marburg virus disease	C	DI
Measels (rubeola), all presentations	A	DI
Melioidosis, all forms	S	
Meningitis	S	
Aseptic (nonbacterial or viral meningitis [also see enteroviral infections])		
Bacterial, gram-negative enteric, in neonates	S	
Fungal	S	
Haemophilus influenzae, known or suspected	D	U
Listeria monocytogenes	S	
Neisseria meningitidis (meningococcal) known or suspected	D	U
Pneumococcal	S	
Tuberculosis	S	
Other diagnosed bacterial	S	
Meningococcal pneumonia	D	U

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Infection/condition	Precautions	
	Type	Duration
Meningococemia (meningococcal sepsis)	D	U
Molluscum contagiosum	S	
Mucormycosis	S	
Multidrug-resistant organisms, infection or colonization		
Gastrointestinal	C	CN
Respiratory	C	CN
Pneumococcal	S	
Skin, wound, or burn	C	CN
Mumps (infectious parotitis)	D	
Mycobacteria, nontuberculosis (atypical)		
Pulmonary	S	
Wound	S	
Mycoplasma pneumonia	D	DI
Necrotizing enterocolitis	S	
Nocardiosis, draining lesions or other presentations	S	
Norwalk agent gastroenteritis (see viral gastroenteritis)		
Orf	S	
Parainfluenza virus infection, respiratory in infants and young children	C	DI
Parvovirus B19	D	
Pediculosis (lice)	C	U
Pertussis (whooping cough)	D	
Pinworm infection	S	
Plague		
Bubonic	S	
Pneumonic	D	U
Pleurodynia (see enteroviral infection)		
Pneumonia		
Adenovirus	D, C	DI
Bacterial not listed elsewhere (including gram-negative bacterial)	S	
Burkholderia cepacia in cystic fibrosis (CF) patients, including respiratory tract colonization	S	
Chlamydia	S	
Fungal	S	

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Infection/condition	Precautions	
	Type	Duration
Haemophilus influenzae		
Adults	S	
Infants and children (any age)	D	U
Legionella	S	
Meningococcal	D	U
Multidrug-resistant bacterial (see multidrug-resistant organisms)		
Mycoplasma (primary atypical pneumonia)	D	DI
Pneumococcal		
Multidrug-resistant (see multidrug-resistant organisms)		
Pneumocystis carinii	S	
Pseudomonas cepacia (see Burkholderia cepacia)	S	
Staphylococcus aureus	S	
Streptococcus, Group A		
Adults	S	
Infants and young children	D	U
Viral		
Adults	S	
Infants and young children (see respiratory infectious disease, acute)		
Poliomyelitis	S	
Psittacosis (ornithosis)	S	
Q fever	S	
Rabies	S	
Rat-bite fever (Streptobacillus moniliformis disease, Spirillum minus disease)	S	
Relapsing fever	S	
Resistant bacterial infection or colonization (see multidrug-resistant organisms)		
Respiratory infectious disease, acute (if not covered elsewhere)		
Adults	S	
Infants and young children	C	DI
Respiratory syncytial virus infection, in infants and young children, and immunocompromised adults	C	DI
Reye's syndrome	S	

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Infection/condition	Precautions	
	Type	Duration
Rheumatic fever		S
Rickettsial fevers, tickborne (Rocky Mountain spotted fever, tickborne typhus fever)	S	
Rickettsialpox (vesicular rickettsiosis)	S	
Ringworm (dermatophytosis, dermatomycosis, tinea)	S	
Ritter's disease (staphylococcal scaled skin syndrome)	S	
Rocky Mountain spotted fever	S	
Roseola infantum (exanthem subitum)	S	
Rotavirus infection (see gastroenteritis)		
Rubella (German measles; also see congenital rubella)	D	
Salmonellosis (see gastroenteritis)		
Scabies	C	U
Scalded skin syndrome, staphylococcal (Ritter's disease)	S	
Schistosomiasis (bilharziasis)	S	
Shigellosis (see gastroenteritis)		
Sporotrichosis	S	
Spirillum minus disease (rat-bite fever)	S	
Staphylococcal disease (<i>S aureus</i>)		
Skin, wound, or burn		
Major	C	DI
Minor or limited	S	
Enterocolitis	S	
Multidrug-resistant (see multidrug-resistant organisms)		
Pneumonia	S	
Scalded skin syndrome	S	
Toxic shock syndrome	S	
Streptobacillus moniliformis disease (rat-bite fever)	S	
Streptococcal disease (group A streptococcus)		
Skin, wound, or burn		
Major	C	U
Minor or limited	S	
Endometritis (puerperal sepsis)	S	
Pharyngitis in infants and young children	D	U
Pneumonia in infants and young children	D	U

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Infection/condition	Precautions	
	Type	Duration
Scarlet fever in infants and young children	D	U
Streptococcal disease (group B streptococcus), neonatal	S	
Streptococcal disease (not group A or B) unless covered elsewhere	S	
Multidrug-resistant (see multidrug-resistant organisms)		
Strongyloidiasis	S	
Syphilis		
Skin and mucous membrane, including congenital, primary, secondary	S	
Latent (tertiary) and seropositivity without lesions	S	
Tapeworm disease		
Hymenolepis nana	S	
Taenia solium (pork)	S	
Other	S	
Tetanus	S	
Tinea (fungus infection dermatophytosis, dermatomycosis, ringworm)	S	
Toxoplasmosis	S	
Toxic shock syndrome (staphylococcal disease)	S	
Trachoma, acute	S	
Trench mouth (Vincent's angina)	S	
Trichinosis	S	
Trichomoniasis	S	
Trichuriasis (whipworm disease)	S	
Tuberculosis		
Extrapulmonary, draining lesion (including scrofula)	S	
Extrapulmonary, meningitis	S	
Pulmonary, confirmed or suspected or laryngeal disease	A	
Skin-test positive, with no evidence of current pulmonary disease	S	
Tularemia		
Draining lesion	S	
Pulmonary	S	
Typhoid (<i>Salmonella typhi</i>) fever (see gastroenteritis)		

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Infection/condition	Precautions	
	Type	Duration
Typhus, endemic and epidemic	S	
Urinary tract infection (including pyelonephritis), with or without urinary catheter	S	
Varicella (chickenpox)	A, C	
Vibrio Parahaemolyticus (see gastroenteritis)		
Vincent's angina (trench mouth)	S	
Viral diseases		
Respiratory (if not covered elsewhere)		
Adults	S	
Infants and young children (see respiratory infectious disease, acute)		
Whooping cough (pertussis)	D	
Wound infections		
Major	C	DI
Minor or limited	S	
Yersinia enterocolitica gastroenteritis (see gastroenteritis)		
Localized in immunocompromised patient, disseminated	A, C	DI
Localized in normal patient	S	
Zygomycosis (phycomycosis, mucormycosis)	S	
Zoster (varicella-zoster)		

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BODY FLUIDS TO WHICH UNIVERSAL PRECAUTIONS APPLY

- Blood
 - Any bodily fluids containing visible blood
 - Semen
 - Cerebrospinal fluid
 - Synovial fluid
 - Amniotic fluid
 - Pleural fluid
 - Peritoneal fluid
 - Pericardial fluid
 - Saliva, in association with dentistry
-

BODY FLUIDS SHOWN TO HAVE NO OR VERY LOW INCIDENCE OF TRANSMISSION

- Faeces
 - Nasal secretions
 - Sputum
 - Sweat
 - Tears
 - Urine
 - Vomit
 - Breast milk (occupational transmission to healthcare workers)
-

However, precautions should be taken with all body fluids, as they may present risks other than the bloodborne viruses discussed.

MODULE 2

Immunization and the expanded programme of immunization (EPI)

Stated learning outcomes

Glossary of terms

History

The basic principles of immunization

Administration of vaccines

Contraindications to immunization

Vaccine storage

The creation of the EPI

The six targeted diseases – vaccine information

Further notes on vaccination against tuberculosis

The disease control era of EPI

Progress towards meeting EPI targets

Summary of key points

Bibliography

Appendices

MODULE 2

The OBJECTIVE of this module is to give a broad overview of immunization issues and to discuss the role of the Expanded Programme of Immunization (EPI). More detailed information about individual diseases, including definitions, epidemiology within Europe, modes of transmission, methods of prevention, treatment options, and practical nursing care can be found in Modules 3 – 6 of this manual.

STATED LEARNING OUTCOMES

On completion of this module you should have an understanding of:

- the basic principles of immunization;
- ways to ensure that safe and effective immunization is provided;
- the role of the Expanded Programme on Immunization (EPI); and
- the achievements and future goals of the EPI.

KEY WORDS

Immunization; vaccine; efficacy; safety; cold chain; expanded programme of immunization; surveillance.

GLOSSARY OF TERMS

EFFICACY: success in producing an intended result

ELIMINATION: removal of

EPIDEMIC: (of a disease) attacking or affecting many persons simultaneously in a community or area; a widespread occurrence of disease

EPIDEMIOLOGY: the branch of medical science concerned with the occurrence, transmission and control of epidemics

ERADICATION: obliteration

IMMUNE: protected against a specific disease by inoculation, or as a result of innate or acquired resistance

IMMUNIZATION: the practice of making immune by inoculation

IMMUNOCOMPROMISED: state in which the immune system is not working properly – may have several causes

INOCULATE: to introduce (the causative agent of a disease) into the body (of a person or animal) in order to induce immunity

SURVEILLANCE: close observation or supervision of a person or group

VACCINE: 1. A suspension of dead, attenuated, or otherwise modified microorganisms for inoculation to produce immunity to a disease by stimulation of antibodies 2. A preparation of the virus cowpox

It is widely acknowledged that the two most important public health interventions, which have had the greatest impact on the world's health, are the provision of clean drinking water and immunization. In addition, immunization has been shown to be one of the safest and most cost-effective interventions known.

Edward Jenner produced the very first vaccine over two hundred years ago. He observed that dairymaids and herdsmen did not



Edward Jenner. Credit: Messrs. Parke-Davis & Co.

seem to catch smallpox, although they were prone to cowpox. He took some material from a cowpox pustule and scratched it into the arm of a young boy. The boy developed a cowpox pustule and mild fever but remained well when subsequently inoculated with smallpox. The first vaccine had been discovered and indeed, as a consequence, the original meaning of “vaccine” was “protection against smallpox”. One hundred and seventy years later, following a targeted global vaccination programme, smallpox had been completely eradicated.

It was to be almost one hundred years later before the next major breakthrough occurred when Louis Pasteur developed a rabies vaccine. Pasteur found a way to grow the rabies virus in neural tissue and managed to reduce the strength of the virus. A child who had been bitten by a rabid dog was inoculated with several doses of the reduced strength virus and was prevented from developing a rabies infection. The discoveries of Jenner and Pasteur formed the basis for vaccine production. Now there are many different types of vaccine.

Immunization occurs when a specific resistance to an infectious disease is induced by the administration of a vaccine. Immunization can be active or passive.

Active immunization involves the stimulation of an individual's immune system to produce antibodies. This can be achieved by the administration of:

- live attenuated organisms: the organism's pathogenicity is reduced by sequential subculturing (for example, oral poliomyelitis, BCG, yellow fever, measles, mumps, rubella);
- inactivated organisms: the organisms have been inactivated by chemical means (for example, rabies, Japanese B encephalitis, hepatitis A);
- toxoid: the inactivated products of an organism (for example, diphtheria, tetanus);
- components of organisms: such as capsular polysaccharides (for example, meningococcal, pneumococcal); and
- genetically engineered viral products (for example, hepatitis B).

Passive immunization does not induce an antibody response; rather it involves the direct transfer of antibodies by the administration of immunoglobulin derived from blood donations. Immunity is gained immediately but is short-lived. Sometimes normal pooled immunoglobulin contains sufficient antibodies to be protective (e.g. hepatitis A) but specific immunoglobulin may need to be prepared by taking blood from actively immunized donors (e.g. hepatitis B and rabies).

Active immunization is preferred to passive immunization for the following reasons:

- it confers long term immunity, and
- it does not involve the use of blood products.

Passive immunization is generally reserved for situations where:

- rapid immunity is needed (for example, for post-exposure treatment of a tetanus-prone wound), and
- active immunization may not be effective for example, in immunocompromised individuals.

A primary course of immunization may consist of one or more doses of vaccine depending upon the individual vaccine. When a primary course is complete, there is usually an interval of around two weeks before protective immunity is achieved. A full course of immunization may consist of a primary course of vaccine followed by one or more boosters. Boosters of vaccine are given at varying intervals depending upon the individual vaccine. Boosters usually confer immunity quickly.

Now carry out Learning Activity 1.

Consent (written or implied) must be obtained from parents or guardians of small children before any vaccine is given. It is important to understand local policy on informed consent.

Doctors and nurses who administer vaccines must have suitable training in the appropriate techniques. Training for anaphylaxis should be undertaken and suitable drugs and equipment should be available for such emergencies.

All vaccines vary slightly, but all come packaged with a manufacturer's data sheet, providing information about the route

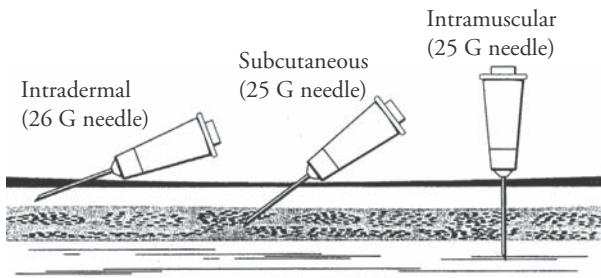


Stored vaccines. Credit: WHO/TDR.

of administration, cautions and contraindications, and side effects, etc. Vaccines needing to be reconstituted with diluent should be used within the manufacturer's time recommendations. No vaccine should be used after the expiry date.

Generally vaccines are administered via the oral, intramuscular, subcutaneous or intradermal routes. Vaccines that are not administered via the correct route may be sub-optimal or cause harm. (For example, BCG given subcutaneously instead or intradermally can cause a local abscess). If the skin is cleaned with alcohol prior to the administration of a vaccine, the alcohol should be allowed to dry first.

Diagram 1. Correct vaccine administration techniques



After the administration of each vaccine, the name of the vaccine and its batch number should be recorded for future reference. All expired, partly used and spent vials, needles and syringes, should be disposed of safely, usually in a sharps bin for incineration.

Administration of more than one vaccine

When more than one live attenuated vaccine is to be given, all vaccines should ideally be given at the same time or separated by a three week period to allow optimum response. If a live vaccine and immunoglobulin are to be given, the live vaccine should be given first and the immunoglobulin administered three or more weeks later to allow optimum response. All other vaccines can be given within any time schedule.

The World Health Organization recommends reducing the number of contacts required for children to complete their primary immunization schedules. To that end, as many vaccines as possible should be given at a single visit. This is especially important in areas where vaccine uptake is poor. All EPI vaccines are safe and effective when administered simultaneously i.e. during the same immunization session but at different sites. For example, a one-year-old child who has never previously been immunised should receive BCG, measles, the first DPT (combined diphtheria, tetanus and pertussis) and polio. Yellow fever and

hepatitis B can be administered if appropriate. The EPI does not recommend mixing different vaccines in one syringe as this reduces efficacy.

REVISION POINT 1

What are the differences between active and passive immunizations. (See page 41 for help.)

Contraindications to immunization

There are few absolute contraindications to EPI vaccines. If immunization is delayed because of mild illness, there is a risk that the child may not return again, and the opportunity to immunise is lost. Throughout the world, lost opportunity because of false contraindications is a major cause of delay in completing the immunization schedule. In general, the EPI recommends that health care workers should take every opportunity to immunize eligible children.

Generally speaking live vaccines should not be given to immunocompromised individuals due to malignant disease, therapy with immunosuppressive agents or irradiation. Both measles and oral poliomyelitis vaccines should be given to children with HIV/AIDS. Children with HIV/AIDS should not be immunised with BCG or yellow fever.

A severe adverse event following a dose of vaccine (anaphylaxis, collapse, shock, encephalitis/encephalopathy or non-febrile convulsion) is a true contraindication. Such events are easily recognizable.

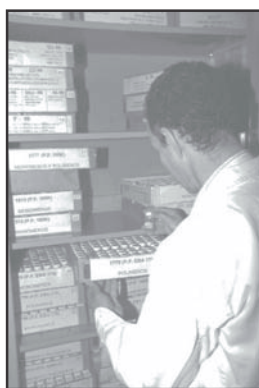
False contraindications include the following: minor illness with fever ($<38.5^{\circ}\text{C}.$); allergy, asthma, the “snuffles”; prematurity, small for dates

children; malnutrition; breast-fed infants; family history of convulsions; treatment with antibiotics or low dose steroids; dermatitis, eczema, local skin infections; chronic disease of heart, lung, kidney, liver; stable neurological conditions; history of jaundice at birth. Taking a brief medical history prior to administering a vaccine is good practice and will identify possible contraindications.

Vaccine storage

Care must be taken to ensure that all vaccines are stored according to the conditions stated in the manufacturer's data sheet.

Failure to do so can result in the preparation becoming ineffective. Correct storage of vaccines usually means maintaining the "cold chain", and refrigerated transportation and storage is usually necessary, as most vaccines need to be stored at 2–



Stored vaccines. Credit: WHO/TDR.

8° C. Vaccines must not be allowed to freeze. A protocol document about vaccine storage can help to ensure that the cold chain is maintained. An example of such a document is found in Appendix 1.

Now carry out Learning Activity 2.

The creation of the EPI (Expanded Programme on Immunization)

Following the success of smallpox eradication, the World Health Organization was keen to attempt eradication of other infectious diseases. As a result WHO created the Expanded Programme of Immunization (EPI) in 1974. The term "expanded" was used to indicate the increase in the

number of vaccine preventable diseases targeted within the programme and the increase in immunization coverage globally. The EPI would target six key diseases chosen because of the high burden they caused and the availability of effective and inexpensive vaccines. These six diseases were diphtheria, measles, pertussis, poliomyelitis, tetanus and tuberculosis. When the EPI was created, only 5% of children in developing countries were being vaccinated.

The impact of the EPI

Following the introduction of the EPI, global coverage with immunization against the six diseases increased, with varying degrees of success both between and within individual countries. The increase in immunization uptake was higher in developed areas and lower in less developed areas. Lack of resources and political unrest made coverage difficult in those areas that needed it most.

The EPI commenced training programmes, and between 1974 and 1980 almost every country in the world had adopted the principle of a national immunization programme. In spite of this, it became clear that disease incidence was not decreasing, because areas with low immunization coverage were perpetuating transmission. At this time more effort was placed on developing surveillance of disease so that disease incidence and vaccine coverage could be more accurately followed. Problem areas were targeted and strategies set up to ensure that vaccines were readily available to those areas with poor coverage.

Now carry out Learning Activity 3.

The six targeted diseases

The following information covers vaccines used to prevent the six targeted diseases and is meant for guidance only. Individual vaccine details and immunization schedules vary between and within countries.

Diphtheria

Type of vaccine: Active immunization with diphtheria toxoid (often given combined with tetanus).

Primary course: Usually 3 doses.

Boosters: Usually 2 doses.

Adverse reactions: swelling and redness at the injection site. Malaise, transient fever and headache may occur.

Contraindications: Acute febrile illness or severe adverse event to previous dose of same vaccine.

Notes: A lower dose of vaccine is usually given to persons over the age of 10, to reduce side effects.

Measles

Type of vaccine: Active vaccination with live attenuated virus, usually with mumps and rubella (also live viruses).

Primary course: Usually 1 dose.

Boosters: Usually 1 dose.

Adverse reactions: Malaise, fever and/or rash. Rarely, febrile convulsions, arthropathy. Side effects are far less common with booster doses.

Contraindications: Acute febrile illness, untreated malignant disease, immunocompromised status, allergy to neomycin or kanamycin, pregnancy, severe adverse event to previous dose of same vaccine.

Notes: There is an exceptionally small risk of encephalitis or encephalopathy related to vaccination.

Pertussis

Type of vaccine: Active vaccination with inactivated organisms, usually with diphtheria and tetanus.

Primary course: Usually 3 doses.

Boosters: Usually none.

Adverse Reactions: Swelling and redness at the injection site. Malaise, transient fever and headache may also occur.

Contraindications: Acute febrile illness or severe adverse event to previous dose of same vaccine (severe local or prolonged high-pitched screaming more than four hours; convulsion).

Notes: The risk of vaccine related neurological problems (encephalopathy and convulsions) is not proven.

Poliomyelitis

Type of vaccine: Active vaccination with live attenuated virus in an oral preparation (OPV or Sabin) or active vaccination with inactivated virus in an injectable preparation (IPV or Salk).

Primary course: Usually 3 doses.

Boosters: Usually 2 doses.

Adverse reactions: OPV – vaccine associated poliomyelitis (1: 1 000 000)

Contraindications: OPV - acute febrile illness, vomiting or diarrhoea, malignant disease, immunocompromised status, pregnancy. IPV – acute febrile illness.

Notes: Some countries use a combination of OPV and IPV within their vaccination schedule.

Tetanus

Type of vaccine: Active vaccination with tetanus toxoid (often given with diphtheria and pertussis).

Primary course: Usually 3 doses.

Boosters: Usually 2 doses.

Adverse reactions: Swelling and redness at the injection site, malaise, transient fever and headaches are uncommon.

Contraindications: Acute febrile illness, severe adverse event to previous dose of same vaccine.

Notes: Tetanus toxoid and/or tetanus immunoglobulin is used as treatment of tetanus prone wounds.

Tuberculosis

Type of vaccine: Active vaccination with live attenuated *Mycobacterium bovis* (Bacillus Calmette-Guerin vaccine, i.e. BCG)

Primary course: Usually 1 dose.

Boosters: Usually none or 1 dose.

Adverse reactions: Vertigo and dizziness (reaction to the vaccination), ulcer or abscess formation, keloid formation.

Contraindications: Tuberculin skin test positive, acute febrile illness, malignant disease, immunocompromised status, pregnancy.

Notes: BCG is only carried out after a negative skin test, except for infants, less than 3 months old (see further notes).

Note: Further vaccines were included in the EPI at a later date: yellow fever (for those living in endemic countries), hepatitis B, and mumps and rubella for those countries which used the combined measles, mumps, and rubella vaccine (MMR).

**REVISION POINT 2**

Make a list of true and false contraindications to vaccination.
(See page 43–44 for help.)

The vaccine used is the Bacillus Calmette-Guerin (BCG) vaccine. It provides some protection against TB but is not 100% protective. It is especially beneficial in preventing miliary TB and TB meningitis in young children and is thought to lessen the severity of disease in vaccinated individuals who do develop TB. Immunization against TB is included as part of the Expanded Programme of Immunization (EPI).

Immunization against TB with BCG (in all persons more than three months old) should only be carried out following a negative tuberculin skin test.

The Tuberculin skin test

There are two main methods of skin testing:

1. Heaf test (or multiple puncture test)
2. Mantoux test






Both tests use purified protein derivative (PPD), a sterile preparation produced from heat-treated products of mycobacterium. Different tests require different concentrations of PPD.

The Heaf test

Equipment needed: PPD 100 000 units/ml, a Heaf “gun”, disposable Heaf heads (paediatric and standard).

Procedure: draw up 0.1 ml of PPD in a syringe; expel the PPD onto the flexor surface of the left forearm. Smear the PPD over the surface of the skin using the Heaf gun head so that it covers an area just greater than the surface of the Heaf gun head. Using a firm pressure, press the Heaf gun head down on to the arm and six needles from the Heaf head will be released and protrude 2mm into the skin. The disposable head should be safely discarded.

Diagram 2. Results of a Heaf test

Heaf grade	Result	Appearance
0	No induration at the puncture sites. Erythema only is present. Discrete induration of three or fewer needle sites is acceptable. NEGATIVE	
1	Discreet induration of four or more needle sites. NEGATIVE	
2	Induration around each needle site merging with the next, forming a ring of induration but with a clear centre. POSITIVE	
3	The centre of the reaction becomes indurated to form one uniform circle 5-10mm wide. STRONG POSITIVE	
4	Solid induration over 10mm wide. Vesiculation or ulceration may also occur. STRONG POSITIVE	

The Mantoux test

Equipment needed: PPD 100 units/ml, and a 1 ml syringe with short bevel and 26 gauge needle.

Procedure: draw up 0.1 ml of PPD in the syringe and administer using the intradermal technique (see administration of BCG) into the flexor surface of the left forearm. The test should be read 48–72 hours later.

Extent of duration	Result	Heaf Test Equivalent
0 mm	Negative	0-1
0-4 mm	Negative	0-1
5-14 mm	Strongly positive	2
>15 mm	positive	3-4

Interpretation of Heaf and Mantoux tests

Heaf grades 0 and 1 or a Mantoux response of 0–4mm induration are regarded as negative. Individuals who have not previously received immunization with BCG may be offered it in the absence of contraindications. Those who are not sure of previous BCG should only be immunized if there is no evidence of the characteristic scar. Those with a Heaf grade 2 or Mantoux response of 5–14 mm induration are positive. They are hypersensitive to tuberculin and should not be given immunization with BCG.

Heaf grades 3 or 4 and Mantoux tests of 15 mm induration or more, are considered to be strongly positive and should be referred for further investigation and possible prophylactic chemotherapy.

Administration of BCG

The recommended site for giving the vaccine is at the insertion of the deltoid muscle near the middle of the left upper arm. Sites higher



Site for administering BCG vaccine. Credit: WHO/TDR.

on the arm are more likely to lead to keloid

formation. The vaccine must be given strictly intradermally with 0.1 ml of vaccine. If the skin is visibly dirty, it should be swabbed with spirit and allowed to dry. The skin is stretched between the thumb and forefinger of one hand; the other hand slowly inserts the needle with the bevel upwards for about 2 mm into the superficial layers of the dermis, almost parallel with the surface. The needle can usually be seen through the epidermis.

A correctly administered intradermal injection results in a blanched raised area (“bleb”) and considerable resistance is felt when the fluid is injected. A bleb typically of 7 mm diameter follows a 0.1 ml injection. If little resistance is felt when injecting, the needle is too deep – stop injecting, withdraw and recommence at the correct depth. Administration of BCG vaccine too deeply can result in ineffective protection and possible abscess formation at the injection site.

Diagram 3. Site and technique for BCG immunization



(For further information on skin testing and screening of high-risk groups such as contacts with tuberculosis and new immigrants, see Module 5).

Now carry out Learning Activity 4.

The disease control era of EPI

Since the 1980s, the focus of the EPI has changed. While the implementation of immunization programmes in all countries remains a key goal, the actual control or elimination of major childhood diseases is now the focus.

The challenges include: the global eradication of poliomyelitis, the elimination of neonatal tetanus, and a reduction in cases of and deaths from measles.

REVISION POINT 3

List the 6 targeted diseases of the EPI. What type of vaccine is used to prevent each?

(See pages 45–46 for help.)

The global eradication of polio

An estimated 2 billion children have now been immunized through polio eradication initiatives. National immunization days have been carried out in 82 countries, and over 140 countries now conduct surveillance for cases of acute flaccid paralysis in children.

All countries involved in polio eradication have undertaken mass campaigns using OPV, followed by “mopping-up” activities, such as house-to-house visits, in areas where cases persist. The incidence of polio has followed a downward trend, and an increasing number of areas in the world are becoming free of the disease. Whilst success is in sight, zones and countries where there is armed conflict remain difficult to implement effective immunization programmes.

The elimination of neonatal tetanus

Since the early 1980s major progress has been made towards the elimination of neonatal tetanus. In 1989, the World Health Assembly declared its commitment to the global elimination of neonatal tetanus by 1995. In 1994 it was estimated that around 733 000 deaths due to neonatal tetanus were prevented and 48% of pregnant women were immunized with at least two doses of tetanus toxoid. The EPI has promoted the administration of the tetanus vaccine to either pregnant women or all women of childbearing age. Five doses of vaccine given to a mother provides full, life long protection, but even two doses given in pregnancy provide good protection to newborn infants against neonatal tetanus. Unfortunately immunization coverage has remained unacceptably low in many countries.

WHO and UNICEF have established a new goal to eliminate maternal and neonatal tetanus as a

public health problem by 2005. A key component of this strategy is the routine immunization of all women in antenatal clinics.

Clean delivery practices (a complementary strategy) have improved in recent years although most babies in developing countries are still born at home without the assistance of a trained attendant. The reduction in neonatal tetanus deaths is the result of impressive progress in certain high-risk countries.

A reduction in cases of and deaths from measles

In 1998 it was estimated that the global coverage of the measles vaccine had reached 75%, and the number of reported cases fell from 4 billion (4 thousand million) in 1980 to fewer than 1 billion in 1998 and is now 900 000 deaths per year. The global strategic plan aims at reducing mortality by 50% by 2005.

For many countries where the measles vaccine was not introduced until 1985, however, the disease reduction goals will be hard to reach. Since then, although the global numbers of reported measles cases have fallen, high transmission rates are still found in densely populated areas. This means that uniform measles vaccine coverage is necessary, especially when the one dose schedule is used. Mass campaigns in the Americas have resulted in the virtual disappearance of measles from the continents. The global strategy aims at providing 2 measles immunizations for every child.

Accelerated introduction of new vaccines

One of the current priority areas of work for the immunization programme is to introduce new vaccines into the world's poorest countries with a special emphasis on introducing Hepatitis B vaccine. Most industrialized countries, and many

countries in South America, the Middle East, Southeast Asia and the Pacific Islands, have included hepatitis B vaccine in their routine immunization programmes. Routine programmes are still needed in sub-Saharan Africa, the Indian subcontinent and the Newly Independent States.

Resources on the World Wide Web

www.who.int

www.who.int/vaccines

www.who.int/vaccines-surveillance/intro.html

- Immunization is one of the safest and cost effective interventions known.
- Health care professionals responsible for immunization should understand the basic principles involved and know how to provide safe and effective immunization.
- Opportunities for immunization should not be missed because of false contraindications.
- The EPI targets six main diseases. The EPI has had a positive effect in increasing immunization coverage globally, but problems still persist in some countries.
- The EPI aims to control disease and eliminate major childhood diseases.
- While all countries share the same aims for the control, elimination, or eradication of the six main vaccine preventable diseases, regional variations exist in strategies set up to achieve these aims.

The immunization centre safe vaccine storage protocol

Aims and objectives

1. All vaccines delivered to the Immunization Centre are accepted in the knowledge that they have been transported safely.
2. All vaccines accepted are stored within the recommended manufacturer guidelines (usually between 2–8° C).
3. All equipment used for vaccine storage should be of an acceptable standard and regularly maintained.

Procedures for vaccine administration should maintain the cold chain at all times thus offering maximum efficacy.

Staff involved

All staff at the immunization centre should be aware of the importance of the safe storage of vaccines and the maintenance of the cold chain. One person is designated to be the overall responsible person for this and in her/his absence the deputy is responsible.

Name of designated vaccine coordinator:

Name of deputy vaccine coordinator:

Reference sources

1. National guidelines on immunization procedures.
2. Medical information departments of vaccine manufacturers.
3. Local community pharmacist.

Responsibilities of the vaccine coordinator

1. Vaccine delivery:

- Ensure that the delivery has taken no more than 48 hours
- Place the vaccines in the refrigerator immediately
- Ensure the delivery contents are correct

2. Vaccine storage:

- Ensure the vaccine storage refrigerator is used for storage of vaccines only
- Ensure the refrigerator is maintained regularly
- The refrigerator should ideally be a self defrosting model
- The maximum/minimum thermometer should be placed in the centre of the middle shelf so that it can measure the core temperature
- The thermometer should be read and recorded daily
- The temperature should usually be maintained between 2–8° C.
- In the event of adverse temperatures or refrigerator power failure contact the community pharmacist or individual vaccine manufacturer.

3. Vaccine stocks:

- The refrigerator should be stocked so that air can easily circulate internally, care should be taken to prevent over stocking
- Ensure that sufficient stock is available to meet the demand
- Vaccines should not be stored in the refrigerator door

Staff Training

All staff should be aware of the importance of maintaining the cold chain. The vaccine coordinator should ensure that all staff have access to information on the safe and effective storage of vaccines.

Review

This protocol should be reviewed annually.

Next date for review:

Signatures:

MODULE 3

Infections spread by food and water

Stated learning outcomes

Glossary of terms

Diarrhoeal disease

Aetiology

Assessing the patient with diarrhoea

Using the diarrhoea management chart

Assessing the child for other problems

Consequences of watery diarrhoea

Rehydration therapy

Use of antimicrobials

Prevention of spread

Typhoid

Paratyphoid fever

Poliomyelitis

Hepatitis A

Hepatitis E

Summary of key points

Bibliography

MODULE 3

The OBJECTIVE of this module is to increase the nurse's and midwife's knowledge of the infectious diseases that are spread by faecal-oral transmission and are prevalent in the Eastern European region: infectious diarrhoeal disease, typhoid and paratyphoid fever, poliomyelitis, and hepatitis A and E. Diarrhoea is the most common and the resultant dehydration is responsible for serious morbidity and mortality. Increased knowledge and awareness will lead to:

- greater awareness of prevention measures;
- early recognition of clinical signs and symptoms;
- prompt and effective intervention, treatment and nursing care, and
- improved public health measures.

STATED LEARNING OUTCOMES

On completion of this module you should have an understanding of:

- the role of prevention of faecal–oral transmission;
- the importance of food and water hygiene;
- the importance of personal hygiene, particularly hand washing;
- the importance of properly preventing, treating, and managing dehydration; and
- the importance of the role of public health education.

KEY WORDS

Diarrhoea; dehydration; rehydration; faecal-oral transmission; malnutrition.

GLOSSARY OF TERMS

AETIOLOGY: the study of the causes of diseases

COMMUNICABILITY: the period of time that a disease can be transmitted from an infected person to another person

CONTAMINATION: to make impure, especially by touching or mixing

CYST: a thick-walled protective membrane enclosing a cell, larva or organism

DIARRHOEA: frequent and copious discharge of abnormally liquid faeces

DEHYDRATE: to lose or deprive (the body or tissues) of water

DYSENTERY: infection of the intestine with bacteria or amoebae, marked chiefly by severe diarrhoea with the passage of mucus and blood

ENTERIC: intestinal

IMMUNODEFICIENCY: a deficiency in, or a breakdown of, a person's immune system

IMMUNOSUPPRESSION: medical suppression of the body's immune system

KWASHIORKOR: severe malnutrition of infants and young children, especially soon after weaning, resulting from a diet deficient in protein

MALNUTRITION: lack of adequate nutrition resulting from insufficient food or unbalanced diet

MARASMUS: general emaciation and wasting, especially of infants, thought to be associated with severe malnutrition or impaired utilization of nutrients

MORBIDITY: relating to illness or disease

MORTALITY: death

PROTOZOA: minute invertebrate (including flagellates, sporozoans and amoebas)

SUSCEPTIBILITY: lack of ability to resist some extraneous agent (as a pathogen or drug)

TENESMUS: straining at stool

UNDERNUTRITION: deprivation or failure to provide nutrients essential for health and growth

Diarrhoea

Annually, up to 1500 million episodes of diarrhoea occur worldwide in children aged five years and under, and an estimated 4 million children die each year from it. About 80% of deaths occur in the first two years of life. Dehydration is the main cause of death from acute diarrhoea although other important causes are septic shock, peritonitis and malnutrition. The patient with diarrhoea not only eats less, but also has an inability to absorb nutrients at a time when nutrients are more in demand as a result of the infection. When diarrhoeal attacks are repeated and prolonged, natural growth of a child is affected. Diarrhoea is also an economic burden on developing countries; working days are lost and expensive hospitalization for treatment may be required.

Definition

Diarrhoea is a clinical syndrome in which there is frequent passage of unusually loose or watery bowel movements, usually three or more in a 24 hour period, sometimes accompanied by vomiting and fever, abdominal pain or cramps, faecal urgency, tenesmus, or the passage of bloody or mucoid stools.

Mode of transmission

Infectious diarrhoea is spread by the faecal-oral route. The most common sources are contaminated food and water, person-to-person contact and direct contact with infected faeces. Enteropathogens survive in ice and untreated swimming pools. Protozoan parasites can survive as cysts even in water that seems adequately chlorinated. Seawater, heavily contaminated with sewage and faecal microorganisms is another source.

Factors that increase the risk of diarrhoea include:

- Failing to breastfeed exclusively for the first 6

months of life: the risk of developing severe diarrhoea is many times greater in non-breast-fed infants than in breast-fed infants; the risk of death from diarrhoea is also substantially greater.

- Failing to continue breastfeeding until at least one year of age: prolonged breastfeeding reduces the incidence or severity of certain types of diseases causing diarrhoea, such as shigellosis and cholera.
- Using infant feeding bottles: these easily become contaminated with faecal bacteria and are difficult to clean.



Breastfeeding. Credit: WHO/INF.

When milk is added to an unclean bottle it becomes contaminated and if it is not consumed immediately, further bacterial growth occurs.

- Allowing an infant or child to crawl, or play in an area where human or animal faeces are present.
- Storing cooked food at room temperature: when food is cooked and then saved to be used later, it may easily be contaminated, for example, by contact with contaminated surfaces or containers. If food is kept for several hours at room temperature, bacteria in it can multiply many times.
- Drinking water that is contaminated with faecal bacteria: water may be contaminated at its source or during storage in the home.
- Contamination in the home may occur when a storage container is not covered, or when a contaminated hand comes into contact with water while collecting it from a container.
- Failing to wash hands before handling food, after defecation, or after handling faeces.
- Failing to dispose of faeces (including infant faeces) hygienically. It is often believed that infant faeces are harmless, whereas they may actually

contain large numbers of infectious viruses or bacteria such as rotaviruses or enterotoxigenic *E. coli*.


- Animal faeces can transmit enteric infections such as salmonella to humans.

Host factors also increase susceptibility to diarrhoea and are associated with increased incidence, severity or duration of diarrhoea.

- Under nutrition: the frequency, severity, duration and risk of death from diarrhoea are increased in undernourished children, especially those with severe under nutrition.

- Current or recent measles: diarrhoea and dysentery are more frequent or severe in children with measles or in children who have had measles in the four weeks prior to infection. This presumably results from immunological impairment caused by measles.

- Immunodeficiency or immunosuppression: this may be a temporary effect of certain viral infections (for example, measles), or it may be prolonged, as in persons with the acquired immunodeficiency syndrome (AIDS). When immunosuppression is severe, diarrhoea can be caused by unusual pathogens and may also be prolonged.



REVISION POINT 1
Define diarrhoea.
(See page 56 for help.)

Aetiology

Diarrhoea can result from viral, bacterial or parasitic infections. Until a few years ago, pathogenic organisms could be identified in the faeces of only about 25% of patients with acute diarrhoea. Today, using new techniques, experienced laboratories can identify pathogens in about 75% of cases seen at a treatment facility and up to 50% of milder cases detected in the community.

Important pathogens

Several of these pathogens are important causes of acute diarrhoea in all developing countries:

- Rotavirus
- Enterotoxigenic *Escherichia coli*
- *Shigella*
- *Campylobacter jejuni*
- *Cryptosporidium*

Rotavirus

Rotavirus is the most common cause of severe, life-threatening diarrhoea in children under 2 years of age worldwide. There are four serotypes of human rotavirus; infection with one serotype causes a high level of immunity to that serotype, and partial protection against the other serotypes. Nearly all children are infected at least once before the age of 2 years, and repeat infections are common. For the most part, only the first rotavirus infection causes significant illness. About one-third of children under 2 years of age experience an episode of rotavirus diarrhoea. Rotavirus is usually spread from person to person and possibly also through respiratory secretions as well as faeces.

Enterotoxigenic *E. coli* (ETEC)

ETEC is an important cause of acute watery diarrhoea in adults and children in developing countries. ETEC does not invade the bowel mucosa and the diarrhoea it causes is toxin-mediated; there are two ETEC toxins – heat-labile (LT) and heat-stable (ST). Some strains produce only one type of toxin, some both. The LT toxin is closely related to the cholera toxin. ETEC is usually spread via contaminated food and water.

Shigella

Shigella is the most common cause of dysentery, present in about 60% of all episodes, and in nearly all severe episodes; watery diarrhoea may also occur.

There are four serogroups: *S. sonnei*, *S. boydii*, *S. flexneri* and *S. dysenteriae*. *S. flexneri* is the most common serogroup in developing countries, but *S. dysenteriae* type 1, which occurs in regional epidemics, causes the most severe disease. Tissue destruction and possibly watery diarrhoea are caused in part by the extremely potent Shiga toxin, produced in relatively large amounts by *S. dysenteriae* Type 1. *Shigella* is spread mostly by person-to-person transmission.

Camphylobacter jejuni

In developing countries, *C. jejuni* causes disease mostly in infants. *C. jejuni* also infects animals, especially chickens and dogs, and is spread by contact with their faeces or consumption of contaminated food, milk, or water. *C. jejuni* can cause both watery diarrhoea (two-thirds of cases) or dysentery (one third of cases). Fever may be present. Disease is not usually severe and lasts 2–5 days.

Cryptosporidium

This is a coccidian parasite that causes disease in infants, immunodeficient patients and a variety of domestic animals. In developing countries infection is frequent and most episodes of illness occur in the first year of life. Thereafter, infections are usually asymptomatic. Diarrhoea is usually neither severe nor prolonged, except in immunodeficient patients, such as those with severe malnutrition or AIDS. In such individuals, *Cryptosporidium* is an important cause of persistent diarrhoea with wasting.

Now carry out Learning Activity 1.

Others pathogens that may be of local importance include:

- *Vibrio cholerae* 01 in endemic areas and during epidemics;

- Non-typhoid *Salmonella* in areas where commercially processed foods are widely used;
- Enteropathogenic *Escherichia coli* (in infants in hospitals).

Mixed infections involving two or more enteropathogens occur in 5–20% of cases seen at health facilities.

Vibrio cholerae 01

V. cholerae 01 has two biotypes (classical and El Tor) and two serotypes (Ogawa and Inaba). *V. cholerae* 01 is non-invasive, diarrhoea being mediated by a cholera toxin which causes a profuse secretion of water and electrolytes in the small bowel. Diarrhoea may be severe, leading to dehydration and collapse within a few hours if the lost fluids and salts are not replaced. In endemic areas cholera occurs mostly in children, adults have substantial immunity from previous infections. In non-endemic areas, epidemics cause disease with equal frequency in adults and children.

Salmonella

Most *Salmonella* infections can be traced to infected animals or contaminated animal products. *Salmonellae* are an unusual cause of diarrhoea in most developing countries, but may be important in communities where commercially processed foods are widely used. Diarrhoea is usually watery, but dysentery may occur. Antibiotics are not effective, and may cause delayed clearance of *Salmonellae* from the intestinal tract.

Other pathogens

A number of other pathogens can cause diarrhoea in young children although their importance is not well defined. They include:

- Viruses: Norwalk agent, enteric adenoviruses
- Bacteria: *Aeromonas hydrophila*, enteroadherent *Escherichia coli*, enteroinvasive *Escherichia coli*,

enterohaemorrhagic *Escherichia coli*, *Plesiomonas shigelloides*, *Vibrio cholerae* non-O group 1, *Vibrio parahaemolyticus*, *Yersinia enterocolitica*

• Protozoa: *Giardia lamblia*, *Entamoeba histolytica*, *Isospora belli*.

Enteric pathogens can also be found in about 30% of healthy children under 3 years of age, making it difficult to know whether a pathogen isolated from a child is actually the cause of that child's illness. This is especially true for *Giardia lamblia*, cysts of which are found nearly as often in healthy children as in those with diarrhoea; it is also true for enteropathogenic *E. coli* or *C. jejuni* isolated from children older than 1 year. On the other hand, *Shigella* and rotavirus are rarely identified in healthy children; their presence in a child with diarrhoea strongly indicates that they are the cause of the illness.

REVISION POINT 2

List 10 factors that increase the risk of diarrhoea, and 3 host factors that increase susceptibility to diarrhoea. (See pages 56–57 for help.)

Epidemiological summary

There is a highly significant geographical variation in prevalence of diarrhoeal infection throughout the world, but it is especially common in North Africa, sub-Saharan Africa, the Indian Subcontinent, Southeast Asia, South America, Mexico and the Middle East. Intermediate areas include the southern European countries (eastern and western) and the Caribbean islands. Low risk areas include North America, northern Europe and Australia.

Distinct seasonal patterns of diarrhoea occur in many geographical areas. In temperate climates, bacterial diarrhoeas tend to occur more frequently

during the warm season, whereas viral diarrhoeas, particularly disease caused by rotavirus, peak during the winter. In tropical areas, rotavirus diarrhoea tends to occur throughout the year, increasing in frequency during the drier, cool months, whereas bacterial diarrhoeas tend to peak during the warmer, rainy season. The incidence of persistent diarrhoea follows the same seasonal pattern as that of acute watery diarrhoea.

Most enteric infections are asymptomatic, especially in those over 2 years of age owing to the development of active immunity. Asymptomatic infections may last for several days or weeks, during which time stools contain infectious viruses, bacteria, or protozoal cysts. Persons with asymptomatic infections play an important role in the spread of many enteric pathogens, especially as they are unaware of their infection and therefore take no special hygiene precautions.

Two enteric pathogens, *Vibrio cholerae* 01 and *Shigella dysenteriae* type 1, cause major epidemics, and may result in high morbidity and mortality rates in all age groups. Since 1961, cholera caused by the El Tor biotype of *V. cholerae* 01 has spread to countries in Asia, the Eastern Mediterranean, and Africa, and to some areas in Europe and North America. During that same period, *S. dysenteriae* Type 1 has been responsible for large epidemics of severe dysentery in Central America, and more recently in Central Africa and Southern Asia.

Now carry out Learning Activity 2.

Manifestations

There are three types of diarrhoea:

- acute watery diarrhoea;
- dysentery; and
- persistent diarrhoea.

Acute watery diarrhoea

- Starts acutely
- Lasts < 14 days and in most cases < 7 days
- Stools passed are frequent, loose or watery without visible blood
- The patient may vomit and have a fever
- Acute watery diarrhoea causes dehydration
- When food intake is reduced it contributes to undernutrition
- When death occurs it is usually due to acute dehydration
- Most important causes of acute watery diarrhoea in young children in developing countries are: rotavirus, enterotoxigenic *Escherichia coli*, *Shigella*, *C. jejuni* and *cryptosporidium*
- In some areas *Vibrio cholerae* 01, salmonella and enteropathogenic *E. coli* are also important causes

Dysentery

- Diarrhoea with visible blood in the faeces
- Can cause anorexia and rapid weight loss, and the invasive bacteria can cause damage to the intestinal mucosa
- Other complications may occur, for example, haemolytic uraemic syndrome, which may cause renal failure
- The most important cause of acute dysentery is *Shigella*; other causes are *C. jejuni*, and infrequently enteroinvasive *E. coli* or *Salmonella*; *Entamoeba histolytica* can cause serious dysentery in young adults, but rarely in young children.

Persistent diarrhoea

- Begins acutely, but is of an unusually long duration (at least 14 days).
- May begin either as watery diarrhoea or as dysentery.
- Marked weight loss is frequent.
- Diarrhoeal stool volume may also be great, with a risk of dehydration.

- There is no single microbial cause for persistent diarrhoea.
- Enteroadherent *E. coli*, *cryptosporidium*, and giardiasis sometimes play a greater role than other agents.
- Persistent diarrhoea should not be confused with chronic diarrhoea, which refers to recurrent or long-lasting diarrhoea due to noninfectious causes, such as sensitivity to gluten or inherited metabolic disorders.

Age groups affected

Most diarrhoeal episodes occur during the first two years of life. Incidence is highest at ages 6–11 months, a time period often associated with weaning. This pattern reflects the combined effects of declining levels of maternally acquired antibodies, the lack of active immunity in the infant, the introduction of food that may be contaminated with faecal bacteria, and direct contact with human or animal faeces when the infant starts to crawl. Most enteric pathogens stimulate at least partial immunity against repeated infection or illness, which helps to explain the declining incidence of disease in older children and adults. However, some elderly adults may become increasingly susceptible with advancing years if they become physically frail.

Diagnosis

The diagnosis of infective diarrhoea is dependent upon the identification of the causative pathogen from the faeces by culture, antigen detection or by light microscopy (in the case of parasites). For viruses, antigen detection, culture and microscopy are most often used. Bacterial bowel pathogens are closely related and the only reliable diagnosis is made by culture and identification of the individual pathogens. However, routine determination of the aetiology of diarrhoea in a

laboratory is not practical, and the clinical aspects of an illness do not usually permit a specific aetiological diagnosis, although clinical features can act as a rough guide. The treatment of diarrhoea must therefore be based on the major features of the disease and an understanding of the underlying pathogenetic mechanisms, as described earlier.



REVISION POINT 3

Name 6 pathogens that can cause diarrhoea.
(See pages 57–59 for help.)

Now carry out Learning Activity 3.

Diarrhoea is potentially dangerous in children and every child should be carefully assessed. In most cases the information gained by spending a few minutes asking for details of the illness, and observing and examining the child for specific signs (dehydration or undernutrition) is sufficient to make a diagnosis and develop a treatment plan.

The objectives of the clinical assessment are to:

- detect dehydration and its severity;
- diagnose dysentery;
- diagnose persistent diarrhoea;
- evaluate feeding practices and determine the child's nutritional status (emphasis is placed on the detection of severe undernutrition);
- diagnose concurrent illness; and,
- determine the child's immunization history, especially for measles.

The clinical assessment should lead directly to:

- a plan for treating or preventing dehydration;
- a plan for treating dysentery;
- a plan for treating persistent diarrhoea;
- recommendations for feeding during and after diarrhoea;
- a plan for managing any concurrent illness;
- recommendations regarding measles immunization; and
- a plan for follow-up.



REVISION POINT 4

What are the 3 types of diarrhoea?
(See pages 59–60 for help.)

Using the diarrhoea management chart

The WHO diarrhoea management chart (Appendix 1) is a useful tool and can be used for all children who are seen at a treatment facility with a complaint of loose or watery stools with or without blood.

The top part of the chart shows how to assess patients for dehydration and how to assess and manage other important problems. The clinical features described in these figures are the features that are most important and can be most reliably assessed by health workers at all levels.

Assessing the child for dehydration

Children should first be evaluated for dehydration and then for other problems associated with diarrhoea. Usually, both steps are completed before treatment is given. However, when a child is severely dehydrated, taking a complete history and doing a thorough examination must be deferred so that treatment can be started without delay. A stuporous child, with severe dehydration requires an intravenous drip immediately.

The detection of dehydration is based entirely on clinical signs. Nevertheless, the history can help to identify children with diarrhoea who are at increased risk of becoming dehydrated, for example, those children who are vomiting, have a fever, or have passed six or more diarrhoeal stools in the past 24 hours. The risk is also greater when fluids or water have been restricted or could not be given because of vomiting. The risk may be less when breast milk, oral rehydration solution (ORS), recommended home fluids, or water have been given liberally during the illness.

Severity of dehydration

The diarrhoeal management chart is useful in determining the severity of dehydration (see Appendix 1). During the examination of the patient, a circle is placed around the descriptive term in column A, B, or C that best describes the patient. Signs that are most valuable in assessing dehydration, termed key signs, are marked with asterisks (*) and shown in bold. Two or more circled signs in one column, including at least one key sign, means that the patient falls in that category and requires the corresponding treatment plan. If signs are noted in more than one column, as often occurs, the category of dehydration is the one farthest to the right (among columns A, B, and C) in which two items, including at least one key sign, are circled.

Column C: Severe dehydration

Look first at column C. If two or more signs are circled in that column, including at least one key sign, the patient has severe dehydration.

Children with severe dehydration have a fluid deficit equalling more than 10% of their body weight. They are usually lethargic, stuporous or even comatose. The eyes are deeply sunken and without tears; the mouth and tongue are very dry, and breathing is rapid and deep. Children who are awake are very thirsty; however, when there is stupor, the patient may drink poorly. Children who are unconscious are unable to drink. A skin pinch retracts very slowly (more than 2 seconds). The femoral pulse is very rapid and the radial pulse is either very rapid and feeble or undetectable. The fontanelle in infants is very sunken. The child may have passed no urine for six hours, or longer. When

there is hypovolaemic shock, the systolic blood pressure taken in the arm is low or undetectable, the arms and legs are cool and moist, and the nail beds may be cyanosed.

Severe dehydration requires urgent treatment, usually with IV fluids, following Treatment Plan C.

Column B: Some dehydration

If severe dehydration is not present, look next at column B. If two or more signs listed in that column are circled, including at least one key sign, the child has some dehydration. Note that patients may have signs in both columns B and C. If the signs in column C are not sufficient to diagnose severe dehydration, they should be counted as belonging to column B.

Children with some dehydration have a fluid deficit equalling 5–10% of their body weight. This category includes both mild and moderate dehydration, which are descriptive terms used in many textbooks:

- Mild dehydration (5–6% loss of body weight) is manifested mostly by increased thirst and restlessness. Skin turgor may be slightly decreased. Other signs associated with dehydration are not usually present.
- Moderate dehydration (7–10% loss of body weight) causes children to be restless, “fussy”, or irritable. The eyes are somewhat sunken and the mouth and tongue are dry. There is increased thirst: older patients ask for water and young children drink eagerly when offered fluid from a cup or spoon. A skin pinch flattens slowly. The radial pulse is detectable, but rapid, and the fontanelle in infants is somewhat sunken. Children with some dehydration should be treated with ORS solution given by mouth, following treatment plan B.

Column A: No signs of dehydration

If neither severe dehydration nor some dehydration is present, the child has no signs of dehydration. Children with diarrhoea but no signs of dehydration usually have a fluid deficit, but it equals less than 5% of their weight. Although they lack distinct signs of dehydration, they should be given more fluid than usual to prevent signs of dehydration from developing. Children with no signs of dehydration can be treated at home, following treatment plan A.

Now carry out Learning Activity 4.

Weigh the child

Children who are found to have some dehydration or severe dehydration should be weighed, if an accurate scale is available; children should be weighed unclothed.

Weight is important for determining the amount of oral or intravenous fluid to be given in treatment plans B and C. If no scale is available, weight should be estimated on the basis of the child’s age or length, and treatment should be given without delay.

The weight taken when a child is dehydrated should not be recorded on a growth chart, as it will be lower than normal owing to dehydration. Instead, the child should be weighed again after rehydration has been completed and that weight should be recorded on the chart. If possible, children with no signs of dehydration should also be weighed and the results recorded on a growth chart. The assessment of hydration status is difficult in children with severe undernutrition because many of the signs described above are altered by the state of undernutrition. This is especially true for signs

related to the child's general condition or behaviour such as sunken eyes, absence of tears and diminished skin turgor.

REVISION POINT 5

What are the 6 main objectives in the clinical assessment of a patient with diarrhoea?
(See page 61 for help.)

Using a patient record form

Information on the history, examination, and treatment of each patient should be summarized on a "Patient Record Form". Modified versions of this form may be used, but they should include at least:

- a brief history of the diarrhoeal episode, including its duration and whether blood was seen in the faeces;
- the child's pre-illness feeding pattern;
- the child's immunization history, especially as regards measles;
- important findings during examination of the child, especially signs of dehydration or undernutrition, and the child's weight;
- a summary of fluid intake and output, and clinical findings following rehydration therapy at the health facility;
- a description of food given at the health facility;
- a description of any medicines given at the health facility; and
- recommendations for treatment, feeding, and follow-up after the child leaves the health facility.

When the form is completed it provides a valuable record of the child's progress during treatment. It also helps remind the healthcare worker of all of the steps that should be taken during evaluation and management. Completed forms should be kept at the health facility and reviewed regularly to identify areas where management practices could be improved.

After the child has been evaluated for dehydration, other problems – such as dysentery, persistent diarrhoea, and under nutrition – should be considered.

Dysentery

The healthcare worker should ask whether the diarrhoea stools have contained any blood. If possible, a fresh stool specimen should also be observed for visible blood. If bloody diarrhoea is present, the patient should be considered to have dysentery. If dehydration is present it should also be treated immediately.

Persistent diarrhoea

The healthcare worker should ask when the present diarrhoea began. Episodes that have lasted at least 14 days are considered to be cases of persistent diarrhoea. Persistent diarrhoea patients with bloody stool or a stool culture positive for *Shigella* should receive antibiotics. If stool culture yields another bacterial pathogen, for example, enteropathogenic *E. coli*, an oral antibiotic to which that agent is sensitive should be given. If *Giardia* cysts, or trophozoites of either *Giardia* or *E. histolytica* are seen in the faeces, a course of appropriate antiprotozoal therapy should be given.

However, "blind" therapy with antibiotics or antiprotozoal agents should only be used with caution. Similarly, no "antidiarrhoeal" drug (including antimotility drugs, antisecretory drugs, and adsorbents) has any proven value in patients with persistent diarrhoea, therefore such drugs should not be given.

Sometimes it is difficult to determine whether a child has persistent diarrhoea or is having sequential episodes of acute diarrhoea. Patients with persistent

diarrhoea usually have loose stools every day, although the number per day may vary considerably. Sometimes, however, the child may have normal stools for one or two days after which diarrhoea resumes. If the period of normal (formed) stools does not exceed two days, the illness should be considered a single diarrhoeal episode. However, if the period of normal stools is longer than two days, any subsequent diarrhoea should be considered to be a new episode.

Now carry out Learning Activity 5.

Undernutrition

Children who die from diarrhoea, despite good management, are usually malnourished and often severely so. During diarrhoea, decreased food intake, decreased nutrient absorption, and increased nutrient requirements often combine to cause weight loss and failure to grow. The child's nutritional status declines and any preexisting malnutrition is made worse. In turn, malnutrition contributes to diarrhoea, which is more severe, prolonged, and possibly more frequent. This vicious circle can be broken by:

- continuing to give nutrient rich foods during diarrhoea; and
- providing a nutritious diet, appropriate for the child's age, when the child is well.

When these steps are followed, malnutrition can be either prevented or corrected and the risk of death from a future episode of diarrhoea is much reduced.

A brief nutritional assessment should be carried out for each child with diarrhoea to identify nutritional problems and to obtain the information needed to make dietary recommendations. This assessment should include the recent feeding

history and an examination to determine whether the child is adequately nourished or undernourished. Additionally, in areas where vitamin A deficiency is a public health problem, evidence of such deficiency should be sought and treated.

Feeding history

The feeding history should consider both the child's usual (pre-illness) diet and the feeding pattern during the current episode of diarrhoea. The following points should be considered:

Pre-illness feeding

Breastfeeding:

Is the child breastfeeding?

How frequently is breast-milk given?

If less than 6 months of age, are any other liquids or food given?

If no longer breastfeeding, when was breast-feeding stopped?

Animal milk or infant formula

When was animal milk or formula started?

What type of milk is used and how is it prepared?

For powdered milk or formula: is boiled water used? Is the formula correctly diluted?

Is the milk given in a feeding bottle, or by cup and spoon?

How much milk is given and how often?

Weaning foods (for children aged 6 months or older):

At what age were soft foods started?

What foods are given and how are they prepared?

Are food mixtures used? Do these contain vegetables, pulses, oil, fruit, eggs, or meat?

Are the foods liquid, soft, or solid?

How much food is given and how frequently?

Is the child given food from the family pot?

Feeding during diarrhoea

Breastfeeding:

Is breast-milk given more often, as usual, or less often?

Does the child breastfeed well?

Animal milk or infant formula

Has this been continued?

Has the amount given or the method of preparation changed, e.g., has the milk or formula been diluted?

Other fluids

Has the child been given water, tea, juice, or other drinks?

How much has been given and how often?

Weaning foods

Have these been continued?

How frequently has food been offered?

What types of food (and how much food) has the child accepted?

Mother's beliefs about feeding during diarrhoea:

What does the mother believe about giving breast milk, animal milk, formula, or other fluids or foods during diarrhoea?

Which fluids or foods does she consider acceptable or unacceptable during diarrhoea?

Physical findings

First, determine whether there is obvious severe protein-calorie undernutrition. This may have the features of marasmus, kwashiorkor, or both.

Signs of marasmus

- “Old man’s face”
- Extreme thinness, “skin and bones” appearance

- Very thin extremities, distended abdomen
- Absence of subcutaneous fat; the skin is very thin
- Fretful, irritable behaviour

Signs of kwashiorkor

- Essential features – oedema; miserable, apathetic, listless behaviour, thin hair with reddish discolouration
- Possible features – flaking, dry skin, enlarged liver

Next, determine whether there is a less serious degree of undernutrition. This may not be possible in all settings, but should be done where conditions permit. The following examinations may be performed:

Weight-for-age: this is the simplest measure of nutritional status; however, it does not distinguish between past nutritional damage (i.e., stunting, which does not respond to increased feeding) and recent weight loss (i.e., wasting, for which increased feeding is important). Weight-for-age is most valuable when recorded on a growth chart and used to monitor growth over time; a series of points over several months shows whether or not the growth pattern is satisfactory (see Appendix 2). Young children whose weight-for-age is below 70% of the standard, or whose weight is not increasing or is decreasing over time, should receive special nutritional advice and careful follow-up.

Mid-upper arm circumference: this test involves measurement of the upper arm circumference using a standard tape. It is simple to perform (a weighing scale is not required) and valuable as a screening test for undernutrition. However, it is not useful for monitoring growth over time.

Weight-for-height/length: a low height-for-age identifies children with stunting, but does not reveal whether their nutritional damage occurred recently or much earlier; this distinction is important because only those with recent undernutrition will benefit from nutritional therapy. A low weight-for-height ratio is valuable because it detects children with recent weight loss (wasting); however, two accurate measurements are required (i.e., weight and height/length). Unfortunately, height and length are more difficult to measure accurately than weight.

Each of the above measurements should be interpreted using standard charts or tables. These may be either national or international standards. If the latter are used, national guidelines must be followed for their interpretation in the local setting.

Now carry out Learning Activity 6.

Vitamin A deficiency

Night blindness: ask the mother if her child is able to see normally at night. Children with night blindness do not move about normally in the dark and may be unable to find their food or toys. Night blindness is difficult to recognize in children who are not yet old enough to walk.

Bitot's spots: these are dry, grey-white, foamy-appearing areas, triangular in shape, and are located in the temporal part of the scleral conjunctivae. Usually both eyes are affected.

Corneal xerosis and ulceration: these are areas of the cornea that are roughened or ulcerated.

Children who have night blindness, Bitot's spots or corneal xerosis/ulceration should be treated

immediately with therapeutic doses of vitamin A.

Fever

The mother should be asked whether her child has had fever during the past five days. The temperature should also be measured (if possible, rectally). If rectal thermometers are available and can be disinfected after use, they are preferred. Otherwise, the temperature should be measured in the axilla (armpit). Any child with a history of recent fever or with a temperature of 38° C or greater should be managed as described in Module 5. Such children should also be carefully checked for signs or symptoms of another infection, e.g. pneumonia.

Now carry out Learning Activity 7.

Measles vaccination status

The mother should be asked whether her child has already received the measles vaccine. The child's immunization record should also be consulted if available. Children between 9 months and 2 years of age who have not previously been immunized should receive the measles vaccine. The best time to give the vaccine is during the child's current visit to the treatment facility.

Treatment

The main principles of treatment are as follows:

- Watery diarrhoea requires fluid and electrolyte replacement, irrespective of its aetiology
- Feeding should be continued during all types of diarrhoea to the greatest extent possible, and should be increased during convalescence so as to avoid any adverse effect on nutritional status.
- Antimicrobials and antiparasitic agents should not be used routinely; most episodes, including severe diarrhoea and diarrhoea with fever do not benefit from treatment with antimicrobials or antiparasitic agents.

Exceptions to this are:

- Dysentery, which should be treated with an antibiotic effective for *Shigella*; cases not responding to this treatment should be studied for possible amoebiasis.
- Suspected cases of cholera and/or persistent diarrhoea, when trophozoites or cysts of *Giardia* are seen in faeces or intestinal fluid or pathogenic enteric bacteria are identified by stool culture.

Since the mainstay of diarrhoea treatment involves maintaining an adequate fluid intake to compensate for the fluid and electrolytes lost owing to diarrhoea, it is important to understand the consequences of watery diarrhoea and to comprehend the theoretical value and mechanism of rehydration.



REVISION POINT 6

In a child with diarrhoea, after assessing for dehydration, what other problems should be considered?
(See pages 64–67 for help.)

Diarrhoea stools contain large amounts of sodium chloride, potassium, and bicarbonate. All the acute effects of watery diarrhoea result from the loss of water and electrolytes from the body in liquid stool. Additional amounts of water and electrolytes are lost when there is vomiting and water loss is further increased by fever. These losses cause dehydration (due to the loss of water and sodium chloride), metabolic acidosis (due to the loss of bicarbonate), and potassium depletion. Among these, dehydration is the most dangerous because it can cause decreased blood volume (hypovolaemia), cardiovascular collapse, and death if not treated promptly.

Types of dehydration

Isotonic dehydration

This is the type of dehydration most frequently caused by diarrhoea. It occurs when the net losses of water and sodium are in the same proportion as normally found in the extracellular fluid (ECF).

Principal features include:

- a balanced deficit of water and sodium;
- serum sodium concentration is normal (130–150 mmol/l);
- Serum osmolality is normal, that is, (275–295 mOsmol/l); and
- hypovolaemia occurs as a result of a substantial loss of extracellular fluid.

Manifestations

- Thirst, followed by:
- decreased skin turgor, tachycardia, dry mucous membranes, sunken eyes, lack of tears, a sunken anterior fontanelle in infants, and oliguria.
- Physical signs appear when the fluid deficit approaches 5% of body weight and worsens as the deficit increases.

- As the fluid deficit approaches 10% of body weight, dehydration becomes severe and anuria, hypotension, a feeble and very rapid pulse, cool and moist extremities, diminished consciousness, and signs of shock appear.
- A fluid deficit that exceeds 10% of body weight leads rapidly to death from circulatory collapse.

Hypertonic (hypernatraemic) dehydration

Some children with diarrhoea, especially young infants, develop hypernatraemic dehydration. This reflects a net loss of water in excess of sodium, when compared with the proportion normally found in ECF and blood. It usually results from:

- the ingestion and inefficient absorption, during diarrhoea, of fluids that are hypertonic (owing to their content of sodium, sugar, or other osmotically active solutes, such as lactose in whole cow's milk); and
- an insufficient intake of water or other low-solute drinks.

The hypertonic fluids create an osmotic gradient that causes a flow of water from extracellular fluid (ECF) into the intestine, leading to a decrease in the ECF volume and an increase in sodium concentration within the ECF.

Principal features include:

- a deficit of water and sodium, but the deficit of water is greater;
- serum sodium concentration is elevated (>150 mmol/l); and
- serum osmolality is elevated (>295 mOsmol/l).[?]

Manifestations

- Thirst is severe and out of proportion to the apparent degree of dehydration.
- The child is very irritable.
- Seizures may occur, especially when the serum sodium concentration exceeds 165 mmol/l.

Hypotonic dehydration

Children with diarrhoea who drink large amounts of water or other hypotonic fluids containing very low concentrations of salt and other solutes, or who receive intravenous infusions of 50% glucose in water, may develop hyponatraemia. This occurs because water is absorbed from the gut while the loss of salt (NaCl) continues, causing the net loss of sodium to exceed the net loss of water.

Principal features include:

- a deficit of water and sodium, but the deficit of sodium is greater;
- serum sodium concentration is low (<130 mmol/l); and
- serum osmolality is low (<275 mOsmol/l).

Manifestations

- The child is lethargic; infrequently, there are seizures.

Base-deficit acidosis (metabolic acidosis)

During diarrhoea, a large amount of bicarbonate may be lost in the stool. If the kidneys continue to function normally they replace most of the lost bicarbonate and a serious base deficit does not develop. However, this compensating mechanism fails when the renal function deteriorates, as happens when there is poor renal blood flow due to hypovolaemia. When this occurs, base deficit and acidosis develop rapidly. Acidosis can also result from excessive production of lactic acid when patients have hypovolaemic shock.

Principal features include:

- serum bicarbonate concentration is reduced - it may be less than 10 mmol/l; and
- arterial pH is reduced – it may be less than 7.10.

Manifestations

- Breathing becomes deep and rapid causing a

compensating respiratory alkalosis and raising arterial pH

- Increased vomiting

Potassium depletion

Patients with diarrhoea often develop potassium depletion owing to large faecal losses of this ion. These losses are greatest in infants and can be especially dangerous in malnourished children, who are frequently potassium-deficient before diarrhoea starts. When potassium and bicarbonate are lost together, hypokalaemia does not usually develop. This is because the metabolic acidosis that results from the loss of bicarbonate causes potassium to move from intracellular fluid (ICF) to ECF in exchange for hydrogen ions, thus keeping the serum potassium level in a normal or even elevated range. However, when metabolic acidosis is corrected by giving bicarbonate, this shift is rapidly reversed, and serious hypokalaemia can develop. This can be prevented by replacing potassium whilst simultaneously correcting the base deficit.

Manifestations

- General muscular weakness
- Cardiac arrhythmias
- Paralytic ileus, especially when drugs are taken that also affect peristalsis (such as opiates)



REVISION POINT 7

Define: isotonic dehydration, hypertonic dehydration, hypotonic dehydration, and base-deficit acidosis.
(See pages 68–70 for help.)

Rehydration therapy

Managing diarrhoeal dehydration involves:

- rehydration therapy: the rapid correction of fluid and electrolyte deficits, followed by
- maintenance therapy: continued replacement of fluid and electrolyte losses as they occur until diarrhoea stops.

Fluid losses can be replaced either orally or intravenously; the latter route is usually needed only for initial rehydration of patients with severe dehydration.

Oral rehydration therapy (ORT)

ORT is based on the principle that intestinal absorption of sodium (and thus of other electrolytes and water) is enhanced by the active absorption of certain food molecules such as glucose (which is derived from the breakdown of sucrose or cooked starches) or l-amino acids (which are derived from the breakdown of proteins and peptides). Fortunately, this process continues to function during secretory diarrhoea, whereas most intestinal absorption of sodium is impaired.

Thus, if patients with secretory diarrhoea drink an isotonic salt solution that contains no source of glucose or amino acids, sodium is not absorbed and the fluid remains in the gut, adding to the volume of stool passed by the patient. However, when an isotonic solution of glucose and salt is given, glucose-linked sodium absorption occurs and this is accompanied by the absorption of water and other electrolytes. This process can correct existing deficits of water and electrolytes, and replace further faecal losses in most patients with secretory diarrhoea, irrespective of the cause of diarrhoea or the age of the patient.

Oral rehydration salts (ORS)

The principles underlying ORT have been applied

to the development of a balanced mixture of glucose and electrolytes for use in treating and preventing dehydration, potassium depletion, and base deficit due to diarrhoea. To attain the latter two objectives, salts of potassium and citrate (or bicarbonate) have been included as well as sodium chloride. This mixture of salts and glucose is termed oral rehydration salts (ORS).

When ORS is dissolved in water, the mixture is called ORS solution. The following guidelines were used in developing the WHO/UNICEF-recommended ORS solution:

- The solution should have an osmolarity similar to, or less than that of plasma, i.e. about 300 mOsmol/l or less.
- The concentration of sodium should be sufficient enough to efficiently replace the sodium deficit in children or adults with clinically significant dehydration.
- The ratio of glucose to sodium (in mmol/l) should be at least 1:1 to achieve maximum sodium absorption.
- The concentration of potassium should be about 20 mmol/l in order adequately to replace potassium losses.
- The concentration of base should be 10 mmol/l for citrate or 30 mmol/l for bicarbonate, a satisfactory amount for correcting base-deficit acidosis due to diarrhoea. The use of trisodium citrate dihydrate is preferred, since this gives ORS packets a longer shelf life.



ORS in packet form. Credit: WHO/INF.

Oral rehydration therapy solutions are designed to approximate the composition of gut fluid losses

in diarrhoea. The WHO-recommended composition of oral rehydration solution is:

- 1 litre of clean drinking water (boiled and cooled before mixing if there is any doubt);
- 3.5 g sodium chloride;
- 2.9 g trisodium citrate dihydrate (or 2.5 g sodium bicarbonate);
- 1.5 g potassium chloride; and
- 20 g glucose (or 40 g sucrose).

This is the formulation generally recommended for developing countries. It is possible to buy ORS formulations over the counter in most parts of the world.



ORS. Credit: WHO/INF.

Use of antimicrobials

Antimicrobials should not be used routinely. This is because, except as noted below, it is not possible to clinically distinguish episodes that might respond, such as diarrhoea caused by enterotoxigenic *E. coli*, from those caused by agents unresponsive to antimicrobials, such as rotavirus or cryptosporidium. Selecting an effective antimicrobial requires knowledge of the causative organism and this information may not be available.

Antimicrobial agents are helpful for the treatment of dysenteric shigellosis and amoebiasis. They are also useful in cholera, giardiasis, and in ETEC and *Campylobacter* infections. Their effectiveness in the treatment of nonbacteraemic salmonellosis, yersiniosis, *Aeromonas* and *Plesiomonas* infection, and cryptosporidiosis is considered controversial or at best of unproven benefit.

Antibiotic usage for selected infections

Shigella: Antibiotics to which *Shigellae* are sensitive provide effective treatment, but antibiotic resistance is a common problem. Resistance to multiple antibiotics may occur, especially among *S. dysenteriae* type 1. The most useful antibiotics are co-trimoxazole and nalidixic acid; ampicillin is effective in some areas.

***Campylobacter jejuni*:** Erythromycin or clarythromycin shortens the illness if given soon after the symptoms start. However, erythromycin is often ineffective if therapy is delayed until the diagnosis is confirmed by a laboratory.

***Vibrio cholerae* 01:** Antibiotics can shorten the duration of the illness and thus simplify case management. Tetracycline (or doxycycline) is most widely used, but resistance has been observed in some areas. When resistance occurs, other

antibiotics (furazolidone, co-trimoxazole, erythromycin, or chloramphenicol) are usually effective.

Salmonella: Antibiotics such as aminoquinolones may (unpredictably) shorten the diarrhoeal illness, but may also cause delayed clearance of *Salmonellae* from the intestinal tract.

Prognosis

The prognosis of infective diarrhoea depends upon the infecting organism, the development of complications such as dehydration or septicaemia, the age of the patient and the presence of any underlying disease. For example, children, the elderly and those with AIDS are particularly vulnerable to a severe illness.

Prevention of spread of diarrhoea

This is dependent upon:

- prevention of diarrhoea; and
- interruption of transmission of pathogens.

Although a wide variety of infectious agents cause diarrhoea, they are all transmitted through common pathways such as contaminated water, food, and hands. Measures to interrupt the transmission should focus on the following pathways:

- giving only breast milk for the first 6 months of life;
- avoiding the use of infant feeding bottles;
- improving practices related to the preparation and storage of weaning fluids and feeds;
- washing hands after defecation or handling faeces, and before preparing food or eating;
- minimizing microbial contamination and growth of foods by preventing breaks in the food hygiene chain including: use of human excrement as fertilizer; sale of foods in open-air markets where flies are numerous and food is uncovered; improper personal hygiene of food handlers; improper storage of previously cooked foods.
- using clean water for drinking;
- avoiding bathing in contaminated water with sewerage; and
- safely disposing of faeces, including infant faeces.

Now carry out Learning Activity 8.

Measures that strengthen host defences

A number of risk factors for frequent or severe diarrhoea directly relate to impaired host defences. Measures that can be taken to improve host defences and thus diminish the risk of diarrhoea include:

- immunizing against measles;
- continuing to breastfeed for at least the first year of life; and

- improving nutritional status by improving the nutritional value of weaning foods and giving children more food.

Nursing care

Nursing care of the patient with infective diarrhoea requires:

- assessment and continuous observation of the clinical state;
- supervision and administration of appropriate fluid and food;
- maintenance of a fluid input and output chart;
- maintenance of a stool chart;
- monitoring of temperature, pulse and blood pressure;
- monitoring of weight, daily if the patient is a child;
- encouraging a scrupulous personal hygiene regime; and
- skin care to prevent excoriation.

Prevention of spread within the hospital depends upon:

- isolation of the patient and implementation of transmission based precautions;
- scrupulous handwashing before and after attending to each patient;
- disinfection of soiled articles from infected patients;
- disposal of faeces: where the community has a modern well maintained sewage system, faeces can be disposed of into the sewage system without prior disinfection, but if the sewage system is inadequate, disinfection of faeces from infected patients should be undertaken individually.
- terminal cleaning of isolation rooms following discharge of each patient; and
- controlling access of visitors to the isolation room (see Module 1).



REVISION POINT 8

List 8 measures that can be taken to help prevent diarrhoea. (See page 73 for help.)

Rehabilitation

Although temporary secondary lactose intolerance may delay recovery in any group of patients, those patients who respond to therapy and who had no preceding underlying disease should make a full recovery. Rehabilitation may be more protracted in individuals with serious underlying disorders. Giving a nutritious diet, appropriate for the child's age, when the child is well is important.

Role of primary healthcare team

The primary healthcare team plays the following crucial roles in health education:

- Detection and acute assessment of diarrhoeal cases and supervision of their treatment in the community
- Identification of severe and complicated cases requiring referral to hospital
- Alerting of public health authorities to possible outbreaks of diarrhoeal disease

Role of the hospital

The hospital must undertake the secondary care management of cases, especially those cases where the patient is severely ill and/or severely dehydrated. In addition, the hospital must determine the infecting organism and report it to the relevant public health authority; this is of primary importance in epidemic situations.

Role of the community

The community is responsible for ensuring the maintenance of good standards of food and water hygiene, educating about careful hand washing and other aspects of personal hygiene, and home

management of mild cases of diarrhoea.

Health education/health promotion

Health education involves educating the community about:

- the risk to health from diarrhoea;
- ways in which enteric infections are transmitted;
- how infective diarrhoea can be prevented;
- treatment of diarrhoea, especially the role of oral rehydration solutions; and
- the importance of hand washing, safe disposal of excreta, and food and water hygiene.



REVISION POINT 9

What are the main principles of treatment of diarrhoea? (See page 67 for help.)

Definition

Typhoid fever (also known as enteric fever) is a severe systemic infection caused by the Gram negative bacterium *Salmonella typhi*. Ingestion of a large number of organisms is usually necessary for the disease to occur unless there is achlorhydria. The organisms are absorbed from the gut and transported via the blood stream to the liver and spleen. They are released into the blood after 10 to 14 days. This is when the symptoms begin. The organisms localise in the lymphoid tissue of the small intestine, which can bleed and perforate. This is the main cause of death from typhoid fever.

Mode of transmission

Typhoid fever is spread via the faecal-oral route, usually through contaminated food and water. Organisms only infect humans, so spread comes from infected excreta of a human with typhoid, or from a carrier. Polluted water is the most common source of typhoid, but shellfish gathered from sewage-contaminated beds and raw vegetables fertilized with night soil are high-risk foods. The incubation period is from 10 to 21 days.

Communicability

Most patients who have typhoid will excrete organisms at some stage of their illness. About 10% who have typhoid fever excrete the organisms for approximately three months after the acute stage of the illness and 2 to 5% of untreated patients become long-term carriers. Incidence of becoming a carrier increases with age, especially in females.

Epidemiological summary

The organism responsible for typhoid fever was first isolated in 1880, but epidemics of the disease were believed to be the cause of many deaths as far back as the early 17th century. Typhoid fever affects 17 million people in the world annually, with

approximately 600 000 deaths. Typhoid is predominantly a disease of countries with poor sanitation and poor standards of personal and food hygiene. Multi-drug resistant strains have been reported in Asia, the Middle East, and Latin America.

Manifestations

- In the early stages fever, severe headache, constipation and a dry cough may be present.
- The fever rises in a “step ladder” pattern for 4 or 5 days.
- Abdominal tenderness and an enlarged liver or spleen may occur.
- The pulse can often be slower than would normally be anticipated considering the patient’s temperature.
- After 7 to 10 days, the fever reaches its peak and a rash may appear on the upper abdomen and back as sparse, slightly raised, rose-red spots, which fade on pressure and are usually only visible on white skin.
- Diarrhoea may develop later, together with bronchitis; the patient may also show signs of confusion.
- If untreated, complications can occur during the second week of the illness; these include weakness, dehydration, and most commonly intestinal bleeding and perforation.
- Other complications may affect any patient because of the occurrence of septicaemia during the first week. These may include cholecystitis, pneumonia, myocarditis, arthritis, osteomyelitis and meningitis.
- Bone and joint infection is seen, especially in children with sickle cell disease.

Age groups affected

Typhoid can affect any age.

Prognosis

Case-fatality rates of 10% can be reduced to less than 1% with appropriate antibiotic therapy.

Diagnosis

Blood culture is the most important method for diagnosis. Isolation of the organism from the stool is more common in the second and third weeks of the illness. In some cases, isolation of the bacteria in the urine can be used as a diagnostic method.

Methods of treatment

Four different antibiotics are often used for treatment: Ciprofloxacin, Co-trimoxazole, Amoxicillin and Chloramphenicol. Unfortunately, as with many Salmonella, *S. typhi* is becoming resistant to many antibiotics and some isolates are only sensitive to Ciprofloxacin. Treatment must continue for two weeks (10 days in the case of Ciprofloxacin) and it is common for the patient to remain pyrexial for five days following commencement of treatment. Effective treatment does not always prevent complications, the disease recurring or the patient becoming a carrier. A chronic carrier may be treated for four weeks with aminoquinolones and in some cases it may be necessary to perform a cholecystectomy, as the gallbladder can act as a reservoir for the *S. typhi* organisms.

Prevention of spread

Prevention of spread is dependent upon:

- **Clean water supply:** protection and chlorination of public water supplies is necessary.
- **Good sanitation:** ensuring there is no back flow connection between sewers and water supplies; disposal of human excreta must be carried out in a safe manner and toilets must be fly-proof. Public education on food, water and particularly hand washing hygiene; the importance of hand washing is especially vital for food handlers and those caring for patients and/or children (see Module 1).

Treatment of carriers: this can often be very difficult to implement, but spread through carriers is unusual if good personal hygiene is practised and stools are disposed of hygienically.

Selective immunization of groups: during an epidemic in an endemic country, selective immunization of groups such as school children, institutionalized people and healthcare workers is of great benefit. Travellers from an industrialized country to an endemic area should seek vaccination.



REVISION POINT 10

List 6 manifestations of typhoid.
(See page 75 for help.)

Immunization against typhoid

There are three types of typhoid vaccine:

- **Monovalent whole cell typhoid vaccine** contains in excess of 1000 million *S. typhi* organisms per millilitre, killed by heat and phenol. The vaccine offers 70–80% protection and is administered in a 0.5 ml dose, by intramuscular or deep subcutaneous injection. Two doses, given four to six weeks apart, give protection for three years, but side effects include a painful reaction at the injection site and sometimes fever. After the first dose the vaccine can be given intradermally (0.1 ml), which may reduce the severity of adverse reactions. This vaccine is now less commonly used, having been superseded by less reactive products which provide equally good protection.
- **Typhoid Vi polysaccharide antigen vaccine** comes from the capsule of the organism, preserved with phenol. It provides equally effective protection as the whole cell vaccine but with fewer

febrile side effects, although it can cause irritation at the vaccine site. One 0.5 ml dose offers three years protection.

- **Oral typhoid vaccine** contains a live attenuated *S. typhi* strain (Ty21a) in an enteric-coated capsule. It is given in three doses on alternate days. Length of protection may be less and vaccination may need repeating after one year. The vaccine is unstable at room temperature and must be kept refrigerated. Efficacy is as good as the parental vaccines.

It should be emphasized that whilst these vaccines provide good protection, protection is not 100%. Consequently strict food, water and personal hygiene protection continue to be of great importance.

Now carry out Learning Activity 9.

Screening and contact tracing

If an outbreak occurs, an intensive search for the source of infection (case or carrier) and for the transport medium (food or water) by which the infection was transmitted is necessary. Blood cultures can provide early confirmation; the organism can then be tested for antibiotic sensitivity. Stool and urine culture may also be performed from one week following confirmation of the disease. Water and food samples from suspected sources also need to be tested.

Nursing care

(See Module 1 for guidelines on infection control.) Specific nursing care of a patient with typhoid fever includes:

- rehydration as required;
- sedation of patients presenting with confusion and agitation;
- close and regular observation of vital signs and

general examination for complications;

- observation for bowel haemorrhage and perforation; and
- transfer to an intensive care unit if serious complications develop.

Rehabilitation

Recovery may be complete after treatment, but may also be delayed with recurrence of the symptoms in 10–15% of cases. Recurrence is usually less severe than the original illness, but in some cases can be severe and even fatal. Recurrence is more likely to occur after inadequate treatment.

Role of primary health care team

- Education regarding food, water and personal hygiene precautions, particularly for all persons handling food.
- Awareness of the risks and management of patients with carrier status
- Knowledge of vaccines available

Role of hospital and community settings

- Management and treatment of the affected person
- Awareness of the risks and management of patient with carrier status

Role of health education and health promotion

- Heighten public awareness of the disease and its prevention
- Placement of public health control measures to minimize spread of disease

Paratyphoid fever

Paratyphoid fever is caused by *Salmonella* paratyphi A, B and C and is a very similar illness to typhoid fever, but usually far less severe. Paratyphoid usually has a shorter incubation period, with diarrhoea from the onset, a more abundant rash and less commonly develops intestinal complications.

Poliomyelitis

Definition

Poliomyelitis is an infection caused by one of three types of virus. The virus most commonly invades the gastrointestinal tract and a viraemic illness may develop. In some cases the virus invades and destroys the anterior horn cells of the spinal cord. This results in flaccid muscle paralysis, more commonly of the lower limbs. In the most severe cases, the virus attacks the motor neurons of the brainstem, causing difficulty in breathing, swallowing and speaking. In such cases, death can occur unless respiratory support is given.

Modes of transmission

- The faecal-oral route, particularly in areas where there is poor food and water hygiene.
- Droplet infection from the nasopharynx is also possible in the acute phase; this is more typical in areas where sanitation is good.

The incubation period is between 4 and 35 days although more usually 7–14 days.

Communicability

Cases are most infectious from 7–10 days before and after onset of the illness, although the virus may be shed in the faeces for up to six weeks or even longer.

Epidemiological summary

It is thought that poliomyelitis first occurred nearly 6000 years ago in the time of the ancient Egyptians. Evidence for this theory lies in the withered and deformed limbs of some Egyptian mummies. Since the development of the polio vaccine in the mid-1950s, cases of poliomyelitis have diminished dramatically. The disease was brought under control and practically eliminated as a public health problem in industrialized countries.

Today the disease has been eradicated from large parts of the world; the key remaining reservoirs of



Administering oral polio vaccine (OPV).
Credit: WHO/INF.

virus transmission are in South Asia and sub-Saharan Africa. However, outbreaks still occur and in

1996 such an episode happened in Albania, Greece and the Federal Republic of Yugoslavia, demonstrating that disease can easily be reintroduced if immunization coverage is allowed to drop. Two billion children have now been fully immunized worldwide. Global eradication is not far from completion. In the meantime, countries free from poliomyelitis must continue to vaccinate in order to prevent the virus reestablishing itself if reintroduced from other countries.

Manifestations

The disease can follow three pathways:

- **Asymptomatic illness**, which produces seroconversion and life long immunity to the virus. Non-paralytic poliomyelitis, which produces mild flu-like illness with fever, pharyngitis and mild diarrhoea. Sometimes viral meningitis with fever and headache develops, but improves after a few days with complete recovery.
- **Paralytic poliomyelitis**, which commences with mild illness as described above with a brief period of wellbeing. The disease then progresses with fever, meningism, and myalgia. Destruction of the anterior horn cells of the spinal cord and the brain stem occur.

In paralytic poliomyelitis:

- A lower motor neurone paralysis can develop, with flaccid paralysis and normal sensation.
- In the initial stages of the disease, the muscles can be painful.
- Overexertion or trauma at this time (strenuous exercise or injections) can increase the likelihood of paralysis to these muscles.

- The level of damage to the spinal cord determines the muscles affected. However, muscles of the lower limbs are more frequently paralyzed.
- Contractures can occur, the most common being flexion contractures of the hip and knee, and equinus deformity of the ankle.
- Bladder and bowel dysfunction can occur.
- If the upper body is involved, paralysis of trunk muscles including intercostal muscles can lead to respiratory failure and/or pulmonary complications.
- Bulbar muscle involvement can lead to difficulty in swallowing and speaking, and reduced respiratory function.

Age groups affected

Polio can affect any age and the illness is more severe in older age groups. However, the virus most commonly affects children 3 years and under with over 50% of all cases occurring in this age group.

Prognosis

Although paralytic poliomyelitis is rare, two thirds of those who develop severe symptoms will be left with some varying degree of paralysis. Severe disability is less common in children. Death from poliomyelitis is usually related to respiratory failure, for which there are many contributory factors. Secondary attacks are very rare, but occasionally deterioration of muscle power and bulk can present many years later.

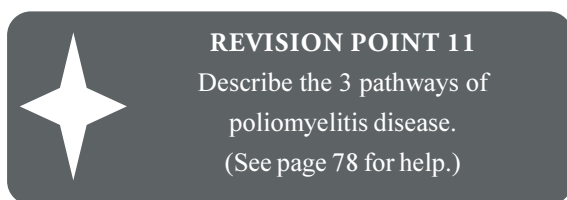
Diagnosis

Diagnosis can usually be done clinically, but culture of throat swabs, stool and CSF can identify the type of polio virus. High or rising titres of polio serum antibodies can also be used as a means of diagnosis.

Methods of treatment

There is no available drug therapy for the treatment of poliomyelitis. However, symptomatic treatment in the form of muscle relaxants and analgesia in the

acute phase of the illness will help. Antibiotics can also be used to treat the occurrence of a secondary bacterial infection in the chest or bladder.



REVISION POINT 11
Describe the 3 pathways of poliomyelitis disease.
(See page 78 for help.)

Prevention of spread

This is dependent upon:

- Adopting good food, water and personal hygiene measures.
- A prior natural infection with the polio virus: acquiring poliomyelitis will provide lifelong immunity, but only against the particular type of virus that caused the illness (Type 1, 2 or 3). Infection with one type will not provide protection against the other two polio viruses. Natural immunity is acquired through maternal antibodies for two or three months after birth
- Immunization – see Module 2.

Screening and contact tracing

Screening can be performed by culture of throat swabs and stool in suspected contacts. After a single case of paralytic poliomyelitis, a dose of oral polio vaccine should be given to everyone in the neighbourhood, regardless of their previous poliomyelitis vaccine status. In previously unimmunized individuals, a course of three doses, each a month apart should be completed. In those individuals where live oral polio vaccine is contraindicated, an inactivated polio vaccine should be administered. All possible contacts should be kept under surveillance until the full incubation period has passed.

Nursing care

Specific nursing care of poliomyelitis patients

- Strict bed rest during the febrile phase (the mainstay of management)

- Tracheotomy and positive pressure ventilation may be required in cases of severe respiratory paralysis. Before ventilators were available, cases of paralytic poliomyelitis with respiratory involvement were cared for in “iron lungs,” huge metal cylinders that operated like a pair of bellows, regulating the breathing. These are still occasionally used in some countries.
- Urinary catheterization may be required.
- Regular physiotherapy is necessary; following the acute phase, to help improve muscle recovery. Splints and limb-supporting devices may be needed at an early stage to prevent deformities.
- If contractures develop, orthopaedic intervention may be required.

Rehabilitation

This depends on the severity of the illness, but as described above, intensive physiotherapy and rehabilitation may be required.

Role of primary health care team

- Immunization policy should be encouraged at all times and close surveillance undertaken to ensure that primary immunization courses are always completed.
- Explanation and education should be given to mothers and fathers of newborns to explain the importance of immunization.
- Immunity status of those in close contact with the care of the baby being immunized should be checked, and vaccination given where appropriate.

Role of hospital and community settings

- Management and treatment of the affected person
- Rehabilitation programmes for those severely affected by the disease

Role of health education and health promotion

- Heighten public awareness of the disease and its prevention
- Placement of public health control measures

Hepatitis A

Definition

Hepatitis A (HAV) is a viral infection primarily affecting the liver. It can range in severity from a mild illness to a severely disabling one lasting for several months. Lifelong immunity follows a case of infection.

Mode of transmission

Hepatitis A is transmitted via the faecal-oral route, most commonly by person-to-person spread, although contamination of food and water is also possible, particularly shellfish harvested from sewage-contaminated water. The disease is more common in countries that have poor sanitation and poor standards of personal and food hygiene. Person to person spread is most common between children, but also occurs between sexual partners. The incubation period is from 15 to 40 days.

Communicability

Hepatitis A is highly infectious to close contacts and therefore spreads easily in very young age groups in settings such as nurseries and schools.

Epidemiological summary

Hepatitis A is endemic in countries where sanitation is poor. In such countries, most people become infected during childhood when the illness is usually extremely mild and often without symptoms. The highest risk areas are the Indian subcontinent and the Far East, but the risk extends to Eastern Europe. Outbreaks among adults in such countries are rare, but in more developed countries, infection in young children is far less common and many older children and adults remain susceptible.

Manifestations

- Following the incubation period a prodromal

period with malaise, myalgia and variable fever may occur and last 2–7 days.

- Following this, features of hepatitis may present, including nausea and vomiting.
- Some patients, especially children, may have diarrhoea.
- Urine darkens and stools become noticeably paler.
- Jaundice then develops firstly in the sclera and later in the skin, but is less likely in childhood. Fever resolves at this point and virus excretion ceases. As a consequence the patient is no longer infectious.
- Most patients feel better at this stage.
- Duration of jaundice is usually 7–10 days.
- Recovery is usually complete after this period, although hepatitis A can cause cholestasis, with a rise in the liver enzyme alkaline phosphatase.
- Abnormality of bile salt excretion may cause itching.
- Sometimes, cholestasis is prolonged, with increased jaundice and severe pruritis, which can last for months if untreated.
- Minor relapse can occur approximately 4 weeks after recovery of the initial illness and at this point the virus will again be present in the stool.
- Recovery can take up to six months, but is usually complete, except in rare instances (less than 1%) when liver failure develops.

Age groups affected

Hepatitis A can affect all age groups, but in developing countries is more common in children than adults.

Prognosis

In the majority of cases, the prognosis is good and whilst recovery time can vary in length, it is usually complete. A chronic carrier state does not occur in hepatitis A.

Diagnosis

Liver function tests are used for diagnosis, with an

elevation of alanine transaminase (ALT) and aspartate transaminase (AST) confirming the presence of hepatitis A. Diagnosis can also be made by finding IgM antibodies to HAV in the patient's serum. IgG antibodies will indicate a previous infection or immunity due to previous vaccination.

Methods of treatment

Rest and simple analgesia are recommended as required in the prodromal stage. Antiemetics may be of benefit and antipruritics if required. If cholestasis is severe and lengthy, use of corticosteroids can be helpful.

In the very rare instances when liver failure does present, treatment is given to prevent further deterioration where possible; liver transplant is sometimes the only successful measure at this stage. In the case of fulminant hepatitis A infection, if a transplant is possible, the outcome can be quite good.

Prevention of spread

Prevention of spread is dependent upon:

- Clean water supply: protection and chlorination of public water supplies is necessary;
- Good sanitation: ensuring there is no back flow connection between sewers and water supplies; disposal of human excreta must be carried out in a safe manner and toilets must be fly-proof.
- Public education regarding food, water and particularly hand washing hygiene: the importance of hand washing is especially important for food handlers and those caring for patients and/or children. Facilities must be adequate to meet these needs, especially in nurseries and schools.
- Immunization: there is now a very effective vaccine for the prevention of hepatitis A.

The vaccine is prepared from a strain of hepatitis

A virus grown in human diploid cells and is inactivated. A primary dose produces anti-HAV antibodies, which persist for at least one year, and a booster dose administered 6–12 months after the initial dose provides at least 10 years protection. This vaccine is particularly beneficial for travellers coming from a developed to a developing country. Human normal immunoglobulin (HNIG) is available for pre- and post-exposure prophylaxis. An intramuscular injection can provide protection for two months or slightly longer, depending on the amount administered. It can also be given post exposure to help prevent a case, but must be given within one week of the event. Its use is rarely indicated for pre-exposure prophylaxis since vaccine has become readily available (see Module 2).

Now carry out Learning Activity 10.

Screening and contact tracing

Outbreaks of hepatitis A are rare in developed countries. When an outbreak does occur, the common source can usually be associated with food contamination, caused either by an infected food handler, undercooked shellfish, or harvesting from a contaminated source. In such events, efforts must be made to trace the source to prevent further spread of the disease.

Nursing care

In mild forms of the disease, supportive nursing care is required. Severely ill patients will require intensive care nursing.

Rehabilitation

The majority of patients who contract hepatitis A will make a full recovery and require no active rehabilitation. This however, can take some time and patience is required to achieve this outcome.

Role of primary care team

- Education regarding food, water and personal hygiene precautions, particularly for those persons handling food and those working in nursery and school units
- Knowledge of vaccines available

Role of hospital and community settings

- Management and treatment of the affected person
- Rehabilitation programmes for those severely affected by the disease



REVISION POINT 12

How can transmission of Hepatitis A be prevented?
(See page 82 for help.)

Hepatitis E was formerly known as enterically transmitted non-A, non-B hepatitis. It's a water-borne infection, found in epidemics and sporadic cases. The virus is probably widespread in the eastern Mediterranean area as well as in Asia, and north and sub-Saharan Africa. The disease primarily affects young adults, is clinically similar to hepatitis A and does not lead to chronic disease. However, 15–20% of women who contract the disease in the second or third trimester of pregnancy will die of fulminant hepatitis. There is no vaccine against hepatitis E and immunoglobulin prepared in Europe does not give protection. Avoidance of contaminated food and water is the only effective protective measure.

Summary of key points

- Diarrhoea is one of the most important diseases worldwide, accounting for around 1500 million episodes and 4 million deaths each year in children.
- The main cause of death is dehydration resulting from diarrhoea.
- Diarrhoea and dehydration can be diagnosed clinically, and in severe cases treatment must be initiated quickly; the WHO Diarrhoea Management Chart is a useful tool.
- Factors that increase the risk of diarrhoea are more common in socio-economically deprived countries.
- Europe is currently polio free; full immunization coverage must be maintained for this to continue.
- Implementation of simple measures to interrupt the faecal-oral chain of infection will reduce the incidence of such infections.

Bibliography and RESOURCES

List of publications on control of diarrhoeal diseases: <http://www.who.int/chd/publications/catalog.htm>

Medical Education Teaching Medical Students about Diarrhoeal Diseases: <http://www.who.int/chd/publications/cdd/mededd/1med.htm> (there are 8 units in total, each one identified by the number in the last section)

Huckstep, R.L. Poliomyelitis - a guide for developing countries including appliances and rehabilitation: <http://worldortho.com/database/polio/>

World Health Organization (2000) Polio: <http://www.who.int/gpv-polio/virus.htm>

World Health Organization (2000) The global eradication of polio: Target 2000: <http://www.who.int/gpv-polio/eradconcept.htm>

World Health Organization (1998), Global Programme for vaccines and immunization expanded programme on immunization: <http://www.who.int/vaccines>

Typhoid Fever Fact sheet no 149: <http://www.who.int/inf-fs/en/fact1498.html>

First, assess your patient for dehydration (*... denotes signs of dehydration)

	A	B	C
1. LOOK AT:			
Condition	Well, alert	*Restless, irritable	*Lethargic or unconscious, floppy
Eyes	Normal	Sunken	Very sunken and dry
Tears	Present	Absent	Absent
Mouth and tongue	Moist	Dry	Very dry
Thirst	Drinks normally, Not thirsty	*Thirsty, drinks eagerly	Drinks poorly or not able to drink
2. FEEL: skin pinch	Goes back quickly	*Goes back slowly	Goes back very slowly
3. DECIDE:	The patient has NO SIGNS OF DEHYDRATION	If the patient has two or more signs including at least one *sign , there is SOME DEHYDRATION	If the patient has two or more signs, including at least one *sign , there is SEVERE DEHYDRATION
4. TREAT:	Use Treatment Plan A	Weigh the patient, if possible, and use Treatment Plan B	Weigh the patient and use Treatment Plan C URGENTLY

Assess the child for other problems

<p>ASK ABOUT BLOOD IN THE STOOL</p>	<p>IF BLOOD IS PRESENT</p> <ul style="list-style-type: none"> • Treat for 5 days with an oral antibiotic recommended for Shigella in your area. • Teach the parents to feed the child as described in Plan A. • See the child again after 2 days if: <ul style="list-style-type: none"> ○ under 1 year of age ○ initially dehydrated ○ there is still blood in the stool ○ not getting better • If the stool is still bloody after 2 days, change to a second oral antibiotic recommended for Shigella in your area. Give it for 5 days.
<p>ASK WHEN THIS EPISODE OF DIARRHOEA BEGAN</p>	<p>IF DIARRHOEA HAS LASTED AT LEAST 14 DAYS:</p> <ul style="list-style-type: none"> • Refer to hospital if: <ul style="list-style-type: none"> ○ the child is under 6 months old ○ dehydration is present. (Refer the child after treatment of dehydration). • Otherwise, teach the parents to feed the child as in Plan A, except: <ul style="list-style-type: none"> ○ dilute any animal milk with an equal volume of water or replace it with a fermented milk product, such as yoghurt ○ assure full energy intake by giving 6 meals a day of thick cereal and added oil, mixed with vegetables, pulses, meat or fish. • Tell the parents to bring the child back after 5 days: <ul style="list-style-type: none"> ○ if diarrhoea has not stopped, refer to hospital ○ if diarrhoea has stopped, tell the parents to: <ul style="list-style-type: none"> ▪ use the same foods for the child's regular diet. ▪ after one more week, gradually resume the usual animal milk ▪ give an extra meal each day for at least 1 month.
<p>LOOK FOR SEVERE UNDER-NUTRITION</p>	<p>IF THE CHILD HAS SEVERE UNDERNUTRITION:</p> <ul style="list-style-type: none"> • do not attempt rehydration; refer to hospital for management • provide the parents with ORS solution and show them how to give 5 ml/kg/hr during the trip.
<p>ASK ABOUT FEVER AND TAKE TEMPERATURE</p>	<p>IF TEMPERATURE IS 39°C OR GREATER:</p> <ul style="list-style-type: none"> • give paracetamol. <p>IF THERE IS FALCIPARUM MALARIA IN THE AREA, And the child has any fever (38° C or above) or history of fever in the past 5 days:</p> <ul style="list-style-type: none"> • give an antimalarial (or manage according to your malaria programme recommendation).

USE THIS PLAN TO TEACH THE PARENTS TO:

- Continue to treat at home their child’s current episode of diarrhoea
- Give early treatment for future episodes of diarrhoea

EXPLAIN THE THREE RULES FOR TREATING DIARRHOEA AT HOME:

1. GIVE THE CHILD MORE FLUIDS THAN USUAL TO PREVENT DEHYDRATION:

- Use a recommended home fluid, such as a cereal gruel. If this is not possible give plain water. Use ORS solution for children described in the box below.
- Give as much of these fluids as the child will take. Use the amounts shown below for ORS as a guide.
- Continue giving these fluids until the diarrhoea stops.

2. GIVE THE CHILD PLENTY OF FOOD TO PREVENT UNDERNUTRITION:

- Continue to breast feed frequently.
- If the child is not breast fed, give the usual milk. If the child is less than 6 months old and not yet taking solid food, dilute milk or formula with an equal amount of water for 2 days.
- If the child is 6 months or older, or already taking solid food:
 - Also give cereal or another starchy food mixed, if possible, with pulses, vegetables, and meat or fish. Add 1 or 2 teaspoonfuls of vegetable oil to each serving.
 - Give the fresh fruit juice or mashed banana to provide potassium.
 - Give freshly prepared foods. Cook and mash or grind the food well.
 - Encourage the child to eat: offer food at least 6 times a day.
 - Give the same foods after diarrhoea soups, and give an extra meal each day for two weeks.

3. TAKE THE CHILD TO THE HEALTH WORKER IF THE CHILD DOES NOT GET BETTER IN 3 DAYS OR DEVELOPS ANY OF THE FOLLOWING:

- * many watery stools
- * Repeated vomiting
- * Marked thirst
- * Eating or drinking poorly
- * Fever
- * Blood in the stool

CHILDREN SHOULD BE GIVEN ORS SOLUTION AT HOME IF:

- They cannot return to the health worker if the diarrhoea gets worse
- It is national policy to give ORS to all children who see a health worker for diarrhoea

IF THE CHILD WILL BE GIVEN ORS SOLUTION AT HOME, SHOW THE PARENTS HOW MUCH ORS TO GIVE AFTER EACH LOOSE STOOL AND GIVE THEM ENOUGH PACKETS FOR 2 DAYS:

Age	Amount of ORS to give after each loose stool	Amount of ORS to provide for use at home
Less than 24 months	50-100ml	500ml/day
2 up to 10 years	100-200ml	1000ml/day
10 years or more	As much as wanted	2000ml/day

- Describe and show the amount to be given after each stool using a local measure.

SHOW THE PARENTS HOW TO MIX ORS.

SHOW THEM HOW TO GIVE ORS:

- Give a teaspoonful every 1-2 minutes for a child under 2 years.
- Give frequent sips from a cup for an older child
- If the child vomits, wait 10 minutes. Then give the solution more slowly (for example, a spoonful every 2-3 minutes).
- If diarrhoea continues after the ORS packets are used up, tell the parents to give other fluids as described in the last rule above or return for more ORS.

APPROXIMATE AMOUNT OF ORS SOLUTION TO GIVE IN THE FIRST 4 HOURS:

Age*	Less than 4 months	4 – 11 months	12 – 23 months	2 – 4 years	5 – 14 years	15 years or older
Weight:	Less than 5kg	5-7.9kg	8-10.9kg	11-15.9kg	16-29.9kg	30kg or more
Amount in ml	200-400	400-600	600-800	800-1200	1200-2200	2200-4000
Amount in local measure						

* Use the patient's age only when you do not know the weight. The approximate amount of ORS required (in ml) can also be calculated by multiplying the patient's weight (in grams) times 0.075.

- If the child wants more ORS than shown, give more.
- Encourage the mother to continue breast feeding.
- For infants under 6 months who are not breast-fed, also give 100-200ml clean water during this period.

OBSERVE THE CHILD CAREFULLY AND HELP THE PARENTS GIVE ORS SOLUTION:

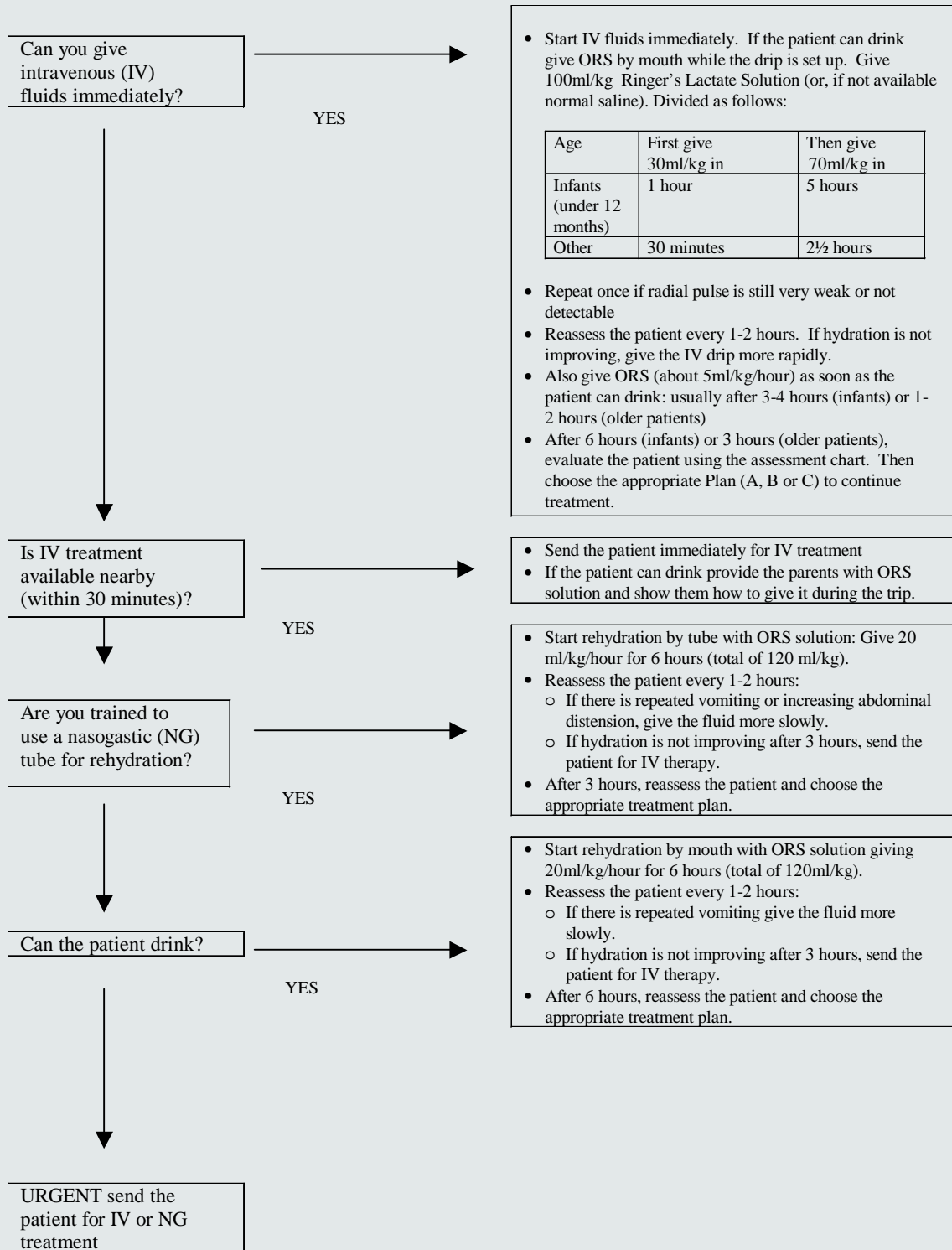
- Show them how much solution to give the child.
- Show them how to give it – a teaspoonful every 1-2 minutes for a child under 2 years, frequent sips from a cup for an older child.
- Check from time to time to see if there are problems
- If the child vomits, wait 10 minutes and then continue giving ORS, but more slowly, for example, a spoonful every 2-3 minutes.
- If the child's eyelids become puffy, stop ORS and give plain water or breast milk. Give ORS according to Plan A when the puffiness is gone.

AFTER 4 HOURS, REASSESS THE CHILD USING THE ASSESSMENT CHART, THEN SELECT PLAN A, B, OR C TO CONTINUE TREATMENT.

- If there are no signs of dehydration, shift to Plan A. When dehydration has been corrected, the child usually passes urine and may also be tired and fall asleep.
- If signs indicating some dehydration are still present, repeat Plan B, but start to offer food, milk and juice as described in Plan A.
- If signs indicating severe dehydration have appeared, shift to Plan C.

IF THE PARENTS MUST LEAVE BEFORE COMPLETING TREATMENT PLAN B:

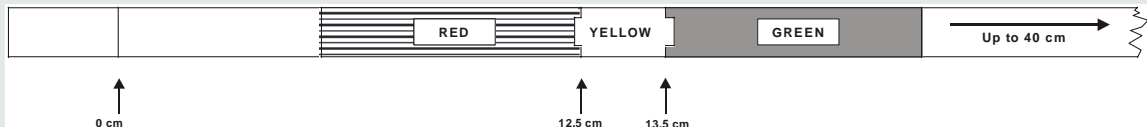
- Show them how much ORS to give to finish the 4-hour treatment at home.
- Give them enough ORS packets to complete rehydration, and for 2 more days as shown in Plan A.
- Show them how to prepare ORS solution.
- Explain to them the three rules in Plan A for treating their child at home:
 - to give ORS or other fluids until diarrhoea stops
 - to feed the child
 - to bring the child back to the health worker, if necessary.



How to determine if a child is undernourished using arm circumference

The upper arm has a bone, muscles and fat. When babies are about 1 year old, they have quite a lot of fat under the skin of their arms. When they are 5 years old, there is much less fat and more muscle. The distance around the upper arm remains almost the same between the ages of 1 and 5 years. If a child is undernourished, this distance is reduced, and his arm becomes thin. This is due to reduction in muscles and fat. By placing a special measuring strip around the upper arm one can find out whether a child between the ages of 1 and 5 is undernourished or not.

This measuring strip is called a tri-coloured arm strip and looks like this:



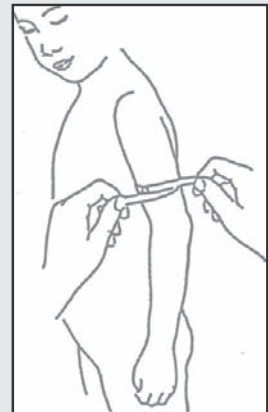
You can make one from a string or strip of material that does not stretch, being careful that the markings are accurate.

To use this strip:

Put the strip around the mid upper arm of the child and see which colour is touched by the 0 cm end of the strip.

- if the green part is touched, the child is well nourished.
- If the yellow part is touched, the child is moderately undernourished.
- If the red part is touched, the child is severely undernourished.

This method of measuring the arm is useful because the health worker can identify undernutrition in a child without using a scale or knowing the child's age. However, since it only shows large changes in a child's nutrition, it is not suitable for determining whether the child is improving or becoming worse.



MODULE 4

Infections spread by animals and insects, and less common infections found in Europe

Stated learning outcomes

Glossary of terms

Anthrax

Crimean-Congo haemorrhagic fever

Hantavirus

Legionnaires disease

Leishmaniasis

Leptospirosis

Louse borne typhus

Lyme disease

Malaria

Rabies

Tetanus

Tickborne encephalitis

Toxoplasmosis

West Nile fever

Summary of key points

Bibliography

Appendices

MODULE 4

The OBJECTIVE of Module 4 is to increase the nurse's and midwife's awareness and knowledge of infections spread to humans by animals and insects, and to provide general background information about some less common diseases found within Europe. The severity of these diseases varies from "subclinical" requiring little or no treatment to life threatening requiring intensive care. The diseases have been indexed alphabetically rather than by severity, incidence or mode of transmission. Two of the most important diseases, tetanus and rabies, stand alone because of their severity and widespread distribution throughout much of Europe.

STATED LEARNING OUTCOMES

On completion of this module you should have an understanding for each disease of:

- mode of transmission;
- epidemiology (when available);
- manifestations;
- potential complications;
- recommended treatment and any available vaccines; and,
- preventative and health education measures that can be taken.

In addition you should be able to identify the needs of a patient requiring intensive nursing care.

KEY WORDS

Vector; arthropod; arbovirus; zoonosis; spirochaetes; rickettsia.

GLOSSARY OF TERMS

ANTIGEN: any molecule recognized by the immune system of the body as “foreign”. Such a molecule will provoke the production of a specific antibody.

ARBOVIRUSES: (arthropod-borne viruses) viral infections that affect mainly animals, but can be spread to humans. Such infections are spread to humans by arthropods (insects and their close relatives), especially mosquitoes, ticks and flies, which bite the human and consequently introduce the infection into the human blood stream.

ARTHROPODS: the group of invertebrates including centipedes, crustaceans and insects; the most common “arthropod vectors” are mosquitoes flies and ticks.

ASSAY: qualitative or quantitative analysis of a substance.

ATAXIA: unsteadiness in standing and walking due to a disorder of the control mechanism in the brain, or inadequate information input to the brain from the skin, muscles and joints.

AUTONOMIC NERVOUS SYSTEM: the part of the nervous system controlling unconscious functions, such as the heart beat, the secretion of glands and the contraction of blood vessels.

COGNITION: the mental process by which knowledge is acquired.

CONTAGIOUS: capable of being passed on by direct contact with a diseased individual or by handling clothing etc. contaminated with the causative agent.

CONGENITAL: present at birth

CUTANEOUS: pertaining to the skin

CYANOSIS: blueness of the skin caused by insufficient oxygen in the blood.

DEBRIDEMENT: the radical surgical removal of all contaminated tissue, such as the damaged edges of wounds and [especially] all muscle suspected of being dead.

DELIRIUM: a mental disturbance due to a disorder of brain function caused by high fever, head injury, drug overdose or drug withdrawal; there is confusion, disorientation, restlessness, trembling, fearfulness and disorder of sensation.

DEMENTIA: a syndrome of failing memory and progressive loss of intellectual power due to continuing degenerative disease of the brain.

DISSEMINATED INTRAVASCULAR COAGULATION: a serious disorder of the blood clotting mechanism in which extensive clotting occurs within the blood vessels, followed by a strong activation of the clot fibrin breakdown system leading to a tendency towards severe bleeding.

EMACIATION: the state of extreme thinness from absence of body fat and muscle wasting usually resulting from malnutrition, widespread cancer or other another debilitating disease.

ENCEPHALITIS: inflammation of the brain, most commonly caused by infection, usually from a virus.

ENCEPHALOPATHY: any degenerative or other noninflammatory disorder affecting the brain in a widespread manner.

ENDEMIC: present within a localised area or peculiar to persons in such an area.

EPISTAXIS: nose bleed

ERYTHEMA MIGRANS: the characteristic ring skin eruptions of early Lyme disease

ESCHAR: an area of dead separated tissue produced by skin damage caused by a caustic substance, burns or bites (e.g. from ticks).

HAEMATEMESIS: vomiting blood

HAEMATURIA: blood in the urine

HAEMORRHAGIC FEVERS: fevers that involve internal bleeding or bleeding into the skin.

HEPATIC: pertaining to the liver

HYDROPHOBIA: violent and painful spasms of the throat muscles occurring as one of the principal symptoms of rabies; literally a fear of water

HYPERTHERMIA: body temperature above 41.1 degrees C

HYPOGLYCAEMIA: abnormally low levels of glucose in the blood

HYPOTHERMIA: below normal body temperature

HYPOVOLAEMIA: an abnormal reduction in the circulating blood volume

HYPOXIA: deficiency of oxygen in the tissues

LASSITUDE: a disinclination to make an effort to achieve anything

MACULA: any small flat spot

MACULOPAPULAR: pertaining to small, circumscribed, usually discoloured and slightly raised spots on the skin.

MELAENA: blackening of the stools by altered blood that has been released into the bowel from bleeding in the oesophagus, stomach or duodenum.

MORTALITY RATE: death rate

MYALGIA: muscle pain

MYELITIS: inflammation of the spinal cord

MYOCARDITIS: inflammation of the heart muscle

NEURON: the functional unit of the nervous system

NEUROPATHY: any neuron disorder

OLIGURIA: an abnormally small output of urine

ORGANISM: any living animal or plant

PARASITE: an organism that lives on or in the body of another living organism, and depends on it for nutrition and protection

PARENTERAL: drugs or nutrients given or taken by any route other than by the alimentary tract, e.g. intramuscular, intravenous

PETECHIAE: tiny, flat, red or purple spots in the skin or mucous membranes caused by bleeding from small blood vessels

PNEUMONITIS: inflammation of the lungs

PRODROME: any symptom that signals the impending onset of a disease

PROPHYLAXIS: act, procedure or drug used to guard against or prevent an unwanted outcome, such as a disease.

PROTOZOA: primitive single-celled microscopic animals; many are human parasites.

RICKETTSIAE: gram negative bacilli, widespread in the world as zoonotic infections of mainly small mammals, and transmitted to humans by parasitic vectors, mainly ticks or mites; louse borne typhus is an exception to this, it has no zoonotic reservoir, but the louse remains infected for its lifetime with the rickettsia organism.

RIGOR: a violent attack of shivering causing a rapid rise in body temperature.

SEPTICAEMIA: the presence in the circulating blood of large numbers of disease producing organisms.

SPIROCHAETES: bacteria, which are widely distributed in nature, and can cause generalised infections in humans e.g. Lyme disease, leptospirosis

SPORES: a dormant or resting stage of certain bacteria and other organisms. Such organisms are capable of surviving for long periods in hostile environments and of reactivating under suitable conditions.

STRIDOR: noisy breathing caused by narrowing or partial obstruction of the larynx or trachea

STUPOR: a state of severely reduced consciousness, short of coma, from which the affected person can be briefly aroused only by painful stimulation

TOPICAL: pertaining to something, usually medication, applied to a surface on or in the body, rather than taken internally or injected

TOXAEMIA: the presence of bacterial or other poisons (toxins) in the blood

TOXIN: any substance produced by a living organism that is poisonous to other organisms

VECTOR: an organism, especially insect, that carries a disease-producing material from one host to another, either within or on the surface of its body

VIRAEMIA: the presence of viruses in the blood

ZOONOSIS: natural infections of non-human vertebrates, which can be transmitted to man

Many of the infections and infectious diseases described in this Module occur in sporadic outbreaks affected by various geographical, environmental, seasonal, economic and social factors. The severity of these diseases varies from subclinical, requiring little or no treatment to life-threatening, requiring intensive care. The diseases have been indexed alphabetically rather than by severity, incidence or mode of transmission. Two of the most important diseases, tetanus and rabies, stand alone because of their severity and widespread distribution throughout much of Europe.

Definition

Anthrax is an acute infectious disease caused by the spore forming bacterium *Bacillus anthracis*. It is primarily a disease of herbivorous animals, but it can infect all mammals including humans. The *B. anthracis* spores can be found in animal products such as wool, hair, hides, skins, bones, bonemeal and the carcasses of infected animals. The spores can survive in the soil for many years.

Modes of transmission

There are three main modes of transmission:

- direct contact with skin – infection is passed on by the handling of contaminated animal products, resulting in a cutaneous infection. This is the most common route.
- airborne – spores are inhaled causing respiratory infection; and
- faecal/oral – when undercooked meat from an infected animal is eaten causing gastrointestinal (GI) infection.

Epidemiological summary

Anthrax is now unusual in Western Europe but sporadic cases still occur especially in animals such as cattle. It is more common in Eastern and Southern Europe.

Manifestations

Symptoms vary, but are usually apparent within 7 days.

Cutaneous infection:

- The bacterium enters through a cut or abrasion on the skin when handling contaminated wool, hides, leather or hair products of infected animals.
- Most cases occur on exposed skin such as the arms and hands, followed by the face and neck.
- Skin infection presents as a raised itchy bump like an insect bite.

- Within a few days a painless ulcer (1–3cm) with a black necrotic area in the centre develops; this is called an eschar.
- Over 2–3 weeks, the eschar loosens and eventually falls off; a scar may persist.
- In mild cases, the patient may suffer only moderate malaise, fever and headaches.
- If left untreated, the lymph glands become involved and a life threatening septicaemic spread can occur with 20% mortality.

Respiratory infection

- Very difficult to diagnose early.
- Initial symptoms resemble a common cold.
- After several days severe respiratory distress, cyanosis, stridor and possible subcutaneous oedema of the neck and chest can develop.
- Shock follows.
- Death usually results soon after the onset of acute symptoms.

GI infection

- Characterized by acute inflammation of the intestinal tract
- Initially the patient suffers from nausea, loss of appetite, vomiting and fever.
- Abdominal pain, haematemesis and bloody diarrhoea develop.
- Toxaemia may develop, followed by shock.

Anthrax mortality rate is 25%–60%.

Risk factors

Workers who come into contact with animal hides, bristles, bonemeal, etc. and workers involved in the handling of dead animals or their products are at greatest risk of infection.

Diagnosis

Laboratory diagnosis is made by identification of

the typical Gram positive bacilli of *Bacillus anthracis* from skin lesions, respiratory secretions, blood or by measuring specific antibodies.



REVISION POINT 1

Describe the 3 modes of transmission and 3 types of anthrax infection.

(See pages 97–98 for help.)

Methods of treatment

To be effective, treatment should be initiated as soon as possible. Mild cases of cutaneous anthrax may be effectively treated with oral Penicillin or a tetracycline. Antibiotic therapy does not affect the healing process or evolution of the skin lesion, but it can prevent systemic symptoms from developing. Topical therapy is not effective. If the infection is spreading or if systemic symptoms are present, high dose parenteral antibiotic therapy should be given. Treatment of inhalation or gastrointestinal anthrax requires high dose intravenous Penicillin.

Prevention of spread

Human anthrax is rare. Successful prevention depends upon:

- controlling anthrax in livestock;
- preventing gastrointestinal anthrax by forbidding the sale of meat from sick animals or animals that have died of the disease;
- ensuring bonemeal used as horticultural fertilizer is steam-sterilized (as it can, rarely, contain anthrax spores); those handling it in bulk should wear impervious gloves, which should be destroyed after use;
- regular cleaning and disinfection of the workplace;
- disinfecting animal products;
- processing hides, wool, and bone by tanning, dyeing, carbonizing or using acid treatment;
- administering vaccines to humans who are at high

occupational risk (4 doses of 0.5ml IM every 3 weeks, followed by a booster at 6 months, then boosted annually for those at continued risk);

- providing suitable protective clothing with provision of clothes-changing areas so that workers do not wear contaminated clothes home; and
- providing information for those at high occupational risk, including information on how anthrax is contracted, the signs and symptoms of the disease, good hygiene practice (hand washing, avoiding hand to eye/mouth contact), and the need to cover cuts and abrasions.

Now carry out Learning Activity 1.

Nursing care

Patients with cutaneous anthrax may require dressings to prevent secondary infection of the lesions. Soiled dressings should be incinerated, autoclaved or otherwise disposed of as biohazardous waste (see Module 1).

Close observation is necessary for patients with inhalation anthrax. The patient is likely to be very unwell and may have an elevated pulse, respiratory rate and temperature. Those with severe respiratory distress will require intensive care facilities.

Although person-to-person transmission of anthrax has never been documented, universal precautions should be adopted when providing care for such patients.

Definition

Crimean-Congo haemorrhagic fever (CCHF) is a viral haemorrhagic fever of the Nairovirus group. Although primarily a zoonosis, sporadic cases and outbreaks of CCHF affecting humans do occur.

Modes of transmission

There are two modes of transmission to humans:

- Through the bite of an infected tick – immature ticks feed on small vertebrates, thought to be the main source of the virus. In order to undergo their developmental stages, the ticks feed again and transmit the infection to larger vertebrates such as cattle, sheep, goats, and humans.
- Through direct transmission, that is, through contact with blood or tissues from infected livestock.

Epidemiological summary

The geographical distribution of the virus is widespread, with evidence of infection in Eastern Europe and predominantly the former Soviet Union. In the Southern USSR and Bulgaria, several hundred cases of CCHF are seen annually, with mortality rates as high as 15–20% when left untreated. CCHF is a seasonal disease, seen predominantly during spring and summer when ticks are most active.

Manifestations

- The incubation period following a tick bite is 1–3 days.
- The incubation period following contact with infected blood or tissue may be 5–6 days
- Sudden onset of headache, fever, myalgia, dizziness, headache, sore eyes, photophobia.
- Nausea, vomiting, sore throat, abdominal pain and diarrhoea may present.
- Over the next few days, the patient may experience sharp mood swings, becoming confused and aggressive.

- After 2–4 days the agitation may be replaced by sleepiness, depression and lassitude, and the abdominal pain may localise to the right upper quadrant with detectable liver enlargement.
- Other complications can then develop: tachycardia, petechial rash (caused by bleeding into the skin), haemorrhagic complications (melaena, haematuria, epistaxis, and bleeding from the gums).

The severely ill may develop liver, kidney and pulmonary failure.

Risk factors

Most cases occur in persons involved with the livestock industry, such as farmers, agricultural workers and slaughterhouse workers.

Diagnosis

Diagnosis of suspected CCHF must be carried out in specially equipped, high-level biosafety laboratories, because of the potential for blood borne transmission of the virus. During the first few days of illness the virus may be isolated from blood or tissue specimens grown in cell culture. Serum antibodies can be detected from day six of the illness.

Treatment

General supportive therapy is the mainstay of patient management. The antiviral drug Ribavirin, given both orally and intravenously, has been used with good results.

Nursing care

Many of these patients will develop complications requiring intensive nursing care; careful monitoring of fluid and blood replacement may be necessary (Appendix 1).

When patients suffering from CCHF are admitted to hospital, there is a risk of infection being spread to those in contact with the patient. It is therefore imperative that adequate control measures are taken to prevent this. Patients with suspected or confirmed CCHF must be isolated and transmission based precautions followed (see Module 1).

Prevention of spread

Persons living in endemic areas should be aware of the disease and how it is transmitted. Personal protective measures include:

- avoiding areas where tick vectors are abundant, especially during April and September when they are active;
- wearing protective clothing (long trousers, socks);
- using an insect repellent, and
- skin should be inspected for ticks every few hours and any ticks found should be removed immediately.

Persons who work closely with livestock in endemic areas should wear gloves and protective clothing to prevent skin contact with infected tissue or blood.

Vaccine

Although an inactivated, mouse brain-derived vaccine has been developed and used on a small scale in eastern Europe, there is no safe and effective vaccine widely available for human use.

Definition

Several types of hantavirus exist. While hantaviruses found in the Far East (Korea and China) can cause illness with high mortality, in Europe and Central Asia the disease is milder, causing asymptomatic or mild infections presenting with one of two main clinical syndromes: nephropathia epidemica or haemorrhagic fever with renal syndrome.

Mode of transmission

These viruses are spread in the urine and respiratory secretions of infected rodents, especially field mice and other rodents.

Epidemiological summary

Most cases are reported during the summer especially in rural and semi-rural areas. It is more common in Scandinavia and Finland, but is also found elsewhere in Europe.

Manifestations

- Nephropathia epidemica
- Initially a flu-like illness then renal failure and oliguria
- Raised liver enzymes
- Less than 0.5% mortality; prognosis is good

Haemorrhagic fever with renal syndrome:

- Severe cases present with hypovolaemic shock
- Mortality rate up to 20% for severe cases

Risk factors

Risk is related to increased human contact with rodents, for example, through outdoor occupations such as agriculture, forestry, and military activities, as well as through handling of recently-gathered wood, working in sheds or barns; and digging, working, or sleeping in fields or trenches. Retrospective studies among the former

Yugoslavian army demonstrated an association between outbreaks of this disease and army field exercises.

Persons living in areas where rodent populations thrive, such as socioeconomically disadvantaged areas or areas with displaced populations, have a higher risk of haemorrhagic fever.

Diagnosis

This is made by identifying specific hantavirus antibodies in the blood.

Treatment and nursing care

There is no specific treatment for this virus, but for severe cases, supportive measures and intensive nursing care would be required (Appendix 1).

Legionnaire's disease

Definition

Legionnaire's disease is caused by the gram-negative bacillus legionella pneumophila, found widely in soil and water.

Mode of transmission

Legionella is transmitted via droplet or aerosol inhalation of infected water. Hot water tanks, cooling towers, and shower heads all act as foci of infection. The bacteria may survive in tap water at room temperature for more than a year. Cooling fans in air conditioning units may nebulize infected droplets over a large area.

Epidemiological summary

It is responsible for both sporadic occurrences and clusters of cases. (See chart on following page.)

Manifestations

- May be asymptomatic
- A mild self-limiting febrile illness may occur.
- A severe, potentially fatal progressive illness with malaise, myalgia, and a rapidly rising fever with rigors and an unproductive cough may develop.
- Progressively worsening symptoms can occur within a few days, including pleuritic chest pain, vomiting, abdominal pain, confusion, neuropathy and clouding of consciousness.
- Further complications include disseminated intravascular coagulation, gastrointestinal bleeding, respiratory failure, shock and renal failure.

Risk factors

A person's risk of acquiring legionellosis following exposure to contaminated water depends upon a number of factors including:

- The type and intensity of exposure
- The exposed person's health status (those with underlying chronic disease, the elderly and the immunocompromised are more susceptible).

Table 1. Legionnaire's disease, 28 European countries, 1998 (WHO, 1999)

	Number of reported cases	Populations (millions)	Rate per million
Austria	28	8	3.5
Belgium	62	10	6.2
Croatia	8	1	8.0
Czech Republic	19	10.5	1.81
Denmark	106	5.2	20.38
England/Wales	217	52.2	4.16
Finland	15	5.1	2.94
France	307	58.54	5.25
Germany	20	1	20.00
Greece	10	1	10.00
Ireland	1	3.63	0.28
Italy	102	57	1.79
Latvia	0	2.5	0.00
Lithuania	0	3.7	0.00
Malta	2	0.37	5.46
Netherlands	44	15.65	0.60
N. Ireland	1	1.7	2.81
Norway	5	4.3	1.16
Portugal	17	1	17.00
Russian Federation (Moscow)	24	10	2.40
Scotland	42	5.14	8.17
Slovakia	1	5.3	0.20
Slovenia	16	1.9	8.06
Spain	232	39.35	5.90
Sweden	77	8.85	8.59
Switzerland	78	7.1	10.99
Tunisia	0	8.9	0.00
Turkey	8	4	2.00
TOTAL	1442*	333	4.33

*Confirmed cases =1028; presumptive cases = 402; status unknown = 12

Diagnosis

Clinical suspicion of this disease can be confirmed with sputum cultures and serum antibody levels. Early diagnosis can be made by the detection of antigen in urine.

Treatment

Intravenous Erythromycin and/or oral Rifampicin is the treatment of choice, substituted with oral Erythromycin once symptoms improve. With appropriate antibiotic therapy the mortality of legionnaires disease is low in immunocompetent patients. Intensive supportive care will be required for those who develop severe symptoms.

Now carry out Learning Activity 2.

Infection control

This disease is not contagious from person to person, so isolation precautions are not required. Sterile water should be used to fill reservoirs of devices used for nebulization or for rinsing such devices and other respiratory care equipment after disinfection. Large-volume air humidifiers that create aerosols should not be used unless they can be sterilised or subjected to high-level disinfection.

Prevention of spread

Environmental health measures should include regular cleaning and maintenance of water supplies and cooling and ventilation systems.

In hotels or institutions, flushing through showers with hot water prior to use, especially when they have not recently been used, may help to disperse any potential focus of bacteria in the shower head.

Definition

Leishmaniasis is caused by the protozoan *Leishmania*.

Mode of transmission

Leishmaniasis is transmitted to humans by the female sandfly. The sandfly bites on an animal or human in order to obtain a blood meal to develop its eggs. If this blood contains the leishmania parasites, these will continue to develop inside the sandfly over a period of 4–25 days. When the sandfly feeds again on a fresh source, transmission of the disease continues.

There are two types of leishmaniasis infection, cutaneous leishmaniasis (CL) and visceral leishmaniasis (VL). CL, the less serious form of infection, can be transmitted to humans from humans, via the bite of a sandfly. VL, the more serious form of infection, can only be transmitted to humans from animal hosts, via the bite of a sandfly. The dog is the main reservoir of infection.

Epidemiology

CL is the most common presentation in the otherwise fit population in Europe from countries that border with the Mediterranean. However, there has been an increase in the number of reported cases of VL infecting people who already suffer from HIV infection. IV drug abusers have been identified as the main population at risk.

Leishmania/HIV co-infection is considered to be a real emerging disease, especially in Southern Europe, where 25–75% of adult VL cases are related to HIV infection, and 1.5–9.5% of AIDS cases suffer from newly acquired or reactivated VL.

AIDS increases the risk of VL by 100–1000 times in endemic areas. Moreover, individuals with HIV

who are immunocompromised develop more severe leishmaniasis. VL, once developed in the HIV-infected person, accelerates HIV replication and causes further immunosuppression; AIDS develops more quickly and opportunistic diseases are more common.

Now carry out Learning Activity 3.

Manifestations

Although the leishmania parasites look the same under the microscope, CL and VL have very different clinical manifestations.

Manifestations of Cutaneous Leishmaniasis

This is one of the most important causes of chronic ulcerating skin lesions in the world, with types of lesions varying between geographical regions.

In the Mediterranean region the patients most commonly suffer from “dry” lesions.

This form of the disease produces skin ulcers on the exposed parts of the body such as the face, arms and legs.

They are single, dry, cutaneous lesions, which will heal over after a few months, and confer lifelong immunity against infection with the same parasite. The other species of CL found in regions such as Africa and South America, cause more severe ulceration and scarring.

Manifestations of Visceral Leishmaniasis (also known as Kala-azar)

This is the most serious form of leishmaniasis, and is fatal if left untreated.

Early infection

- After inoculation by the biting sandfly, the parasite may multiply locally causing a cellular

reaction and forming a definite nodule (leishmanioma).

- This may provoke a vigorous enough local reaction to kill the parasite and halt the disease process.
- In these cases, the patient will recover and will have developed resistance to further infection.

Disseminated infection

- If the body’s defence mechanisms do not destroy the parasite at the early stage, the disease will become disseminated throughout the body and the visceral stage of the infection is established.
- The incubation period at this stage is normally 3–18 months, but occasionally it is as short as two weeks.
- Fevers and sweating may develop but the patient may otherwise feel well.
- As the disease progresses, the spleen and liver become enlarged and the patient becomes emaciated and markedly anaemic.
- The body becomes unable to defend itself against a variety of bacterial infections (commonly infections of the respiratory tract and gut with pneumonia, bacillary and amoebic dysentery and tuberculosis), which then become the major cause of death
- If left untreated, the disease is usually fatal and death may occur within a few weeks of the first symptoms or be delayed for two years or more.

Diagnosis

The most accurate way to diagnose is to identify the parasite by microscopy or to culture material on a medium that allows their growth. This type of diagnosis will involve obtaining material from bone marrow, spleen or lymph nodes.

Blood tests can be used to try and identify antibodies, but this can give a false positive result.

Treatment

Most “dry” lesions found in CL are self-limiting and require no treatment other than protection from secondary infection with the use of simple dressings.

Patients with VL should be hospitalised until stable. Their nutritional status and potential deficiencies must be addressed, and any associated bacterial infections promptly diagnosed and treated. Most cases of VL respond to parenteral “pentavalent organo-antimony” drugs. These are given over a period of 30 days, but haematological and parasitological follow up should extend to one year to prevent any relapse. Unfortunately, HIV infected individuals have a very poor response to therapy.

Prevention of spread

This is dependant upon:

- control of the sandfly population through reducing breeding sites such as dark, moist habitats (cracks in masonry, piles of rubble and the bark of dead trees.)

Prevention of bites:

- Take precautions at dawn and dusk when sandflies bite.
- Wear suitable clothing, covering arms and ankles.
- Use repellents, especially during the evening
- Use bednets impregnated with permethrin if staying in basic accommodation.
- Control of animal reservoirs. Although the sandfly transmits leishmaniasis to humans, it is dogs and wild canines such as foxes that form the reservoirs of VL infection in the Mediterranean region. Infected animals look sick, lose their hair, and have an enlarged spleen. Efforts to identify and destroy infected animals have been attempted in France. However, although infected dogs can be identified by their appearance, infected foxes appear healthy and are thus more difficult to control.



REVISION POINT 2

Summarize cutaneous leishmaniasis and visceral leishmaniasis.
(See page 105 for help.)

Leptospirosis

Definition

Leptospirosis is a spirochaetal infection. It affects wild and domestic animals worldwide, especially rodents, but is rarely transmitted to humans.

Mode of transmission

Leptospirosis is transmitted when infected animal urine or other excretions come into contact with skin abrasions.

Epidemiological summary

Reliable figures on morbidity and mortality related to leptospirosis are generally lacking and the disease is often overlooked or underreported. The International Leptospirosis Society (ILS) had its first meeting in France in 1996 and attempts are currently being made to obtain epidemiological data. Cases occur throughout Europe, especially in rural areas where close contact with rodents is possible.

Manifestations

- Incubation period is 2–17 days.
- A flu-like illness with headache, fever, myalgia and arthralgia presents.
- Occasionally a more severe form of the disease (Weil's disease) occurs, presenting with jaundice, renal failure, and disseminated intravascular coagulation. Weil's disease has a fatality rate of 10–20%

Risk Factors

Farmers, veterinary surgeons, sewerage workers, fish farmers and those bathing or participating in water sports in contaminated water are particularly at risk.

Diagnosis

Leptospire can be cultured from blood, cerebrospinal fluid or urine.

Methods of treatment

Mild forms of the disease require no treatment. In

more severe cases, antibiotics (Doxycycline, Amoxicillin or Ampicillin) should be administered early to shorten the duration of early disease and to limit renal damage in extremely ill individuals. Delayed antibiotic treatment after complications have occurred may be of some help.

Nursing care

In cases of severe infection, patients may present with impaired renal and hepatic function, haemorrhage, and alterations in conscious level. In such cases hospitalization and full supportive care is necessary (Appendix 1).

Prevention of spread

- Avoid swimming in lakes and rivers.
- Those who may be exposed should: wear protective clothing and footwear; cover cuts with waterproof dressings; and wear gloves if coming into contact with or handling rodents.

REVISION POINT 3



What are the main treatments for anthrax, CCHF, hantavirus, Legionnaire's disease, and leptospirosis? (See pages 98–107 for help.)

Louse-borne typhus

Definition

Louse-borne typhus is a rickettsial disease caused by *Rickettsia prowazekii*.

Mode of transmission

Rickettsia prowazekii is transmitted by the human body louse *Pediculus humanus*. The lice become infected while feeding on the blood of a patient with acute typhus fever. Infected lice then excrete rickettsia in faeces when feeding on a second human host. The rickettsia enter humans through rubbing or scratching either infected faecal matter or crushed lice into the bite wound or any other entry site on the skin.

Epidemiological summary

This condition is rare in households with good hygiene.

Manifestations

- Incubation period is 1–3 weeks.
- Abrupt fever, severe headache and myalgia present.
- The fever remains high and unremitting.
- A fine pink macular rash spreads from the upper trunk to the whole body.
- Complications include delirium, meningitis, cranial nerve palsies, hepatitis and vascular collapse.
- Secondary infection may also occur.
- The fever settles after approximately two weeks.
- Post-infectious fatigue can last for several months.

If untreated, the mortality may be 1–20%.

Risk factors

The disease is associated with poor living conditions and overcrowding, as may be experienced by refugees or those living in war zones.

Diagnosis

Serological diagnosis can be made but takes several weeks to become positive. Treatment may often

be started if clinical diagnosis of this disease is suspected.

Treatment

If treatment begins before serious complications occur, the risk of fatal illness is virtually eliminated. Treatment is a single dose of 200 mg doxycycline, regardless of the patient's age.

Prevention of spread

Prevention is through:

- Cleanliness to prevent body louse infestations
- Delousing measures with insecticides and efforts to improve living conditions

Typhus vaccine

An inactivated typhus vaccine is available. It is recommended for high risk groups only, for example, workers who live in or visit areas where typhus cases actually occur and who will be in close contact with the indigenous population, and medical personnel who may provide care for patients with louse-borne typhus.

Lyme disease

Definition

Lyme disease is an infection caused by the bacteria *Borrelia burgdorferi*.

Mode of transmission

Borrelia burgdorferi is transmitted in tick (*Ixodes ricinus*) saliva when the tick bites the host. *Ixodes ricinus* is found throughout North America and Europe. The disease reservoirs are small mammals such as field mice and moles, and larger mammals such as deer and sheep. The ticks feed on blood by inserting their mouthparts into the skin of the host animal, but because they are slow feeders, a complete blood meal can take several days. As they feed their bodies slowly enlarge.

Epidemiological summary

This infection is widespread in Europe although clinical cases are not frequently identified. Serological studies suggest asymptomatic infection is common in those exposed to tick bites.

Manifestations

Lyme disease is a multi-system disease, which can be described in three broad categories, based on the clinical features and the time since acquisition.

Early localized disease

- A few days to a month after the tick bite.
- The patient presents with general “flu-like” symptoms (fatigue, headache, arthralgia).
- Careful examination at this stage may reveal a macule at the site of the tick bite surrounded by a painless red rash.
- If left untreated the disease can potentially progress.

Early disseminated disease

- Weeks to months after the tick bite.

- This can present with cerebro nervous system (CNS) symptoms (meningitis, peripheral neuropathy, myelitis).
- Cardiac complications may occur.
- Multiple areas of erythema migrans can be seen on the skin.
- Migratory arthritis may affect one or more of the large joints.
- Facial nerve paralysis.

Chronic or persistent disease

- Months to years after the tick bite
- Arthritis
- Encephalopathy – confusion, memory loss, cognitive impairment, atoxia, dementia
- Skin lesions
- Mood or sleep and may occasionally present with
- Bladder dysfunction
- Depression

It is rarely, if ever, fatal, but can be debilitating for those with the chronic condition.

Risk factors

Ticks do not fly or jump. They can only crawl, and are transferred to humans and animals as they brush against vegetation. Ticks are found in areas with long grass and shrubs. Those at high risk of being bitten are outdoor workers, campers, hikers, and others who frequent wooded, brushy, and grassy places.

Diagnosis

The diagnosis is established from the clinical picture, a possible exposure to tick bites and the detection of antibodies, which are normally detectable around 4–6 weeks after exposure.

Methods of treatment

At the early-localized stage, it can be successfully

treated with antibiotics (Amoxicillin or tetracyclines). Treatment at the later stage is with long-term (4 weeks or more) antibiotics such as cefotaxime (I.V.) or doxycycline. Patients will require support and reassurance throughout this debilitating illness.



REVISION POINT 4

Summarize the 3 categories of Lyme disease. (See page 109 for help.)

Prevention of spread

There is no vaccine against the type of Lyme disease found in Europe, although a vaccine is available for North American strains.

Prevention is through:

- Avoidance of tick bites: those at risk should wear protective clothing (long trousers and socks), and use an insect repellent. Skin should be inspected for ticks every few hours and any ticks found should be removed immediately.
- Those living in areas where the disease is prevalent being aware of the early signs of disease to allow prompt diagnosis and treatment.

Now carry out Learning Activity 4.

Definition

Malaria is caused by a protozoan parasite. There are four *Plasmodium* species that affect humans. *Plasmodium falciparum* causes the most dangerous type of malaria and can quickly cause life-threatening cerebral malaria and multi-organ failure if left untreated or not treated properly. *Plasmodium vivax*, *Plasmodium ovale*, and *Plasmodium malariae* cause the other three types of malaria which can cause significant morbidity, but which rarely causes death.

Epidemiological summary

Malaria occurs in five European countries: Tadjikistan, Turkey, Azerbaijan, Armenia and recently (since 1999) Georgia. In Tadjikistan, official figures showed an increase from under 300 in 1993 to more than 30 000 in 1998. In Turkey the disease was brought under control in the 1960s, but then epidemics occurred, once again, during the 1970s. The type of malaria prevalent in these regions is *Plasmodium vivax* malaria. The more serious *Plasmodium falciparum* malaria has limited transmission in Tadjikistan and is more of a risk for European travellers visiting tropical areas.

Modes of transmission

The modes of transmission are:

- via the bite of the female anopheline mosquito, mainly during the night. This is by far the most common mode of transmission; and
- by direct transmission via blood transfusion, sharing of drug injecting equipment, or by needlestick injury.

Manifestations

- Presentation is varied and nonspecific but fever is almost always present.
- Often presents as a “flu-like” illness 8–30 days after exposure.

- Fevers and rigors are common.
- Malaise, headache, diarrhoea, nausea, muscle pain and aching limbs may occur.
- If *Plasmodium falciparum* is left untreated, progressive life-threatening complications can develop within a few days (such as cerebral malaria), with increasing complication following within a few months (such as severe anaemia).
- Ominous signs are jaundice, drowsiness or confusion and occasionally black urine (“black-water fever”).
- If not treated quickly and effectively, the more serious form of disease can lead to death.

Diagnosis

A presumptive clinical diagnosis can be made in the absence of laboratory facilities or when rapid results are not available for any person with a fever or flu-like symptoms, who lives within or has been in a malarious area, excluding other obvious causes of fever.

Thick and thin blood films can confirm malaria; the thick, stained film can reveal white cells and parasites which can be too scanty to see on normal thin films, whereas species identification is performed on the thin blood film. *Plasmodium falciparum* may be seen on a blood film 9 days after infection, but it may take weeks or months before the other species can be seen. Repeat examinations may be required.

In certain circumstances, rapid immunological tests (dipstick) can be used.

Methods of treatment

Treatment involves:

- elimination of the asexual parasites from the blood with schizontocidal drugs;
- recognition and management of any

complications; and

- provision of supportive measures.

The choice of antiprotozoal drug used for treatment will depend upon:

- the type of Plasmodium species identified; and,
- whether the parasites are resistant to any of the drugs. (This is unlikely in malaria contracted within Europe and is more likely in Europeans who have returned from a tropical area.)

Depending upon the above, drugs may be used on their own or as combinations. They include: chloroquine, Pyrimethamine-sulfadoxine, mefloquine, quinine and tetracyclines. Patients with severe falciparum malaria require prompt treatment, preferably with quinine parenterally, depending upon the patient's condition. *P. vivax* malaria requires radical treatment (clearing parasites also from outside the blood) with three days chloroquine followed by 14 days of primaquine.



REVISION POINT 5

Name the 4 species of Plasmodium affecting humans. What type predominates in Europe?
(See page 111 for help.)

Nursing care

If complications develop, the patient may require intensive nursing and medical care (Appendix 1). Since blood-to-blood spread can occur, universal precautions regarding sharps and other intravenous equipment should be applied (see Module 1). It is important that medical staff be aware that blood transfusion is a potential source of infection in areas where malaria is endemic.

Prevention of spread

This is dependent upon:

- control of the mosquito population through prevention of mosquito breeding sites, indoor residual spraying and/or consistent use of impregnated bednets;
- control of other factors associated with potential spread, such as deterioration of public health services resulting from armed conflicts and mass movement of refugees (mainly the case in European countries); and
- personal prevention of mosquito bites for those in risk areas through: awareness of how malaria is spread; taking barrier precautions against mosquito bites (clothing, repellents, screened accommodation, use of impregnated mosquito nets); when appropriate, taking antimalarial chemoprophylaxis (usually for visitors going into endemic areas); and, early diagnosis and prompt treatment.

Now carry out Learning Activity 5.

Rabies is caused by a rhabdovirus. It is a zoonotic viral disease found in domestic and wild animals.

Mode of transmission

Rabies is transmitted to humans through close contact with infected saliva, whether through a bite, scratch or lick onto mucous membrane or broken skin. It is not, in the natural sense, a disease of humans; rather, human cases are incidental to the reservoir of disease in domestic and wild animals.

Epidemiological summary

With the exception of Antarctica and Australia, animal rabies is present in all continents. It is endemic in wild animals (particularly foxes) in rural areas of northern Europe and is found in most countries in southern Europe.

Cases of human rabies are, however, rare in Europe, with fewer than 10 cases annually. Most infections resulting from dog bites occur in the Eastern European countries.

The eradication of dog rabies by vaccination of domestic animals and elimination of stray dogs has been very successful in most western European countries. In an effort to further eradicate the disease in foxes, a campaign began in 1990 to orally immunise wildlife in European countries. The number of rabies cases in animals has since been reduced by 80% and it is hoped that with the use of this technique, terrestrial reservoirs of rabies in western Europe will eventually be eliminated. (See Appendix 2 for figures.)

Manifestations

Rabies virus infects the central nervous system, causing encephalopathy. Once symptoms develop, there is no known cure and the disease is always

fatal. The disease may manifest with a prodromal phase, followed by an acute neurological phase that takes one of two forms: furious or paralytic.

Prodromal phase

- The incubation period is usually 2–8 weeks but may be more than a year. (Bites nearer to the head and brain, or where large amounts of virus are transmitted, result in shorter incubation periods.) There may be fever, headache, and general malaise. Pain or numbness at the site of the original bite is common.

Furious rabies

- Initial neurological signs may include hyperactivity, disorientation, hallucinations or bizarre behaviour.
- After a period of hours to days, hyperactivity characteristically becomes intermittent, with 1–5 minute periods of agitation, thrashing, running, biting or other bizarre behaviour, alternating with periods of calm where patients are often cooperative and orientated although anxious.
- The hyperactive episodes may occur spontaneously or may be precipitated by a variety of stimuli (tactile, auditory, visual or other).
- Attempts at drinking during this period are followed by severe spasms of the pharynx, larynx and diaphragm that produces choking, gagging and fear (hydrophobia).
- Copious secretions of saliva are characteristic with the patient often frothing at the mouth

Paralytic rabies

- This occurs in approximately 20% of the patients where paralysis dominates the entire clinical course.
- The patient is initially relatively intact mentally, with little agitation or confusion, but the mental status gradually deteriorates from confusion to disorientation, stupor and finally coma.

- The acute neurological phase lasts 2–7 days with the longer duration in the paralytic form.
- It ends with an abrupt death or progression to coma.
- Coma may last for hours to months, but in untreated patients, respiratory arrest usually occurs at or shortly after the onset of coma.

Even if intensive care facilities are available, complications occur during the coma phase, which result in death: hypoxia, anaemia, renal failure, cardiac arrhythmias, congestive cardiac failure, and cerebral oedema.

Risk factors

Those who work with animals in endemic areas, and anyone exposed to an animal bite or lick on mucosal or damaged skin surfaces while in an endemic area, is at risk for contracting rabies.

Diagnosis

No tests are currently available to diagnose rabies in humans before the onset of clinical symptoms. In the clinical course of the disease, the virus can be isolated from saliva, brain, CSF and urine. A corneal impression smear and skin biopsies may show a positive result; although this will confirm a diagnosis, a negative result does not exclude infection. Postmortem diagnosis can be confirmed by examination of brain tissue.

Methods of treatment

There is no specific treatment once the disease is established.

Treatment of a wound following a potentially infected bite

Since elimination of the rabies virus at the site of infection by chemical or physical means is the most effective mechanism of protection, immediate

vigorous washing and flushing with soap and water, detergent or water alone are imperative. (This procedure is recommended for all bite wounds.) Following this, apply either ethanol (700 ml/l), tincture or aqueous solution of iodine or povidone iodine. Suturing should be avoided and tetanus prophylaxis should be considered.

The infiltration of human rabies specific immunoglobulin around the wound may be indicated in high risk cases, for example, bites sustained in a country where there is a high risk of rabies infection (Asia, Africa, South America), or an unprovoked, penetrating bite from an animal with no history of immunization. Human rabies specific immunoglobulin provides immediate passive protection. A course of rabies vaccine (usually five doses deep subcutaneously or IM on days 0, 3, 7, 14 and 30) should be initiated. Rabies immunoglobulin is difficult to access in many areas and rabies vaccine can be expensive (see further notes) so may not be easily available.

Now carry out Learning Activity 6.

Nursing care

Intensive care facilities can prolong life, but since death is inevitable, the most humane care for such patients involves the relief of agony and suffering with effective analgesia and sedation.

Supportive care for the presenting symptoms includes:

- Hydrophobia: nil by mouth
- Hyperactive episodes: sedation
- Hypothermia: heat blankets
- Hyperthermia: cooling measures.

Infection control

Rabies virus may be present in saliva, tears, urine,

or other body fluids. Therefore, in order to prevent any possible transmission basic precautions, Universal Precautions and transmission based precautions should be taken (see Module 1).

While human-to-human transmission has not been recorded, pre-exposure vaccination is recommended for those caring for, or likely to care for, a patient with rabies. Post-exposure vaccine can be given to staff found to be caring for infected patients.

Prevention of spread

This is dependent upon:

- reduction of rabies virus in animal hosts through vaccination campaigns; and
- post-exposure treatment following a potentially infected bite.
- Pre-exposure prophylaxis for individuals at risk; cell cultured neurological tissue or egg based vaccines may be given as a course of three injections of 1ml given deep subcutaneously or IM or 0.1 ml given intradermally on days 0, 7 and 28; if the cell culture vaccine is unavailable, the cheaper, alternative, but less effective animal nerve tissue or mouse brain tissue vaccine can be used. Pre-exposure vaccination does not rule out the need for further vaccine if exposed to the virus.

REVISION POINT 6

What is the difference between rabies vaccine and rabies-specific immunoglobulin?
(See page 114 for help.)



Definition

Tetanus is caused by infection of wounds by the bacterium *Clostridium tetani*, which produces a toxin that damages the nervous system and muscles.

Epidemiological summary

Tetanus occurs throughout the world and is a leading cause of death in many developing countries, particularly in hot, moist tropical areas. Globally, it is significant because it is common, often fatal, and although difficult to treat, is easily prevented.

Sixty years ago tetanus was common in Europe, but the introduction of immunization programmes such as the Expanded Programme of Immunization have greatly reduced its incidence. Countries in Europe reporting sporadic cases in recent years include Albania, Azerbaijan, Croatia, the Federal Republic of Yugoslavia, Portugal and Romania.

Mode of transmission

The bacterium *Clostridium tetani* is found in the intestinal tracts of man and animals, where it remains harmless and causes no disease. However, spores are produced which are passed in the faeces, and contaminate the environment. These spores can persist for years in soil and dust and are resistant to heat, drying, chemicals and sunlight.

Tetanus spores enter open wounds at the time of an injury (traumatic wounds, animal bites or burns). The wound need not be serious. In countries where hygiene standards are poor, there is a high incidence of neonatal tetanus, where spores enter and infect the babies through the umbilical cord. Tetanus cannot be spread directly by person-to-person contact.

Manifestations

- The incubation period is 3–21 days.
- Slowly increasing muscle rigidity occurs.
- Often the patient will complain of trismus (“lockjaw”), an inability to open the mouth wide.
- Clinical examination at this stage may also show rigidity of spinal muscles and board like firmness of the abdominal muscles.
- General painful muscle spasms then develop, resulting typically in arching of the back and facial grimacing; spasms may be provoked by sudden sensory stimuli like loud noises or abrupt handling.
- Progression may involve the autonomic nervous system causing cardiac arrhythmias, instability of temperature and highly labile blood pressure.
- The severity is greater when the incubation period is short.
- The death rate is estimated at 3 per 100 with good hospital care.

Diagnosis

Diagnosis is entirely clinical. *Clostridium tetani* is recovered from the wound in only 30% of patients.

Methods of treatment

Guidelines for treating wounds

Thorough and careful wound cleaning is essential when treating any wound. Protection against tetanus with vaccine and human tetanus immunoglobulin must be considered, the choice depending upon previous immunization history and whether the wound is considered to be tetanus-prone or not. (See Module 2 for tetanus immunization schedules).

The following are considered to be tetanus-prone wounds:

- Six hour interval between wound or burn and treatment

- Any wound or burn regardless of time since injury that shows substantial devitalised tissue, a puncture wound, contamination with soil or manure, and the presence of infection

The guidelines below are from the British recommendations. These may be different in other European countries.

the characteristic spasms. These spasms are often triggered by sensory stimuli, so a calm, quiet environment should be provided. Analgesia should be administered to prevent pain.

Prevention of spread

Tetanus can never be eradicated because the spores are always present in the soil. However, prevention of

Specific anti-tetanus prophylaxis

Immunization Status	Clean Wound – Treatment Required	Tetanus Prone Wound – Treatment Required
Last of 3 dose course or reinforcing booster within last 10 years	Nil	Nil (a dose of human tetanus immunoglobulin may be given if infection is considered high e.g. contamination with manure)
Last of 3 dose course or reinforcing booster more than 10 years	A reinforcing dose of adsorbed vaccine	A reinforcing dose of adsorbed vaccine plus a dose of human tetanus immunoglobulin
Not immunized or immunization status not known	A full 3 doses course of adsorbed vaccine	A full 3 doses course of adsorbed vaccine plus a dose of human tetanus immunoglobulin

Treatment

Deep penetrating wounds provide ideal conditions for bacteria to develop so these should be surgically opened and debrided. Antibiotic therapy (Metronidazole or Penicillin) should be given.


Patients with mild muscular spasms may be treated with infusions of diazepam. For more severe cases, where autonomic instability presents, intensive medical care with assisted ventilation and muscle relaxants may be required.

Nursing care

The patient suffering from tetanus does not lose consciousness and experiences severe pain during

human cases can be achieved through diligent immunization programmes. (See Module 2.)

Individuals who contract the disease do not subsequently confer natural immunity. Immunization should therefore be given to anyone who recovers from tetanus.



REVISION POINT 7
 What normally constitutes a primary course of tetanus vaccine?
 (See pages 116–117 for help.)

Tickborne encephalitis

Definition

Tickborne encephalitis is a flavivirus infection.

Modes of transmission

The virus responsible for this disease is transmitted to man in two ways:

- via the bite of an infected tick (*Ixodes ricinus*); and,
- by ingestion of unpasteurised milk from infected animals, usually goats. (Very rarely is it transmitted in this manner.)

The reservoir of infection found is in rodents, birds, goats and cattle. It cannot be spread directly from human to human.

Epidemiological summary

The disease is endemic in parts of Europe and Scandinavia, and in forested areas (especially where there is heavy undergrowth). Risk is greatest in late spring and summer when ticks are most active.

Manifestations

- The incubation period is 1–2 weeks.
- A flu like illness lasting for a few days presents.
- The illness may produce no further symptoms.
- In approximately 25% of cases, a second phase will develop after 10 days, characterised by severe headache and fever.
- 1–10% will then develop encephalitis.
- Death is rare.

Risk factors

Tickborne encephalitis is primarily an occupational disease affecting soldiers, agricultural workers, and forestry workers. Campers, hill walkers and ramblers may also be exposed.

Treatment

Post-exposure prophylaxis with specific human immunoglobulin can be initiated following a potentially infectious tick bite, but there is no specific treatment for this disease once established.

Nursing care

In cases where the disease progresses to encephalitis, intensive medical and nursing care will be required. (Appendix 1).

Prevention of spread

This is dependent upon:

- Avoidance of tick bites. Those at risk should wear protective clothing (long trousers and socks), and use an insect repellent. Skin should be inspected for ticks every few hours and any ticks found should be removed immediately.
- Those living in endemic areas should be aware of the disease and how it is transmitted.

Immunization

A pre-exposure vaccine is available for those likely to be exposed. Two doses of 0.5 mls IM given 4–12 weeks apart provides protection for one year; a third dose given 9–12 months after the second, gives protection for three years. The vaccine is widely used to protect special groups of workers and inhabitants in known tickborne encephalitis foci in Europe.

Prompt treatment with post exposure prophylaxis (specific human immunoglobulin) is available and provides immediate passive protection if given within four days of the tick bite.

Now carry out Learning Activity 7.

Toxoplasmosis

Definition

Toxoplasmosis is an infection caused by the single celled parasite *Toxoplasma gondii*.

Mode of transmission

- Faecal-oral spread through eating poorly cooked meats, especially pork and mutton. Cysts are harboured in the animal's tissues but are not excreted in the faeces.
- Faecal-oral spread through contact with cat's faeces. Members of the cat family are known definitive hosts for *T. gondii* and thus are the main reservoirs for infection; the parasites are excreted in the cats' faeces and can remain in the soil or environment for many months.

Vertically: a congenitally acquired infection can occur when a pregnant woman acquires an acute infection and the organism enters the foetal blood circulation.

Epidemiological summary

Toxoplasmosis is one of the most common of human infections throughout the world, but is more prevalent in warmer climates and at lower altitudes than in cold climates and mountainous regions. It is more common in countries where meat is eaten raw or rare.

Manifestations

Uncomplicated infection

- Generally asymptomatic
- 10–20% of cases will experience a flu-like illness
- The clinical course is benign and self-limiting and any symptoms will resolve within a few months.

Infection in an immunocompromised patient

- May suffer more severe symptoms including myocarditis, pneumonitis, and intracerebral lesions.

Infection in pregnancy

- Likely to cause spontaneous abortion
- Infants born with congenitally acquired infection are likely to develop eye disease as a result (endophthalmitis). Urgent diagnosis is required because sight may be severely and permanently compromised.

Reactivation of latent illness

The most common presentation is as choroidoretinitis with eye pain. Retinal damage, which may include the macula, can cause blind spots.

Diagnosis

Diagnosis is by serological testing. The diagnosis of endophthalmitis is by culture of vitreous humour.

Treatment

Treatment is usually with oral pyremethamine and sulphonamide. Hospital referral is essential for infants with endophthalmitis.

Prevention of spread

Awareness and prevention of spread is especially important for women during pregnancy and the immunocompromised. Advice should include:

- wash hands after handling raw meat and poultry;
- do not touch eyes or mouth whilst handling raw meat and poultry;
- cook meat completely (heat to at least 65° C);
- do not clean cat litter boxes; if unavoidable, wear gloves while doing so; and
- wear gloves when gardening.

As an additional precaution for children, keep children's play areas free of cat excrement.

Definition

West Nile fever is caused by the West Nile flavivirus.

Mode of transmission

The virus is spread to humans by the bite of the culex mosquito. Wild birds are the principal hosts of this virus, although it has been isolated from mammals (mice, camels, horses, and dogs). The virus is principally maintained within the bird population, but human outbreaks of the disease occur when the culex mosquitoes feed on both infected birds and humans.

Epidemiological summary

In Europe, the virus was first isolated in 1963 from patients in the Rhone Delta and Volga Delta. Over the past 40 years cases have been identified in southern France, southern Russia, Spain, Romania, Belarus, Ukraine and Czechoslovakia.

In 1996–1997, an outbreak of West Nile fever in and near Bucharest, Romania, resulted in more than 500 clinical cases and a case fatality rate approaching 10%.

The incidence of West Nile Fever in Europe is largely unknown, but the 1996–1997 outbreak reaffirmed that mosquito-borne viral diseases may occur on a mass scale, even in temperate climates. It is essential that careful surveillance of this disease continue, as it is predicted that environmental factors and human activities which enhance vector population densities (irrigation, heavy rains followed by floods, higher than usual temperatures), may allow the re-emergence of this mosquito borne disease. Global warming may also lead to an increase in mosquito vectors.

Manifestations

- A flu-like illness characterised by an abrupt onset of fever and headache, sore throat, backache, myalgia, arthralgia, maculopapular or roseolar rash, anorexia, nausea, diarrhoea and respiratory symptoms.
- Occasionally (< 15% of cases) encephalitis, meningitis, hepatitis, and myocarditis occurs.

Diagnosis

Peak viraemia occurs 4–8 days post infection, but can be identified from a blood sample for up to 10 days.

Treatment

There is no specific treatment for this illness, but the use of analgesics and anti-inflammatories will provide relief of general symptoms. Intensive care (Appendix 1) may be required if more severe complications occur.

Prevention

Prevention is dependant upon:

- Control of the mosquito population (See previous notes.)
- Prevention of mosquito bites for those in risk areas (See previous notes.)

Note: The culex mosquito responsible for spreading this disease is a day-biting mosquito, and can be found in houses and urban areas.

REVISION POINT 8



What is/are the main treatment(s) for the following diseases: leptospirosis, louse-borne encephalitis, Lyme disease, malaria, rabies, tetanus, tickborne encephalitis, toxoplasmosis, and West Nile fever?
(See pages 107–120 for help.)

Summary of key points

- The epidemiology of infections transmitted by animals and insects varies due to its dependence upon numerous factors including variations in geographical, environmental, seasonal, economic, and social factors.
- Transmission of infection may be direct from the animal or insect, but often an intermediate host is also involved.
- Specific treatment for such diseases is often unavailable and symptomatic care and support are indicated.
- For the most severe forms of infection, intensive care facilities are indicated if available.
- Vector control and prevention of insect bites are important in the prevention of insect-borne infections.

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Patients who are suffering from serious symptoms or complications from certain infectious diseases may, at some point, require intensive care. Each patient care plan will depend on hospital facilities and equipment available, and will vary according to the specific disease symptoms. The following guidelines provide a framework for planning the essential areas of care necessary for these patients. To provide continuity of care, one nurse should be allocated to look after each patient, and in order to monitor the patient's progress, clear and concise written charts and progress reports must be maintained. Any deterioration in the patient's condition should be reported immediately to the physician in charge.

GENERAL OBSERVATIONS

Respiration

- Goal: to maintain a clear airway and promote gas exchange
- Regular observation of respiratory rate, tidal volume, cyanosis, use of accessory respiratory muscles.
- Observe secretions: need for suctioning or culture if infection suspected.
- Provide oxygenation if required.

If equipment available it may be possible to provide

- Continuous monitoring of oxygen saturation.
- Regular monitoring of blood gases.
- Artificial ventilation: (this may be necessary for patients with respiratory, neurological or muscular disorders).

Cardiovascular

- Regular observation of pulse (volume, rhythm, rate).
- Regular observation of blood pressure.

Recorded every 15 minutes – but more or less frequently, depending on stability of patient's condition.

If equipment available, then ideally by continuous monitoring.

If central venous cannulation is available, it should also be monitored.

Temperature control

- Regular observation of temperature, with cooling measures implemented when indicated e.g. cooling fans, antipyretic agents.

Neurological

- If consciousness is affected, it should be assessed and recorded using a format such as the Glasgow Coma Scale (GCS), which has a relatively high degree of inter-observer reliability (see below).
- In general, neurological observations should be carried out every hour unless the patient's condition dictates otherwise.
- In addition to observing and recording the GCS, pupil size and reaction to light should be recorded.
- Limb strength and cardiovascular status are also useful indicators.

Glasgow coma scale

Eye opening (E)	Verbal response (V)	Motor response (M)
Spontaneous	Orientated	Obeys commands
To speech	Confused	Localises to pain
To pain	Inappropriate words	Flexion to pain
None	Incomprehensible sounds	Extension to pain
	None	None

Hydration

- Careful observation of fluid loss (for example, urinary output, diarrhoea, temperature, sweating, blood loss) and fluid intake.
- Regular observation of intravenous cannula site for redness or signs of inflammation.
- Additional consideration to hydration should be given if the patient has renal or cardiac failure.
- Regular monitoring of urea and electrolyte balance (twice daily if possible).

Elimination

- Observation of bowel movements – amount, consistency, frequency, odour, colour, any blood loss, stool culture if indicated.
- Observation of urinary output – amount, colour, haematuria, culture if indicated.
- Urinary catheterization may be considered if patient unable to micturate.

Nutrition

- If unable to eat, nutrition should be provided by nasogastric tube feeding.
- If equipment is available, Total Parenteral Nutrition (TPN) may be given via the central venous line.

Muscular/skeletal/skin care

- Daily bed bath
- 2 hourly eye care
- 2 hourly oral hygiene
- 2 hourly positional changes, observe “pressure areas”, encourage passive exercises
- Any contaminants (faeces, vomit, urine, etc.) should be removed immediately and the area washed.

Communication/psychology

- Patients, even when unconscious, should be constantly reassured and given an explanation of any procedure about to be carried out.
- The family should be kept well informed of the patient’s progress and time taken to discuss any fears or concerns they may have.

Number of rabies cases in Europe, 1. 1. 1998–30. 9. 1998
(most recent data available)

Appendix 2

Country	Domestic animals							Wild animals						Cases in humans	Total
	Dog	Cat	Cattle	Horse	Sheep Goat	Others	Total	Fox	Badger	Other mustel	Deer	Others	Total		
Albania ^a							0						0		0
Austria							0	2					2		2
Belgium							0	1					1		1
Bosnia and Herzegovina ^b							0						0		0
Bulgaria							0					8	8		8
Belarus	22	7	5	4		1	39	25				18	43		82
Croatia	7	8	2		3		20	214		4		3	221		241
Czech Republic	1	3					4	49	1			1	51		55
Denmark					1		1					12	12		13
Estonia	15	22	1		1		39	69	2	2	1	29	103		142
Finland ^a								0					0		0
France	1						1	1				1	2		3
Germany	2	2			1	1	6	5	6	2	2	3	63		69
Greece ^a								0					0		0
Hungary	17	40	13	2	1		73	325		5	4		334		407
Iceland ^a								0					0		0
Ireland ^a								0					0		0
Italy ^a								0					0		0
Latvia	17	24	6				47	77	11	2	1	29	120		167
Lithuania	9	15	33	3			60	47	3	9	2	15	77		137
Luxembourg ^a								0					0		0
Netherlands								0				6	6		6
Norway ^a								0					0		0
Poland	31	46	58				135	723	5	32	4	90	854		989
Portugal ^a								0					0		0
Republic of Moldova	3	3	1					7	18				18		25
Romania	3	5	1		18		27	8				1	9		36
Russian Federation	337	186	313	16	61	13	926	531	6	11	1	46	595	3	1524
Spain	7							7					0		7
Slovakia	20	22	1				43	220		4	1	2	227		270
Slovenia								0	14				14		14
Sweden ^a								0					0		0
Switzerland + Liechtenstein								0					0		0
Turkey	81	1	15	1	2	1	101						0		101
The former Yugoslav Republic of Macedonia								0					0		0
Ukraine ^b								0					0		0
United Kingdom ^a								0					0		0
Federal Republic of Yugoslavia	4	8					12	43			2	1	46		58
TOTAL	577	392	449	27	88	15	1548	2423	28	71	18	266	2806	3	4357

^a no cases

^b no data

MODULE 5

Diseases spread by person-to-person contact

Stated learning outcomes

Glossary of terms

Diphtheria

Influenza

Pertussis

Mumps

Rubella (German measles)

Haemophilus influenzae Type B disease (HiB)

Pneumococcal pneumonia

Summary of key points

Bibliography

Appendices

MODULE 5

The OBJECTIVE of this module is to increase the nurse's and midwife's knowledge of eight infectious diseases prevalent in the Eastern European region: diphtheria, influenza, pertussis, mumps, measles, rubella, haemophilus influenzae type b, and pneumococcal pneumonia. It is hoped that increased knowledge and awareness about the diseases will lead to:

- earlier recognition of clinical signs and symptoms with appropriate investigation;
- prompt and effective intervention, treatment, and nursing care; and
- improved public health education.

STATED LEARNING OUTCOMES

On completion of this module you should have an understanding of:

- the epidemiology, mode of transmission, manifestation, standard treatment, and prevention of spread in relation to the eight communicable diseases presented;
- the nursing care of patients with the above diseases, including the assessment of respiratory status, specific complications and nursing interventions; and
- the education required for patients, families, and the general public on how to prevent and control the diseases.

KEY WORDS

Bacteria; communicability; epidemiology; incubation period; immunization; microbe; prodromal period; transmission; virus

GLOSSARY OF TERMS

BACTERIA: a procaryotic microbe; they vary morphologically; spheric (cocci), rod-shaped (bacilli), spiral (spirochetes) or comma-shaped (vibrios)

COMMUNICABILITY: the period of time that a disease can be transmitted from an infected person to another person

EPIDEMIOLOGY: the branch of medical science concerned with the occurrence, transmission, and control of epidemic diseases

INCUBATION PERIOD: the interval between infection with a microbe and the development of the signs and symptoms of disease

IMMUNIZATION: the practice of making immune with inoculation

MICROBE: an organism too small to be seen with the naked eye (or only just visible); the term includes bacteria, fungi, protozoa, some of the algae and viruses (microorganisms)

PRODROMAL PERIOD: term describing the time when symptoms signal the onset of a disease

TRANSMISSION: the way in which a microbe spreads from one person to another

VIRUS: a microorganism only capable of reproduction within living cells

It is evident that diseases once thought to be retreating are reappearing again, with outbreaks of diphtheria and influenza occurring in the last ten years, particularly in Eastern Europe. The increase in mass population movements has transported diseases into areas where they were not previously known. In addition, refugees and displaced people are particularly vulnerable to infectious disease. Many factors contribute to the spread of infectious diseases.

The link between environmental quality and health is critical. Over 10% of all preventable ill-health today is said to be due to poor environmental standards – bad housing, overcrowding, indoor air pollution, poor sanitation, and unsafe water. Bad housing and poor environmental conditions have the greatest impact on acute respiratory infections and children are the worst affected. In developing countries about 700 million people – mainly women and children in poor rural areas – inhale harmful smoke from burning wood and other fuels, predisposing them to the risk of acute respiratory infections, especially pneumonia.

Globally, it is said that six infectious diseases, including pneumonia and measles, cause over 90% of deaths due to infection. At least half, in some cases nearly all, of the deaths could have been avoided with affordable interventions such as childhood vaccination and the adoption of the integrated management of childhood illnesses strategy (IMCI). Given that seriously ill children often suffer from more than one condition at the same time, the IMCI approach is to offer combined therapy. This includes oral rehydration solutions to treat diarrhoea, antibiotics to treat pneumonia, vitamin and mineral supplements, immunization, breastfeeding and improved general nutrition.

This module discusses eight infectious diseases spread from person to person. All eight infectious diseases are vaccine preventable, six occurring predominantly in children, and two occurring in both children and adults. Most of the diseases are spread by direct and indirect droplet spread from the respiratory tract.

Understanding person-to-person spread of disease

In relation to diphtheria, influenza, pertussis, measles, mumps, rubella, haemophilus influenzae type b, and pneumococcal pneumonia, the person to person spread of infection may be:

- direct via droplet nuclei; sneezing, talking or coughing results in airborne particles being discharged from the nose, mouth or respiratory tract of the infected person onto the mucous membranes of another person; and
- indirect via articles or hands freshly soiled with the persons infectious secretions.

Now carry out Learning Activity 1.

Definition

Diphtheria is a serious bacterial infection, usually of the throat, caused by *Corynebacterium diphtheriae*. The throat infection may obstruct breathing and cause death. The important feature of an isolate of *C. diphtheriae* is whether it is able to produce toxins. There are many harmless non-toxigenic strains of *C. diphtheriae* which may be carried in the throat. If the strain is toxin-producing, the exotoxin becomes fixed on tissues unless neutralised by circulating antitoxin. The exotoxin can cause damage to other organs such as the heart, kidneys and nerves and can result in death.

Mode of transmission

Diphtheria is spread from person to person by droplets from the respiratory tract of a carrier or patient, or via the discharge from cutaneous lesions. The bacteria resists drying and contaminated articles may serve as a reservoir of infection. Transmission is increased in over-crowded and poor socio-economic conditions. Prolonged close contact is normally required for transmission.

- Incubation period: usually 2–5 days, but 1–7 days possible.
- Communicability: up to 2–3 weeks after the onset of the disease, shorter if antibiotics are given.

Epidemiological summary

Large epidemics occurred in Europe during and after the Second World War, with an estimated one million cases and 50 000 deaths in 1943. In the face of rising immunization levels in all countries throughout the world in the 1940s and 1950s, what was once a cyclical epidemic disease is now characterized by sporadic cases and intermittent outbreaks of low intensity. However, recent large epidemics of diphtheria have occurred in several eastern European countries, the epidemiological

pattern of the disease differing in relation to the different immunization histories in the populations. In the early 1990s a major epidemic of diphtheria spread throughout Eastern Europe, being declared an international emergency in 1997. The outbreak of diphtheria in Estonia in 1991–1993 was thought to be a reflection of the Russian epidemic but was said to be under control in 1994. In 1980, Europe accounted for less than 1% of diphtheria cases worldwide, but by 1994 almost 90% of reported cases occurred there. The large numbers of cases reported from the Russian federation, Ukraine, and Newly Independent States are said to be due to a combination of low vaccine coverage in children, low immunity in adults, increasing migration of populations, and poor response to outbreaks from Public Health Authorities.

Now carry out Learning Activity 2.

Manifestations

Pharyngeal and tonsillar diphtheria

- Sore throat, which may be mild or severe
- A false membrane forms in the throat spreading from the tonsils to the anterior pillars and uvula. The membrane may obstruct the airway. It is typically a dirty grey or grey-green colour when fully developed but may be white in the early stage of the disease. The edges of the membrane are slightly elevated and bleeding occurs when there is an attempt to remove it. It should not be scraped off as the toxin may be released and absorbed into the bloodstream. Also:
 - Neck tissues may become swollen giving a “bull neck” appearance.
 - Pulse rate is often rapid.
 - Fever; moderate (38.5°–39° C) to high (39.5°–40° C).

Nasal diphtheria

Symptoms include:

- Unilateral or bilateral nasal discharge, initially clear and later becoming bloodstained

Laryngeal diphtheria

- Usually spreads from pharynx to larynx
- Hoarseness or loss of voice
- Croupy cough
- Cyanosis
- Difficulty in breathing and eventually respiratory obstruction

Non-respiratory diphtheria (cutaneous diphtheria)

- Problematic in tropical countries
- Usually appears on exposed parts, especially the legs
- Lesions start as vesicles and quickly form demarcated and sometimes multiple ulcers

Complications

The potentially fatal indirect and direct complications of diphtheria are due to the release of diphtheria exotoxin into the circulating blood and lymphatics by the organism. The exotoxin becomes fixed on tissues unless neutralised by circulating antitoxin.

Direct complication

- Laryngeal croup

Indirect complications

- Neurological: polyneuritis may affect the cranial or peripheral nerves. Cranial nerve lesions can cause paralysis of the soft palate and regurgitation of fluids. Paralysis of the diaphragm and limbs could also occur.

- Cardiovascular: the heart muscle may be involved (myocarditis) or other effects leading to disturbances of the conducting fibres of the heart renal - proteinuria may be a sign of renal damage.

Secondary complications

- Pneumonia
- Otitis media

Age groups affected

Infants born of immune mothers are immune for about six months. With active immunization in early childhood the disease is becoming more common in adolescents and adults.

Prognosis

The prognosis varies depending on which day the antitoxin treatment is given. If the patient has gone six days without antitoxin treatment, mortality can be 50%. Myocarditis in the first ten days of illness is an ominous sign.

Diagnosis

Cultures of *C. diphtheriae* from nose and throat swabs are tested for toxin production.

Laboratory findings

A smear of the throat exudate when stained with a methylene blue dye shows the bacterial rods. The patient's white blood cell count may be normal or slightly raised.



REVISION POINT 1

Briefly describe the manifestations of diphtheria. (See pages 129–130 for help).

Methods of treatment

Immediate antitoxin must be given to the patient. Antitoxin is given on the basis of clinical signs and symptoms, do not wait for reports of cultures. Antitoxin dosage is 10 000–100 000 units for patients of any age depending on the site, severity, and duration of the disease. Antitoxin may be given intramuscularly but the intravenous route is used wherever the patient has symptoms of laryngeal involvement, nasopharyngeal involvement, extensive cervical adenitis, haemorrhage, or in all patients treated after the third day of illness. Doses of up to 30 000 units should be given intramuscularly but for doses of over 40 000 units a portion is given intramuscularly followed by the bulk of the dose intravenously after a half to two-hour interval. Children require the same dose as adults, the dose being dependent on the severity of the case. Antitoxin is no longer used as prophylaxis because of the risk of hypersensitivity. A trial dose to exclude hypersensitivity should precede its use. Adrenaline must be available in case anaphylaxis develops.

Antibiotics are used to destroy toxin producing organisms and to shorten the period of infectivity. Penicillin is given, or if allergic to Penicillin, Erythromycin is used.

If antibiotics are commenced before specimens are collected for culture, the bacteria may be inhibited and prevent diagnosis. If possible, obtain a nose and throat swab for diagnosis before commencing antibiotics but never delay treatment if laboratory diagnosis is going to be delayed.

Diphtheria may not confer immunity, therefore diphtheria toxoid may need to be given in convalescence as a complete course or reinforcing dose depending on the patients immunization history.

Prevention of spread

The primary means of preventing spread is by diphtheria immunization (See Module 2).

General infection control measures to prevent spread are outlined in Appendix 1, but specifically:

- The patient must be cared for in strict isolation until 2 consecutive negative nose and throat swabs (and skin lesions in cutaneous diphtheria) have been received taken 24 hours after completion of antibiotics and at least 24 hours apart.
- Where available, health care staff should wear disposable face masks when attending the patient during the acute stage of the illness.

Screening and contact tracing

Patient contacts are investigated for signs of the disease and for carriage of the bacteria. Non-immune close contacts are given prophylactic antibiotics and vaccine.

Those at greatest risk will be:

- contacts who sleep in the same household;
- kissing/sexual contacts; and
- healthcare workers who have performed mouth-to-mouth resuscitation to the index case or dressed the wounds of a patient with cutaneous diphtheria.

Antibiotic prophylaxis for an unimmunized person is with single dose intramuscular Benzylpenicillin (60 000 units for a child under six years of age, or 1.2M units for anyone aged six or over) or a seven day course of oral Erythromycin as per Appendix 4. A nose and throat swab should be taken wherever possible before commencing antibiotics.

Swabs should be taken after completion of the antibiotics. Antibiotics will clear the carriage of *C. diphtheria* from the nose and throat in an average of three days. If the patient is still culture positive when the antibiotics have been completed a further

10 days of antibiotics are prescribed.

All contacts should be kept under surveillance and if any develop a sore throat or nasal discharge the antitoxin may be considered.

Asymptomatic carriers of toxigenic strains of *C. diphtheria* must be looked for during outbreaks of the disease as these carriers may help spread the bacteria. Such carriers must be isolated and treated.

Nursing care

See Appendix 2, but specifically:

- tracheostomy may be necessary for respiratory obstruction;
- myocarditis: oxygen therapy and intravenous fluids; and,
- neuritis: nasogastric tube if dysphasic.

Mechanical ventilation for intercostal paralysis.

Role of primary health care team

- ensure uptake of diphtheria immunization;
- contact tracing and treatment of carriers;
- public health education.

Role of hospital/community setting

Nursing care as per Appendices 2, 3 and 4.


Prevention of cross-infection to others as per Appendix 1.

Health education and health promotion

Mothers and fathers should be educated about the importance of having their children immunised against the common communicable diseases. Crowded living conditions and exposure to people with respiratory conditions should be avoided where possible. Care should be taken to avoid indoor air pollution caused by tobacco smoke or the smoke or fumes from heating or cooking appliances. Good ventilation and basic hygiene in the home must be encouraged.

In general, the nurse and the midwife must promote safe breastfeeding practices and the essentials of good nutrition for young children. Dietary intake should include, where possible, fresh fruit and vegetables to ensure an adequate intake of vitamins. Outdoor activities to expose the child to fresh air and sunlight are vital. Mothers should ensure children are warmly dressed in cold weather to prevent chills, especially in young children whose temperature regulating mechanisms are not fully developed.

Now carry out Learning Activity 3.



REVISION POINT 2
What is the treatment
of diphtheria?
(See page 131 for help.)

Definition

Influenza, commonly known as flu, is one of the oldest and most common diseases known. Influenza is an acute respiratory illness caused by influenza viruses A and B. Laboratory tests are required to distinguish it from other acute respiratory infections. It is most often a mild viral infection. Its ability to cause death arises from the fact that the virus can mutate quickly, producing new strains against which humans have no immunity.

Mode of transmission

The influenza virus is transmitted by respiratory secretions discharged via airborne droplets during coughing or sneezing and possibly by direct contact with the secretions or indirect contact with articles contaminated with respiratory secretions. The influenza virus can survive for some hours on inanimate surfaces.

- Incubation period: 1–3 days
- Communicability: during the prodromal phase and for three days after the onset of symptoms

Epidemiological summary

Influenza occurs in seasonal epidemics and minor changes in the make-up of the influenza virus (known as antigenic drift) account for the changes in the virus from one season to another. Influenza tends to strike during the winter in temperate climates such as America and Europe, and during the rainy season in the tropics or sporadically throughout the year.

Influenza A virus has been associated with epidemics, but whilst all human influenza A viruses infect avian species, only a few subtypes of influenza A virus infect man and other animals (particularly pigs and horses). Influenza B viruses also cause epidemics and are largely restricted to

human beings.

There are currently three different influenza strains circulating worldwide; two subtypes of influenza A, and one of influenza B.

Influenza also occurs in worldwide epidemics (pandemics) due to major changes in the virus (antigenic shift). Pandemics are independent of season and affect large numbers of the population given that they do not have immunity to the “new” virus.

Hippocrates first described influenza in 412 BC and the first well-described influenza pandemic occurred in 1580. There have been 31 such pandemics of influenza since that time, three occurring in the 20th Century in 1918, 1957, and 1968.

Following World War 1 the great “Spanish flu” pandemic of 1918–1920 (caused by influenza A H1N1) was responsible for the deaths of at least 20 million people within a year, more than the total deaths during the First World War. Many of the deaths came after a very brief illness in otherwise healthy adults.

The pandemic in 1957 (“Asian flu”) caused by influenza A (H2N2) and 1968 (“Hong Kong flu”) caused by influenza A (H2N2) together killed more than 1.5 million people with enormous economic repercussions worldwide due to work productivity losses and medical expenses.

There is evidence that the viruses responsible for the pandemics originated in animals; 1918 swine, 1957 and 1968 avian strains. A vaccine against swine influenza has been developed.

A recent avian flu outbreak in chickens occurred

in Hong Kong, Special Administrative Region of China occurred in 1997-1998 and an experimental vaccine to avian flu is being developed. There were a few human cases among chicken workers.

Manifestations

- Typically a febrile, pharyngeal, laryngeal, tracheobronchitis
- Runny or stuffy nose
- Headache
- Myalgia (muscle aches)
- Fatigue
- Loss of appetite

Symptoms usually subside within 4 days but tiredness and depression may persist for a few days longer. Most people recover fully within 1 to 2 weeks.

Complications

- Pneumonia: unlike other viral respiratory infections such as the common cold, influenza causes more severe secondary complications such as pneumonia, particularly in children, the elderly and other vulnerable groups. Pneumonia may be primary viral pneumonia or secondary bacterial pneumonia.
- Myocarditis
- Post-infectious encephalitis

Age groups affected

All ages

Prognosis

Depends on course of illness

Diagnosis

Viral culture of naso-pharyngeal aspirate or throat swab sent to the laboratory in viral transport medium. Serum samples can be taken to confirm the presence of antibodies.

Methods of treatment

The antiviral drugs Amantadine and Rimantadine can be administered to vulnerable people in an attempt to prevent illness when taken throughout the period of exposure to the virus, or to reduce the severity and duration of illness if taken early after the appearance of symptoms. Two new anti-influenza drugs – Relenza and GS4104 – have been shown to prevent multiplication of the virus. Resistance to the drugs is said to be less frequent than to Amantadine and Rimantadine.

Prevention of spread

Vaccination is the mainstay of prevention and control of influenza. Vaccine composition is changed annually to keep abreast of virus changes. Vaccination is recommended for elderly people, and people with chronic underlying conditions such as diabetes and cardiopulmonary disease. Adults receive a single dose of vaccine whilst two doses at one month apart are given to young children. Protection against the selected strain of influenza lasts about one year.

For general infection control measures to prevent spread of influenza, see Appendix 1.

Screening and contact tracing

Global surveillance to monitor the current circulating influenza strains is undertaken by WHO via a network of sentinel influenza monitoring centres around the world.

Now carry out Learning Activity 4.

Nursing care

See Appendix 2, but specifically:

- Administer antibiotics if secondary bacterial infection occurs.

Rehabilitation

Depends on course of illness

Role of primary health care team

Ensure the uptake of vaccine where appropriate and provide public health education.

Role of hospital/community setting

Management and treatment of the patient as per Appendices 2, 3 and 4

Prevention of cross-infection as per Appendix 1

Health education and health promotion

As for diphtheria

REVISION POINT 3
 List measures to take to prevent the spread of influenza. (See page 134 for help.)

Definition

Pertussis (whooping cough) is a highly infectious acute bacterial disease involving the respiratory tract. The causative bacteria is *Bordetella pertussis* in more than 90% of cases or more rarely *Bordetella parapertussis*.

Mode of transmission

Pertussis is transmitted by airborne contact with respiratory secretions of infected persons.

Incubation period: 5–14 days, usually about 8 days.

- Communicability: from one week before to three weeks after the onset of paroxysmal coughing.

Epidemiological summary

There are approximately 20–40 million cases of pertussis worldwide each year, 90% of them in developing countries; there are an estimated 200 000–300 000 deaths each year. A vaccine has been part of the Expanded Programme of Immunization since around 1960 and has dramatically reduced the public health impact of pertussis (See Module 2). However, cases are increasing in some eastern European countries, for reasons that are largely unknown.

Manifestations

Catarrhal stage

- Fever and dry cough becoming worse at night
- Vomiting with the cough
- Infants often have a runny nose and sneezing
- A particularly infectious stage of the illness

Spasmodic stage (or paroxysmal stage)

- Violent cough
- The rapid expulsion of air followed by gasping for breath through a narrowed glottis results in the characteristic high pitched “whoop” which gives the condition its name.

- Vomiting often accompanies a paroxysm and the child will be exhausted when there have been many paroxysms.
- Apnoeic attacks and cyanosis are frequent in young infants.
- The paroxysms of coughing often become worse for 2–6 weeks but may persist for many weeks afterwards.

Complications

- Pneumonia
- Convulsions due to cerebral anoxia during coughing paroxysms
- Brain damage as a result of cerebral anoxia
- Deafness
- Blindness can result from haemorrhages into the conjunctiva during coughing paroxysms.
- Hernias and rectal prolapse can occur due to repeated coughing.
- Like measles, pertussis can “unmask” underlying tuberculosis.

Age groups affected

Pertussis may occur at any age but most cases of serious illness and death are observed in infants and young children.

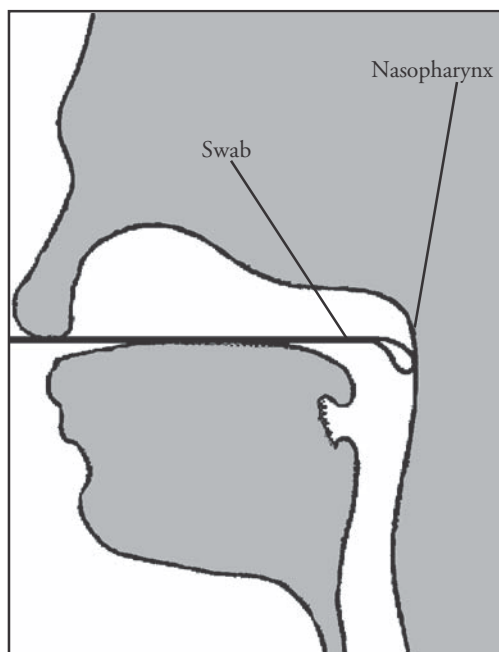
Prognosis

Pertussis is one of the most lethal diseases in infants and young children who have not been immunised. The prognosis is worse for children who are malnourished or have other co-existing respiratory infections such as pneumonia. Severe disease in infants under one year of age has a poor prognosis. Prolonged hospital care may be needed. The prognosis is better for patients over one year of age with uncomplicated infection.

Diagnosis

Diagnostic cultures are best obtained by taking a

Diagram 1. Nasopharyngeal swab



naso-pharyngeal swab.

Methods of treatment

Erythromycin (see Appendix 4) may eradicate the bacteria thus shortening the period of infectivity but organisms can reappear when treatment is stopped. This may reduce the possibility of secondary infection (if started early enough). Antibiotics do not influence the course of the clinical disease unless given within the first 5 days of illness when the diagnosis is often unclear.

Prevention of spread

Immunization (see Module 2).

General infection control measures to prevent spread: see Appendix 1.



REVISION POINT 4

Make a list of true and false contraindications to vaccination with pertussis. (See pages 43–44 for help.)

Screening and contact tracing

Due to the highly infectious nature of pertussis there will always be a large number of secondary cases among non-immune contacts.


Prophylactic antibiotics

Erythromycin, if given in the early incubation period to close contacts under one year of age, may prevent the disease in selected individual cases. The difficulty in early diagnosis, the costs, and concerns related to antibiotic resistance, limit the treatment of secondary cases.

Nursing care

See Appendix 2, but specifically:

- Strict observation of respiratory status as in Appendix 3.
- Suction of oropharynx and nasopharynx as necessary.
- Monitor convulsions.
- Administer oxygen in severe cases to reduce the severity of cerebral anoxia and the incidence of convulsions and brain damage.
- Humidity may help those with tenacious secretions.
- Small frequent feeds are best given after paroxysmal coughing and refeeding may be necessary after vomiting.
- Nasogastric feeding may be necessary for small infants.
- Administer antibiotics if secondary bacterial infection occurs.
- Keep the patient quiet and avoid excess stimulation which may precipitate coughing.



REVISION POINT 5
List the main points in the assessment of a child's respiratory status.
(See page 152 for help.)

Role of primary health care team

- Vaccination
- Contact tracing of secondary cases

Now carry out Learning Activity 5.

Role of hospital/community setting

- Management and treatment of the patient as per Appendices 2, 3, and 4
- Prevention of cross infection to others: see Appendix 1

Health education and health promotion

As for diphtheria

Mumps

Definition

Mumps is an acute viral infection usually affecting the salivary glands, chiefly the parotid gland in 60% of cases; hence the term “infectious parotitis”. The virus is one of the paramyxovirus family, and commonly affects bilateral as opposed to unilateral parotid salivary glands. The virus may spread in the bloodstream to involve other organ systems and the central nervous system.

Mode of transmission

Transmission is by airborne droplet spread from the saliva of an infected patient, and by contact with contaminated articles.

- Incubation period: 12–28 days, usually about 18 days
- Communicability: from 1–3 days before the facial swelling is apparent to about 7 days after the swelling has disappeared

Epidemiological summary

The virus is present throughout the world and at least 50% of infections are asymptomatic. Cases usually occur in winter and spring. There was an increase in reported cases of mumps in Lithuania in 1994. The disease is not considered eradicable and has a low priority in terms of efforts to control it.

Manifestations

Prodromal symptoms may present 1 or 2 days before the parotid swelling and are characterized by:

- fever;
- malaise; and
- pain behind the ear on chewing or swallowing or opening the mouth.

As the infection progresses there is:

- tenderness of the salivary glands for 1–3 days;
- swelling of the salivary glands for 7–10 days;
- fever may be absent or as high as 40° C;

- malaise;
- anorexia; and
- headache.

Complications

- Orchitis (inflammation of the testicles) which usually affects one side (up to 20% of symptomatic cases in postpubertal males). Sterility is a rare but potential complication.
- Central nervous system aseptic meningitis or encephalitis is an uncommon complication.
- Hepatitis, oophoritis, myocarditis, thyroiditis and nerve deafness are rare but potential complications.

Age groups affected

Children aged between 4–14 years are most commonly affected; complications are more likely in adult patients. As vaccine uptake increases, cases tend to occur in older children and unvaccinated adults.

Prognosis

Excellent, even with extensive organ system involvement.

Diagnosis

The diagnosis is made clinically. Mumps virus can be grown in tissue culture the laboratory from saliva, urine and cerebrospinal fluid. Acute serum can be sent to check for antibody formation.

Methods of treatment

Supportive, no specific treatment available.

Prevention of spread

The effects of mumps are limited by immunizing childhood populations, this is particularly important in terms of preventing more serious illness in adults. The vaccine is usually given in combination with measles and rubella but may be

a single vaccine. It is expected that as vaccine uptake increases cases will occur more predominantly in older children.

General infection control measures to prevent spread – see Appendix 1.

Methods of screening and contact tracing

Nil specific

Nursing care

See Appendix 2, but specifically:

- Mouthwash and frequent mouthcare
- Avoid highly flavoured acidic foods and drinks

Role of primary health care team

Vaccination and public health education

Role of hospital/community setting

- Management and treatment of the patient as detailed above
- Prevention of cross-infection to others. See Appendix 1

Health education and health promotion

As for diphtheria



REVISION POINT 6

What are the main complications of mumps?
(See page 138 for help.)

Rubella (German measles)

Definition

Rubella is a mild febrile viral illness with a faint rash which is only of importance given the damage it may cause to the foetus when a mother contracts the infection during pregnancy. The rubella virus may cross the placenta and infect the developing foetus resulting in congenital rubella syndrome.

Mode of transmission

Transmission is by airborne droplet spread from the nose and throat of an infected patient and from direct contact with the patient or secretions.

- Incubation period: 14–23 days, usually about 18 days
- Communicability: usually from about 7 days before the rash until 5 days after the appearance of the rash. The disease is highly contagious. Babies affected by congenital rubella can continue to shed the virus in nose and throat secretions and in urine for 1 year or more.

Epidemiological summary

The epidemic which occurred in Estonia in 1993 was brought under control following the introduction of rubella vaccination in 1993. There was a reported increase in Lithuania in 1994.

Manifestations

Prodromal period

There may be a mild pyrexia during the 24 hours before the rash appears. There may be slight malaise and tender lymph nodes behind the ears and over the occiput for 1–2 days. Older children or adults may have arthralgia or polyarthritis affecting small joints of the hands or feet.

Rash

A faint, fine, discreet pink macular rash appears. Erythematous macules appear first on the face and spread rapidly over the trunk and extremities.

Macules are only slightly raised and will blend and disappear by the third day. The rash may suggest measles on the first day and scarlet fever on the second.

- Fever not generally exceeding 38.3° C for up to two days
- Headache
- Runny eyes
- Rubella can occur without a rash. During an epidemic, febrile lymphadenopathy for a week or more without a rash may represent over 40% of cases.

Congenital rubella

This is a syndrome describing infants born to mothers affected by rubella during the first trimester of pregnancy. The risk of congenital abnormality depends on the time of infection during pregnancy. If rubella occurs in the first few weeks of pregnancy the risk of various foetal abnormalities is high, whereas infection in the third trimester of pregnancy carries virtually no risk.

Manifestations of congenital rubella

- Congenital defects of the heart, eyes, and ears
- Many infants show growth retardation, an enlarged liver and spleen
- Marked thrombocytopenia (absence or diminution of platelets in the blood) is a common finding

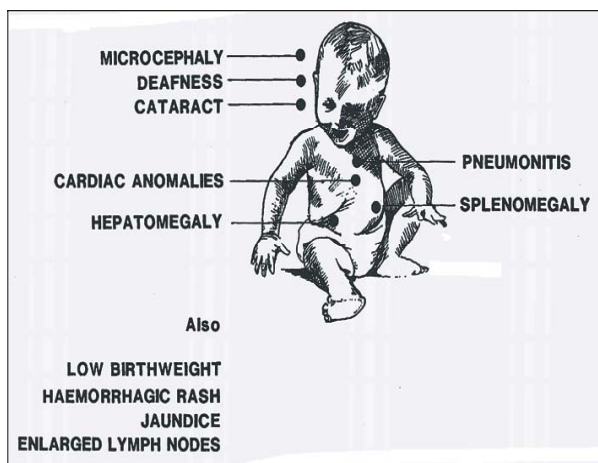
Age groups affected

Anyone who has not had rubella infection or rubella vaccine. Children and adults of any age may become infected but rubella is most common in primary school children.

Prognosis

The prognosis for patients with acquired infection is excellent. The prognosis for patients with

Diagram 2. Congenital Rubella Syndrome



congenitally acquired infection is poor. There may be late manifestations of brain damage.

Diagnosis

Clinical diagnosis is unreliable and the infection can be asymptomatic. Acute rubella can only be confirmed with laboratory diagnosis of IgM antibody. Saliva samples are appropriate for children but serological samples are essential for pregnant women. Either technique can be used for men and non-pregnant women.

Methods of treatment

There are no specific measures available and treatment is supportive. The possibility of termination of pregnancy or very close follow up of foetal development should be discussed with parents following infection in early pregnancy.

Prevention of spread

Vaccination of children before puberty, particularly girls before the onset of menstruation and the possibility of pregnancy. Vaccination is usually given with measles and mumps vaccines (MMR) in the second year of life. Pregnant women should avoid exposure to rubella virus unless they are known to be serologically immune. See Appendix 1, but specifically:

- Exclude a patient with rubella from school or work until 7 days after onset of rash
- Avoid exposure of pregnant women

Screening and contact tracing

A rubella antibody test will establish immunity status in exposed women. Pregnant women who are not immune should not normally receive vaccine whilst pregnant but should be immunised following delivery. Pregnancy should be avoided within 3 months of receiving the rubella vaccine. Inadvertant administration of vaccine in pregnancy has not been associated with foetal abnormalities.

Nursing care

Symptomatic

Role of primary health care team

Ensure uptake of vaccination and public health education.

Role of hospital/community setting

- Management and treatment of the patient as detailed above
- Prevention of cross-infection to others; see Appendix 1

Health education and health promotion

Advice to females planning pregnancy to check rubella antibody status.



REVISION POINT 7

How can congenital rubella be prevented?
(See page 141 for help.)

Measles (Rubeola)

Definition

The measles virus is a paramyxovirus mainly affecting the mucous membranes of the respiratory tract and skin producing fever and rash. Measles can lead to fatal complications including pneumonia, diarrhoea, and encephalitis (inflammation of the brain). Many children suffer subsequent deafness, impaired vision or blindness.

Mode of transmission

Transmission is by the droplet spread of infectious respiratory secretions through the respiratory tract or conjunctiva. Measles is highly contagious.

- Incubation period: 7–14 days
- Communicability: throughout the prodromal period and for up to 4 days after the appearance of the rash

Epidemiological summary

Before the vaccine became available in the 1960s, measles killed between 7 and 8 million children a year and caused an estimated 135 million cases a year worldwide. Measles is still the leading killer among vaccine-preventable diseases of childhood, still killing about 1 million of the estimated 42 million who are sick, the great majority in developing countries. Measles takes its highest toll among malnourished children whose immunity is weakened by other infections or poor social living standards. There was an outbreak of measles in Latvia in 1990–1992 with 248 cases reported, mostly in children.

Manifestations

- Prodromal period 4–5 days before the onset of the rash with fever, malaise, may develop a runny nose, sneezy cough
- “Koplik’s spots” may appear on the buccal mucosa (in the mouth) between the first and third day of the prodromal period before the appearance of the

rash. These are small greyish-white lesions which fade once the rash has appeared.

- The rash usually starts on the fourth to seventh day of the illness. It usually starts behind the ears, on the forehead, and around the mouth. The skin lesions are dusky red in colour and the florid maculopapular rash quickly spreads over the trunk and the limbs. The rash lasts about 5 days.
- Coryza (runny nose)
- Conjunctivitis
- Miserable, fractious child

Complications

- Secondary bacterial infection of the ears (otitis media)
- Pneumonia, due to the virus itself (primary pneumonia) or secondary bacterial pneumonia
- In malnourished children the skin lesions can be haemorrhagic and the virus can enter the bloodstream (viraemia)
- Central nervous system complications include post-measles encephalitis which commonly occurs 10 days after the illness and carries a significant mortality rate
- Subacute sclerosing panencephalitis (SSPE) is a rare and fatal complication presenting several years after the original measles infection

Age groups affected

Pre-school and young children

Prognosis

If post-infectious encephalitis occurs the prognosis is poor with a 15% mortality. Overall mortality is 5–15%. In the developing world measles is still a major cause of death with up to 1 million deaths per year arising from measles worldwide. The infection can be complicated by bacterial pneumonia or severe diarrhoea. A child born in a developing country today runs a 1000-fold greater

chance of dying from measles than a child born in an industrialized country. Poverty and malnutrition are key factors affecting health. Malnutrition is especially lethal in combination with infectious diseases such as measles, and is said to be an independent factor in over half of child deaths. In 1997, an estimated 160 million children were moderately or severely malnourished and more than one in four of the world's population were estimated to be living in poverty.

Diagnosis

Clinical

Methods of treatment

Supportive, no specific treatment available. Antibiotics are indicated when secondary bacterial infections such as otitis media or pneumonia occur.

Prevention of spread

Prophylaxis is by active immunization with vaccine as part of a combined vaccine with mumps and rubella. Following an attack of measles there is lifelong immunity to the disease.

General infection control measures to prevent spread – see Appendix 1.

Screening and contact tracing

Nil specific

Nursing care

See Appendix 2, but specifically:

- Mouthcare
- Calomine lotion or emollient cream may soothe lesions and promote comfort
- Keep fingernails trimmed short to avoid skin damage through scratching
- Loose cotton clothing

Role of primary health care team

Ensure uptake of vaccination and public health education.

Role of hospital/community setting

- Management and treatment of the patient as detailed above
- Prevention of cross-infection to others; See Appendix 1

Health education and health promotion

As for diphtheria

Haemophilus influenzae type B (Hib)

Definition

Haemophilus influenzae type b (Hib) is a bacterial infection causing epiglottitis and croup, pneumonia and meningitis.

Mode of transmission

Haemophilus influenzae type b (Hib) lives only in the human nasopharynx and is spread by droplet spread of secretions.

- Incubation period: unknown, probably short, 2–4 days.
- Communicability: as long as organisms present which may be prolonged even without nasal discharge. Not communicable within 24–48 hours of starting effective antibiotic therapy.

Epidemiological summary

Epidemics do not occur although disease may occur following an initial case in a sibling or day care attendee. The failure to breast feed, household overcrowding and day-care attendance have been shown to be independent risk factors for infection.

Manifestations

Epiglottitis

- Most commonly affects children aged 3–7 years old
- Rapid onset of fever
- Dysphagia (difficulty swallowing)
- Salivation (drooling)
- Toxic appearance;
- Lateral X-ray shows enlarged epiglottis
- On inspection the epiglottis is cherry-red and swollen

Hib Meningitis

- Neck stiffness (inability to touch the chin to the chest)
- Positive Kernig's sign (inability to extend the knee when the leg is flexed anteriorly at the hip)
- Bulging fontanelle in infants due to raised

intracranial pressure

- Irritability
- Headache
- Vomiting
- Coma
- Convulsions
- Fever (high or low grade)
- In infants persistent crying (may be high pitched), irritability, poor feeding, vomiting, or diarrhoea may be the only symptoms
- Fever may be absent or low grade and other signs of meningitis may be absent
- There is no skin rash

Other manifestations

- Osteomyelitis and septic arthritis
- Pericarditis or endocarditis (rare)

Complications

- The development of croup (inspiratory stridor) may lead to airway obstruction with hypoxia and is a potentially fatal complication of epiglottitis.
- Neurological defects occur in 20% of survivors who have had Hib meningitis. Subdural collection of fluid can cause persistent intracranial pressure and associated symptoms.

Age groups affected

Children under one year of age are at the highest risk of the disease and disease is rare in children over five years old. Hib meningitis mainly occurs in the three month to five year old age group, with peak incidence at two years.

Prognosis


For epiglottitis the prognosis is good if antibiotic therapy is started promptly. The most serious manifestation of Hib disease is meningitis with a case fatality rate of 3–5% in industrialized countries and up to 30% in developing countries.

Diagnosis

In epiglottitis, examination of the throat and larynx or taking a throat swab can be hazardous and should not be performed unless equipment to intubate the patient is at hand. *Haemophilus influenzae* type b can be isolated from blood cultures and, in cases of meningitis, from the cerebrospinal fluid (CSF) obtained via lumbar puncture.

Methods of treatment

Treatment is with antibiotics. Many strains are resistant to Ampicillin, so third generation Cephalosporins, for example Cefotaxime or Chloramphenicol, are often used empirically until antibiotic susceptibility is known. (There are fewer adverse effects with Cefotaxime than with Chloramphenicol.) In developing countries, acute respiratory infections are treated with ampicillin or cotrimoxazole. Cefotaxime or Chloramphenicol are given for epiglottitis.



REVISION POINT 8
List the manifestations of Hib infection.
(See page 144 for help.)

Prevention of spread

Active immunization with *H. influenzae* vaccine (Hib) is recommended to prevent the spread. Vaccination has been available in industrialized countries since the 1990s. Ways of ensuring that expensive vaccines can be introduced into developing countries are being sought. General infection control measures to prevent spread – see Appendix 1.

Screening and contact tracing

Prophylaxis with antibiotics can be given to close contacts, but even if optimally applied it is said

that this would only prevent 1–2% of all disease.

Nursing care

See Appendix 2, but specifically:

- Intubation may be necessary in epiglottitis and the tube is left insitu until the swelling of the epiglottis has receded and the patient can breathe around the tube.

Role of primary health care team

Ensure uptake of vaccination where appropriate and public health education.

Role of hospital/community setting

- Management and treatment of the patient as detailed above
- Prevention of cross-infection. See Appendix 1

Health education and health promotion

As for diphtheria

Pneumococcal pneumonia

Definition

Streptococcus pneumoniae is an important bacterial cause of pneumonia in adults and children. Pneumococcal pneumonia is the biggest childhood killer. Other associated diseases caused by *Streptococcus pneumoniae* include otitis media, sinusitis, mastoiditis, meningitis, and brain abscesses.

Mode of transmission

Airborne droplet spread of respiratory secretions.

- Incubation period: 24–72 hours
- Communicability: during the course of active infection or until 24–48 hours of appropriate antibiotic therapy

Epidemiological summary

Acute respiratory infections are responsible for many deaths, and pneumonia is the deadliest, killing more children than any other infectious disease. Ninety-nine percent of the deaths occur in developing countries. *Streptococcus pneumoniae* is the most frequent cause of bacterial pneumonia in children. In developing countries 20–25% of deaths in the under 5 age group are caused by *Streptococcus pneumoniae*. Pneumonia often affects children with low birth weight or whose immune systems are already weakened by malnutrition and other diseases. Without treatment pneumonia kills quickly. Although low-cost drugs are available to treat pneumonia, many children die because treatment is delayed. Due to the emergence of antibiotic resistant strains of bacteria, treatment is becoming more expensive.

Manifestations

- Cough: usually non-productive in the early stages but blood stained sputum, rarely purulent, may be produced later
- Pleuritic chest pain

- Tachypnoea/dyspnoea (fast/laboured breathing)
- Fever: may be as high as 38.9–40° C with rigors
- Infants: refusal to eat, vomiting, diarrhoea, increased respiratory rate, grunting respiration, nasal flaring and retractions may indicate respiratory distress (see Appendix 3)
- Older child: headache, malaise, dry cough, fever, pleuritic pain, restlessness, rapid respiratory rate, possible abdominal pain

Complications

- Empyema (pus in the lungs)
- Meningitis: most common in extremes of age (for example, infants less than two years and the elderly) and is usually related to disease of the mastoid, nasal sinuses or cranial fractures

Age groups affected

All ages are affected, but *Streptococcus pneumoniae* is the predominant cause of pneumonia in young children and the elderly.

Prognosis

The mortality rate is greatest in young children and patients over 70 years old, especially when already debilitated by underlying disease.

Diagnosis

Streptococcus pneumoniae may be isolated from blood culture, throat swab and naso-pharyngeal aspirate.

Methods of treatment

Amoxicillin or Benzylpenicillin. Penicillin-resistant pneumococcal infection may respond to high dose Benzylpenicillin. Erythromycin, Cefuroxime or Tetracycline can be given if the patient is allergic to Penicillin. Avoid Cephalosporins if immediate type Penicillin allergy suspected. In some countries, up to half of

the most common forms of pneumonia are resistant to penicillin, the first line drug.

Prevention of spread

Vaccination is not effective in children under 2 years of age (the highest risk age group). The most promising vaccines are said to be those modelled after the Hib vaccine which has been highly successful in reducing Hib pneumonia and meningitis in industrialized countries. General infection control measures to prevent spread; see Appendix 1.

Screening and contact tracing

Nil specific

Nursing care

See Appendix 2, but specifically:

- Physiotherapy to clear any lung consolidation
- Administration of oxygen and humidity

Role of primary health care team

Ensure uptake of vaccination where appropriate and public health education.

Role of hospital/community setting

- Management and treatment of the patient as detailed above
- Prevention of cross-infection to others; see Appendix 1

Health education and health promotion

As for diphtheria

Now carry out Learning Activity 6.

- All infections discussed in this module can be prevented by immunization.

- Outbreaks and epidemics of infections transmitted by person to person can occur if immunization programmes are not implemented or maintained nursing care includes implementation of general infection control measures and sometimes isolation and transmission based precautions.

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Isolation

- Physical isolation: the patient should be isolated in hospital for the period of communicability outlined in each specific disease category. At home the child should ideally sleep in a separate bedroom or bed from susceptible siblings.

General hygiene

- Care must be taken when handling respiratory secretions. Soiled tissues should be disposed of straight into a disposal bag where possible, avoiding the risk of contaminating surfaces or needing to handle secretions.
- The patient should be encouraged to put his hand over his nose and mouth when sneezing or coughing to avoid dispersal of airborne droplets.
- The room where the patient is being cared for should be kept clean and tidy. Surfaces should be cleaned with a damp cloth and detergent daily to avoid the build up of contamination. Disinfection of surfaces and equipment should be undertaken with a 1 in 10 solution of bleach (hypochlorite).
- The room should be well ventilated (18–22° C, humidity 55–60%).
- Handwashing is extremely important in reducing cross infection. Hands should be washed before and after caring for the patient.

Protective clothing

- Where available masks and eye protection should be worn by health care staff where splashing or spraying of secretions into the eyes or mucous membranes of the nose or mouth may occur, e.g. during respiratory suctioning.
- Where available plastic disposable aprons should be worn in hospital when giving direct physical care to the patient.
- Where available disposable gloves should be worn when handling secretions from the patient and for procedures such as respiratory suctioning.

Assess respiratory status as per Appendix 3.

Administration of antibiotics as per Appendix 4.

Physical and psychological rest

- Bed rest in a semi-prone position to increase the vital capacity of the lungs and facilitate breathing.
- Play therapy for children to alleviate boredom associated with convalescence and as diversional therapy to help children cope with difficult and frightening procedures
- Reduce anxiety and apprehension in an effort to reduce distress and avoid further compromises in respiratory status. Ensure a quiet calm environment, explain procedures as appropriate for the patients age.

Management of fever

- Ensure adequate fluid intake to prevent dehydration and reduce the symptoms of toxicity. Intravenous or nasogastric fluids may be necessary to prevent electrolyte imbalance and to avoid aspiration of oral fluids during acute respiratory distress.
- Administer antipyretics/analgesics – paracetamol (Do not give aspirin to children under 10 years of age in view of the recognized association with Reyes syndrome). Paracetamol dose every 4–6 hours: Adults 500 mg–1 g per dose up to 4 g per day. Children 10–15 mg/kg per dose every 4–6 hours or as a general guide: 3 months–1 year: 60–120 mg per dose / 1–5 years : 120–250 mg per dose / 6–12 years : 250–500 mg per dose. Caution in liver disease. Side effects are rare (nausea, rash). Ibuprofen is often used in children 5 mg/kg per dose every 6 hours. Risk of gastrointestinal bleeding. Caution in asthma.
- Dress in light absorbent material. Reduce the ambient room air temperature and improve air circulation by using a fan. If the patient is peripherally shutdown with cold extremities, apply cotton socks/mittens. Apply cool compresses to skin (forehead) to promote comfort.

Nutrition and hydration

- A light nourishing diet should be given, nasogastric tube feeding may be necessary. Mothers of breast feeding babies should have the baby rest intermittently during feeding to avoid the aspiration of milk. Smaller frequent feeds should be given. Feeds can be supplemented with water, milk and fruit juice.
- In all patients, increase feeding after the acute phase of the illness is over to avoid malnutrition.
- Monitor the intake and output of fluids and note if urine is concentrated which may indicate fluid deficit. In infants observe the frequency of wet nappies. In infants under one year feel the anterior fontanelle, if it is sunken or depressed this may indicate poor hydration.

Respiratory care

- Keep the nostrils clear of mucous so the child can breathe while sucking and eating; infants are obligatory nose breathers. 0.9% saline nose drops may be instilled in infants nostrils 30 minutes before feeding and before bedtime.
- Avoid pooling and consolidation of respiratory secretions by altering the position of the patient frequently.
- Observe the nature of sputum if the patient has a productive cough.
- Administer oxygen if the patient has signs of anoxia. It can be applied via a head-box in infants and the concentration monitored. It can also be administered via nasal prongs or a mask in older patients at approximately 0.5-1 l per minute for infants and young children, 2-4 l per minute for adults. Where available the patients oxygen saturations are monitored via a pulse oximeter.
- Humidify the oxygen in hospital to liquefy secretions and prevent blockage of the airway. At home the room air can be moistened by placing a moist cloth or uncovered pot of water on/near the heater.
- Cough syrup may be given for patients with severe nonproductive coughs but should be avoided otherwise given that this is the natural way for the body to clear the airway.
- Aspiration of the airway as necessary with suction.

Skin care/hygiene

- Mouthcare if oral intake poor. There may be dryness of the lips due to dehydration or excoriation of the skin around the nose from secretions, apply white soft paraffin.
- The buttock area may be excoriated from diarrhoea or from concentrated urine during periods of poor feeding and dehydration. Bathe frequently and apply emollient creams.
- Avoid bed sores from prolonged confinement to bed by altering the position of the patient frequently.

Observe for complications

- As outlined in each specific disease category.

The parents/relatives should seek advice immediately if the patient's condition deteriorates, i.e. breathing becomes difficult or fast, feeding becomes a problem or the patient becomes sicker. The patient must be reassessed; the antibiotics may need to be changed and the patient may need admitting to hospital.

Ask	Observe
How old is the child?	Is the child abnormally sleepy or difficult to wake? Is the child restless and agitated? Is there a cough? Is there a wheeze? Is there cyanosis? Is the breathing noisy? Is there stridor?
Has the child been sleeping longer than normal?	Try and count the respiratory rate when the child is calm. Count for one full minute. Count the respiratory rate before taking temperature or pulse to avoid upsetting the child and affecting the true rate.
Has the child been difficult to wake?	Does the child look distressed? Observe the respiratory effort, note the rate, rhythm, depth of respirations. Can you hear grunting? Observe for nasal flaring, gasping, head retraction Inspect the skin colour. Are the mucous membranes and nail beds pink or is there evidence of cyanosis?
How long has the child been coughing?	Observe the diaphragmatic movement and lung expansion. Is the child using accessory muscles to breathe? (supra-sternal, sub-sternal, intercostal, subcostal) Is there indrawing ('sucking in') of the accessory muscles? Whilst mild indrawing is normal in children under 2 months, severe indrawing is not normal and is not normal at all in infants more than 2 months
Has the child stopped breathing or turned blue?	Observe the diaphragmatic movement and lung expansion. Is the child using accessory muscles to breathe? (supra-sternal, sub-sternal, intercostal, subcostal) Is there indrawing ('sucking in') of the accessory muscles? Whilst mild indrawing is normal in children under 2 months, severe indrawing is not normal and is not normal at all in infants more than 2 months
Has the child had a fever? If so for how long?	Is the respiratory rate faster than normal, that is: Faster than 60 per minute in an infant less than 2 months old
Has the child had convulsions?	Faster than 50 per minute in a child between 2-12 months Faster than 40 per minute in a child between 12 months to 5 years?
Has the child been feeding?	Auscultation of the chest – note the presence of breath sounds, intensity, quality and symmetry of breathing Chest X-ray where pneumonia suspected
Has the child been producing wet nappies?	Does the skin feel hot/cold? Is there evidence of dehydration? Check the fontanelle in infants– is it sunken? Check skin turgor – has the skin lost its elasticity? Is there sign of undernutrition?

Antibiotic	Dose and regime	Common side effects/comments
Penicillin: Ampicillin 5 days	Adults Oral 250 mg–1 g every 6 hours at least 30 minutes before food Intramuscularly (IM) or Intravenously (IV) 500 mg every 4–6 hours Higher dose in meningitis e.g. 2 g 4–6 hourly Children under 10 years, any route, half adult dose	Nausea, vomiting, diarrhoea. If rash occurs discontinue treatment unless other cause known. Safe in pregnancy and whilst breastfeeding.
Amoxicillin 5 days	Adults Oral 250 mg every 8 hours, doubled in severe infections Children up to 10 years Oral 125 mg every 8 hours usually or 20–50 mg/kg per day in divided doses every 8 hours up to 1.5 g per day	May reduce the effectiveness of oral contraceptive pill.
Benzylpenicillin (Penicillin G)	Adults IM/IV 600 mg–1.8 g 6 hourly Higher dose in meningitis e.g. 2.4 g 4–6 hourly Infant 1–4 weeks IM/IV 75mg/kg daily in divided doses every 8 hours (Higher dose in meningitis 150mg/kg daily in 3 divided doses every 8 hours) Child 1 month–12 years IM/IV 100 mg/kg daily in divided doses every 6 hours (Higher dose in meningitis 180–300 mg/kg daily in 4–6 divided doses)	
Cephalosporins Cefotaxime	Adults IM/IV injection 1–2 g every 8 hours Children IM/IV injection 100–150 mg/kg per day in 2–4 divided doses. If body weight over 50 kg use adult dose 1g every 6–8 hours Dose increased in severe infections	Nausea, vomiting, diarrhoea Rash (1 in 10 penicillin allergic patients will develop a rash on cephalosporins). Caution in pregnancy and breastfeeding but appropriate to use
Macrolides Erythromycin	Adults and children over 8 years Oral 250–500 mg every 6 hours Children up to 2 years Oral 125 mg every 6 hours. Child 2–8 years, 250 mg every 6 hours. Doses doubled for severe infections. Intravenously: adult 500 mg–1 g 6 hourly Child 50 mg/kg per day in divided doses every 6 hours.	Used instead of penicillins and tetracyclines for people allergic to those drugs. Nausea and vomiting. Fever, rash, and jaundice may be a sign of liver disorder and should be reported to a doctor. The drug passes into the breast milk but at normal doses is unlikely to effect the baby. Safe in pregnancy.

Antibiotic	Dose and regime	Common side effects/comments
Tetracyclines Tetracycline	Adults 250 mg every 6 hours Increase dose in severe infections to 500 mg every 6–8 hours Children: not recommended under 12 years old. Oral 20–40mg/kg per day in divided doses every 6 hours. IM/IV injection 12mg/kg per day every 12 hours. (IM injections painful)	Nausea, vomiting and diarrhoea. Rashes may occur – discontinue treatment. Discolouration of developing teeth if taken by children or mothers during pregnancy. Avoid if kidney function poor. Avoid milk products for 1 hour before and 2 hours after taking the drug since they may impair its absorption. May reduce the effectiveness of oral contraceptive pill. Contraindicated in pregnancy and breastfeeding.
Other Chloramphenicol	Adults Oral/IV 50 mg/kg per day in 4 divided doses Children Oral/IV 2 weeks old 25 mg/kg per day in 4 divided doses 2 weeks–1 year 50 mg/kg per day in 4 divided doses Children > 1 year 50–100 mg/kg per day in divided doses every 6 hours. IM absorption poor. Decrease higher doses as soon as clinically indicated	Occasionally causes serious or even fatal blood disorders and sore throat, fever and unusual tiredness must be reported to a doctor immediately. Do not use if equally effective drug available. Blood levels are recommended in infants under 4 years of age receiving chloramphenicol. Drug passes into breast milk. Contraindicated in pregnancy and breastfeeding.
Co-trimoxazole	Adults Oral/IV 960 mg every 12 hours (up to 1.44 g in severe infections) Children 6 weeks–5 months Oral 120 mg every 12 hours 6 months–1 years Oral 240 mg every 12 hours 6–12 years Oral 480 mg every 12 hours By IV infusion 36 mg/kg per day in 2 divided doses. Increase to 54 mg/kg per day in severe infections	A mixture of trimethoprim and sulphamethoxazole. Nausea, vomiting, rash (may be severe), sore tongue and rarely jaundice and serious blood and liver or kidney disorders. Not usually given in pregnancy due to risks to the unborn baby. The drug passes into the breast milk but at normal doses adverse side effects are rare.

MODULE 6

Tuberculosis

Stated learning outcomes

Glossary of terms

Definition

Modes of transmission

Epidemiological summary

WHO strategy for TB control: DOTS

Manifestations of TB

Risk factors

HIV and TB

Immigrants from countries with a high incidence of disease

Staff who may be exposed to risk from TB

Prisoners

Diagnosis

Treatment

The essential anti-TB drugs

Rationale for recommended standardised treatment regimes

Standard code for TB treatment regimes

Treatment regimens in special situations

Monitoring the patient during treatment

Adverse effects of anti-TB drugs

Directly Observed Therapy (DOTS)

Prevention of spread

Contact tracing

Immunization

The role of the nurse/midwife

Nursing care

Protecting others from acquiring infection

In-patient treatment

Summary of key points

Acknowledgement

Bibliography

Appendices

MODULE 6

The OBJECTIVE of Module 6 is to give a broad overview of the main issues regarding tuberculosis.

STATED LEARNING OUTCOMES

On completion of this module you should have an understanding of:

- the disease process
- the significance of TB as an infectious disease globally and within Europe
- risk factors for TB
- methods of diagnosis
- WHO strategy for TB control
- DOTS
- the role of the nurse or the midwife
- nursing care of the patient with TB with particular reference to infection control.

KEY WORDS

Mycobacterium tuberculosis; sputum smear positive TB; Global TB Programme (GTB); National TB Programme (NTP); Directly Observed Therapy Short Course (DOTS); tuberculin skin test; Bacillus Calmette Guerin (BCG); immunocompromised.

GLOSSARY OF TERMS

BACILLUS CALMETTE-GUERIN (BCG): active vaccine with live attenuated *Mycobacterium bovis*

CALCIFIED: deposits of calcium salts in tissues

DOTS: Directly Observed Therapy Short Course

FIBROSIS: thickening or scarring of connective tissue

GTB: Global Tuberculosis TB Programme

GRANULOMA: mass of granulation tissue produced in response to chronic infection

HAEMOPTYSIS: spitting of blood coughed up from the lungs

IMMUNOCOMPROMISED: state in which the immune system is not working properly: may have several causes

LYMPH: fluid present within the vessels of the lymphatic system

MDRTB: multi-drug resistant tuberculosis

MILIARY: small nodules or lesions which resemble millet seed

MYCOBACTERIUM: an aerobic bacteria

NTP: National TB Programme

PLEURA: covering of the lungs

PLEURAL CAVITY: the space between the visceral and parietal pleura

PLEURAL EFFUSION: fluid in the pleural cavity

PLEURISY: An inflammation of the parietal pleura of the lungs causing restriction of ordinary breathing and spasm of the chest on the affected side

PHC: Primary health care

PULMONARY: relating to the lungs

SCC: Short course chemotherapy

Introduction

Tuberculosis (TB) is arguably the most important chronic disease in the world. It affects individuals of all ages and social classes, although those affected most are the socioeconomically disadvantaged. TB can affect any part of the body, but the most significant form of the disease is pulmonary TB, as this can be infectious to others.

Definition

Tuberculosis is a disease caused by organisms classified as *Mycobacterium*. There are three main types:

Mycobacterium tuberculosis: the main cause of tuberculosis globally;

Mycobacterium bovis: causes disease in cattle and other animals, as well as in humans; and,

Mycobacterium africanum: occurs in Africa.

Modes of transmission

Mycobacterium bovis can be transmitted to humans from animals through the air, or indirectly by drinking contaminated milk. Control of cattle TB and pasteurization of milk largely prevents bovine TB in humans, although the disease is still found in low-income countries.

The most common cause of TB is from *Mycobacterium tuberculosis*, and most of the reference within this manual will be to this form of infection. Human sputum is the most important source of *Mycobacterium tuberculosis*, which is spread through air by droplet infection from coughing, sneezing, or some other form of enforced expiration from the lungs, such as singing or shouting.

The small droplets may be inhaled and are able to reach the alveoli; they may travel via the

bloodstream to distant sites where they may be reactivated later.

Those whose sputum is found to be smear positive microscopically, have the potential to infect others in close contact and should be considered potentially infective until they have completed at least two weeks of treatment (See Treatment). Those whose sputum is found to be smear negative are unlikely to infect others.

Epidemiological summary

TB represents a major health problem and in 1993 the World Health Organization declared a global emergency. In developed countries, the advent of effective anti-tuberculous drugs in the early 1950s was responsible for a decline in the mortality and number of cases of TB, and this decline continued until the mid 1980s when the incidence in disease appeared to plateau. In recent years throughout the world the number of notified cases of TB has risen.

About one third of the world's population is infected by *Mycobacterium tuberculosis*. In 1995, there were about nine million new cases of TB with three million deaths. *Mycobacterium tuberculosis* kills more people than any other single infectious agent. Deaths from TB comprise 25% of all avoidable deaths in developing countries, 95% of TB cases and 98% of TB deaths occur in developing countries. 75% of TB cases in developing countries are in the economically productive age group (15-40 years).

The main reasons for the increasing global TB burden are:

- poverty and the widening gap between rich and poor in various populations, particularly in

developing countries and in inner city populations in developed countries;

- neglect (inadequate case detection, diagnosis and cure);
- changing demography (increasing population and changing age structure); and
- the impact of the HIV pandemic.

The main reasons for failure of global TB control efforts so far include:

- inadequate political commitment and funding;
- inadequate organization of services;
- inadequate case management (failure to cure cases that were diagnosed); and
- over-reliance on BCG.

WHO's Fourth Global Tuberculosis Control report (2000) summarizes the results of five consecutive years of data supplied by national control programmes to assess worldwide progress in TB control.

The results are based on returns of standard data collection form which were sent to 211 countries requesting information. 189 countries reporting to WHO in 1998 notified a total of 3 617 045 cases (61 per 100 000 population) of which 1 431 413 (40%) were sputum smear positive (therefore infectious). These totals compare with 3 368 879 and 1 292 884 for 1997 demonstrating a 7% increase in cases and an 11% increase in smear-positive cases.

Among all cases reported for 1998, 1 410 094 (39%) originated in DOTS areas (DOTS is discussed later).

Table 1 gives a breakdown of notifications by region. Incidence of TB is highest in South East Asia Region, Western Pacific Region, and Africa.

Region	Percentage of population		Notifications		Sputum smear-positive notifications	
			Number	%	New notifications	% of all pulmonary TB notifications
AFR	DOTS	61.0	495 736	76.6	249 692	63.4
	Non-DOTS	36.1	151 106	23.4	86 181	71.9
	no report	2.9				
	Total		646 842		335 873	
AMR	DOTS	58.7	116 816	49.2	71 044	74.8
	Non-DOTS	37.5	120 630	50.8	58 950	60.5
	no report	3.8				
	Total		237 446		129 994	
EMR	DOTS	33.1	79 133	33.7	41 298	76.4
	Non-DOTS	66.9	155 909	66.3	33 584	25.5
	no report					
	Total		235 042		74 882	
EUR	DOTS	13.3	53 662	15.3	18 957	48.0
	Non-DOTS	80.0	297 859	84.7	92 414	36.2
	no report	6.7				
	Total		351 521		111 371	
SEAR	DOTS	29.3	168 844	12.9	103 498	69.1
	Non-DOTS	70.7	1 138 331	87.1	284 450	26.7
	no report					
	Total		1 307 175		387 948	
WPR	DOTS	57.9	495 903	59.1	282 746	61.8
	Non-DOTS	42.0	343 116	40.9	108 599	35.9
	no report					
	Total		839 019		391 345	
Global	DOTS	42.6	1 410 094	39	767 235	64.5
	Non-DOTS	55.6	2 206 951	61	664 178	33.7
	no report	1.8				
	Total		3 617 045		1 431 413	

Percent of population: the regional non-DOTS population includes the non-DOTS portion of DOTS countries and the entire population of non-DOTS reporting countries.

AFR = Africa
 AMR = American Region
 EMR = Eastern Mediterranean Region
 EUR = European Region
 SEAR= South East Asia Region
 WPR = Western Pacific Region

DOTS: The information listed in this row refers to those areas of the Region in which DOTS is implemented

Non DOTS: The information listed in this row refers to those areas of the Region in which DOTS is not implemented.

No report: The information listed in this row refers to those areas of the Region which GTB has no direct information as no report were received.

Total: The sum of the three cells listed (DOTS, non-DOTS, and no report)

Table 2. Breakdown by country of notifications to WHO in the European Region for 1998.

Country	Population A	Notified Cases				New sputum smear-positive cases in the country		Category G
		All types		New sputum smear-positive		Estimated Number F	Percentage detected D/F	
		No. B	Rate C	No. D	Rate E			
Albania	3 119 089	694	22.3	212	6.8	425	49.9	1
Andorra	76 000	8	10.5	1	1.3	8	12.2	4
Armenia	3 536 449	1 381	39.1	475	13.4	725	65.5	3
Austria	8 139 937	1 268	15.6			615		1
Azerbaijan	7 668 715	4 672	60.9	727	9.5	1 997	36.4	3
Belarus	10 314 539	6 150	59.6	5 047	48.9	3 021	167.1	1
Belgium	10 140 775	1 055	10.4	418	4.1	731	57.2	1
Bosnia and Herzegovina	3 675 480	2 711	73.8	640	17.4	1 444	44.3	3
Bulgaria	8 335 580	4 559	54.7	1325	15.9	1 608	82.4	1
Croatia	4 480 743	2 118	47.3	1 129	25.2	1 294	87.2	1
Czech Republic (the)	10 281 729	1 758	17.1	545	5.3	905	60.2	4
Denmark	5 269 719	506	9.6	132	2.5	257	51.4	1
Estonia	1 429 417	820	57.4	299	20.9	324	92.3	1
Finland	5 153 847	508	9.9	188	3.6	285	66.0	1
France	58 683 488					4 899		0
Georgia	5 058 518	4 876	96.4	547	10.8	1 625	33.7	4
Germany	82 133 337	10 440	12.7	3 124	3.8	5 353	58.4	1
Greece	10 600 283	1 079	10.2	313	3.0	1 139	27.5	1
Hungary	10 116 299	3 489	34.5	667	6.6	2 111	31.6	1
Iceland	276 049	16	5.8	2	0.7	5	40.0	5
Ireland	3 681 073	365	9.9	116	3.2	357	32.5	1
Israel	5 984 047	625	10.4	221	3.7	212	104.2	4
Italy	57 369 144	5 727	10.0	2 361	4.1	2 518	93.8	3
Kazakhstan	16 318 584	20 623	126.4	6 180	37.9	7 839	78.8	2
Kyrgyzstan	4 642 924	5 706	122.9	830	17.9	2 006	41.4	4
Latvia	2 424 397	1 970	81.3	668	27.6	903	74.0	4
Lithuania	3 693 679	3 016	81.7	787	21.3	1 330	59.2	1
Luxembourg	421 856	44	10.4	24	5.7	30	80.0	1
Malta	383 677	16	4.2	6	1.6	13	46.2	4
Monaco	33 000							5
Netherlands (the)	15 678 486	1 212	7.7	254	1.6	699	36.3	4
Norway	4 419 091	223	5.0	49	1.1	112	43.8	4
Poland	38 718 148	13 302	34.4	3502	9.0	7 817	44.8	2
Portugal	9 868 982	5 260	53.3	2 016	20.4	2 429	83.0	4
Republic of Moldova (the)	4 378 058	2 625	60.0	477	10.9	1 467	32.5	1
Romania	22 474 175	25 623	114.0	10 841	48.2	12 237	88.6	4
Russian Federation (the)	147 433 600	121 434	82.4	42 219	28.6	70 055	60.3	2
San Marino	26 000							5
Slovakia	5 377 162	1 117	20.8	303	5.6	835	36.3	4
Slovenia	1 992 600	424	21.3	157	7.9	259	60.6	4
Spain	39 627 632	8 927	22.5	1 906	4.8	10 225	18.6	1
Sweden	8 874 974	447	5.0	97	1.1	194	50.0	5
Switzerland	7 299 100	749	10.3	165	2.3	348	47.4	1
Tajikistan	6 015 392	2 448	40.7	435	7.2	2 378	18.3	1
The former Yugoslav Republic of Macedonia	1 998 776	620	31.0	179	9.0	461	38.8	1
Turkey	64 479 315	22 509	34.9	3 692	5.7	11 703	31.5	1
Turkmenistan	4 308 688	3 839	89.1	790	18.3	1 436	55.0	1
Ukraine	50 861 259	31 318	61.6	10 586	20.8	14 578	72.6	1
United Kingdom of Great Britain & N. Ireland	58 648 658	5 658	9.6	1 342	2.3	4 859	27.6	1
Uzbekistan	23 574 250	14 558	61.8	3 504	14.9	8 589	40.8	2
Yugoslavia	10 635 264	3 028	28.5	1 873	17.6	2 392	78.3	1
Regional Total	870 131 984	351 521	43.3	111 371	13.7	197 052	56.5	

Explanation of column headings

A: the total number of people who live in the country
B: the total number of tuberculosis cases (all types) notified to WHO
C: the case notification rate (per 100 000 population)
D: the total number of new sputum smear positive cases notified to WHO
E: the new sputum smear positive case notification rate (per 100 000 population)
F: the total number of new sputum smear positive cases estimated for the country
D/F: the proportion of new sputum smear positive cases notified by the country (D) out of the total number of new sputum smear positive cases estimated for the country (F)
G: the TB control category by which the country is classified (see below).

Key for category column

0: countries not reporting to WHO
1: countries not implementing the DOTS strategy and having a case notification rate of over 10 cases per 100 000 population
2: countries implementing the DOTS strategy in less than 10% of the total population (pilot phase)
3: countries implementing the DOTS strategy in 10 to 90% of the total population (expansion phase)
4: countries implementing the DOTS strategy in over 90% of the total population (routine implementation)
5: countries not implementing the DOTS strategy but having a case notification rate of less than 10 cases per 100 000 population (low incidence).

WHO strategy for TB control – DOTS

In 1993, WHO declared that TB is a global emergency because TB was out of control in many parts of the world. TB programmes in many developing countries have failed in the past to control TB, because they have not cured enough TB patients, particularly the infectious (smear-positive) patients.

The main reasons for this are:

- reliance on special TB care facilities which have failed to ensure directly observed therapy and which have not been accessible for many patients;
- use of inadequate treatment regimens and failure to use standardized treatment regimens; and
- lack of an information management system for the rigorous evaluation of treatment outcomes of TB patients.

Global TB control is possible because good tools exist for diagnosis (sputum smear microscopy) and treatment can be effective (Short course chemotherapy – see further notes).

WHO uses DOTS as a “brand name” for the recommended TB control strategy. It is vital for successful TB control for health care workers to treat TB patients within the framework of a National TB Programme (NTP).

Overall objectives of TB control

- To reduce mortality, morbidity and disease transmission
- To prevent the development of drug resistance

Strategy for TB control

To provide standardized short-course chemotherapy (SCC) under direct observation at least during the initial phase of treatment to, at least, all identified smear positive TB cases (the sources of infection).

Targets for TB control

- To cure 85% of detected new cases of sputum smear-positive TB
- To detect 70% of existing cases of sputum smear-positive TB

An effective NTP has:

- a high cure rate;
- a low level of acquired drug resistance; and
- a high case detection rate.

The success of the DOTS strategy depends on the implementation of a five-point package:

1. Government commitment to a National Tuberculosis Programme.
2. Case detection through case-finding by sputum smear microscopy examination of TB suspects in general health services.
3. Standardized short-course chemotherapy to at least all smear positive TB cases under proper case management conditions.
4. Regular, uninterrupted supply of all essential anti-TB drugs.
5. Monitoring system for programme supervision and evaluation.

DOTS is discussed further in other sections of this module.

Now carry out Learning Activity 1.

Manifestations of TB

The majority of people infected with *Mycobacterium tuberculosis* remain well. Around 10% of those infected will go on to develop the disease; half will do so within a year following infection, and the other half over the next 60 years or so. This can vary according to the intensity and duration of exposure. Immunocompromised patients and other vulnerable groups are more likely to develop the disease (See risk factors).

There are two main categories of TB:

- pulmonary and
- extra-pulmonary.

(Note: If a patient is diagnosed with pulmonary and extra-pulmonary TB, it is classified as a case of pulmonary disease).

Extra pulmonary TB

TB can affect any organ of the body including: upper respiratory tract; meninges; pericardium; lymph nodes; arms and joints; urinary tract; genital tract; peritoneum; eyes; mouth, tonsils, tongue; and skin. Swelling and/or pain in the affected area may be the presenting symptom.

Now carry out Learning Activity 2.

Pulmonary TB

As stated earlier, pulmonary TB is the most significant form of the disease, as it can be infectious to others. The information within this module, deals primarily with pulmonary TB.

Symptoms

Respiratory	General
Cough***	Loss of weight**
Sputum***	Fever and sweating**
Blood spitting**	Tiredness*
Chest wall pain*	Loss of appetite*
Breathlessness*	
Localised wheeze*	
Frequent colds*	

(The more *s, the more important the symptom is). A diagnosis of pulmonary TB may be suspected if someone presents with persistent cough (more than 3 weeks) with or without sputum production. This persistent cough is the main symptom of pulmonary TB and is often wrongly attributed to smoking. Symptoms often appear come on gradually over weeks or even months. All of the above symptoms can be caused by other illnesses so to make a diagnosis of TB, the sputum must be examined.)

Now carry out Learning Activity 3.

Risk factors

Certain groups of people are at special risk of acquiring TB.

- Those with HIV and AIDS and other immunocompromised states
- Immigrants from countries with a high incidence of disease
- Healthcare workers in close contact with infectious TB
- The very young
- The elderly
- Those with underlying medical conditions such as diabetes
- The homeless
- People who share residential accommodation, for example, hostels, social care homes
- Persons in penal institutions, for example, police cells, detention centres
- Prisoners



REVISION POINT 1

List the respiratory symptoms of TB.

(See page 163 for help.)

HIV and TB

HIV is recognized to be the strongest link for the progression of TB. In countries with HIV epidemics, there has been a dramatic rise in the notifications of TB. Individuals with impaired immune systems are at greater risk of reactivation of latent tuberculosis and of contracting infection from sputum smear-positive source. The progression from infection to disease may be rapid.

The clinical picture may be atypical and TB may mimic or coexist with other opportunistic infections. Diagnosis may be difficult as X rays may have an uncharacteristic appearance; there can be a

higher proportion of smear negative cultures and the tuberculin skin test may be negative.

Patients with HIV and TB are treated with standard anti-tuberculosis therapy. Thiocetazone should not be used, as it is associated with a high risk of severe, and sometimes fatal, skin reaction in HIV-infected individuals. Ethambutamol should be used instead. BCG vaccination is contraindicated for those with severe impairment of immune system, since there is a risk of active infection developing as a result of injection with live attenuated bacilli.

Immigrants from countries with a high incidence of disease

Areas considered high prevalence for TB for the purposes of screening new immigrants, refugees and asylum seekers include South East Asia, Western Pacific, Africa, South and Central America, and some parts of the Middle East and Eastern Europe. Students from high risk areas should be routinely screened by colleges and universities prior to entrance of the establishment, to prevent imported TB being spread within that environment. For a further guide on screening of immigrants from high risk areas, see the example of a protocol in Appendix 1 and consult your NTB Guidelines.

Staff who may be exposed to risk from TB

Healthcare staff who care for patients with infectious TB and those who deal with specimens are at risk of contracting the disease, including multi-drug resistant TB. The number of staff caring for infectious patients should be kept to a minimum and the patient's room should have adequate ventilation, particularly during activities likely to induce coughing such as inhaling pentamidine, sputum induction, and bronchoscopy. (See further notes under nursing care.)

For a further guide on the screening of staff who may be exposed, see the example of a protocol Appendix 2 – consult your NTB guidelines.

Now carry out Learning Activity 4.

Babies born to mothers with infectious pulmonary TB

This risk group of babies should automatically receive chemoprophylaxis for six weeks and then they should be tuberculin skin tested. If the skin test is negative BCG should be given. HIV-positive children and babies born to HIV-positive mothers should not be offered BCG. If the tuberculin skin test is positive after six weeks, chemoprophylaxis should be continued. Babies born to mothers with infectious TB may be breastfed.

Prisoners

TB among prisoners is a large and growing problem in many countries. MDRTB is also a very serious concern among this risk group. The magnitude of the MDRTB problem is largely unknown, as information is often held in the penal records and not passed on to the health authority following discharge of the prisoner. Many penal systems have very limited medical facilities, and no access to the drugs required to treat MDRTB. An additional concern to any National TB control programme is the lack of fixed abode following discharge. Prisoners often become economic migrants who move to other countries for work, thus spreading TB or MDRTB. Such persons present problems that may affect several countries.

Basic precautions such as segregating sick from well prisoners, and separating those prisoners awaiting trial from prisoners serving sentences are simple infection control procedures which would reduce the numbers of prisoners who contract TB.

Diagnosis

The methods of TB diagnosis are:

Sputum for microscopy

Finding TB in a smear of sputum is the most reliable way to diagnose TB. Generally three sputum samples are sent for microscopy and culture to confirm a diagnosis of pulmonary tuberculosis. The reason for this is that with a single specimen only, approximately 25% of microscopically positive and 50% culture positive cases may be missed. With milder disease and fewer bacilli, the smears may be negative and the culture positive. It is important to obtain good specimens of sputum. There should be at least three to five mls in quantity. If the patient has difficulty in producing sputum, a nebulized inhalation of 3% hypertonic saline might help. Early morning samples are usually taken. (See Infection control for coughing and precautions related to obtaining sputum.)

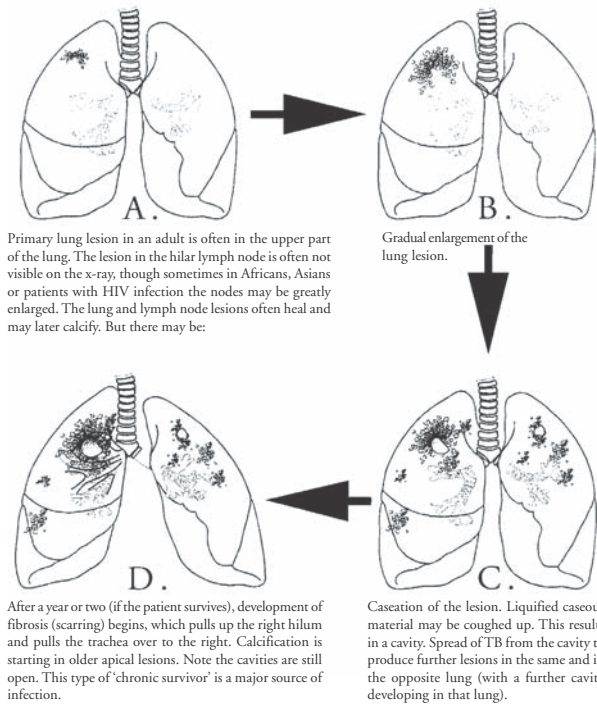
Clinical diagnosis based on symptoms

This may be necessary when facilities for microscopy are unavailable.

Radiological evidence

Cavitating apical lesions on chest X-ray are characteristic of tuberculosis. Other chest X-ray features include irregular mottled shadowing, which may particularly affect the lung apices. There may be streaky fibrosis, calcified granuloma, miliary mottling, pleural effusions, or hilar gland enlargement. Since these features may be present in other conditions, further investigations should be carried out to establish a diagnosis.

Diagram 1. X-ray appearance of progression of primary lesion in an adult



Tuberculin skin testing

Although this can be useful in measuring prevalence in a community in many poorer countries, tuberculin skin testing is less reliable than other methods, as it can provide a negative due to malnutrition or the presence of other diseases. (See further notes.)

Pathological examination of tissue or microscopy of specimens; and,

Post-mortem examination can detect TB.

Note: Any patient presenting with a cough lasting more than 3 weeks must have their sputum examined for TB.

Treatment

The objectives of TB treatment are:

- to cure the patient with the least interference to their lives;

- to prevent death of the seriously ill patient;
- to prevent relapse of the disease;
- to prevent the development of resistant tubercle bacilli (acquired resistance – see further notes); and,
- to prevent transmission of TB to others.

Effective treatment of TB is possible when:

- the correct medication is prescribed; and
- the patient takes his/her medicine as prescribed and for a sufficiently long period.

If both of the above criteria are met, all patients can be cured of TB.

Chemotherapy

Successful treatment of all types of TB requires anti-tuberculosis chemotherapy. Chemotherapy is a combination of drugs. It is usual for anti-tuberculosis drugs to be prescribed for a minimum of six months and administered daily or two or three times a week. Chemotherapy regimes are internationally agreed and are based on the results of a series of controlled studies.

The essential anti-TB drugs

There are three main properties of anti-TB drugs: bactericidal ability, sterilising ability and the ability to prevent resistance. The anti-TB drugs possess these properties to different extents.

Isoniazid and rifampicin are the most powerful bactericidal drugs, active against all populations of TB bacilli. Table 3 (on next page) shows the essential anti-TB drugs, their mode of action, and recommended dose. (Range given in parenthesis.)

(*WHO does not generally recommend twice weekly regimens. If a patient receiving a twice weekly regimen misses a dose of tablets, this missed dose represents a bigger fraction of the total number of treatment doses than if the patient were receiving a thrice weekly or daily regimen. There is therefore a bigger risk of treatment failure).

Table 3. The essential anti-TB drugs

Essential anti-TB drug (abbreviation)	Mode of action	Recommended dose (mg/kg)		
		daily	Intermittent	
			3x/week	2x/week*
Isoniazid (H)	bactericidal	5 (4-6)	10 (8-12)	15 (13-17)
Rifampicin (R)	bactericidal	10 (8-12)	10 (8-12)	10 (8-12)
Pyrazinamide (Z)	bactericidal	25 (20-30)	35 (30-40)	50 (40-60)
Streptomycin (S)	bactericidal	15 (12-18)	15 (12-18)	15 (12-18)
Ethambutol (E)	bacteriostatic	15 (15-20)	30 (25-35)	45 (40-50)
Thioacetazone (T)	bacteriostatic	2.5	not applicable	

Intermittent use

Isoniazid, rifampicin, pyrazinamide and streptomycin are all as efficacious when given intermittently (2 or 3 times per week) as when given daily. Ethambutol is usually only given intermittently when also given with rifampicin. Thioacetazone is the only anti-TB drug not effective when given intermittently (2 or 3 times per week).

Rationale for recommended standardised treatment regimes

New cases

Treatment regimes have an initial, intensive phase lasting 2 months and a continuation phase usually lasting 4–6 months.

During the initial phase, consisting usually of 4 drugs, there is rapid killing of tubercle bacilli. Infectious patients become noninfectious within about 2 weeks. Symptoms improve. The vast majority of patients with sputum smear-positive TB become smear-negative within 2 months. In the continuation phase, fewer drugs are necessary but are taken a longer time. The sterilising effect of the drugs eliminates remaining bacilli and prevents subsequent relapse.

In patients with smear-positive pulmonary TB, there is a risk of selecting resistant bacilli, since these

patients harbour and excrete a large number of bacilli. Short-course chemotherapy regimes consisting of 4 drugs during the initial phase, and 2 drugs during the continuation phase, reduce the risk of selecting resistant bacilli. These regimes are nearly as effective in patients with initially resistant organisms as in those with sensitive organisms.

In patients with smear-negative pulmonary or extra-pulmonary TB there is little risk of selecting resistant bacilli, since these patients harbour fewer bacilli in their lesions. Short-course chemotherapy regimes with three drugs during the initial phase, and two drugs in the continuation phase, are of proven efficacy.

Re-treatment cases

Previously-treated patients may have acquired drug resistance. They are more likely than new patients to harbour and excrete bacilli resistant to at least isoniazid. The re-treatment regime consists of initially 5 drugs, with 3 drugs in the continuation phase. The patient receives at least 2 drugs in the initial phase which are still effective. This reduces the risk of selecting further resistant bacilli.

Rationale for prioritization of treatment categories

From the public health perspective, the highest TB control programme priority is the identification

and cure of the infectious cases, that is, those patients with sputum smear-positive pulmonary TB. In limited-resource settings, it is necessary for rational resource allocation in order to prioritize TB treatment categories according to the cost-effectiveness of treatment of each category. Treatment categories are therefore ranked from I (highest priority) to IV (lowest priority).

Standard code for TB treatment regimes

There is a standard code for TB treatment regimes; each anti-TB drug has an abbreviation, shown in Table 4. A regime consists of 2 phases; the number before a phase is the duration of that phase in months. A number in subscript (for example, ₃) appearing after a letter, is the number of doses of that drug per week. If there is no number in subscript after a letter, then treatment with that drug is daily. An alternative drug (or drugs) appears as a letter (or letters) in brackets.

Examples

2 HRZE/6 HE

This is a common regime. The initial phase is 2 HRZE. The duration of the phase is 2 months. Drug treatment is daily (no subscript number, for example, ₃ after the letters), with Isoniazid (H), rifampicin (R), pyrazinamide (Z) and ethambutol (E). The continuation phase is 6 HE. The duration of the phase is 6 months. Drug treatment is daily with isoniazid (H) and ethambutol (E).

2 H₃R₃Z₃E₃/4 H₃R₃

In some countries, resources are available to provide rifampicin in the continuation phase as well as in the initial phase. The initial phase is 2 H₃R₃Z₃E₃. The duration of the phase is 2 months. Drug

treatment is 3 times per week (subscript number ₃ after the letters).

The continuation phase is 4 H₃R₃. The duration is 4 months, with isoniazid and rifampicin three times per week (subscript number ₃ after the letters).

Recommended treatment regimes for different treatment categories

There are several different possible regimes. The regimes recommended in each country's NTP depend on that country's budget health coverage by PHC services, and qualifications of health staff at peripheral level. For each patient, the regimen recommended depends on the patient treatment category. Table 4 shows possible alternative regimens for each treatment category that can be used under various circumstances and in certain sub-populations. Follow the regimens recommended by your NTP in your country, shown in your NTP manual.

Table 4. Possible alternative treatment regimens for each treatment category

TB Treatment Category	TB Patients	Alternative TB treatment regimens	
		Initial phase (daily or 3 times per week)	Continuation Phase
I	New smear-positive PTB; new smear negative PTB with extensive parenchymal involvement; new cases of severe forms of extra-pulmonary TB.	2 EHRZ (SHRZ) 2 EHRZ (SHRZ) 2 EHRZ (SHRZ)	6 HE 4 HR 4 H ₃ R ₃
II	Sputum smear-positive: relapse; treatment failure; treatment after interruption.	2 SHRZE /1 HRZE 2 SHRZE /1 HRZE	5 H ₃ R ₃ E ₃ 5 HRE
III	New smear-negative PTB (other than in Category 1); new less severe forms of extra-pulmonary TB.	2 HRZ 2 HRZ 2 HRZ	6 HE 4 HR 4 H ₃ R ₃
IV	Chronic case (still sputum-positive after supervised re-treatment)	NOT APPLICABLE (Refer to WHO guidelines for use of second-line drugs in specialised centres)	

Note: Some authorities recommend a 7-month continuation phase with daily isoniazid and rifampicin (7 HR) for Category 1 patients with the following forms of TB: TB meningitis, miliary TB, spinal TB with neurological signs. Refer back to Table 3 for the drug doses for the currently recommended treatment regimens, which are appropriate for the most patients with TB.

Now carry out Learning Activity 5.

Treatment regimens in special situations

Treatment for pregnant women

It is important to ask a woman before starting anti-TB chemotherapy if she is pregnant. Most anti-TB drugs are safe for use in pregnant women. The exception is streptomycin which is ototoxic to the foetus, should not be used in pregnancy, and can be replaced by ethambutol. It is important to explain to a pregnant woman that successful treatment of TB with the recommended standardised regimen is important for a successful outcome of pregnancy.

Treatment for breastfeeding women

A woman who is breastfeeding and has TB should receive a full course of anti-TB chemotherapy. Timely and properly applied chemotherapy is the best way to prevent transmission of tubercle bacilli to her baby. All the anti-TB drugs are compatible with breastfeeding and a woman taking them can safely continue to breastfeed her baby. The mother and baby should stay together and the baby should continue to breastfeed in the normal way.

Treatment for women taking the oral contraceptive pill

Rifampicin interacts with the oral contraceptive pill, decreasing protective efficacy against pregnancy. A woman who usually takes the oral contraceptive

pill may choose between two options during treatment with rifampicin. Following consultation with her physician, she could:

- take an oral contraceptive pill containing a higher dose of oestrogen (50mcg); or
- she could use another form of contraception.

Treatment for patients with liver disease

Patients with the following conditions can receive the usual short-term course chemotherapy regimens, provided that there is no clinical evidence of chronic liver disease: hepatitis virus carriage, a past history of acute hepatitis, excessive alcohol consumption.

Established chronic liver disease

Isoniazid plus rifampicin, plus one or two non-hepatotoxic drugs such as streptomycin and ethambutol, can be used for a total treatment duration of eight months. An alternative regimen is streptomycin plus isoniazid plus ethambutol in the initial phase, followed by isoniazid and ethambutol in the continuation phase, with a total treatment duration of 12 months. Patients with liver disease should not receive pyrazinamide.

Therefore recommended regimens are the following: **2 SHRE/6 HR** or **2 SHE/10 HE**.

Acute hepatitis (acute viral hepatitis)

This is a rare eventuality that a patient has TB and also at the same time acute hepatitis unrelated to TB or anti-TB treatment. Clinical judgement is necessary. In some cases it is possible to defer TB treatment until the acute hepatitis has resolved. If it is necessary to treat TB during acute hepatitis, the combination of streptomycin and ethambutol up to a maximum duration of 3 months is the safest option until the hepatitis has resolved. The patient can then receive a continuation phase of 6 months isoniazid and rifampicin (6HR).

Treatment of patients with renal failure
Isoniazid, rifampicin and pyrazinamide are either eliminated almost entirely by biliary excretion or metabolised into non-toxic compounds. These drugs can, therefore, be given in normal dosage to patients with renal failure. In severe renal failure, patients should receive pyridoxine with isoniazid in order to prevent peripheral neuropathy. Streptomycin and ethambutol are excreted by the kidney. Where facilities are available to monitor renal function closely it may be possible to give streptomycin and ethambutol in reduced doses. Thioacetazone is excreted partially in the urine, but since the margin is too narrow between a therapeutic and a toxic dose, patients in renal failure should not receive this drug.

The safest regimen to be administered in patients with renal failure is as follows: **2 HRZ/6 HR**.

Monitoring the patient during treatment

There are two main objectives:

- To monitor and record the response to treatment, especially in sputum smear-positive TB patients
- To monitor and manage drug-induced toxicity

TB and extra-pulmonary TB, clinical monitoring is the usual way of assessing response to treatment. Under primitive conditions in high TB incidence countries, routine monitoring by sputum culture is not feasible or recommended. Where facilities are available, culture surveys can be useful as part of quality control of diagnoses by smear microscopy.

New sputum smear-positive pulmonary TB patients (Category I)

The treatment response should be monitored by sputum smear examination. In general, two sputum specimens should be collected for smear examination at each follow-up sputum check.

Table 5 shows when sputum smears should be performed in the six month and eight month treatment regimens. Negative sputum smears at the times shown in Table 5 indicate good treatment progress, which encourages the patient and the health worker responsible for supervising the treatment.

Table 5. Monitoring by sputum smear examination of patients with new smear-positive pulmonary TB

Sputum Smear Examination	Treatment Regimens	
	Six month regimen	Eight month regimen
At end of initial phase	End of second month	End of second month
In continuation phase	End of fourth month	End of fifth month
At end of treatment	In the six month	In the eight month

Monitoring the treatment response

Patients with sputum smear-positive pulmonary TB should be monitored by sputum smear examination. This is the only group of TB patients for whom bacteriological monitoring is possible. It is unnecessary and wasteful of resources to monitor the patient by chest radiography. For patients with sputum smear-negative pulmonary

At the end of the second month of treatment most patients will have a negative sputum smear. Such patients will then start the continuation phase of treatment. If a patient has a positive sputum smear at this time, this may indicate one of the following:

- Most frequently, that the initial phase of therapy was poorly supervised and patient adherence was poor.

- Sometimes, there is a slow rate of progress with sputum smear conversion, for example, if a patient had extensive cavitation and an initial heavy bacillary load.
- Rarely, the patient may have drug-resistant TB which does not respond to first line treatment.

In such cases, if the sputum smears are positive at the end of the second month, the initial phase is prolonged for a third month. The patient then starts the continuation phase. If the sputum smears are still positive at the end of the 5th month, this constitutes treatment failure. The patient is then re-registered as a treatment failure and starts a full course of the re-treatment regimen as a Category II patient.

In most high TB prevalence countries, susceptibility testing should be reserved for surveillance of drug resistance. Access to culture facilities and the reliability of susceptibility testing are usually inadequate for the utilization of susceptibility test results in patient management. In some settings where culture facilities are accessible and susceptibility test results are reliable, susceptibility testing may be useful in cases of treatment failure or relapse, or in chronic cases.

Previously treated sputum smear-positive patients (Category II)

Sputum smear examination is performed at the end of the initial phase of treatment (at the end of the third month), during the continuation phase of treatment (at the end of the fifth month) and at the end of treatment (at the end of the eighth month). If the patient is sputum smear-positive at the end of the third month, the initial phase of treatment with four drugs is extended by another month and sputum smears examined again at the end of the fourth month. If the patient still has positive smears at the end of the fourth month,

sputum is sent to the laboratory for culture and sensitivity, and the patient then starts the continuation phase. If the culture and sensitivity results subsequently show resistance to 2 or more of the 3 drugs employed in the continuation phase, then the patient should be referred to a specialized centre for consideration of treatment with second-line anti-TB drugs. Where there are no facilities for culture and sensitivity testing, the patient continues treatment right until the end of the re-treatment regimen.

New sputum smear-negative pulmonary TB patients (usually Category III)

It is important to check sputum smears at the end of the second month in case of the following 2 possibilities; an error at the time of initial diagnosis (i.e. true smear-positive patient was misdiagnosed as smear-negative); non-adherence to treatment. A patient who was initially diagnosed as sputum smear-negative and treated as category III patient, and who has a positive sputum smear at the end of the second month, should then be re-registered as sputum smear-positive and start a full course of treatment as a Category II patient.

Table 6. Recording treatment outcome in smear-positive patients

Cure	Patient who is smear-negative at, or one month prior, to the completion of treatment and on at least one previous occasion.
Treatment completed	Patient who has completed treatment but in whom smear results are not available on at least two occasions prior to the completion of treatment.
Treatment failure	Patient who remains or becomes again smear positive at five months or later during treatment
Died	Patient who dies for any reason during the course of the treatment
Treatment Interrupted (default)	Patient whose treatment was interrupted for 2 months or more
Transfer out	Patient who has been transferred to another reporting unit and for whom the treatment outcome is not known

Recording standardized treatment outcomes

At the end of the treatment course in each

individual patient with sputum smear-positive pulmonary TB, the District TB Officer records the treatment outcome in the District TB Register. Table 6 shows the standardized definitions of treatment outcomes.

Monitoring for significant adverse effects

Most TB patients complete their treatment without any significant adverse effects of drugs.

However, a few patients do develop adverse effects and therefore clinical monitoring of all TB patients is important during treatment. Routine laboratory monitoring is not necessary.

Health personnel can monitor adverse effects of drugs in the following two ways: teach patients how to recognize symptoms of common adverse effects and advise them to report such events. Specifically ask about symptoms when patients report to collect drugs.

Prevention of adverse effects of drugs

Health personnel can prevent some drug-induced side effects, for example isoniazid-induced peripheral neuropathy. This usually presents as burning sensation of the feet and occurs more commonly in pregnant women and in people with the following conditions: HIV infection, alcohol abuse, malnutrition, diabetes, chronic liver disease. These patients should receive preventive treatment with pyridoxine 10 mg daily along with their anti-TB drugs.

Adverse effects of anti-TB drugs

Adverse effects are classified as minor or major. In general, a patient who develops minor adverse effects should continue the anti-TB treatment, usually at the same dose but sometimes at a reduced dose. The patient also receives symptomatic

treatment. If a patient develops a major side effect, the treatment or the offending drug is stopped. Further management depends on the nature of the adverse reaction and is shown in Table 7. Patients with major adverse reactions should be managed in a district or central hospital.

Table 7. Symptom-based approach to adverse effects of TB drugs

Side effects	Drug(s) probably responsible	Management
Minor		Continue anti-TB drugs, check drug doses
Anorexia, nausea, abdominal pain	Rifampicin	Give drugs last thing at night
Joint pains	Pyrazinamide	Aspirin
Burning sensation in the feet	Isoniazid	Pyridoxine 10 mg daily
Orange/red urine	Rifampicin	Reassurance
Major		Stop responsible drug(s)
Itching of skin, skin rash	Thioacetazone (Streptomycin)	Stop anti-TB drugs, seek further advice
Deafness (no wax on auroscopy)	Streptomycin	Stop streptomycin, use ethambutol
Dizziness (vertigo and nystagmus)	Streptomycin	Stop streptomycin, use ethambutol
Jaundice (other causes excluded)	Most anti-TB drugs (especially isoniazid, pyrazinamide and rifampicin)	Stop anti-TB drugs, seek further advice
Vomiting and confusion (suspect drug-induced acute liver failure)	Most anti-TB drugs	Stop anti-TB drugs. Urgent liver function tests and prothrombin
Visual impairment (other causes excluded)	Ethambutol	Stop ethambutol, seek further advice
Shock, purpura, acute renal failure	Rifampicin	Stop rifampicin, seek further advice

Directly Observed Therapy (DOTS)

The public health priority of a National Tuberculosis Programme is to cure smear-positive cases, while avoiding drug resistance. Ensuring adherence to treatment is necessary to achieve this priority, and also to ensure the cure of a patient with any form of TB.

The patient's compliance is a key factor in treatment success. In many countries, a significant proportion of patients stop treatment before the end, for various reasons. The premature interruption of

treatment represents a problem for patients, those who care for them, and those responsible for TB programmes.

Directly observed treatment is one element in the WHO-recommended policy package for TB control. Directly observed treatment means that a supervisor watches the patient swallowing the tablets. This ensures that a TB patient takes the right drugs, in the right doses, at the right intervals. Many countries have used directly observed treatment in in-patient settings in hospitals or in sanatoria. Directly observed treatment is also applicable in out-patient settings. The supervisor may be a health worker or a trained supervised community member. There may be an incentive of some sort for community members to be supervisors of directly observed treatment. The NTP trains and monitors the community supervisors of directly observed treatment. There must be a clearly defined line of accountability from NTP staff to general health services staff and the supervisor of directly observed treatment. It is important to ensure confidentiality and that directly observed treatment is acceptable to the patient.

Directly observed therapy is always recommended in the following cases:

- two months initial phase of treatment for all new smear-positive cases;
- four months continuation phase of rifampicin-containing (intermittent and daily) regimens; and,
- three months initial phase of re-treatment regimen.

How to apply directly observed treatment to fit patients' needs

A TB patient who has to go far for treatment is less likely to adhere to treatment. One of the aims

of a TB programme is to organise TB services so that the patient has TB treatment as close to home (or sometimes the workplace) as possible.

A TB programme brings TB treatment to patients close to where they live, by integrating TB services with general health services. Many TB patients live close to a health facility such as a health centre or district hospital. For these patients, the supervisor will be a health outreach worker or a trained local community member.

Preventative measures to decrease the duration of treatment interruption

At the time of registration of a tuberculosis patient starting treatment, it is important to set aside enough time to meet with the patient, and preferably with the patient's relatives, since this is an important opportunity to advise and counsel the patient. During this meeting, it is important to record the patient's details, address, and several other addresses, for example, the address of a partner/spouse, parents, work place, or place of study, in order to contact the patient. Also, it is important to identify potential problems which the patient may face during the initial phase of treatment.

Recommendations to help prevent the patient from stopping treatment too early

- Be kind, friendly and patient.
- Explain the disease to patients and family. Remember that there may be local beliefs about TB.
- Explain the importance of full treatment.
- Show the patient the kind of pills he/she will take and how to take them.
- Tell the patient about possible reactions to the drugs, and advise him/her to contact you if there is a reaction to the drugs.

- Give the patient a leaflet about TB and its treatment.
- Tell the patient about local arrangements for supervision of treatment: for example, admission to a ward or hostel, or daily attendance at a centre near home for first 2 months, or supervision by volunteers or other persons in his village.
- Carefully inform the patient regarding the date and place of his next visit, using a card. If there is a local calendar different from the standard international calendar, give the patient the date in the local calendar.
- Check on personal problems - job, marriage, fears about what others may think ; give friendly advice and use counselling if available.
- When the patient returns for a new supply of drugs, remember to check the number of pills left over. This will tell you whether all the doses have been taken. If all the doses have not been taken, courteously ask the patient why not. This will help in determining the right advice to provide about continuing the full treatment.

Now carry out Learning Activity 6.

Prevention of spread

Prevention of spread depends upon the successful implementation of a National TB Programme and effective implementation of the DOTS strategy.

Aspects of prevention to be discussed include:

- contact tracing;
- management of close contacts; and
- immunization.

Contact tracing

Studies in the United Kingdom show that up to 10% of tuberculosis cases are diagnosed by contact tracing. In many countries, there is a statutory requirement for doctors who diagnose TB to notify the public health authorities.

The public health authorities are then often responsible for screening of contacts. Contacts are usually limited to household contacts and to friends sharing a similar level of contact to that of household contacts. Close or household contacts can be generally considered to have had at least four hours' cumulative contact at conversational distance.

Managing close contacts

Figures 1, 2, and 3 on the next page show how close contacts (usually family) should be managed.

Figure 1. How to manage a child contact of a newly diagnosed patient with TB

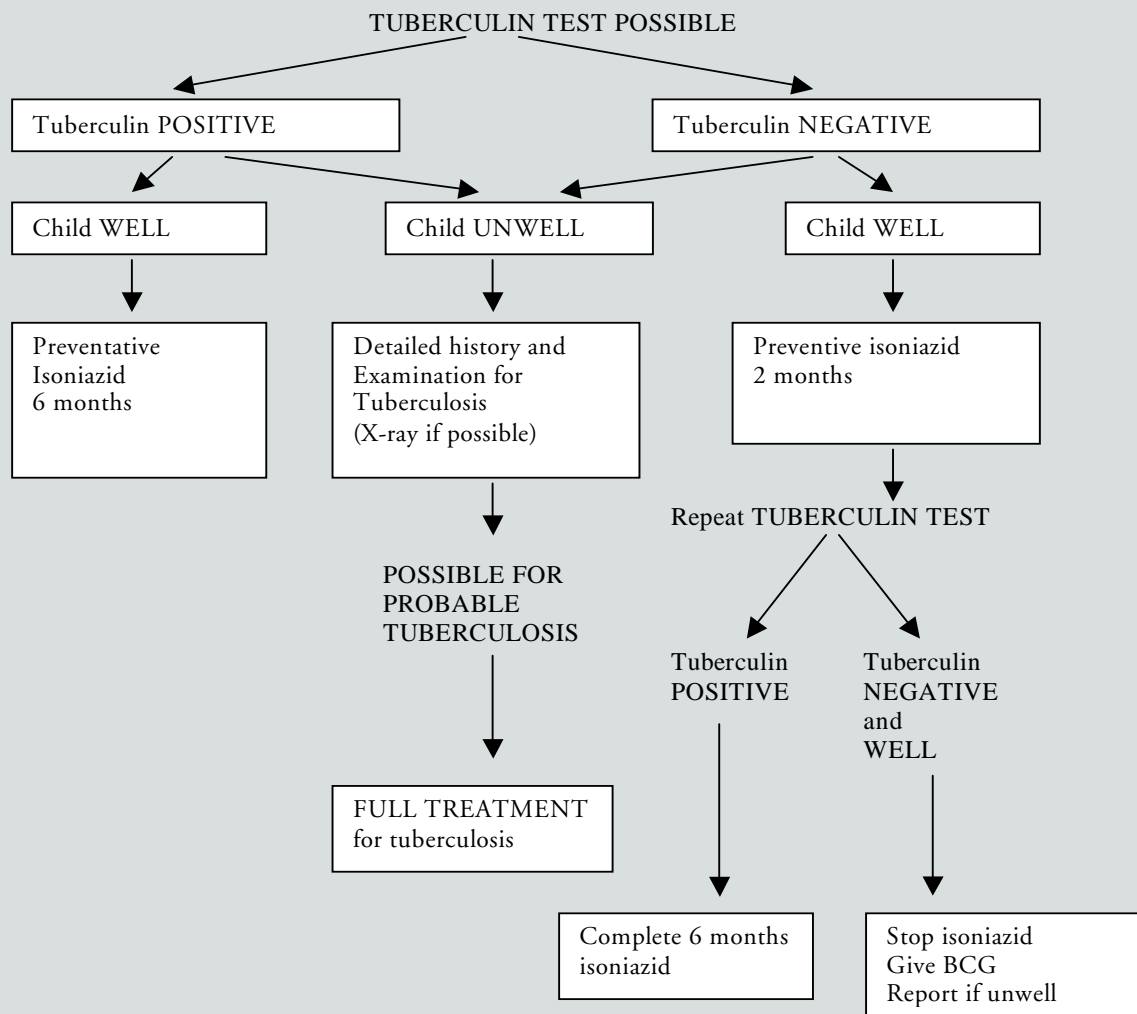


Figure 1 shows how to manage a child contact if tuberculin testing can be carried out. Tuberculin testing may be negative:

- if the child has been infected with TB only recently and has not yet become tuberculin positive;
- if the child is malnourished or ill with another disease;
- if the child is very ill with TB.

(Note: It is important to give preventive (prophylactic) isoniazid treatment, as in Figure 1, to children aged 5 years or less. These young children are in particular danger from the severe forms of miliary and meningeal TB).

Figure 2. Flow chart: how to manage a child contact of a newly diagnosed patient with TB

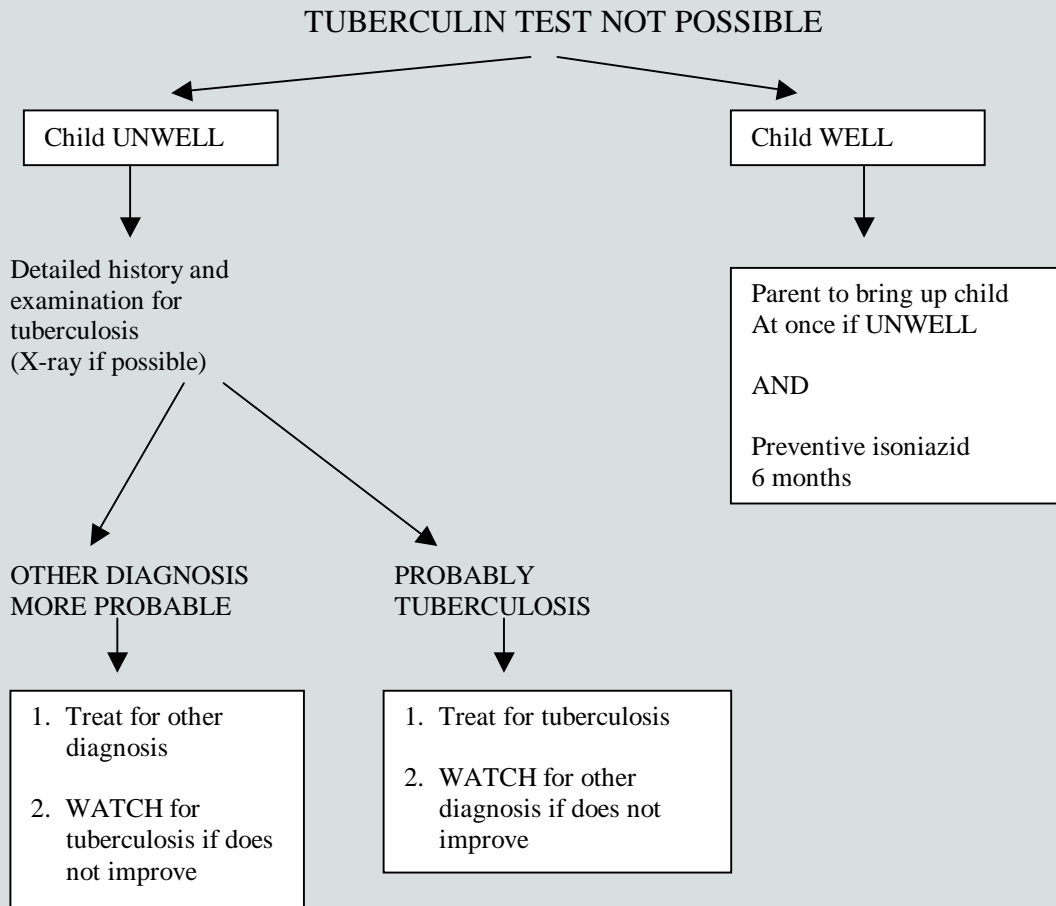


Figure 2 shows how to manage a child contact when tuberculin testing cannot be carried out.

Figure 3. Flow chart: how to manage an adult contact of a newly diagnosed patient with TB

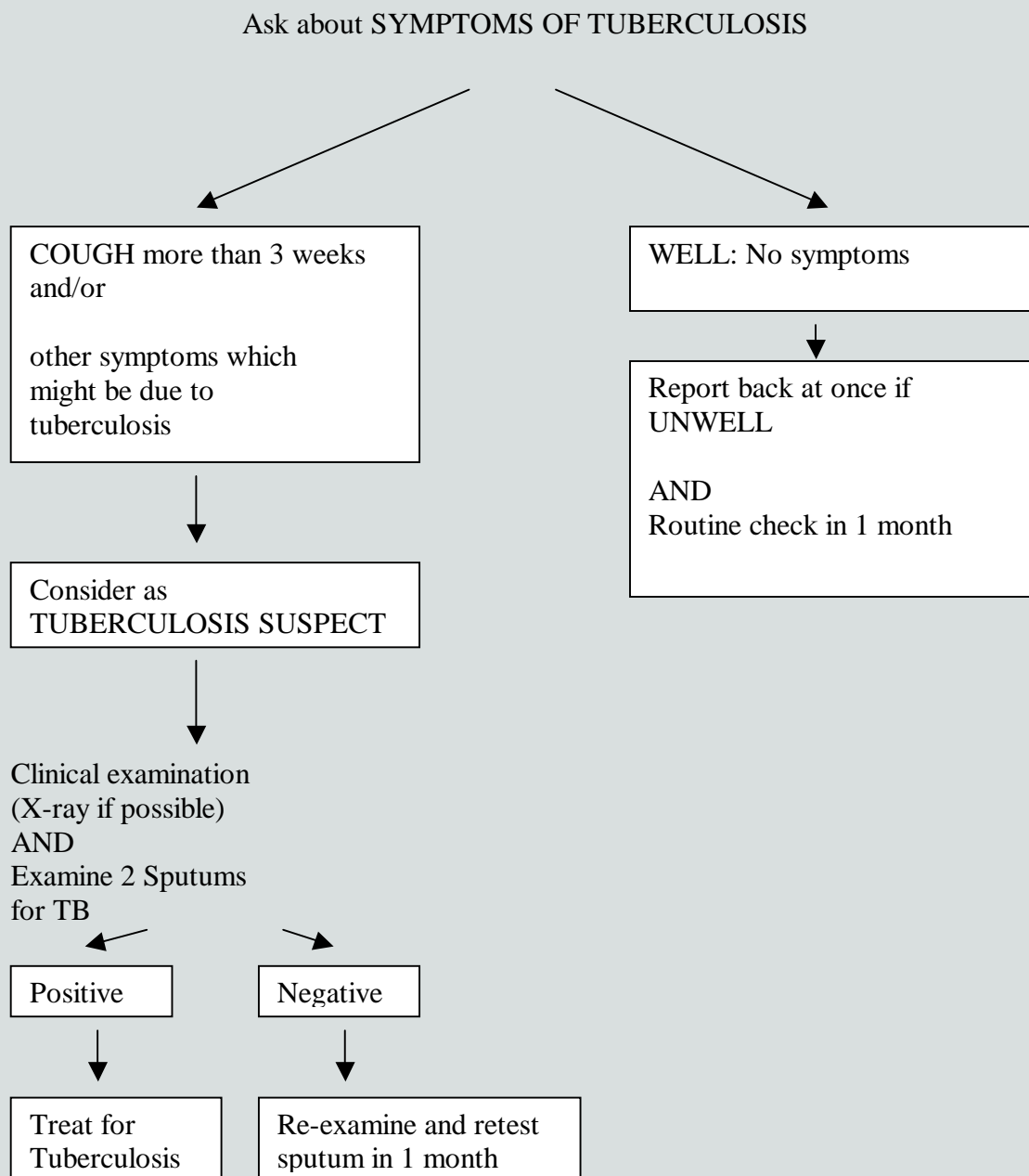


Figure 3 shows how to manage an adult contact. Here tuberculin testing is less useful, as many adults will be tuberculin positive (especially if previously immunised). It is important to examine all adults living in the family home, particularly the grandparents, one of whom may be the infector.

Immunization

Immunization has a role in the prevention of TB; however, over-reliance of this method has been a contributor to the failure of previous efforts to control TB.

The vaccine used to prevent TB is Bacillus Calmett-Guerin (BCG). Controlled trials in several Western countries, where most children are well nourished, have shown that BCG can give 80% protection against TB for up to 15 years if administered before the first infection.

Other trials in the United States and India have failed to show such benefit. A number of smaller trials in infants in poor countries have shown protection against miliary TB and TB meningitis.

The present WHO recommendation is that BCG should be given as a routine to all infants (with a few exceptions such as AIDS) and BCG is included in the Expanded Programme of Immunization (EPI). Immunization against TB with BCG (in all persons more than three months old) should only be carried out following a negative tuberculin skin test.

The tuberculin skin test

There are two main methods of skin testing:

1. Heaf test (or multiple puncture test), and
2. Mantoux test.

Both tests use purified protein derivative (PPD), a sterile preparation produced from heat-treated products of mycobacterium. Different tests require different concentrations of PPD.

The Heaf test

Equipment needed: PPD 100 000 units/ml, a Heaf gun, disposable Heaf heads (paediatric and standard).

Procedure: Draw up 0.1 ml of PPD in a syringe; expel the PPD onto the flexor surface of the left forearm. Smear the PPD over the surface of the skin using the Heaf gun head so that it covers an area just greater than the surface of the Heaf gun head. Using a firm pressure, press the Heaf gun head down on to the arm and six needles from the Heaf head will be released and protrude 2mm into the skin. The disposable head should be safely discarded. The test should be read 7 days later.

The Mantoux test






Equipment needed: PPD 100 units/ml and a 1 ml syringe with short bevel and 26 gauge needle.

Procedure: Draw up 0.1 ml of PPD in the syringe and administer using the intradermal technique (see administration of BCG) into the flexor surface of the left forearm.

The test should be read 48–72 hours later.

Extent of Induration	Result	Heaf Test Equivalent
0–4mm	Negative	0-1
5–14mm	Positive	2
>15mm	Strongly positive	3-4

Diagram 2. Interpretation of Heaf and Mantoux tests

Heaf grade	Result	Appearance
0	No induration at the puncture sites. Erythema only is present. Discrete induration of three or fewer needle sites is acceptable. NEGATIVE	
1	Discrete induration of four or more needle sites. NEGATIVE	
2	Induration around each needle site merging with the next, forming a ring of induration but with a clear centre. POSITIVE	
3	The centre of the reaction becomes indurated to form one uniform circle 5–10mm wide. STRONG POSITIVE	
4	Solid induration over 10mm wide. Vesiculation or ulceration may also occur. STRONG POSITIVE	

Heaf grades 0 and 1, or a Mantoux response of 0–4mm induration, are regarded as negative. Individuals who have not previously received immunization with BCG may be offered it in the

absence of contraindications. Those who give a history of previous BCG should only be immunised there is no evidence of the characteristic scar.

Those individuals with a Heaf grade 2, or Mantoux response of 5–14 mm induration, are positive. They are hypersensitive to tuberculin and should not be given immunization.

Heaf grades 3 or 4, and Mantoux tests of 15 mm induration or more, are considered to be strongly positive and should be referred for further investigation and possible prophylactic chemotherapy.

(For a further guide on skin testing and screening of high-risk groups such as new immigrants and healthcare workers, see the examples of protocols in Appendices 1 and 2).

BCG Vaccine

Type of vaccine: active vaccination with live attenuated *Mycobacterium bovis*;

Primary course: usually 1 dose;

Boosters: usually none or 1 dose;

Route of administration: intradermal (see diagram below);

Adverse reactions: vertigo and dizziness, ulcer or abscess formation, keloid formation;

Contraindications: tuberculin skin test positive, acute or febrile illness, malignant disease, immunocompromised status, pregnancy.

Notes: BCG is only carried out after a negative tuberculin skin test, except for infants < 3 months old.

Administration of BCG

The recommended site for giving the vaccine is at the insertion of the deltoid muscle near the middle

of the left upper arm. Sites higher on the arm are more likely to lead to keloid formation. The vaccine must be given strictly intradermally with 0.1 ml (or 0.05 ml in neonates) of vaccine. If the skin is visibly dirty it should be swabbed with spirit and allowed to dry. The skin is stretched between the thumb and forefinger of one hand while the other slowly inserts the needle with the bevel upwards for about 2 mm into the superficial layers of the dermis almost parallel with the surface. The needle can usually be seen through the epidermis. A correctly administered intradermal injection results in a blanched raised bleb and considerable resistance is felt when the fluid is injected. A bleb typically of 7 mm diameter follows a 0.1 ml injection. If little resistance is felt when injecting, the needle is too deep – stop injecting, withdraw and recommence at the correct depth. Administration of BCG vaccine too deeply can result in ineffective protection and possible abscess formation at the injection site.

Diagram 3. Site and technique for BCG immunization



Now carry out Learning Activity 7.

The role of the nurse and the midwife

Nurses and midwives have important roles to play in the prevention, control and treatment of TB.

The nurse, midwife (or other primary health worker) may be the first to suspect TB in patients who have been coughing for more than three weeks, or who have not responded to antibiotics, have weight loss, or are feeling tired.

Nurses and midwives are the patients' allies in recognizing TB symptoms, referring them for diagnosis and assuring treatment. Nurses and midwives must:

- ensure that correct treatment is started and the treatment card filled out;
- ensure a regular supply of drugs is sent to the treatment supporter for the duration of the treatment;
- report and refer patients with drug side effects; and
- report completion and outcome of treatment.

Nurses and midwives also need to work closely with their community, laboratory staff, doctors, and National TB programme managers to:

- provide information and education on the DOTS strategy;
- build community support (through community leaders, schools and the media) for a strong National TB Programme;
- register all TB cases; and
- train and supervise the primary health workers to find, educate and treat the patients.

Nurses' and midwives' organizations should be vocal advocates for the DOTS strategy for TB control and can help maintain strong National TB control programmes.

What you can do

- Increase community awareness of the right of all to free access to effective TB care.
- Make friends, neighbours, and colleagues aware of DOTS and how your country's National TB

Programme can save lives and prevent the spread of TB.

- Contact your National TB Programme, your Nurses' and Midwives' Association and your Minister of Health to find out how you can participate in the STOP TB initiative.

Now carry out Learning Activity 8.

For further information on the nurse's role in DOTS, refer back to the appropriate sections of this module.

Nursing care

When planning the nursing care of the patient with TB, it is necessary to consider:

- physical needs;
- psychological needs; and
- the need to protect others from acquiring infection.

Physical care

General nursing care will vary according to the type and site of TB infection, presenting symptoms and severity of disease. Many patients with TB suffer weight loss, so maintaining a nutritional diet is essential and can be difficult if gastrointestinal problems occur as a result of treatment.

Psychological care

Psychological support for the patient with TB is important as TB carries a degree of social stigma. This support is even more important for the patient with infectious pulmonary TB who requires isolation. Sharing of information with the patient and family is crucial as everyone involved with care of the patient needs to know about treatment, the importance of compliance with chemotherapy and any infection control precautions needed.

Protecting others from acquiring infection

Since chemotherapy treatment of tuberculosis has already been discussed, this section will concentrate mainly on infection control issues.

Infectious pulmonary TB is spread by inhalation of infected droplets and nursing interventions are therefore based on reducing the contamination of the environment when the patient has a productive cough.

Respiratory precautions prevent the spread of infectious pulmonary TB to other vulnerable patients and staff. Isolation of the patient is usually recommended for a minimum of two weeks after commencing chemoprophylaxis. It may be necessary for longer if the patient has multi-drug-resistant TB. Three negative sputum smear specimens at a minimum of 24 hours apart and resolution of the cough are required before allowing the patient home.

Out-patient clinics

Patients with infectious pulmonary TB and undiagnosed productive coughs are a potential danger to others. When a patient is referred for confirmation of a TB diagnosis this should be noted on the referral form so that out patient clinic appointments can be coordinated to minimize cross infection to other patients. This should also be considered when potentially infectious or known infectious patients attend other departments, for example X-ray.

When sputum samples are obtained in the clinic this should be done in a well ventilated area away from other vulnerable patients (see further notes on coughing and obtaining a sputum sample).

In-patient treatment

Isolation

Infectious patients should be cared for in isolation.

The isolation room should be well ventilated. In some specialized hospitals, a negative pressure ventilation system may be available for nursing patients with MDRTB. These systems also have high efficiency particulate air filters (HEPA) on the external exit system of the vents to prevent infective particles being sent out into the atmosphere.

The negative psychological effects of isolation can be minimized by careful planning prior to admitting the patient. The room should be clean and well-equipped but not cluttered. Consideration should be given to providing some recreation: radios and books or magazines the patient would enjoy. It is good Infection Control practice not to allow staff to share newspapers, magazines or soft toys from any patient in an isolation room as there is a low, theoretical risk of cross-infection. Papers should be discarded as household rubbish and toys washed prior to reuse or thrown away if this is not feasible. It is not necessary to heat treat books following use by a known infected patient.

Equipment

An adjustable and easily cleaned hospital-style bed will facilitate easy cleaning and changing of the patient's position if they are severely unwell. The mattress and pillows should be protected by waterproof covers. Any therapeutic overlay or pressure relieving equipment must also be washable or disposable.

A comfortable washable chair and footstool to allow the patient to sit out of bed should be provided, as should a washable chair for visitors. The movement of furniture in and out of the room during the isolation period should be minimised because everything in the room may be considered potentially infected until cleaned and disinfected. Equipment for monitoring the patient's clinical

condition should be available in each room and kept there until he is discharged.

Ideally, the patient should have his own en suite toilet or a commode within the isolation room to reduce the cross infection risks in communal toilets or bathrooms. A permanently plumbed wash hand basin for staff and patient use should be provided within the room. This should have hot and cold running water, liquid soap for staff use and paper hand towels for staff use. If there is no washbasin within the room a second member of staff will have to bring a basin of water to the door when the first one leaves. The assistant also opens the door for the person who has been giving care in order that they do not have to touch the handles with potentially infected hands.

Washing materials for the patient should be available within the isolation room e.g. 2 basins (if bed bathing is needed), 2 towels (face and body) and 2 washing cloths (face and body). The wash cloths may be disposable or changed daily and laundered in a hot wash laundry.

Now carry out Learning Activity 9.

Care of bedclothes, clothing, and other linen

Staff and caregivers should wear disposable gloves and plastic aprons when removing any used bedclothes from the bed. Use heavy-duty rubber gloves in the laundry when sorting clothes or handwashing any delicate items. Wash and dry hands carefully after taking off gloves.

Bed linen (sheets, towels, cotton sheets or quilts) should be washed in a hot temperature load, as specified for infected laundry if soiled by bronchial secretions or pus from a lymph node abscess, or if the patient has MDRTB. Heavily soiled items have

to be disposed of as contaminated and potentially hazardous.

Patient clothing should be washed at normal temperatures. If soiled, place in a water soluble or water-soluble membrane bag to protect care staff and laundry persons when taking it for washing. If these bags are not available use a polythene bag or bin with a lid to place soiled items in and do not open them until reaching the laundry - lift the clothes directly into the washing machine taking care not to shake the items out. Clothing should be dried and ironed at the recommended temperature for the fabric.

For other items (bed curtains and window curtains), check the temperature specified by the manufacturer of the items; if a lower temperature wash is recommended because of the fabric composition or fire retardant coating use a different wash procedure. Place a half load of items in a full wash programme to allow extra water to mechanically reduce the soiling. The clean linen should be dried thoroughly. Remember that sunlight aids disinfection, and then steam iron to achieve thermal disinfection. Alternatively, the items could be tumble-dried and ironed at a lower temperature.

Coughing and obtaining sputum samples

Patients with infectious TB who are coughing up sputum should be encouraged to use paper handkerchiefs or other disposable paper to cover their mouths when coughing or sneezing.

Sputum samples should be transported in plastic bags and labelled High Risk. It is not necessary for contacts to wear masks unless the patient has MDRTB or has HIV, then both staff and visitors may need to wear a particulate filter mask.

Any contaminated paper handkerchiefs should be placed into a plastic bag or washable receptacle. The easiest way to dispose of the waste is by burning or incineration as clinical waste.

If sputum containers are used they must be handled with caution. Disposable-type containers can be incinerated. Re-useable ones may be emptied into a sluice or toilets taking great care not to splash the surrounding environment. The used container may be reprocessed in a washer/disinfector machine set to a high temperature cycle and using a detergent cleaning agent.

Chemical disinfection of sputum containers may be achieved using either a fresh solution of chlorine releasing agent (bleach) or a phenolic solution. Check the manufacturer's instructions for dilution and the length of time required to achieve disinfection. Empty the sputum into the sluice or toilet as mentioned previously. Clean container by immersing it in a bowl of detergent and warm water, rinse with cold water and then immerse in disinfectant for the required time. Rinse again with cold water prior to leaving to air dry and then reuse. Nurses emptying sputum containers and handling chemicals such as bleach should be protected from splash contamination and accidental eye splash. A single use plastic disposable apron and gloves should be worn for personal safety. Training in the use of disinfectants must be given as part of the Infection Control Induction programme for new staff.

Waste that is not contaminated by sputum, blood or body fluids such as bronchial secretions, does not need to be treated as clinical or High Risk Waste.

Clinical waste should be burnt or incinerated by an approved method or may be treated by steam and microwave to disinfect prior to deep landfill

at a registered disposal site.

Items such as flowers, newspapers or paper waste may be processed as normal landfill rubbish.

Care in the community

Patients who are cared for in their own home while still infectious need simple infection control precautions:

- Adequate ventilation of the room where the patient is coughing.
- Visitors must be limited to those who have already been exposed to the infection, and who are not at risk themselves.
- Staff caring for the patient should be in good health and protected by BCG immunization.
- All visitors and family must be encouraged to wash their hands after visiting the patient.

Last offices/last rites

Infection control precautions are also necessary during last offices. The deceased should be handled with care to minimize the risk of exhalation of breath. Funeral directors, religious elders and those who lay out the body must be advised to cover the deceased's mouth if turning the person after death. Embalming is not advised if the patient has a coexisting HIV infection.

If an autopsy is required to confirm the cause of death, the pathologist must be advised of the communicable disease and must take appropriate precautions in the mortuary. A body bag may be requested for transport of the deceased to the mortuary. The body bag should be clearly labelled on the outside with a Risk of Infection label and biohazard symbol.

A summary of infection control procedures can be found in Appendix 3.

Summary of key points

- Mycobacterium tuberculosis, the main cause of TB, is globally transmitted through the air by droplet infection.
- TB is divided into two main categories - pulmonary TB and extra-pulmonary TB; pulmonary TB is the most significant form of disease as it can be transmitted to others.
- TB is one of the most important chronic diseases in the world. Approximately one-third of the world's population is infected.
- In 1993, WHO declared that TB is a global emergency because TB is out of control in many parts of the world.
- Control of TB is possible through the implementation of effective National TB programmes and the DOTS strategy.
- There are several key groups who are at special risk of TB.
- Finding TB in a smear of sputum is the most reliable way to diagnose TB.
- Treatment of TB requires anti-tuberculosis chemotherapy, to be taken in internationally-agreed regimes.
- Compliance with chemotherapy and direct observation of swallowing of drugs is essential to ensure effective treatment and to prevent a further increase in MDRTB.
- Nurses and midwives have an important role in the prevention, control and treatment of TB.
- Nursing care of the patient with TB involves physical care, psychological care, and prevention of spread of infection to others.

Acknowledgement

The authors thank Macmillan Press Ltd for authorization to use/reproduce the following:

Text describing symptoms of TB

Diagram 1

Recommendations to help prevent the patient from stopping treatment too early

Figures 1, 2, and 3

These were taken from "Clinical Tuberculosis" by Crofton, Horne and Miller 1999.

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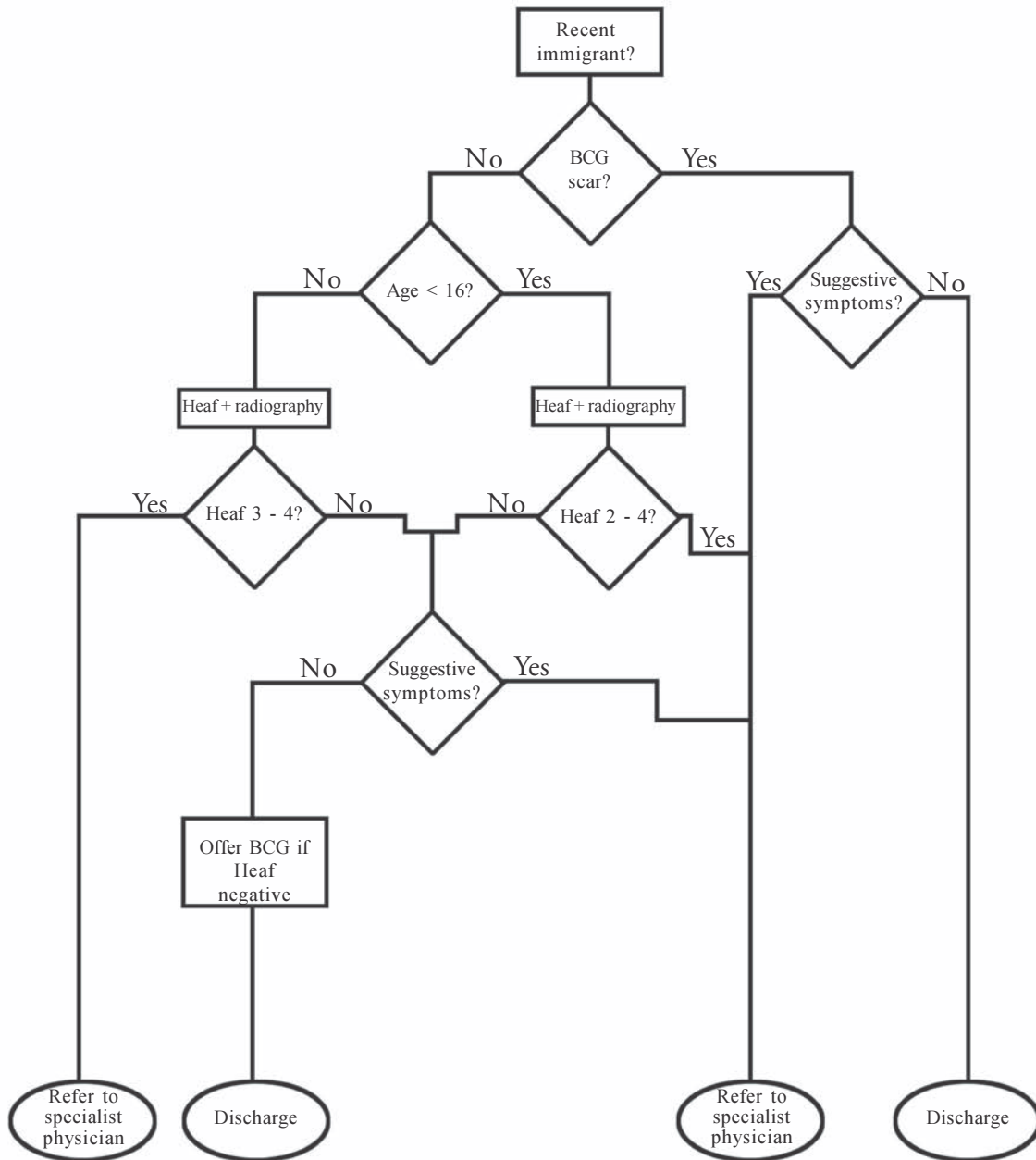
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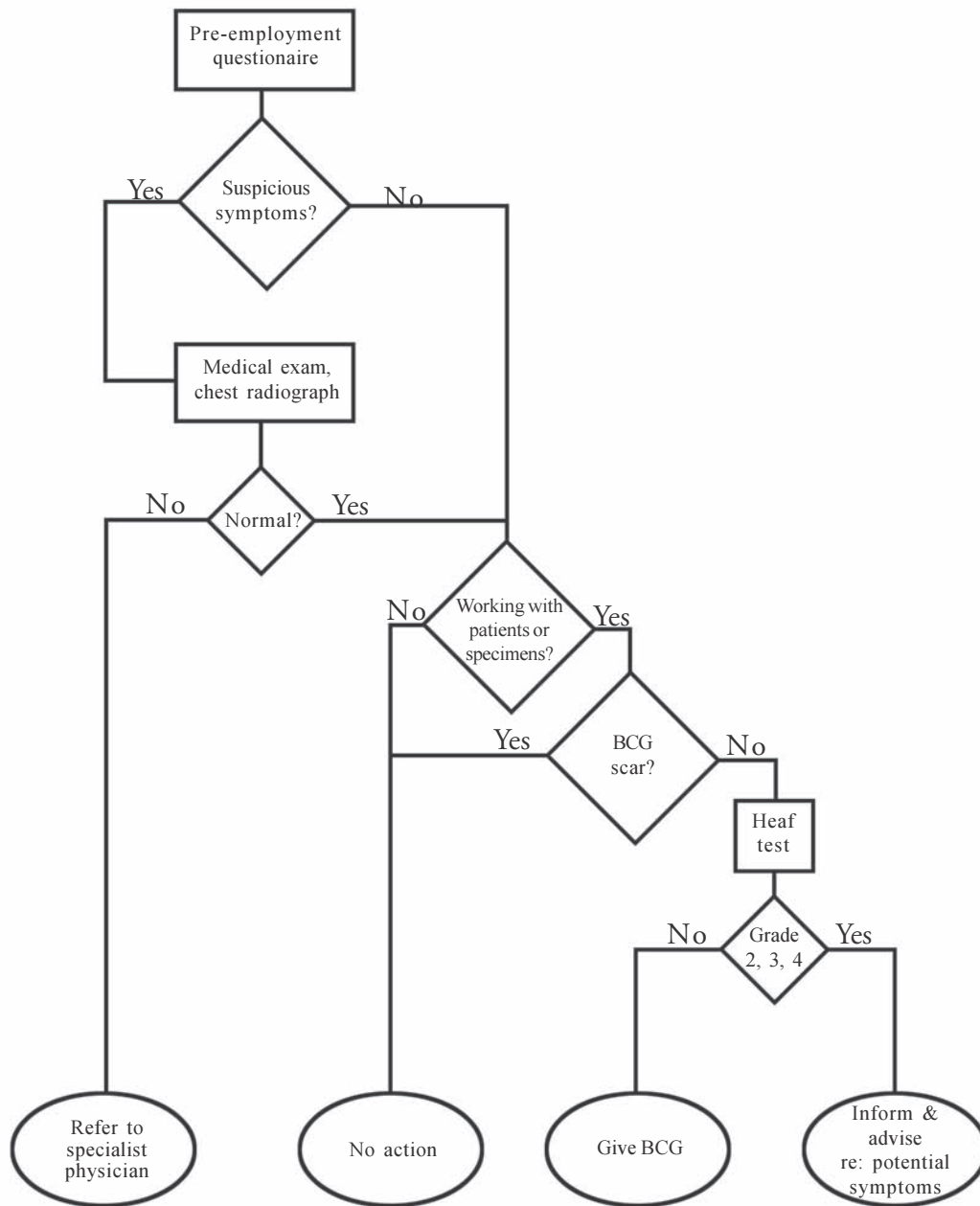
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Reproduced from "The Control of Tuberculosis in Scotland,"
The Scottish Office
Department of Health, 1998



Reproduced from "The Control of Tuberculosis in Scotland,"
The Scottish Office
Department of Health, 1998



Appendix 3

Summary of infection control procedures

- use of single room recommended until considered noninfectious (usually two weeks after treatment commences)
- use of plastic aprons – if necessary to prevent contamination of clothing
- use of disposable gloves – advised for handling secretions/contaminated articles
- wearing of masks – unnecessary unless patient has MDRTB or HIV then visitors and staff may need to wear a particulate filter mask (or if available, a personal respirator). Patient should be educated in normal hygiene, i.e., covering mouth and nose when coughing and sneezing with a paper tissue
- handwashing – always after contact with patient or any contaminated articles
- care of crockery and cutlery – normal
- cleaning of equipment – clean thoroughly with detergent and water after use. If contaminated with bronchial secretions disinfection is necessary (see Disinfectant Policy)
- care of linen – treat as soiled unless contaminated with bronchial secretions, when it should go into a water-soluble bag and as hot a wash as the fabric will tolerate
- disposal of rubbish – treat as clinical type waste if contaminated by sputum
- cleaning – routine cleaning
- investigations – contact Head of Department prior to moving out of the isolation room – observe precautions en route and in other clinical areas
- specimens - avoid contamination of outside of container; label sputum specimens “High Risk” and transport in plastic specimen bag
- terminal cleaning – routine cleaning only required.

MODULE 7

Infections spread by sexual contact and blood and body fluids

Part 1: Infections spread by sexual contact

Stated learning outcomes

Glossary of terms

Working in sexual health: some general points

Gonorrhoea

Chancroid

Non-gonococcal urethritis

Genital warts

Bacterial vaginosis

Summary of key points

Appendices

MODULE 7

THE OBJECTIVE of Module 7 is to provide an overview of the topic of infections transmitted by sexual contact and blood and body fluids. Since there are so many important issues that need to be discussed, the Module is divided into two parts:

Part I. Infections spread by sexual contact

Part II. Infections spread by blood and body fluids.

Each part has its own stated learning outcomes and its own learning activities.

STATED LEARNING OUTCOMES

On completion of Part I of this module, you should have a broad understanding of general sexual health issues, in addition you should have an understanding of the main sexually transmitted infections in Europe including:

- disease definition,
- modes of transmission,
- epidemiology,
- main manifestations,
- complications,
- methods of diagnosis,
- treatments, and,
- prevention of spread.

KEY WORDS

Sexually transmitted infection; vertical transmission; nonsexual transmission; epidemiology; symptomatic; asymptomatic; genital; screening; contact tracing; follow up; partner management; health education.

Glossary of terms

ADNEXA: adjacent parts; in the text refers to the ovaries, uterine (Fallopian) tubes and uterine ligaments

ANAEROBIC: capable of existing without oxygen

AORTITIS: inflammation of the aorta

ATAXIA: failure of muscular coordination

BALANOPOSTHISIS: inflammation of the glans penis and foreskin

BARTHOLINITIS: inflammation of the Bartholin's glands, two oval shaped glands lying on each side of the vagina, opening into Bartholin's ducts which secrete mucous outside the hymen on the external genitalia

BUBO: swollen inflamed lymph node; in chancroid, this is located in the groin

CERVICITIS: inflammation of the cervix

CLUE CELLS: squamous epithelial cells, covered with many small bacterial organisms; presence of clue cells under the microscope contributes to a diagnosis of bacterial vaginosis

CONJUNCTIVA: the delicate membrane lining the eyelids

CUNNILINGUS: stimulation of the female genitalia by the mouth and tongue

DORSAL COLUMN: spinal column or backbone

DYSPAREUNIA: difficult or painful sexual intercourse

ENDOCERVICAL: within the cervical canal which lies between the internal and external os

ENDOMETRITIS: inflammation of the endometrium, the inner mucous membrane lining of the uterus

EPIDIDYMIS: a duct behind the testis, along which sperm passes to the vas deferens

EPIDIDYMO-ORCHITIS: inflammation of the epididymis and testis

ERYTHEMA: redness of the skin, produced by congestion of the capillaries, caused by various factors

FELLATIO: stimulation of the penis by the mouth and tongue

FLAGELLATED: having one or more whip like projections

FLUCTUANT: feels “wavelike” on palpation, owing to a liquid content

FRIABLE: easily broken up

GLANS PENIS: the rounded part at the end of the penis

GRAM STAINING: method of staining microorganisms to assist with microscopic diagnosis

INCIDENCE: degree, extent or frequency of occurrence; amount

INGUINAL REGION: groin

INGUINAL ADENITIS: inflammation of the inguinal lymph nodes

INGUINAL LYMPHADENOPATHY: swelling of the inguinal lymph nodes

KERATINISED: hard and horny like nails

LYMPH NODES: small mass of tissue that is part of the lymphatic system

MENINGOVASCULAR: referring to the meninges and blood vessels

MENORRHAGIA: excessive menstrual flow

MUCOPURULENT: containing both mucus and pus

MYALGIA: muscular pain

MYOMETRIUM: the muscular coat of the uterus

OPHTHALMIA: severe inflammation of the conjunctiva or deeper structures of the eye

PAPILLOMATOSIS: development of multiple warts

PARAMETRIUM: connective tissue lateral to the uterus

PEDUNCULATED: with a stalk which attaches the wart in the text to normal tissue

PHIMOSIS: inability to retract the foreskin behind the glans penis

POLYMORPHONEUCLEAR LEUKOCYTE: nucleated cell in the blood or tissue fluid that has a segmented nucleus. Includes neutrophils which, if increased in number can indicate bacterial infection

POSTCOITAL: occurring after sexual intercourse

PREVALENCE: the number of cases of a disease that are present in a population at one point in time

PROCTITIS: inflammation of the rectum

PROCTOSCOPE: tubular instrument used to inspect the rectum

PRURITUS: itching

QUINOLONES: class of synthetic antimicrobial agents, including ciprofloxacin

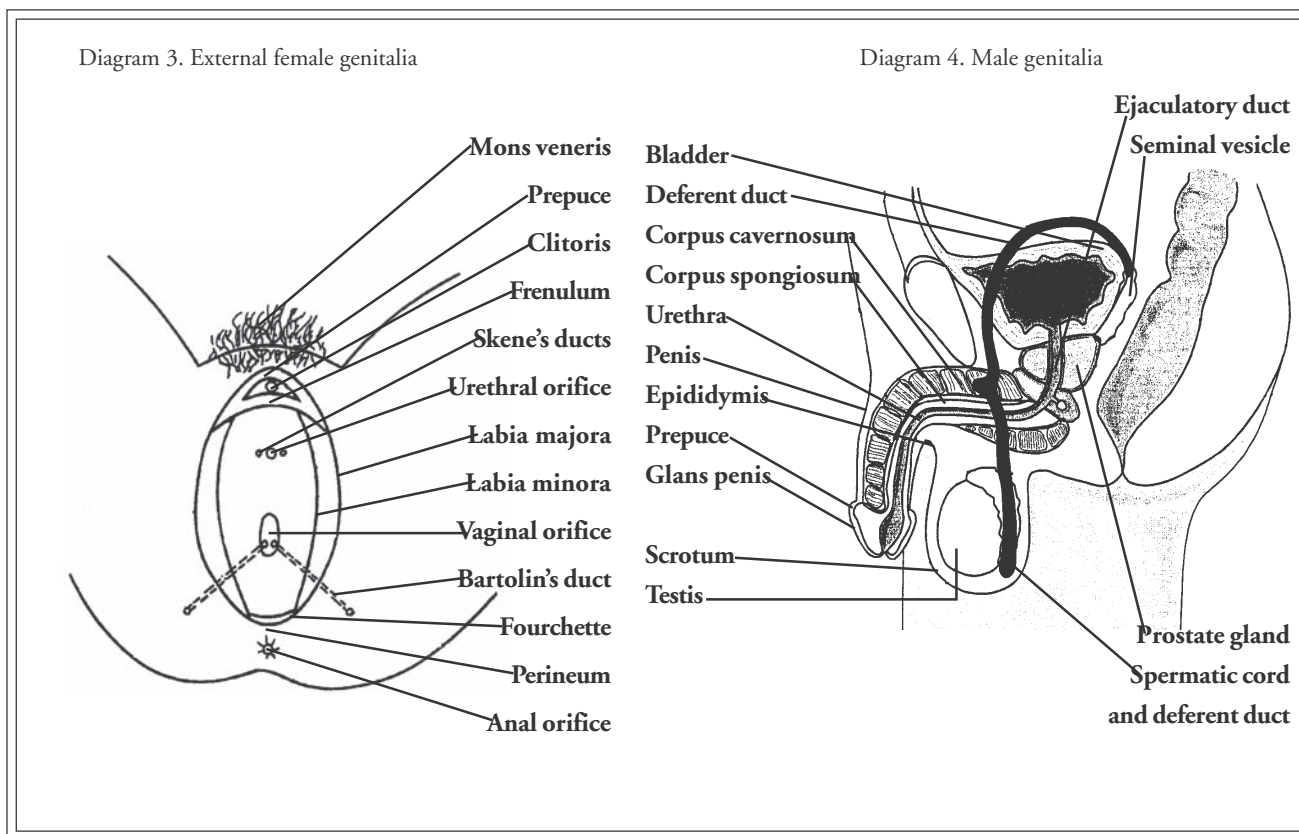
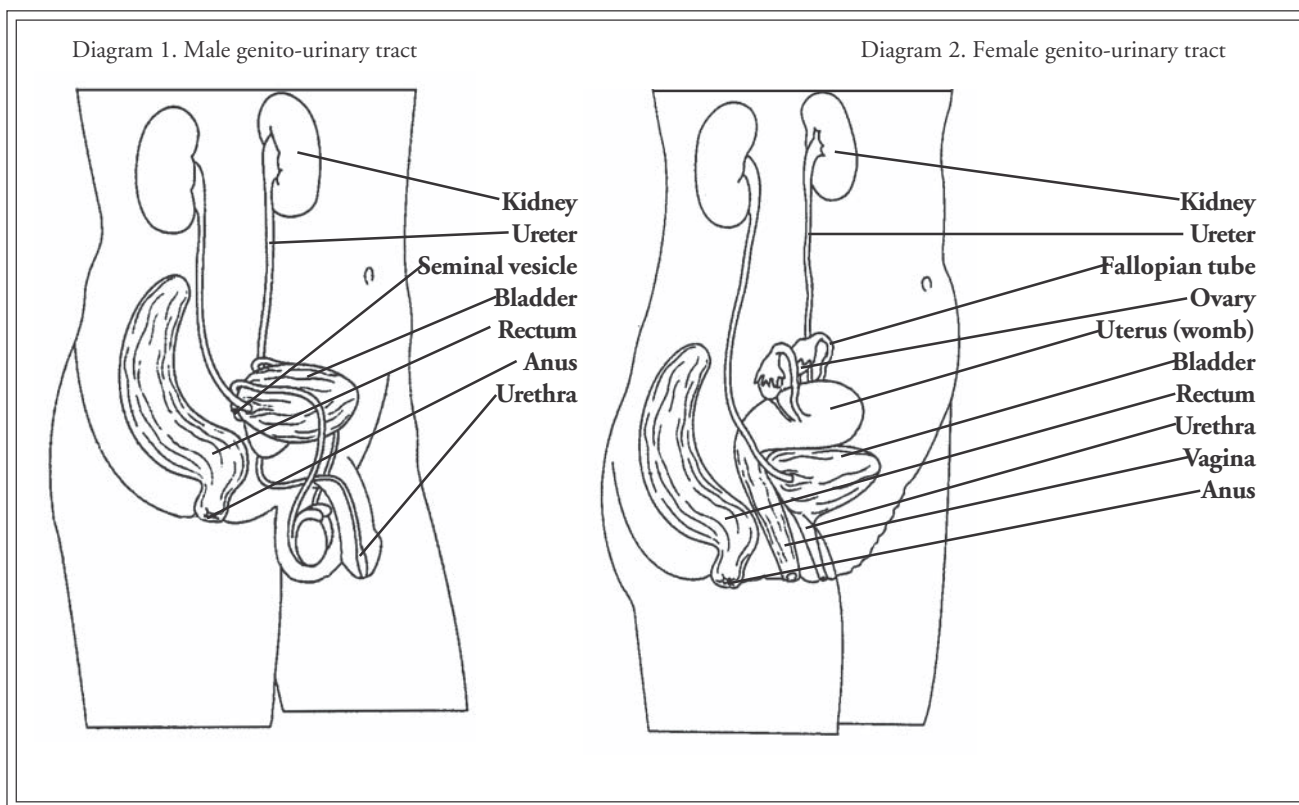
SALPINGITIS: inflammation of the uterine (Fallopian) tube

TENESMUS: straining at stool

TENOSYNOVITIS: inflammation of a tendon sheath

TESTES: testicles

Before beginning this module, it is recommended that you familiarise yourself with the anatomy of the male and female genitourinary tracts.



Sexually transmitted infections (STIs) are among the commonest causes of ill health globally, with an estimated annual incidence of curable non-viral infections at 333 million. Young adults are primarily affected in both industrialized and developing countries, with those aged 20–24 at highest risk. Sexually transmitted infections are a major public health problem, not only because they are a cause of far reaching morbidity, affecting reproductive health and fertility in particular, but also in their role in facilitating transmission of HIV infection, now a global pandemic affecting over 30 million people. In the European Region, particularly in parts of Eastern Europe, there has been a significant increase in some sexually transmitted infections over the last decade, with a notable increase in the incidence of syphilis in Russia and its neighbouring countries.

Controlling the spread of sexually transmitted infections includes a combination of the following: improving access to high quality sexual health services; screening for asymptomatic curable infections; empowerment of individuals through health promotion to make risk-reducing choices; wide access to condoms; destigmatization of issues relating to sex and sexually transmitted infections. The effects of STIs are felt on both a personal and societal level. The nature of STIs, concludes that the individual must have had sexual intercourse, and by implication must be “promiscuous” – and it is this type of stigma that prevents individuals from accessing early treatment.

Most of the information in this module is related to infections and disease, however there are other broader issues of importance that should be considered by anyone working in sexual health.

General points**Talking about sex**

Talking about sexual health is more revealing and personal than talking about simple bodily function. Some patients may have difficulty talking to someone of the opposite sex about such issues. Nurses and midwives need to be aware of the role gender plays in discussions regarding sexual health and sexuality in general. Every one of us has some degree of “sexual baggage” and we have all been exposed to a variety of influences from peers, colleagues, parents, school, the media, and church. This may make us embarrassed about talking about sex, or about certain aspects about sex.

Culture

Women and men from a variety of cultures may have difficulties discussing sexual health issues. Cultural sensitivity is important, including awareness of any surrounding issues and language.

Age

Young adults may be the most sexually active group, but older people have sexual relations, too.

Assumptions

Never assume anything, always establish a baseline of knowledge and check out any facts.

Biological sexism

Due to the “fluid dynamics of sexual intercourse”, a kind of biological sexism emerges: in a heterosexual relationship, women are more likely to acquire infection. Women are also susceptible to STIs due to the warm, moist interior of the vagina. The mucous membranes lining the vagina are also potentially more susceptible than those covering a man’s genitals. In addition, menstruation

may increase risk of infection, due to the bleeding, providing an easier route of access for organisms. Similarly, the “passive” or “non-active” partner in a gay relationship is more likely to become infected.

Sexual practices

People participate in a broad variety of sexual practices. Medicine has been principally responsible for attaching deviancy labels to sexual practices decreed as not “normally” practiced.

Now carry out Learning activity 1.

Sexuality and sexual health

Nurses and midwives are expected to provide non-judgemental holistic care to their patients; however, sexual health is often overlooked, or only dealt with in the context of illness and disease. WHO defines sexual health as follows:

“the integration of the somatic, emotional, intellectual and social aspects of sexual being, in ways that are positively enriching and that enhance personality, communication and love”.

Gay and lesbian identity

A great variety of pejorative terms have been used to describe individuals who have same-sex partners. Men who have sex with men and identify as being homosexual are usually comfortable with being called Gay. Women in same sex relationships may identify as being lesbian. Gay men and lesbian women see their identity and the outward expression of that identity as being central to their sexuality and self-esteem.

Now carry out Learning Activity 2.

Definition

Genital chlamydia is a sexually transmitted bacterial infection, involving the genital tract and occasionally the conjunctiva of both men and women. It is one of three syndromes caused by the organism *Chlamydia trachomatis*, the other two syndromes being hyperendemic trachoma (an eye infection and a major cause of blindness in developing countries) and lymphogranuloma venereum (a sexually transmitted disease of the lymphatic tissue, more common in developing countries).

Modes of transmission

Sexual transmission

The spread of chlamydia between adults is almost exclusively through genital sexual contact, although it may also be transmitted to the pharynx through oral sex and possibly to the rectum through anal sex.

Vertical transmission

50–75% of babies born to mothers who have chlamydia will be infected at birth when passing through an infected endocervical canal. Neonatal chlamydia is most commonly demonstrated as conjunctivitis and pneumonia.

Epidemiological summary

Accurately diagnosing chlamydia involves the use of expensive laboratory tests, which are not universally available. Therefore prevalence data is likely to underestimate the true numbers of individuals infected. In 1995, it was estimated that there were 89 million new adult chlamydia infections globally, the majority in Southeast Asia and sub-Saharan Africa (WHO 1997). In Europe, WHO data for Poland, Sweden the United Kingdom and Switzerland showed that cases of reported chlamydia varied from 2 554 in Poland to 31 857 in the United Kingdom, greatly

outnumbering all other genital sexually transmitted infections reported in each country (WHO 1998). It is estimated that 3–5% of sexually active women attending general practice in the United Kingdom have chlamydia.

Manifestations

In women:

- Vaginal discharge
- Postcoital bleeding
- Intermenstrual bleeding
- Lower abdominal pain
- Dysuria
- Mucopurulent cervical discharge
- Friable cervix or adnexal tenderness on vaginal examination
- Cervicitis, urethritis, Bartholin's glanditis, endometritis, salpingitis
- Perihepatitis (known as Fitz-Hugh-Curtis syndrome)

Note: 80% have no symptoms.

In men:

- Urethral discharge
- Mucoid or mucopurulent urethral discharge
- Dysuria of varying severity
- Epididymo-orchitis resulting in pain and swelling in the scrotum

Note: 50% have no symptoms.

(It is uncommon for pharyngeal or rectal chlamydia in men or women to produce signs or symptoms).

Complications in women

In Europe and North America, 25–50% of pelvic inflammatory disease (PID) is associated with chlamydia. PID is an inflammation of the upper genital tract, involving the endometrium, ovaries, Fallopian tubes, myometrium and parametrium.

Manifestations of PID

- Lower abdominal pain or tenderness
- Dyspareunia
- Abnormal bleeding
- Abnormal vaginal or cervical discharge
- Fever over 38° C
- Cervical and adnexal tenderness on bimanual vaginal examination

Note: may be asymptomatic

Long term complications of PID

- Persistent abdominal or pelvic pain, menstrual changes and deep dyspareunia
- Infertility – after one episode of PID, the risk for infertility is 10–20%, rising to 50–75% after three episodes. Delays in treatment are shown to increase the risk for infertility and asymptomatic PID is also associated with infertility.
- Ectopic pregnancy – the risk increases by seven to ten times after an episode of PID (95% of ectopic pregnancies occur in the Fallopian tubes and carry a risk of tubal rupture followed by severe haemorrhage).

Complications in men

- Approximately 1% of men with chlamydia will develop reactive arthritis.

Clinical manifestations of reactive arthritis

- Arthritis within a month of sexual contact involving pain at one or more of the joints of the knees or feet either with or without swelling
- Pain and stiffness in the posterior and plantar aspects of the heels, giving rise to difficulty in walking
- Painful movement as a result of tenosynovitis
- A proportion of individuals with reactive arthritis will demonstrate urethritis, arthritis and conjunctivitis, known as Reiter's syndrome.

Long-term complications of reactive arthritis

- Most first episodes are self limiting lasting four to six months
- Around 50% of individuals have recurrences
- 17% have chronic arthritis with symptoms lasting longer than a year
- 12–15% of patients suffer erosive joint damage, resulting in disability

Risk factors

- Partner change in the recent past
- Under 25 years old
- Re-remission of pregnancy
- Non-use of barrier contraception

Prognosis

Genital chlamydia is curable with antibiotics once diagnosed. Untreated chlamydia can lead to the complications described. It is thought that there is a large reservoir of untreated chlamydia in the community, partly because the majority of individuals with the infection are asymptomatic.



REVISION POINT 1

List the male and female manifestations of chlamydia. (See page 197 for help.)

Diagnosis

The technology used in diagnosing chlamydia is rapidly changing and the use of any particular test will be subject to its local availability. Chlamydia is currently diagnosed using laboratory tests on swab and urine samples taken from the patient.

The four methods currently available are:

- cell culture;
- direct fluorescent antibody tests;
- enzyme immunoassays; and
- DNA amplification techniques.

(DNA amplification techniques are used with increasing frequency, due to their high (almost 100%) sensitivity and high specificity in detecting chlamydia).

Methods of treatment

Uncomplicated infection

Azithromycin 1 g as a single dose or Doxycycline 100 mg two times per day for seven days.

(Doxycycline is cheaper than Azithromycin, but has a 20% chance of causing gastro-intestinal disturbances and occasionally photosensitivity; compliance is likely to be greater with single dose Azithromycin.)

Infection in pregnancy

Erythromycin 500 mg four times per day for 7 days or Amoxicillin 500 mg four times per day for 7 days.

These treatments have a less than 95% efficacy, so pregnant women should be followed up carefully to ensure there has been no treatment failure. Doxycycline is contraindicated in pregnancy and the safety of Azithromycin is unknown.

Prevention of spread

See Appendix 1. If Azithromycin is used for treatment, sexual intercourse should be avoided for one week after treatment.

Screening

Testing for chlamydia should be offered to the following groups:

- patients with signs or symptoms attributable to chlamydia;
 - individuals attending sexual health clinics;
 - anyone diagnosed with another sexually transmitted infection; and
 - sexual partners of patients with chlamydia.
- Screening for chlamydia should also be offered to women undergoing termination of pregnancy.

Now carry out Learning Activity 3.

Contact tracing of women and asymptomatic men

See Appendix 2 for partner management. All sexual partners over the six months preceding the diagnosis, or the last sexual partner if the most recent sexual contact was more than six months prior, should be traced.

Contact tracing of symptomatic men

Contact tracing is recommended for all sexual partners over the four weeks prior to the onset of symptoms or the last sexual partner if the most recent sexual contact was more than four weeks before.

Follow-up

Patients diagnosed with chlamydia should be seen again after completing treatment in order to:

- Assess efficacy of the treatment. A second chlamydia test is not necessary when Azithromycin or Doxycycline have been completed, unless symptoms continue or the person has been at risk of reinfection. In patients treated with Erythromycin, a second test should be taken after three weeks to check the treatment has cleared the infection.
- Ascertain there has been no risk of reinfection.
- Ensure that contact tracing has taken place if the person has arranged to contact their partner

themselves.

- Reinforce health education (See Appendix 3).

Nursing care

See Appendix 4. For role of primary health care team and role of hospital and community setting, see Appendix 5.



REVISION POINT 2

What drugs are used to treat chlamydia.
(See page 199 for help.)

Gonorrhoea

Definition

Gonorrhoea is caused by the bacterial organism *Neisseria gonorrhoea*. Gonorrhoea infects the mucous membranes of the urogenital tract, oropharynx, rectum and conjunctiva.

Modes of transmission

Sexual transmission

Through vaginal and insertive and receptive anal sex. It is also passed on through fellatio, and, less commonly, cunnilingus.

Vertical transmission

30–47% of infants born to mothers who have gonorrhoea will be infected, developing ophthalmitis, causing a purulent discharge from the eyes, usually within a few days of delivery. Diagnosis is made by Gram staining or culture of swabs taken from eye discharge. Untreated ophthalmitis may lead to conjunctival destruction, corneal ulceration and blindness. Treatment is with ceftriaxone 50 mg/kg (max 125 mg) in a single intramuscular dose.

Epidemiological summary

WHO estimates for 1995 were 62 million new adult cases of gonorrhoea worldwide, mostly in Southeast Asia, followed by sub-Saharan Africa. In many industrialized countries, there has been an overall decline in the incidence of gonorrhoea over the last decade. Reported gonorrhoea in Sweden and Norway has declined from 10 000 cases each in 1981 to almost zero in 2000. In Estonia, Latvia, Lithuania and Russia, there has been an increase in gonorrhoea since 1991, in keeping with an overall rise in sexually transmitted infections in eastern Europe (WHO, 2000). Reports from France and the United Kingdom in 2000 have shown an increase in gonorrhoea since 1997, particularly in men, with suggestions of an increase in high risk

sexual behaviour, especially in gay men.

It is reported that the burden of gonorrhoea in developed countries tends to fall on deprived, inner city populations.

Manifestations

In women:

Usual sites are endocervical canal and urethra.

Incubation is approximately 10 days.

- Increased or changed vaginal discharge
- Pelvic pain
- Intermenstrual bleeding
- Menorrhagia
- Mucopurulent cervical discharge
- Cervical erythema
- Easily induced cervical bleeding
- Dysuria
- Purulent discharge from the urethra

Note: 50% have no symptoms and the genital tract may appear normal.

In men:

Urethral gonorrhoea; incubation is 1–14 days or more, usually 5 days.

- Purulent or mucopurulent urethral discharge
- Dysuria
- Less commonly, epididymal tenderness or swelling

Note: 10% have no symptoms.

Rectal gonorrhoea

In women:

Rectal infection in women can occur after receptive anal sex but is also associated with perineal contamination with cervical secretions where no anal sex has taken place. It is estimated that 35–50% of women with gonococcal cervicitis also have infected rectal mucosa. Rectal gonorrhoea in women is usually asymptomatic.

In men:

Rectal gonorrhoea in men is associated with receptive anal sex. It is most commonly asymptomatic, but clinical features may include:

- Anal pruritus
- Mucopurulent rectal discharge
- Scant bleeding
- Severe proctitis, including pain, tenesmus, and constipation

Pharyngeal gonorrhoea

Pharyngeal gonorrhoea can be transmitted by fellatio and cunnilingus. Over 90% of gonococcal infections in the pharynx are asymptomatic and have a spontaneous cure rate of nearly 100% after 12 weeks of infection.

Complications in women

- 10–20% with acute gonococcal infection develop pelvic inflammatory disease. Gonorrhoea often causes more severe symptoms of PID than chlamydia, including a greater likelihood of fever (See previous notes).
- Ectopic pregnancy (see previous notes).
- Bartholin's gland abscess, characterised by swelling of the vulval area and severe pain. It is treatable with antibiotics, but may require surgery to drain the abscess.
- Persistent pelvic pain.
- Disseminated gonococcal infection, which occurs in up to 3% of patients with untreated gonorrhoea and affects more women than men. It occurs within 7 to 30 days after transmission. Features include acute arthritis, tenosynovitis, dermatitis, or a combination of the three.

Complications in men

- Epididymitis, a unilateral testicular pain and swelling with symptomatic urethritis

- Disseminated gonococcal infection

Risk factors

- Young sexually active adults
- 15–19 year olds at particularly high risk
- Low socioeconomic status
- Past history of gonorrhoe
- Early onset of sexual activity

Prognosis

Gonorrhoea generally remains localised to the initial sites of infection. The complications of gonorrhoea leading to serious morbidity are commoner in areas where access to diagnosis and treatment is more difficult.

Diagnosis

Diagnosis is made by identification of the organism *Neisseria gonorrhoea* at the site of infection through:

- Microscopy; direct visualization of Gram stained specimens allows diagnosis of gonorrhoea when Gram negative diplococci are seen within polymorphonuclear leucocytes. 90–95% of symptomatic male urethral samples will be diagnosed, but only 50–75% of asymptomatic male urethral infection and less than 50% of any female infections. Rectal gonorrhoea is more likely to be diagnosed through microscopy if a proctoscope has been used to collect the sample. Microscopy is not suitable for pharyngeal infections.
- Culture; swabs taken from the sites of sexual contact including the urethra, rectum and oropharynx in men and women and the endocervix in women, and plated on culture medium and grown in the laboratory. (Swabs from the vagina are less likely to grow gonorrhoea.) Without laboratory facilities, the specimens can be grown in culture medium up to 48 hours after collection. Culture is estimated to be 95% sensitive in

diagnosing gonorrhoea.

Resistant strains

Diagram 5. Male urethral swab

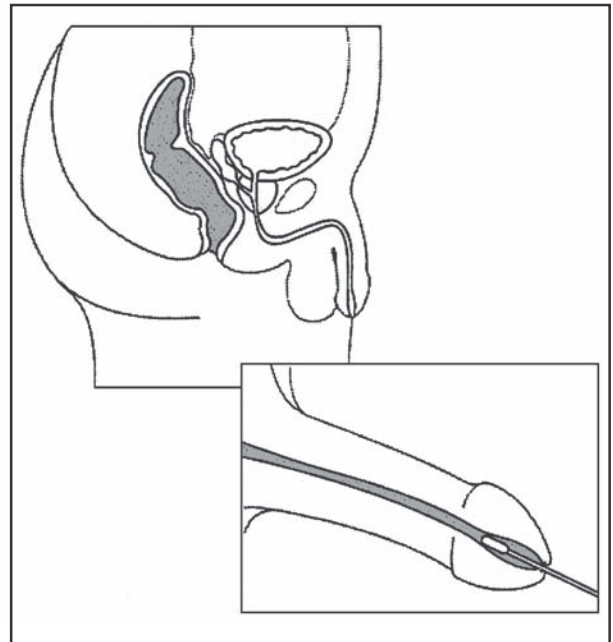


Diagram 6. Female urethral swab

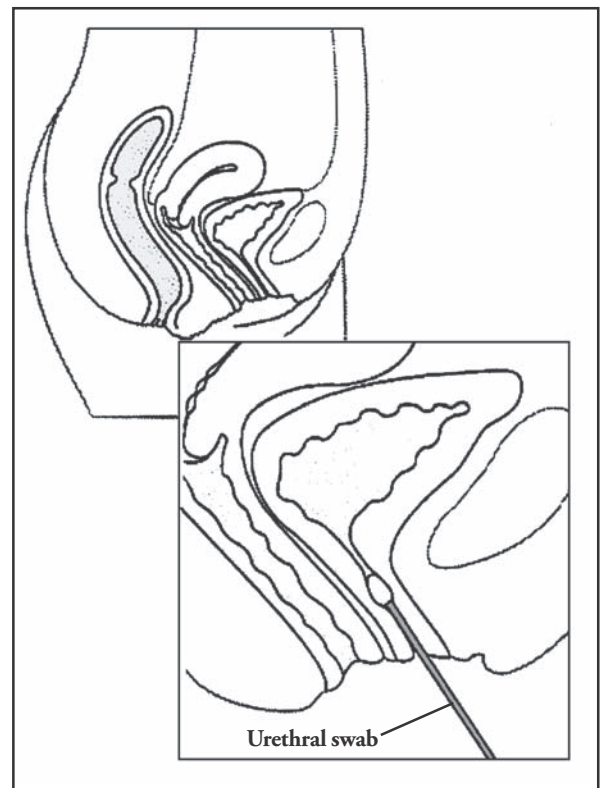
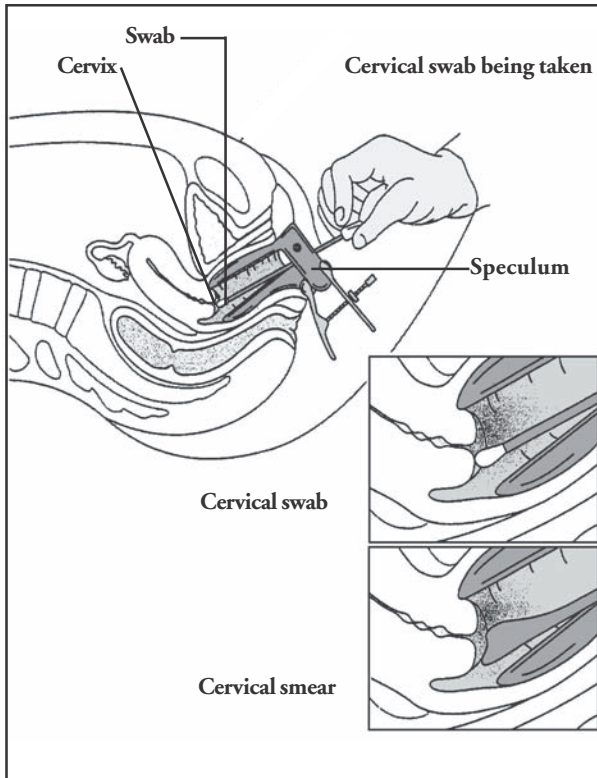


Diagram 7. Speculum examination and tests



Methods of treatment

Uncomplicated genital infection

Ceftriaxone 250 mg intramuscularly as a single dose; Ciprofloxacin 500 mg as a single oral dose; Ampicillin 2 g or 3 g plus Probenecid 1 g orally as a single dose in regions where penicillin resistance is less than 5%.

Pharyngeal infection

Ceftriaxone 250 mg intramuscularly as a single dose; Ciprofloxacin 500 mg orally as a single dose.

Pregnancy and breast feeding

Pregnant women should not receive quinolones or tetracyclines. Ceftriaxone 250 mg intramuscularly as a single dose; Cefotaxime 500 mg intramuscularly as a single dose; Spectinomycin 2 g intramuscularly as a single dose; Ampicillin 2 g or 3 g plus Probenecid 1 g orally as a single dose in regions where penicillin resistance is less than 5%.

Worldwide, resistant strains have developed to penicillins and quinolones. Antibiotics for gonorrhoea should be selected to clear over 95% of infection in the local area. Ceftriaxone has been used worldwide effectively as a single dose with as yet no noted resistance.

Co-infection with chlamydia trachomatis

Up to 40% of adults with genital gonorrhoea infection also have chlamydia. Treating for both infections simultaneously after a diagnosis of gonorrhoea is made is recommended.

Prevention of spread

See Appendix 1.

Screening

Testing for gonorrhoea should be offered to the following groups:

- patients with signs or symptoms attributable to gonorrhoea;
- individuals attending sexual health clinics;
- anyone diagnosed with another sexually transmitted infection; and
- sexual partners of patients with gonorrhoea.

Contact tracing of men with symptomatic



REVISION POINT 3

List the male and female manifestations of gonorrhoea. (See page 201 for help.)

urethral infection

See Appendix 2 for partner management.

- Trace all sexual partners in the two weeks preceding the onset of symptoms.

1998). Other Eastern European countries including

Contact tracing of men and women with asymptomatic infection and infection at other sites

Trace all sexual partners in the three months preceding the diagnosis.

Follow-up

Patients diagnosed with gonorrhoea should be seen again after treatment has been completed in order to assess efficacy of treatment.

Retest to ensure eradication of infection. In some sources, retesting is only recommended if an unusual treatment regime has been used.

- Ascertain there has been no risk of reinfection.
- Check that contact tracing has taken place.
- Reinforce health education (See Appendix 2).

Nursing care and the role of the primary health care team, and of the hospital/community setting, see Appendices 4 and 5.

Now carry out Learning Activity 4.

Definition

Syphilis is caused by the infectious organism *Treponema pallidum*.

Modes of transmission

Sexual transmission

This is the most common route of transmission.

Vertical transmission

Untreated early syphilis in pregnant women will result in a 70-100% risk of transplacental transmission to the foetus. One third of untreated vertically-transmitted episodes will result in stillbirth. Survivors may be born with congenital syphilis, with risks of brain damage, deafness and physical deformities. Treatment for congenital syphilis is with procaine penicillin.

Nonsexual transmission

Less common routes of transmission include kissing a person with active lesions, inoculation via a needlestick injury, or through infected blood transfusion. (Blood in developed countries is screened for syphilis.)

Epidemiological summary

Global estimates for syphilis for 1995 were 12 million new cases among adults, with most occurring in South and Southeast Asia, followed by sub-Saharan Africa (WHO 2000). The incidence of syphilis has fallen in Western industrialized countries since the second world war, and apart from a rise in the early eighties, there have been very low rates of infection in Western European countries. In the early 1990s, there has been an upsurge in syphilis cases in the Russian Federation, Belarus, Kazakhstan, Ukraine and the Baltic States, with an increase in incidence in Russia from less than 30 cases per 100 000 between 1978 and 1992 to 172 per 100 000 in 1995 (WHO

the Slovak Republic and Finland have reported a rise in cases since the early 1990s as well as parts of Turkey bordering the Russian Federation.

Manifestations of syphilis

These vary depending upon the stage of infection.

Early Syphilis

Includes primary, secondary and early latent syphilis.

Primary Syphilis

- Incubation period between 9–90 days (usually 25 days).
- Painless lesion appears at any of the following sites: penis, anal canal, labia, fourchette, cervix, (less commonly lips, tonsils, fingers, buttocks, nipples).
- Usually a solitary lesion.
- Heals without treatment after 3–6 weeks.

Secondary syphilis

Treponema pallidum disseminates through the body via the circulation.

- 4–10 weeks after the primary lesion, a generalized pale red rash forms covering the trunk, arms, legs, face, palms of the hands and soles of the feet. It may remain for several weeks. The rash is non-ulcerative and generally, not itchy (on dark skin, it may appear grey in colour).
- At the same time large, raised, fleshy white/grey lesions (condylomata lata) appear on moist areas including the perineum, axilla and groin – these are highly infectious.
- Irregular grey patches may appear on the mucous membranes of the mouth, larynx or genitalia.
- Systemic symptoms include a slight fever, and general lymph gland enlargement.
- Patchy hair loss.
- Heals without treatment after 3–12 weeks.

Early latent syphilis (up to 2 years of infection)

Untreated secondary syphilis resolves spontaneously after 3–12 weeks with no remaining symptoms at all. Relapses may occur during which transmission of syphilis is possible.

Late syphilis

Includes late latent and tertiary syphilis.

Late syphilis (period after 2 years of infection).

The period after 2 years of untreated syphilis with no signs or symptoms is described as late latent syphilis. Features of late latent syphilis are:

- no relapses;
- immunity to new infections of primary syphilis;
- no risk of horizontal sexual transmission;
- vertical and blood borne transmission can still occur; and
- detectable through serological tests for syphilis.

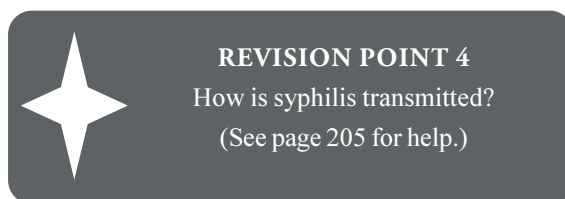
Tertiary syphilis

Tertiary syphilis is noninfectious and can be treated, but damage may be irreversible. It may take the form of:

- neurological syphilis: asymptomatic infection, diagnosed by abnormal cerebrospinal fluid findings on lumbar puncture. Dorsal column loss may result in ataxia, bladder disturbances, faecal incontinence, impotence, loss of pain and temperature sensation and degenerative joint disease. Dementia develops 10–20 years after the original infection, usually in men. The outcome is fatal if untreated. Meningovascular neurosyphilis causes infarcts of the small vessels of the meninges, brain and spinal cord resulting in headaches, hemiplegia and epilepsy.
- cardiovascular syphilis: features include aortitis, causing regurgitation of the aorta, angina and aortic aneurysms. Chest pain and sudden death are common
- gummata: gummata are fibrous lesions affecting most commonly bones and skin and are most frequently found on the lower leg, face and scalp.

Risk factors for contracting syphilis

- Age group 15–30 years (incidence decreases with age)
- Individuals who are most sexually active



Prognosis

One third of patients with untreated late latent syphilis have no recurrence of illness and remain symptomless for the rest of their lives and syphilis can only be detected through standard serological tests. A further third of patients with late latent syphilis not only remain symptomless as in the first group, but also become negative to standard serological tests. Specific treponemal tests will almost always stay positive. The final third develop tertiary syphilis.

Diagnosis of early syphilis

- Microscopic examination of serum from a primary lesion
- Serological tests including non treponemal tests such as VDRL (Venereal Diseases Research Laboratory) and RPR (rapid plasma reagin test)
- Specific treponemal tests to confirm reactive screening tests, including TPHA (Treponema pallidum haemagglutination test), FTA-abs (fluorescent treponemal antibody absorption) test and treponemal EIA (enzyme immunoassay)

Diagnosis of late syphilis

- Positive specific serological tests (FTA-abs and TPHA)
- Clinical assessment including a history or previous treatment, signs and symptoms

Note: If serological tests are positive for syphilis and there is an inadequate history of previous

treatment, the patient should be treated.

Methods of treatment

Early syphilis

Bicillin 800 000 units intramuscularly daily for 10–14 days (contains Procaine Penicillin G) or Doxycycline 200mg daily for 14 days if allergic to Penicillin or Benzathine Penicillin 2.4 megaunits intramuscularly weekly over 2 weeks.

Treatment in pregnancy

Bicillin 800 000 units intramuscularly daily for 10–14 days or Erythromycin 500 mg four times daily over 14 days and examination, tests and treatment of babies at birth.

Treatment in late syphilis or early syphilis with neurological involvement.

Treatment involves increased doses of antibiotics over a longer period of time.

HIV positive patients

Treatment should be as if neurological symptoms are present as it may be difficult to differentiate neurosyphilis from neurological symptoms of HIV.

Prevention of spread

See Appendix 1. Specifically, sexual partners of patients with syphilis should be tested at the first visit, then at 6 weeks and 3 months.

Screening

As for gonorrhoea. Pregnant women should be offered serological testing for syphilis at their first medical check up and at 28 weeks and delivery if there is a high risk of syphilis in the country.

Contact tracing

See Appendix 2 for partner management.

Contact tracing of primary syphilis

Trace all sexual partners within 3 months preceding the diagnosis or onset of symptoms, whichever is earlier.

Contact tracing of secondary or early latent syphilis

Trace all partners in the 2 years preceding the diagnosis.

Contact tracing of late syphilis

Sexual transmission at this stage does not occur, and vertical transmission is unusual after 2 years. Testing of current partners of all patients and children of women with late syphilis is recommended.

Follow-up

All patients should be reviewed after treatment in order to:

- assess efficacy of treatment and to detect relapse which should be retreated (HIV positive patients and those who have not had penicillin as there is an increased risk of treatment failure and relapse – follow up of these groups is for life);
- repeat non-treponemal serological tests every month for 3 months, then at 6 months and at one year;
- ascertain there has been no risk of reinfection;
- ensure contact tracing has taken place;
- reinforce health education including ensuring patients are aware that specific treponemal tests will be positive for life and that evidence of treatment should be given to them in documented form to avoid unnecessary retreatment in the future; and
- provide ongoing medical assessment for those with late syphilis.



REVISION POINT 5

What drugs are used to treat syphilis?
(See page 207 for help.)

See Appendix 4 for general nursing care. Specifically:

- Continuous therapy: the patient should be assisted in making arrangements to attend for daily injections. If the patient is unlikely to be compliant, consider the weekly regime.

Nursing care

- Reactions to treatment: the patient should be warned about the risk of reactions. Resuscitation facilities should be available in treatment areas.
- Anaphylactic reaction: emergency equipment should be readily available since penicillin is one of the main causes of anaphylaxis.
- Jarisch-Herxheimer reaction: an acute febrile illness, resolving after 24 hours and common in early syphilis. In pregnancy can cause foetal distress and premature labour. If it occurs in late syphilis, there can be a risk of severe clinical deterioration and the patient should be cared for in hospital.
- Procaine reaction: if Procaine Penicillin is accidentally injected into the vein, fits and hallucinations can occur, lasting less than 20 minutes. This can be avoided by using the aspiration technique of injecting. Management includes reassurance and Diazepam 10mg intramuscularly/rectally/intravenously if fits occur.

Role of primary health care team and role of hospital/community setting

See Appendix 5.

Now carry out Learning Activity 5.

Definition



REVISION POINT 6

List the main points for partner management. (See page 207 for help.)

Chancroid is an acute genital ulcerative condition, caused by the bacterial organism *Haemophilus ducreyi*.

Mode of transmission

- sexual transmission is the most common route of transmission between adults
- vertical transmission has not been reported
- autoinoculation is thought to be possible, involving fingers, conjunctiva and other sites

Epidemiological summary

WHO reports an absence of prevalence data on chancroid because of the lack of accurate testing facilities and poor understanding of the epidemiology and natural history. Estimates based on syphilis prevalence for 1995 suggest around 7 million new cases. Chancroid is rare in most industrialised countries (WHO 2000).

Manifestations of chancroid

In women:

- Incubation period between 3 and 10 days
- Single or several ulcers usually on the fourchette, labia, vestibule, vagina, or clitoris
- Less commonly, ulcers on breasts, fingers, thighs and mouth
- Ulcers may join to become one large ulcer
- Ulcer has a necrotic base, purulent exudate, ragged edges and bleeds on contact
- 40% have painful unilateral inguinal adenitis
- Buboecan form and rupture releasing pus
- Less specific: dysuria, painful defecation, rectal bleeding, dyspareunia and vaginal discharge

In men:

- Incubation period between 3 and 10 days
- Single or several ulcers usually on the penis
- Ulcer usually painful
- Less commonly, ulcers on fingers, thighs, and

mouth

- Ulcers may join to become one large ulcer
- Ulcer has a necrotic base, purulent exudate, ragged edges and bleeds on contact
- 40% have painful unilateral inguinal adenitis
- Buboecan form and rupture releasing pus


Complications

In men, phimosis and partial loss of tissue on the glans penis may occur.

Risk factors

- Young, sexually active adults

Prognosis



REVISION POINT 7
List the main complications associated with chancroid.
(See page 209 for help.)

Chancroid is curable with antibiotic therapy. If untreated, persistent ulcers and abscesses can remain unhealed for years. Chancroid is a significant risk factor in the sexual transmission of HIV infection, the ulcers acting as a route of entry and exit for the virus.

Diagnosis

- Isolation of the organism *Haemophilus ducreyi* in culture of scrapings from ulcers
- Culture of aspirate from buboes; sensitivity is variable
- Polymerase chain reaction (PCR) techniques, which are over 95% sensitive and soon to be commercially available
- In the absence of an accurate test, a clinical diagnosis is suggested where there is at least one painful ulcer, the patient has tested negative for

syphilis and herpes and the clinical manifestation is typical for chancroid

Methods of treatment

Uncomplicated infection

Azithromycin 1 g in a single oral dose; Ceftriaxone 250 mg intramuscularly in a single dose; Ciprofloxacin 500 mg orally twice a day for three days. Resistance to Ciprofloxacin and Erythromycin has been reported worldwide.

Infection in pregnancy and during breastfeeding
Erythromycin 500 mg orally four times a day for 7 days. Azithromycin has an unestablished safety profile in pregnancy and lactation. Ciprofloxacin is contraindicated in pregnancy, lactation and in those under 18 years of age.

Fluctuant buboes

Recommendations for management depend on the setting and risk of secondary infection. WHO recommends needle aspiration through adjacent healthy skin, repeated after two to three days as required, avoiding the risk of ulceration from incisions (WHO 1995). In countries where complications are less likely, incision and drainage is recommended. Treatment failures may be caused by antibiotic resistance or coinfection with syphilis or herpes simplex.

Prevention of spread

See Appendix 1.

Screening

Testing of chancroid is currently based on culturing material from ulcers or buboes therefore screening does not detect asymptomatic chancroid.

Where chancroid is common and testing facilities are limited, syndromic treatment of all genital

ulcers may be considered (WHO 1995).

Contact tracing

See Appendix 2 for partner management.

Sexual partners should be traced over the ten day period before the onset of symptoms.

Follow-up

Patients should be reviewed within 3 and 7 days of commencing therapy in order to:

- assess efficacy of treatment: ulcers should heal after 3 days and be fully healed after 2 weeks (HIV positive patients may have a slower healing time);
- assess whether fluctuant buboes require aspiration;
- ascertain there has been no risk of reinfection;
- check that contact tracing has taken place; and
- reinforce health education (see Appendix 2).

For nursing care, the role of the primary health care team, and the role of the hospital/community setting, see Appendices 4 and 5.

Now carry out Learning Activity 6.

Definition

Trichomoniasis is caused by *Trichomonas vaginalis*, a flagellated protozoan, found in the genitourinary tract of both men and women. In women it can be found in the urethra, vagina, and paraurethral glands. In men it is found most commonly in the urethra.

Mode of transmission

- Sexual transmission: almost exclusively transmitted through genital sexual contact
- Vertical transmission: 5% of female children born to women with trichomonas are infected with the organism. Maternal oestrogens cause the neonatal vaginal epithelium to resemble adult vaginal epithelium, allowing trichomonas to grow. After 3–4 weeks of life, the infant vagina becomes prepubescent after the maternal oestrogens are metabolised and becomes resistant to trichomonas. Symptoms of discharge usually spontaneously resolve at this stage.

Epidemiological summary

Global trichomoniasis was estimated at 170 million new adult cases for 1995. The greatest numbers were expected in developing countries, with rates as high as 47% in Kenyan antenatal clinics (WHO, 2000). There is very little current WHO data for European prevalence rates, although individual European studies show a general decline since world war 2. In the United Kingdom, trichomoniasis has markedly declined from 1.5 million cases in 1975 to 5533 in 1995 (WHO, 1998).

Manifestations of trichomoniasis

In women:

- Vaginal discharge of a variable consistency, from thin and light to thick, frothy and yellow-green
- Vulval itch
- Dysuria

- Offensive odour
- Less commonly, abdominal pain
- Vulvitis and vaginitis with visible erythema and oedema
- Small ulcerated cervical haemorrhages known as colpitis macularis or strawberry cervix

Note: 10–50% have no symptoms

In men:

- 60% have urethral discharge
- Rarely, balanoposthitis

Note: 15–50% have no symptoms

Complications

- Chronic vaginitis in women if left untreated
- In pregnancy, risk of premature rupture of membranes, resulting in preterm delivery
- Genital inflammation with trichomoniasis increases the risk of coinfection with HIV

Risk factors

- Young adult
- Sexually active
- Working in the commercial sex industry
- Coinfection with another sexually transmitted infection

Prognosis

Trichomoniasis is curable with antibiotic therapy. If left untreated, there may be a risk of the complications listed above.

Diagnosis

A diagnosis based on signs and symptoms alone may not be reliable, as other genital infections in both men and women can appear similar.

- Microscopy: 40–80% of female cases will be detectable by direct microscopic examination, but this is less reliable if the microscopist is inexperienced. Microscopy only diagnoses about

30% of cases in men.

- Culture: for up to 7 days is a considerably more accurate test, with 92–95% sensitivity in women. 60–80% of cases in men will be diagnosed through urethral culture or first void urine samples in men. The disadvantage of culture is that it is more expensive to perform and takes longer to obtain a result.

Treatment without diagnosis

If facilities for laboratory culture are not available, treating male partners of women with trichomonas will reduce reinfection of the female partner and onward transmission to new partners.

Methods of treatment

Uncomplicated infection

Metronidazole 2 g in a single oral dose or Metronidazole 400 mg twice a day for 5–7 days.

Infection in pregnancy

First trimester: symptomatic relief with co-trimazole pessaries 100 mg daily for 7 days.

Second and third trimester: Metronidazole in a single 2 g dose.

Prevention of spread

See Appendix 1. Specifically, avoid alcohol during treatment and for 48 hours afterwards (to prevent nausea and flushing).

Screening

As for gonorrhoea.

Contact tracing

See Appendix 2 for partner management. Current sexual partners should be traced.

Follow-up

A reexamination in about one to two weeks is recommended to:

- assess efficacy of treatment;
- ascertain there has been no risk of reinfection;
- check that contact tracing has taken place; and
- reinforce health education (see Appendix 2).

Nursing care, Role of the primary health care team, and Role of the hospital/community setting

See Appendices 4 and 5.

Definition

REVISION POINT 8

How can a patient with trichomoniasis prevent spreading it to someone else?
(See page 211 for help.)

Non-gonoccal urethritis

Inflammation of the male urethra which is not caused by *Neisseria gonorrhoea*. Causative agents include:

Sexually transmitted organisms:

- *Chlamydia trachomatis* (30-50%)
- *Ureaplasma urealyticum*
- *Mycoplasma genitalium*
- *Trichomonas vaginalis*
- *Neisseria meningitidis*
- Herpes simplex virus
- *Candida*

Non-sexually transmitted organisms

- Bacterial urinary tract infection
- Urethral stricture
- Foreign bodies

Modes of transmission

Non-gonococcal urethritis is thought to be primarily sexually acquired. It is not known to what extent non-sexually transmitted organisms contribute to the total number of cases. 20–30% of men with non-gonococcal urethritis have no detected causative organism.

Epidemiological summary

There appears to be very little global prevalence data on non-gonococcal urethritis. It is estimated that up to 40% of non-gonococcal urethritis may be caused by *Chlamydia trachomatis* which has been reported as a separate condition. Non gonococcal urethritis appears to be common in industrialised countries, being the commonest bacterial sexually acquired infection in men in Italy and the United Kingdom.

Manifestations of non-gonococcal urethritis

- Urethral discharge
- Dysuria
- Penile irritation

- A proportion are asymptomatic

Complications

Complications occur in less than 1% of cases and include:

- Sexually active reactive arthritis (see previous notes)
- Reiters syndrome (see previous notes)
- Epididymo-orchitis

Risk factors

- Young (mostly age 20–24, then 15–19 year olds)
- Sexually active

Prognosis

20–60% of patients have persistent or recurrent non-gonococcal urethritis.

Diagnosis

- Microscopy: visualization of polymorphonuclear leukocytes on either or both urine and urethral swab. (The patient should not have passed urine for, ideally, four hours beforehand.) Urine should be cultured where dipsticks are positive for blood, protein, and glucose. Tests for gonorrhoea and chlamydia should also be given.

Methods of treatment

As for chlamydia

Prevention of spread

See Appendix 1. Specifically:

Partners should be treated with a regime that cures simple chlamydia regardless of test results for chlamydia in either the patient with non-gonococcal urethritis or the partner.

Screening

As for gonorrhoea

Contact tracing

See Appendix 2 for partner management. Partners of men with symptomatic infection should be traced over the four weeks preceding onset of symptoms. Partners of men with asymptomatic infection should be traced over the six months preceding the diagnosis.

Follow-up

Patients with non-gonococcal urethritis should be seen again 2 weeks after initiating therapy in order to:

- assess efficacy of treatment – repeat urethral swab and urine sample if necessary;
- ascertain there has been no risk of reinfection;
- check that contact tracing has taken place; and
- reinforce health education (see Appendix 2).

Recurrent or persistent urethritis

Identify and exclude any risk factors for reinfection. Treatment of recurrent or persistent urethritis is with an alternative antibiotic regime including erythromycin and/or metranidazole.

Nursing care, Role of the primary health care team, and Role of the hospital/community setting

See Appendices 4 and 5.

Now carry out Learning Activity 7.

Genital herpes

Definition

Genital herpes is caused by Herpes simplex virus (HSV) type 1 or type 2, causing:

- symptomatic infections around the entry point of the virus, usually the mouth or genitals; and
- symptomless infections in the same sites.

Epidemiological summary

There is very little clear prevalence data on genital herpes from developing countries and there are no WHO estimates because of a lack of information available (WHO 2000). In developed countries, genital herpes is the commonest cause of genital ulceration, with over 20 000 reports annually from sexual health clinics in the United Kingdom and 50 000 estimated new cases in the United States. HSV type 2 is commonest, but there have been reports of over 50% of new cases of herpes in Europe and the United States being caused by HSV type 1.

Modes of transmission

Herpes simplex virus is shed through mucous membranes, genital and oral secretions, through:

- sexual transmission: through close genital contact and oral sex;
- vertical transmission: acquisition of genital herpes in pregnancy is associated with an increased risk of spontaneous abortion and premature delivery, especially when herpes is acquired in the third trimester. The risk of transmission of primary herpes to an infant during delivery is estimated at around 50%. If the mother has recurrent HSV type 2, the risk of transmission is estimated at less than 1%; and
- non-sexual transmission to other sites: kissing can transmit herpes simplex infection from mouth to mouth, usually HSV type 1.

Manifestations of first episode of genital herpes

First episode

- Blistering and ulceration of external genitalia

- Painful lesions
- Dysuria
- Vaginal/urethral discharge
- Inguinal lymphadenopathy
- Average duration 10–12 days
- Systemic symptoms in primary infection, including fever and myalgia
- More severe symptoms in women
- May be asymptomatic

It is estimated that up to 50% of patients with their first episode of symptomatic genital herpes have already acquired the infection in the past. Individuals in this group are less likely to have a systemic illness and are more likely to have a shorter duration of symptoms than those with primary herpes.

Recurrences of genital herpes

The estimated rate of recurrences is:

- HSV type 1: around 0.08 per month
- HSV type 2: around 0.34 per month

Manifestation of recurrent genital herpes

- It is common to have prodromal symptoms up to five days beforehand, including tingling, shooting pains in legs, buttocks or hips
- Lesions tend to be localised to one area lasting up to six days
- Less likelihood of dysuria
- Women usually have more severe symptoms than men
- Symptoms may be atypical, appearing like cuts caused by trauma or small abrasions which may look like candida
- May be asymptomatic

Asymptomatic viral shedding

Transmission of genital herpes is thought to occur most frequently during periods of asymptomatic

viral shedding.

- Most likely for HSV type 2.
- Most common in first year after infection.
- Most common for people with frequent symptomatic recurrences.
- It is not clear if transmission risks are reduced if the person is taking antiviral medication.

Complications

- More common in women
- Aseptic meningitis
- Autonomic nervous dysfunction, leading to urinary retention and constipation
- Extragenital lesions, typically in the buttocks, groin or thighs
- Secondary bacterial and/or yeast infections

Risk factors

- Young adults-age 15–35
- Sexually active

Prognosis

There is a long-term risk of recurrences in herpes, particularly type 2. It can have a damaging effect on sexual relationships and is a risk factor for acquiring and transmitting HIV infection.

Diagnosis

Laboratory detection and typing of HSV from swabs which are taken from the base of lesions. Facilities for storage, transport and laboratory access may influence the type of tests used.

Methods of treatment

First episode of HSV

If patients are seen within 5 days of the onset of symptoms, or when new lesions are developing, antiviral treatment will shorten the duration and severity of symptoms.

Aciclovir: 200 mg orally 5 times a day for 5 days

Famciclovir: 250 mg orally 3 times a day for 5 days

Valaciclovir: 500 mg orally twice a day for 5 days

Recurrences

Antiviral treatment reduces the duration of recurrences for around 1-2 days. Symptoms are less likely to be severe. Treatment may depend on the individual patient. If recurrences are frequent and/or severe, suppressive continuous antiviral treatment with lower doses than those used for first episode may be offered, with a review after discontinuation after the maximum of a year.

Treatment in pregnancy

Aciclovir, in keeping with the woman's clinical condition. (Acyclovir and more recent drugs for treatment of herpes, are not licensed for use during pregnancy, but there is so far no evidence to show that it causes harm to the foetus).

If infection is acquired in the third trimester, or if there are genital lesions at term, Caesarean section may be indicated.

Prevention of spread

Prevention of spread depends upon:

- Testing for other sexually transmitted infections
- Avoidance of sexual intercourse until the symptoms have resolved and during subsequent recurrences. The risk of asymptomatic shedding should be discussed with patients, especially those diagnosed with HSV type 2. Helping the patient identify mild nonspecific genital symptoms which may be herpetic and advising them to avoid sexual contact during those periods may reduce the risk of asymptomatic transmission.
- If an asymptomatic partner has had previous evidence of HSV type 1 for example as an oral sore, they are less likely to acquire HSV type 2 genitally.
- Use of condoms should be discussed for use

between outbreaks. However, condoms have not been fully evaluated in their ability to reduce transmission, and are likely to be limited.

- Men are more likely to transmit to women than women are to transmit to men.
- The risk of transmission during pregnancy should be discussed with men whose female partners are asymptomatic, especially in the third trimester.

Screening

Screening for herpes is not yet possible, as current tests rely on swabs taken from cuts, sores, or lesions. Tests should be offered for other sexually transmitted infections. Testing may be delayed until symptoms are resolved to avoid causing further pain.

Contact tracing

Commercially-available type specific tests for asymptomatic partners of individuals with herpes are not yet available. Consequently, the benefits for contact tracing may be limited to:

- counselling the patient and their current partner;
- assisting the patient and their partner in identifying risk reduction strategies;
- helping the partner recognise symptoms and advising about prompt attendance for diagnosis;
- identifying a partner who already has HSV; and
- offering to screen for other sexually transmitted infections for the partner.



REVISION POINT 9

What are the main points in the health education of a patient with an STI?
(See pages 215–216 for help.)

Nursing care

See Appendix 4. Specifically:

Symptom relief during outbreaks

Use of analgesia such as paracetamol; regular saline bathing with 3 tablespoons of salt per bath; women

may find passing urine in the bath relieves the pain of micturition; use of topical anaesthetic gel before passing urine may relieve symptoms; wearing loose underwear to let the air dry lesions.

Emotional support around diagnosis

Allowing patient to express anxiety; dispelling preconceptions the patient may have about genital herpes.

Nursing care, Role of the primary health care team, and Role of the hospital/community setting

See Appendix 5.

Now carry out Learning Activity 8.

Genital warts

Definition

Genital warts are benign epithelial skin tumours, caused by the human papilloma virus. About 1% of human papilloma virus infections result in visible genital warts.

Mode of transmission

- Sexual transmission: the most common route
- Vertical transmission: uncommon, but occasionally papillomatosis and anogenital warts occur
- Nonsexual transmission: from some types of hand warts is thought possible

Epidemiological summary

It is estimated that over 50% of sexually active adults are infected with genital human papilloma virus and that there is a similar global distribution of HPV. WHO notes an absence of global information on the prevalence of genital warts (WHO 2000). Data from the United Kingdom and Italy show genital warts as the most common sexually transmitted infections in each country, indicating that there may be a similarly high prevalence in other European countries.

Manifestations

In women:

- Usually affected sites: introitus, vulva, perineum, perianal area
- Less common sites: cervix, vaginal walls, thighs
- Appears as growths (soft on non-hair skin and keratinised on hairy skin)
- May be flat or pedunculated
- May cause pain, burning, itching
- Usually painless

In men:

- Affected sites: penis, scrotum, urethral meatus, perianal area

- Less common sites: pubic area, thighs
- Appears as growths (soft on non-hair skin and keratinised on hairy skin)
- May be flat or pedunculated
- May cause pain, burning, itching
- Usually painless

Risk factors

Over 50% of sexually active adults are estimated to have genital human papilloma virus.

Prognosis

Untreated genital warts may spontaneously disappear, remain the same or proliferate. Treatment is usually for aesthetic reasons. Most genital warts are cured with treatment. There is a risk of recurrence after treatment.

Diagnosis

Diagnosis is usually by naked eye examination. Some genital lesions may be cancerous. If in doubt, it is recommended to biopsy the lesion for laboratory evidence of cell changes and/or arrange for closer examination under colposcopy. Warts on the cervix should be examined by colposcopy before treatment.

Methods of treatment

All treatments have risks of failure and relapse.

Uncomplicated infection

Chemicals: podophyllin, podophyllotoxin, trichloroacetic acid applied topically

Imiquimod: immune response modifier, applied as a cream

Physical ablation: excision under local anaesthetic, cryotherapy with liquid nitrogen, electrosurgery or laser

Treatment in pregnancy

Podophyllin, podophyllotoxin, and imiquimod should not be used in pregnancy. Treatment should reduce the number of warts present to reduce the risk of transmission to the neonate at delivery. Caesarean section may be necessary if vaginal warts occlude the birth canal.

Prevention of spread

It is not clear if the transmission of genital human papilloma virus is reduced after warts are treated. Condoms may reduce transmission, but their efficacy has not been established. The person with warts and their sexual partners should be offered testing for other sexually transmitted infections.

Screening

Screening is not possible as genital warts are diagnosed by sight. All adult women should have regular screening of the cervix for abnormal cells, regardless of whether or not visible warts are present. Screening programmes have resulted in a significant drop in the number of cases of cervical cancer in Iceland, Finland, Sweden and parts of Denmark.

Cervical cytology

Some types of human papilloma virus are associated with an increased risk of cervical neoplasia. National guidelines from the United Kingdom recommend that appearance of genital warts does not necessitate any increase to the frequency of cervical smear tests unless indicated by the results of routine smears.

Contact tracing

Tracing past partners is not recommended.

Nursing care

See Appendix 4. Specifically:

- Psychological support for patients who are distressed at the appearance of warts
- Assisting patients with managing treatments to be applied at home

Role of primary health care team and role of hospital/community setting

See Appendices 5 and 6.

Pubic lice

Definition

Humans are infested with three species of lice: the head louse, *Pediculus humanus capitus*; the body louse, *Pediculus humanus humanus*; the crab or pubic louse, *Phthirus pubis*.

Modes of transmission

- Sexual transmission: most commonly through close body contact
- Other routes: less commonly from toilet seats, beds, and egg-infested loose hairs

The pubic louse hatches after 5–10 days incubation on the human body. Once hatched it requires blood from the host to survive. Pubic lice are not likely to survive more than 24 hours away from the human host. Adult lice mate and lay eggs daily until death. Pubic lice are about 1 mm long and resemble a crab with claws matching the diameter of the pubic hairs. The eggs are glued to these hairs.

Epidemiological summary

There is little available data on the true epidemiology of pubic lice. Underreporting is likely to take place as a result of self medication. United States figures based on sales of commercially available products are in excess of 3 million cases annually.

Manifestations

- Incubation period is usually five days
- Itching, resulting in scratching, erythema and inflammation
- Blue spots at feeding sites
- Some individuals may be asymptomatic

Risk factors

- 15-25 years of age

Prognosis

Pubic lice are completely curable and there are no long-term effects.

Diagnosis

Finding adult lice and/or their eggs on the patient. Both can be seen with the naked eye.

Methods of treatment

Uncomplicated infestation

Topical lotions are used and should be applied to all body hair, including the beard and moustache, with a second application after 3–7 days if necessary.

- Malathion 0.5%: leave in for 12 hours after application to dry hair
- Permethrin: 1% -apply to damp hair and wash out after 10 minutes. This treatment can also be used on eyelashes
- Phenothrin 0.2%: wash out after 2 hours on dry hair
- Vaseline™ used on the eyelids or eyelashes will also kill pubic lice by suffocation

Treatment in pregnancy and during breast feeding

Permethrin can be used.

Prevention of spread

See Appendix 1.

Screening

No specific screening is suggested. An examination of a patient with a sexual health concern should include an inspection of the pubic hair for lice.

Contact tracing

See Appendix 2 for partner management. All sexual partners within the 3 months prior to diagnosis should be traced.

Follow-up

Patients should be reviewed a week after treatment in order to:

- Assess efficacy of treatment: re-examine for lice and offer alternative treatment to those who still have evidence of infestation. There may be dead eggs remaining adherent to hairs which does not mean that treatment has failed. Dead eggs can be combed out with specially designed toothed metal combs.
- Treatment of persistent itch: may be caused by allergy or irritation. Use of antipruritic cream recommended to avoid over self-medicating with the pediculocidal creams.
- Ascertain there has been no risk of reinfection.
- Check that contact tracing has taken place.
- Reinforce health education (see Appendix 2).

Nursing care

See Appendix 4. Specifically, support and reassurance regarding embarrassment or feelings of being unclean.

Role of primary health care team and Role of hospital/community setting

See Appendix 5.



REVISION POINT 10

What are the main aspects of nursing care for a patient with an STI?
(See page 220 for help.)

Bacterial vaginosis and vulvovaginal candidiasis are generally not considered to be sexually transmitted, but their extremely high prevalence among women of childbearing age merits their inclusion as they are commonly seen in sexual health clinics.

Bacterial vaginosis

Definition

The evidence as to whether bacterial vaginosis is sexually transmitted is conflicting, but it is not generally defined as a sexually transmitted infection. Bacterial vaginosis is the commonest cause of abnormal vaginal discharge in women of childbearing age. Its cause is not clear, but it is represented by a proliferation of anaerobic organisms in the vagina, including *Gardnerella vaginalis*, *Prevotella* species, *Mycoplasma hominis* and *Mobiluncus* species. The normal lactobacilli which inhabit the vagina and provide a protective acid environment are reduced.

Epidemiological summary

There is wide variation in the data on prevalence, but it appears that bacterial vaginosis is extremely common worldwide, with reports as high as 50% of women studied in Uganda in 1997. Studies in Italy, Finland and the United Kingdom show variations between 5% and 21% in pregnancy.

Manifestations

- Vaginal discharge with offensive fishy smell
- Thin white discharge, coating the vaginal walls
- No itch or irritation
- Around 50% of women have no symptoms

Complications

- Increased risk in pregnancy of premature rupture of membranes, preterm birth and post partum endometritis
- Post-abortion pelvic inflammatory disease

- Increased risk of coinfection with HIV, associated with a reduction in vaginal lactobacilli

Risk factors

Bacterial vaginosis can appear and resolve spontaneously in women, regardless of sexual activity. It is commoner among black women and women using an intrauterine contraceptive device.

Prognosis

High recurrence rate after treatment of between 50% and 70%.

Diagnosis

Clinical diagnosis, identifying 3 of the 4 criteria:

- Thin white adherent discharge
- Clue cells on microscopy
- Vaginal pH > 4.5 (normally 3.8–4.5)
- Fishy smell from vaginal fluid when mixed with 10%; and potassium hydroxide solution on a glass slide

Bacterial vaginosis can also be diagnosed microscopically in the laboratory by Gram staining.

Methods of treatment

Treatment is recommended for:

- women with symptoms;
- women undergoing some gynaecological procedures, including termination of pregnancy; and
- pregnant women in some circumstances.

Uncomplicated infection

Metranidazole 400–500 mg twice a day for 5–7 days; Metranidazole 2 g as a single dose; 2% intravaginal clindamycin cream once daily for 7 days.

Pregnancy and breastfeeding

If history of preterm delivery or second trimester fetal

loss, screen for bacterial vaginosis and treat with metranidazole at the start of the second trimester.

Treat symptomatic pregnant women as above.

Metranidazole and clindamycin enter breast-milk therefore use an intravaginal treatment if lactating.

Prevention of spread

There is no indication for screening and treatment of male partners of women with bacterial vaginosis.

Screening

As above, in pregnancy. Prior to termination of pregnancy, when women should also be screened for chlamydia.

Follow-up

If symptoms resolve with treatment, there is no need to retest for bacterial vaginosis. If treated in pregnancy to avoid preterm birth, a follow up test with retreatment if necessary should take place after a month.

Nursing care

See Appendix 4 for general nursing care. Specifically:

- advise patients to avoid alcohol while taking metranidazole; and
- advise that clindamycin cream can weaken condoms, and that condoms should not be used during the treatment period.



REVISION POINT 11

In what way do bacterial vaginosis and vulvovaginal candidiasis differ from other STIs?

(See page 220 for help.)

Vulvovaginal candidiasis

Definition

Yeast infection, up to 95% caused by the species *Candida albicans*. The remainder are caused by non-*albicans* species, including *Candida glabrata*. There is no clinical difference in the manifestations demonstrated by each. The role of sexual transmission of candidiasis is thought to be limited.

Epidemiological summary

Data on candidiasis is inaccurate as it is generally not a reportable infection, nor are diagnostic techniques consistent. Prevalence studies suggest 5–15% of the population have candidiasis, with over 75% of women estimated to have it at least once in their lives. It is estimated that 10–20% of women of childbearing age have candidiasis asymptotically. In the United Kingdom, incidence at sexual health clinics has doubled over the last ten years and it is the second commonest cause of vaginal infection after bacterial vaginosis in the United States.

Manifestations

- Vulval itching and discomfort
- Curdy, non-offensive vaginal discharge
- Superficial dyspareunia
- Erythema
- Fissuring
- Oedema

Risk factors

- Pregnancy
- Combined oral contraceptive pill
- Diabetes mellitus
- Broad spectrum antibiotics

Prognosis

20–25% of women experience a relapse after treatment. Less than 5% of healthy women of childbearing years experience recurrent candidiasis.

Diagnosis

- Clinical on the basis of the above manifestations: in vulvovaginal candidiasis, the pH of the vaginal fluid is usually 4–4.5
- Microscopic diagnosis using Gram staining, to identify yeast cells and exclude trichomonas and clue cells, indicating bacterial vaginosis
- Culture, where microscopy is not conclusive

Methods of treatment

There is a wide range of available treatments, depending on the nature of the infection.

Uncomplicated infection

clotrimazole pessary; 500 mg as a single dose; clotrimazole pessary; 200 mg for 3 nights; miconazole pessary; 100 mg for 14 nights; nystatin pessary 100 000 units for 14 nights; fluconazole capsule 150 mg orally stat.

Infection in pregnancy

topical azoles are recommended and longer courses may be required; oral therapy is contraindicated in pregnancy.

Prevention of spread

Male partners of women with candidiasis may experience a transient rash, erythema, and burning sensation of the penis after unprotected sex. Symptoms usually resolve after showering.

Contact tracing is not indicated.

Screening

Screening is not necessary. Women with asymptomatic candidiasis do not need treatment.

Follow-up

There is no need for follow up or retesting if symptoms resolve.

Recurrent vulvovaginal candidiasis

Recurrent vulvovaginal candidiasis is defined as four or more symptomatic episodes a year. It can be caused by diabetes, use of steroids or antibiotics, or immunodeficiency. Treatment is with longer regimes of azoles.

Nursing care

See Appendix 4. Specifically:

- advise patients that miconazole damages latex and clotrimazole has an unknown effect on latex condoms and diaphragms;
- advise patients to avoid using perfumed products on the vulva and vagina; and
- advise patients to avoid wearing tight fitting synthetic clothing, which may increase perineal moisture and temperature.

Now carry out Learning Activity 9.

- STIs cause significant morbidity and can lead to long term complications.
- Patients with STIs may have varied symptoms or be asymptomatic.
- The presence of an STI can increase the risk of infection with HIV if exposed.
- Follow-up after treatment may be indicated to ensure it has been effective.
- Contact tracing, screening and testing may be indicated for partners of the patient with a STI; partner management must comply with the principles of confidentiality and non coercion
- Health education is crucial in the prevention of spread of STIs.
- Anyone working in sexual health should be aware of wider issues related to sexuality, gender and culture, etc.

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http://www.who.int/asd/figures/global_report.html

Appendix 1

Prevention of spread of sexually transmitted infections

This is dependent upon:

- Compliance with treatment – patients should be given verbal and written information including advice about completing the course of treatment.
- Testing for other sexually transmitted infections: the person with an STI and their partner should be offered tests for other sexually transmitted infections.
- Ensuring contact tracing has taken place if the person has arranged to contact their partner themselves.
- Avoidance of sexual intercourse until the patient and their current sexual partner have completed their courses of treatment (and sometimes for longer – see individual diseases).
- Treatment of partners – sexual partners of patients with certain diseases should be offered testing and treated on the basis of exposure regardless of the test result.

Appendix 2

Partner management

The features of partner management are:

- Treatment for the same infection as the patient when indicated
- Identifying any signs or symptoms of infection

Treating sexual partners for sexually transmitted infections breaks the chain of infection transmission and reduces the risk of the person with the diagnosed infection becoming reinfected.

Partner management must comply with the principles of confidentiality and non-coercion. Patients should not be forced to divulge information about partners and their identity must not be disclosed to anyone outside the health care team, who are in turn bound by confidentiality.

Approaches to partner management

Patient referral

The patient takes responsibility for contacting partners and asking them to come for treatment. The patient might approach partners by:

- directly discussing the infection with their partner
- asking the partner to attend the clinic without specifying the reason
- giving the partner a card asking them to attend the clinic

Provider referral

The partners of a patient with a sexually transmitted infection are contacted by a member of the health care team and asked to come to the clinic for treatment. There may be someone in the service with this particular role.

Patient referral is less labour intensive, therefore cheaper and there is less risk of perceived threat to the patient's confidentiality. WHO recommends patient referral.

Patient referral

- Explain to the patient the importance of treating partners
- Remind the patient to avoid sex till current partners are treated
- Help the patient decide how to communicate with partners
- If the patient permits, take the names of partners who may be at risk of the same infection

Patient referral cards

These can be given to a patient to hand to a named partner who in turn brings the card to the health centre. This enables the health centre staff to recognise the code for the patient's infection and to treat the partner appropriately. The information on the card should not risk breaking either the patient or the partners' confidentiality, in that there should be no personal details on it (see the example below).

Diagram 8. Example card

Card No. _____	Card No. _____ Date of issue: _____
Date of Issue: _____	Issuing Clinic: <i>Townville, New Town</i>
Diagnostic Code: _____	Name: _____
Partner's name and details: _____	<i>Please come to Townville Clinic, bringing this card with you.</i>
Clinic: _____	
<i>Townville, New Town</i>	Diagnostic code: _____

<i>Townville Clinic, Townville</i>	
<i>Tel: 456 834</i>	
<i>Opening hours</i>	
Monday	9.00 am - 3.00 pm
Tuesday	9.00 am - 3.00 pm
Wednesday	9.00 am - 3.00 pm
Friday	9.00 am - 3.00 pm
9/3/99	<i>Referral ABC</i>

Provider referral

Ideally, specially trained outreach staff should undertake provider referrals. Provider referral may be offered when:

- The patient does not wish to refer partners themselves
- The partners have not attended after a given time period and the patient has agreed in advance that the health care team can contact the partners in these circumstances
- The identity of the patient and their infection should remain confidential, unless the patient has expressly given permission for them to be disclosed. Details about the patient should never be discussed with a partner.

Treating partners

- Partners should be treated for the same infection as the original patient, regardless of whether they are tested.
- Where testing is available, partners should be offered tests for the range of bacterial sexually acquired infections, including the treated infection. (WHO 1995).

Appendix 3

Treatment education for someone with a sexually transmitted infection should include the following issues:

- explanation about the patient's infection which they are able to understand, supported by written information in their own language;
- assessment of the patient's risk for future sexually transmitted infections;
- exploring ways of reducing risks for future sexually transmitted infections;
- identifying difficulties that the patient may have in reducing risks;
- focusing on changes that the patient is able to make; and
- treatment of sexual partners.

Explanation about the infection

Find out what the patient understands about their infection and how to take their treatment and any questions or concerns they may have.

Assessment of the patients future risk

This information may already be available in the patient's case notes.

Exploring ways of reducing risks

Clarify with the patient recent past or present risks and look with them at safer options for the future.

These may include:

- limiting number of partners;
- consistent use of condoms; and
- changing from high risk penetrative vaginal or anal sex to low risk non-penetrative sex such as mutual masturbation.

Clarify misconceptions, which may include assumptions that only people in particular groups are at risk for sexually transmitted infections, or that washing after sex reduces the risks.

Identification of difficulties

These may include issues related to gender, culture, religion or poverty. The problems are best addressed if specific to the patient rather than generalised.

Focus on changes

Help the patient think about how they can put into practice the changes which they believe they can manage. Discussing costs and benefits of changing sexual behaviour may help the patient decide what they want to achieve and what they are able to do in reality.

Treatment of sexual partners

See partner management, Appendix 2.

Promotion of condom use

Condoms are effective in reducing transmission of bacterial sexually transmitted infections and blood borne viruses. They should be accessible in order to help control the spread of sexually transmitted infections.

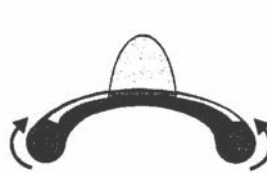
An educative discussion promoting the use of condoms may be appropriate for the individual patient. There should be the facility to demonstrate the use of condoms to the patient, allowing them the chance to practice. A supply of condoms and a penis model or substitute will be required (see below).

Diagram 9. How to use a condom

1. Check the expiry date and the manufacturer date



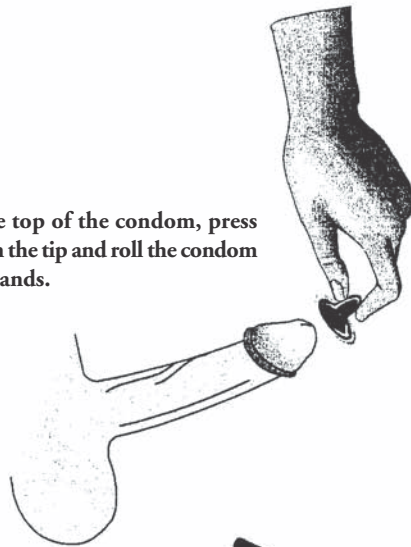
2. Tear the wrapper carefully.



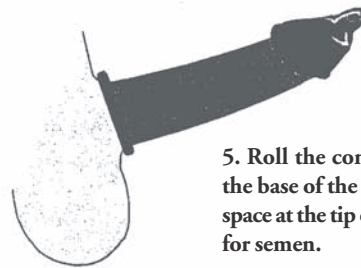
3. Hold the condom this way up, so that it will unravel easily.



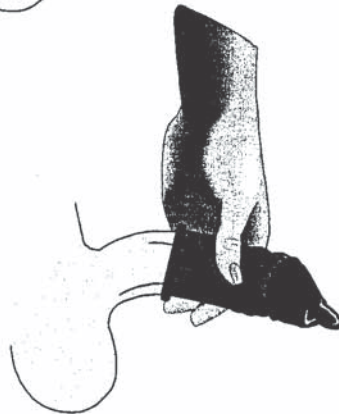
4. Holding the top of the condom, press out the air from the tip and roll the condom on. Use both hands.



5. Roll the condom right to the base of the penis, leaving space at the tip of the condom for semen.



6. After ejaculation, when you start losing erection, hold the condom at the base and carefully slide it off.



Psychological support

Establish a supportive relationship with the patient

- Non-judgmental attitude
- Good listening skills
- Allow the patient to express feelings
- Do not press the patient if they do not wish to disclose personal information about themselves.

Clarify confidentiality

Be able to state to the patient that none of his or her personal details will be communicated to anyone outside the immediate care providing team. There may be specific local legislation governing confidentiality.

Support through genital examination and tests

- Maintenance of privacy of consultation and examination-ensure all verbal communication is out of earshot of other workers and patients.
- Verbal explanation of what to expect during a genital examination.
- Ensure privacy for examinations. Exposure only when being examined and tests taken-ensure patients are dressed when history taking, results giving and any other discussion is taking place.
- Support anxious patients undergoing genital examination-assist with relaxation techniques if required, including deep breathing or visualization.

Safety

Infection control

Sexually transmitted infections are usually passed by direct genital or oral contact and therefore the nurse or midwife in managing patients with sexually acquired infections requires no special precautions. General points include:

- Non-sterile disposable latex gloves should be used when touching any part of the genitalia, not just

the membranous tissue and put in the bin for incineration after use. Gloves should be changed between patients and hands washed.

- Vaginal specula should be disposable or sterilised after use with each patient.

Blood borne viruses

See module 1 on Infection Control and the other part of this module on blood borne viruses.

Administration of drug therapy

- Ensure the treatment has been correctly prescribed and signed for by the prescriber
- Administer intramuscular drug therapy and single oral doses, ensuring adequate preparation and privacy
- Clarify with the patient that they know when and how to take courses of oral or topical medication
- Provide information about possible side effects

Arrangement for follow-up if required

Ensure the patient knows if and when they have been advised to return to the service.

Appendix 5

Role of primary health care team

- Raising awareness of STIs among patients and other professionals working with young sexually active adults
- Offering testing and treatment for at risk groups
- Organizing contact tracing for patients
- Promoting condom use and safer sex among sexually active patients.
- Issuing free condoms if possible
- Using the health centre as a focus for education around sexual health, for example, small group discussions, more formal health talks, use of posters, leaflets and videos to raise awareness
- Working towards destigmatizing sexually transmitted infections.

Role of hospital/community setting

- Inpatient and community care of patients experiencing complications of an STI
- Testing and treating patients admitted with symptoms which could be attributable to an STI

Appendix 6

Syndromic management

The key elements of syndromic management are:

- classifying the main causes of infections;
- using flow charts to help the provider identify causes of a syndrome;
- treatment of the patient for all the important causes of the syndrome with follow-up care; and
- ensuring partner management and patient education has taken place.

Where high quality tests, equipment and skilled staff are unavailable, syndromic management of sexually transmitted infections is recommended. Details of using this technique are outlined in the WHO STD Case Management Workbook (WHO 1995).

Infections spread by sexual contact and blood and body fluids

Part II: Infections spread by blood and body fluids

Stated learning outcomes

Glossary of terms

HIV/AIDS

Modes of transmission

Epidemiological summary

WHO case definitions

Diagnosis

Post-test counselling

Prevention of spread

The principles of nursing care

Nursing care of the patient with symptomatic HIV or AIDS

Hepatitis B

Modes of transmission

Manifestations

Age groups affected

Methods of treatment

Screening and contact tracing

Prevention strategies

Definition

Epidemiological summary

Risk factors

Methods of treatment

Screening and contact tracing

Prevention strategies

Bibliography

MODULE 7

THE OBJECTIVE of Module 7 is to provide an overview of the topic of infections transmitted by sexual contact and blood and body fluids. Since there are so many important issues that need to be discussed, the Module is divided into two parts:

Part I. Infections spread by sexual contact

Part II. Infections spread by blood and body fluids

Each part has its own stated learning outcomes and its own learning activities.

STATED LEARNING OUTCOMES

On completion of Part II of this module, you should have an understanding of HIV, Hepatitis B and Hepatitis C, including:

- disease definition
- modes of transmission
- epidemiology
- main manifestations
- complications
- methods of diagnosis or case definitions
- treatments
- prevention of spread
- health education and health promotion
- specific nursing care

In addition, you should have an understanding of differences between the three viruses in relation to all of the above.

KEY WORDS

HIV infection; AIDS; hepatitis B; hepatitis C; hepatitis D; immunocompromise; sexually transmitted infection; blood borne diseases; hepatocellular carcinoma.

Glossary of terms

ANTI-HBS: antibodies produced in response to hepatitis B antigens - these develop slowly in convalescence and correlate to immunity.

ANTI-RETROVIRAL THERAPY: drug therapy that acts against retroviruses e.g. HIV

Bloodborne virus: virus classified by its mode of transmission, e.g. HIV, hepatitis B, C, D, G.

CD4 T-LYMPHOCYTES: a group of immune cells, important for specific or acquired immunity - also known as “helper cells” which HIV is able to bind with prior to infecting the cell.

CIRRHOSIS: scarring and fibrosis of the liver tissue, associated with chronic progressive liver damage.

CORE IGM ANTIBODY (COREIGM): immune globulin M hepatitis B core antibody, present during the onset of acute infection disappearing after 3-12 months and is often used as a marker of acute infection; it may persist at low levels if viral replication continues.

EIA: enzyme immunoassays (see ELISA).

ELISA: enzyme linked immunosorbant assay used to identify antibodies, e.g., HIV ELISA identifies HIV antibodies.

FLAVIVIRUS: the official generic name for the Group B arboviruses which include yellow and dengue fever.

GENOTYPES: the genetic constitution of an organism.

HBSAG: Hepatitis B surface antigen present in acute and chronic infection; indicates the presence of Hepatitis B - the patient is potentially infectious.

HBV DNA: Hepatitis B genetic material indicating viral replication in acute or chronic infection – the patient is highly infectious.

HBEAG: hepatitis B e-antigen - may be present in acute or chronic infection; this indicates ongoing viral replication and the patient is likely to be highly infectious.

HCV RNA: hepatitis C genetic material.

HEPADENOVIRUS: classification of the group of viruses which includes hepatitis B.

HEPATOCELLULAR CARCINOMA: liver cell cancer.

ICTERIC: a term meaning jaundice

IMMUNOCOMPROMISED: state in which the immune system is not working properly – may have several causes

LYMPHADENOPATHY: swelling of the lymph nodes

MONOGAMOUS: having only one sexual partner over a period of time

OPPORTUNISTIC INFECTION: specific infections that are not normally harmful to people with a healthy immune system, but can cause disease in those with reduced immunity

PCR: an acronym for Polymerase Chain Reaction - a diagnostic technique which amplifies minute genetic material, and so allows detection of viruses and other organisms

RETROVIRUS: a term used to classify this particular group of viruses

RIBA: recombinant immunoblot assay - a diagnostic test for hepatitis C

SEROCONVERSION: represents the stage following initial infection when antibodies are first produced against a virus

VIRAL LOAD: quantity of virus present in the blood

VIRULENCE: the capacity of the organism to produce disease

WESTERN BLOT: immunofluorescence microscopy - a very sensitive diagnostic test

WINDOW PERIOD: the time between acquiring HIV infection and the production of antibodies to the virus – antibody development can take up to 3 months before it is detectable.

This is the second part of the module on infections transmitted by sexual contact and blood and body fluids. Many of the most prevalent sexually transmitted infections have already been discussed in the first part of this module; this section concentrates on the most common and well understood blood borne viruses including HIV, hepatitis B and hepatitis C.

Definition

Human immunodeficiency virus (HIV) is a retrovirus, classified into type 1 and type 2. HIV type 1 predominates worldwide, while HIV type 2 occurs mainly in West Africa. The content of this module will relate to HIV type 1. HIV is an immunocompromising disease, which attacks the immune system by attaching to and integrating with the host cell (CD4T lymphocyte cell) in order to replicate. It is through this process of HIV viral replication that the CD4 host cell is destroyed. The gradual depletion of CD4 cells results in suppression of the immune system increasing susceptibility to opportunistic infections, leading onto Acquired Immunodeficiency Syndrome (AIDS) and ultimately death.

Modes of transmission

HIV is a bloodborne virus, present in the blood, semen and vaginal fluids of infected people – it can only be passed on if infected fluid enters another persons body. Sophisticated laboratory techniques can identify HIV in body fluids other than blood e.g. saliva, however, the amount of virus present here is usually too low to be infectious.

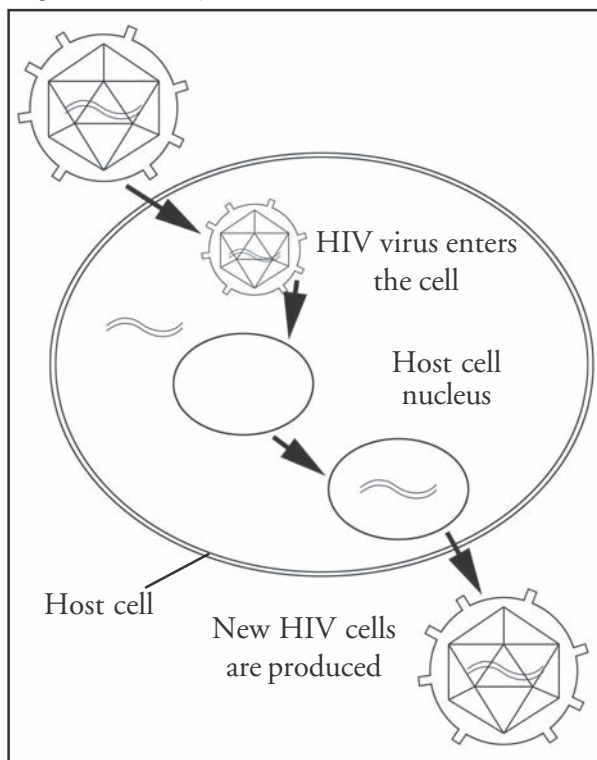
The main modes of transmission are:

- Sexual transmission – through unprotected vaginal, anal and occasionally, oral sex (HIV is unlikely to pass through good quality condoms unless torn or otherwise impaired)
 - Direct transmission – via blood to blood contact through the administration of unscreened blood or blood products (e.g. whole blood transfusion or factor VIII), or the sharing of drug injecting equipment
 - Vertical transmission – from an HIV positive mother to child, via the placenta during pregnancy, during the actual delivery or through breast milk.
- HIV is not spread through insect bites or social

contact such as the following:

- handshakes;
- touching or hugging;
- sharing of cooking or eating utensils; and
- coughing or sneezing.

Diagram 1. HIV life cycle



Factors influencing transmission

- Virulence: how infectious the source is. This is related to the viral load which is usually high shortly after seroconversion or when an AIDS defining illness is present.
- Virus titre: a high viral load indicates greater infectivity.
- Amount of infected material.
- Route of transmission: percutaneous injury is more likely to cause infection than mucocutaneous contact.
- Remedial action: for example, encouraging a wound to bleed following a needle stick injury can reduce the risk of transmission.

Epidemiological summary

Since HIV/AIDS was first recognised and up until 2000, the HIV virus has infected more than 49 million people worldwide. There are currently over 33 million people infected, and there were 2.6 million deaths in 1999 alone. HIV/AIDS has become the fourth leading cause of mortality, and its impact will continue to increase. Over 95% of all HIV cases and AIDS deaths occur in poorer, usually tropical, countries. Sub-Saharan Africa is the worst affected. The newly independent states of the former Soviet Union recorded the world's steepest HIV increase in 1999, with the proportion of the population infected with HIV doubling between 1997 and 1999. It is estimated that the number of infected people rose by over a third in the remainder of central and Eastern Europe during 1999 reaching a total of 360 000. In Western Europe, new combinations of anti-retroviral drugs continue to reduce the number of AIDS deaths significantly, however, new infections still occur. The spread of HIV and subsequent AIDS related deaths have many repercussions, including high child mortality rates in some countries, increased numbers of orphans and a significant burden on health care systems and the economies (see Tables 1, 2 and 3).

Table 1: Regional HIV/AIDS statistics and features (WHO, 1999)

Region	Epidemic Started	Adults and Children living with HIV/AIDS	Adults and Children newly infected with HIV	Adult Prevalence Rate (*)	Percent of HIV-Positive adults who are women	Main mode(s) of transmission (#) for adults living with HIV/AIDS
Sub-Saharan Africa	late 1970s early 1980s	23.3 million	3.8 million	8.0%	55%	Hetero
North Africa and Middle East	late 1980s	220,000	19,000	0.13%	20%	IDU, Hetero
South and South-East Asia	late 1980s	6 million	1.3 million	0.69%	30%	Hetero
East Asia And Pacific	late 1980s	530 000	120,000	0.068%	15%	IDU, Hetero MSM
Latin America	Late 1970s – early 1980s	1.3 million	150,000	0.57%	20%	MSM IDU, Hetero
Caribbean	late 1970s – early 1980s	360 000	57,000	1.96%	35%	Hetero, MSM
Eastern Europe and Central Asia	early 1990s	360 000	95,000	0.14%	20%	IDU, MSM
Western Europe	late 1970s – early 1980s	520 000	30,000	0.25%	20%	MSM, IDU
North America	late 1970s – early 1980s	920 000	44,000	0.56%	20%	MSM, IDU, Hetero
Australia and New Zealand	late 1970s – early 1980s	12 000	500	0.1%	10%	MSM, IDU
TOTAL		33.6 million	5.6 million	1.1%	46%	
<p>* The proportion of adults (15 to 49 years of age) living with HIV/AIDS in 1999, using 1998 population numbers. # MSM (sexual transmission among men who have sex with men), IDU (transmission through injecting drug use), Hetero (heterosexual transmission).</p>						

Table 2: Global summary of the HIV/AIDS epidemic (WHO, 1999)

People newly infected with HIV in 1999	Total	5.6 million
	Adults	5 million
	Women	2.3 million
Number of people living with HIV/AIDS	Children < 15 years	570,000
	Total	33.6 million
	Adults	32.4 million
AIDS deaths in 1999	Women	14.8 million
	Children < 15 years	1.2 million
	Total	2.6 million
Total number of AIDS deaths Since the beginning of the epidemic	Adults	2.1 million
	Women	1.1 million
	Children < 15 years	470,000
Total number of AIDS deaths Since the beginning of the epidemic	Total	16.3 million
	Adults	12.7 million
	Women	6.2 million
Total number of AIDS deaths Since the beginning of the epidemic	Children < 15 years	3.6 million

Table 3: European figures – new reports (WHO, 1999)

Country/area	Hetero-Sexual	Homo-/Bisexual	Intro-venous drug use	Transfusion/Haemo-philac	Mother-to-infant	Other (known)	Reporting period
Austria	25	43	27	2	0	2	97-99
Belgium	57	28	6	3	5	0	97-99
Bulgaria	92	8	0	0	0	0	97-99
Croatia	40	46	11	0	3	0	97-99
Czech Republic	21	76	0	0	0	3	97-99
Denmark	37	51	8	2	1	0	97-99
Finland	37	56	5	0	2	0	97-99
France	37	38	21	2	2	1	97-98
Georgia	40	0	60	0	0	0	97-99
Germany	18	61	18	2	0	0	97-99
Greece	24	68	5	2	2	0	97-99
Hungary	22	75	0	1	0	3	97-99
Ireland	22	34	32	5	5	1	97-99
Israel	71	15	9	2	4	0	97-99
Italy	25	16	56	1	1	2	97-99
Kazakhstan	6	6	81	0	0	6	97-99
Latvia	10	50	40	0	0	0	97-99
Lithuania	23	77	0	0	0	0	97-99
Luxembourg	14	52	29	5	0	0	97-99
Netherlands	29	57	13	1	0	0	97-99
Norway	39	34	24	0	3	0	97-98
Poland	18	18	61	1	2	0	97-99
Portugal	26	10	62	1	0	1	97-99
Republic of Moldova	13	0	81	0	6	0	97-99
Romania	10	1	0	6	4	79	97-99
Russian Federation	23	40	8	2	3	23	97-99
San Marino	30	20	50	0	0	0	97-99
Slovenia	28	67	6	0	0	0	97-99
Spain	19	13	66	1	1	1	97-99
Sweden	48	34	13	3	2	0	97-99
Switzerland	28	29	40	1	1	0	97-99
Turkey	69	7	22	2	0	0	97-99
Ukraine	9	1	87	0	3	0	97-99
United Kingdom	33	51	7	3	4	2	97-99
Yugoslavia Federal Republic of	33	16	44	6	1	0	97-99



REVISION POINT 1

Describe the different modes of transmission of HIV.
(See pages 235–236 for help.)

Manifestations of HIV

There is no vaccination or “cure” for HIV infection; HIV ultimately progresses to AIDS and eventual death. It is possible, however, for an individual to remain relatively well for more than 10 years. Factors which influence the state of health or well being include:

- The stage of infection
- Access to modern medical treatment
- The general health of an individual prior to infection

The four stages of HIV infection

Stage 1: Seroconversion

- Immediately following infection
- Antibodies are first produced
- Sore throat, fever, rash or lymphadenopathy may be present
- May be asymptomatic

Stage 2: Asymptomatic HIV infection

- Initially no symptoms or abnormal signs on examination
- Blood tests may reveal a CD4 count below normal or a reversed CD4/CD8 ratio
- The rate of viral replication may vary but at no time is the virus truly latent; the immune system is keeping the virus under control and symptoms are being prevented
- Patients can remain asymptomatic for a long time: on average around 10 years

Stage 3: Early symptomatic HIV infection

The immune system shows signs of damage including:

- Persistent lymphadenopathy: swollen cervical,

inguinal or axillary nodes

- Persistent fatigue
- Low grade fever and/or night sweats
- Weight loss
- Pruritus

These symptoms are likely to occur intermittently and investigations should be considered to rule out causes other than HIV infection. (See Appendix 1 for some of the more common opportunistic infections, which may present in symptomatic HIV disease.)

Stage 4: AIDS

There is no test for AIDS, nor is there any specific moment in time when HIV becomes AIDS. AIDS is a term used principally for epidemiological purposes. (See case definitions).

AIDS-defining illnesses provide a rough guide to disease progression. Both the CDC (Center for Disease Control and Prevention) in the United States, and WHO, provide definitions for an AIDS diagnosis. The CDC classification system for adults and adolescents categorises persons on the basis of clinical conditions associated with HIV infection and/or CD4 cell counts. WHO case definitions are designed for use in countries where diagnostic tests for defining immunocompromise are limited, and are based on clinical syndromes.

Now carry out Learning Activity 1.

WHO case definitions

AIDS is defined in an adult (>12 years) by the presence of at least 2 major signs, in combination with at least one minor sign from those listed below, when it is known that these are not caused by any other condition (a positive HIV test is not essential although it is desirable).

Major signs in adults

- Weight loss > 10% of body weight
- Chronic diarrhoea > 1 month
- Prolonged fever > 1 month (intermittent or constant)

Minor signs in adults

- Persistent cough > 1 month
- Generalized pruritic dermatitis
- History of herpes zoster
- Mouth or oropharyngeal candidiasis
- Chronic progressive or disseminated herpes simplex infection >1 month; and
- Generalized lymphadenopathy

Note: A diagnosis of Kaposi's sarcoma or cryptococcal meningitis is sufficient in itself for a diagnosis of AIDS.

AIDS in children

AIDS is defined in children by the presence of two major signs, and two minor signs from those listed below, when it is known that these are not caused by any other condition.

Major signs in children

- weight loss or abnormally slow growth
- diarrhoea lasting > 1 month
- fever lasting > 1 month

Minor signs in children

- persistent generalized lymphadenopathy
- oral or oesophageal candidiasis
- cough lasting more than 1 month
- widespread itchy rash
- repeated common bacterial infections (e.g. otitis media, sore throat, pneumonia)
- confirmed maternal HIV infection.



REVISION POINT 2

List factors that influence the transmission of HIV.
(See page 236 for help.)

Risk factors

Anyone, regardless of race, sex, age, or social class can be infected with HIV. However certain behaviours can increase the risk:

- unprotected sexual intercourse (vaginal, anal and less commonly, oral);
- intravenous drug use where injecting equipment is shared; and
- receiving a transfusion of blood or blood products where those products have not been adequately screened for HIV.

Age groups affected

Although HIV can affect all age groups, globally young people are disproportionately affected with approximately half of all new HIV infections occurring in those aged 15–24 years (UNAIDS 1998). Young people are especially at risk of infection from HIV since adolescence is a time of discovery when relationships and sexual behaviour are explored and experimentation with alcohol and drugs often takes place (UNAIDS 1998).

Some young people may be more exposed to HIV than others for example those with no secure home environment, and commercial sex workers. The main modes of transmission in both eastern and western Europe are anal sex between men and intravenous drug use and UNAIDS (1999).



REVISION POINT 3

List and describe the four different stages of HIV infection.
(See page 239 for help.)

Diagnosis

HIV infection is often asymptomatic, although a seroconversion illness may occur 2–3 weeks after infection (see previous notes). Diagnosis is through detection of virus or antibodies. HIV antibodies can take up to three months to be detectable, this is known as the “window period”. There are two tests commonly used to diagnose HIV antibodies:

- Enzyme linked immunosorbant assay (ELISA)
- Immunofluorescence microscopy (Western Blot) which is used to confirm a positive ELISA. (There are also a range of simple/rapid tests adapted for areas with limited resources).

Now carry out Learning Activity 2.

Serological markers

The following blood tests are used to monitor HIV progression:

- CD4 cell count indicates the “strength” of the immune system by measuring CD4 cells circulating in the blood. Serial measurements assist in monitoring the progressive destruction of (CD4 normal range is > 800 copies, although temporary reduction can occur with various other viral infections); and
- Viral load measures the amount of virus present in the blood and therefore reflects the activity of the virus and infectivity. Viral load is undetectable unless a virus is present.

Pre-test counselling

Confidential testing and pre-test counselling should be available within a non-judgmental environment. Skilled voluntary and confidential HIV testing and counselling should be available and accessible.

Aims of pre-test counselling:

- To provide an opportunity to identify any risk behaviour and discuss preventative or risk reduction measures relevant to the individual.
- To ensure the individual is able to make an informed decision regarding HIV testing, based on the understanding of possible personal, medical, social, or legal implications of a positive or negative result. HIV testing without informed consent and confidentiality has been defined as a violation of human rights (UNAIDS 1997).
- To provide support for those who may receive a positive result.

Informed consent must be obtained and confidentiality ensured. It is important that nurses and midwives understand the reasons for and the consequences of any HIV screening, and are able to communicate this sympathetically and clearly to any patient considering a HIV test.

The potential benefits of early detection of HIV

- Earlier access to health care, treatment and nutritional advice
- Prevention or early detection of HIV-related illnesses
- Motivation to initiate safer sex and/or drug related behaviours
- Awareness of safer options for pregnancy, delivery and infant feeding
- Prevention of infection of the new born through the use of appropriate antiretrovirals
- Avoidance of donating infected blood or blood products

The following should be considered before a test is performed

- The reason for a test including the knowledge of the patient regarding risk and possible erroneous understandings about risk behaviour

- The time of exposure so that the window period (when test may be negative) can be taken into account
- How the patient would react if the test is positive; whether the patient would prefer to have a sympathetic and informed friend or member of family with whom to share the problem
- The social or economic consequences of a positive test; a positive HIV result may have serious implications for future employment, life insurance, housing and other consequences

Post-test counseling

HIV results should ideally be given in person (not, for example, by telephone), by the advisor who performed the test. A plan for follow-up support is essential.

Negative results

If the test was taken within the “window period” it should be rechecked later. Further counselling can then be given on avoiding future exposure to HIV infection for the patient and their partners. Patients should be advised to consider repeat testing should they continue to engage in risk behaviour.

Positive results

Patients should be allowed time to adjust to their diagnosis. They may respond with a variety of emotions including shock, fear, anxiety, denial, despair, anger, frustration and guilt. Immediate “coping strategies” discussed during pre-test counselling need to be reviewed, for example, what does the patient have planned for the rest of the day, and who can they be with that evening? Providing a contact phone number, for example, with a counsellor or HIV support group may be helpful. It is important to explain that a positive result is not a diagnosis of AIDS, but rather of the detection of antibodies to the virus. Overloading

the patient with complicated information should be avoided. Practical arrangements for ongoing counseling and medical follow-up should be arranged and recorded.

In time, longer term psychological or emotional issues may need to be addressed. Patients may have many questions they wish to ask, for example, will they be able to have children, when are they likely to become sick or die? It is important not to be drawn into giving precise estimates of life expectancy. Patients may remain well for many years.

Education must include information on how patients can protect themselves and others. The risk of infecting others - such as partners, health care workers and their dentist - should be made clear. Counselling clinic should have lists of HIV informed medical and dental practitioners that can be contacted.

Now carry out Learning Activity 3.

Methods of treatment

In the absence of a cure or effective vaccine, the aim of treatment is to extend and improve the quality of life. This involves alleviating symptoms, preventing and treating opportunistic infections and when possible, inhibiting disease progression through the use of anti retroviral therapy.

Alleviating symptoms

Treatment should be directed towards individual symptoms always taking into account possible side effects (which can be more common in HIV infection) and interactions with any other medications.

Preventing and treating opportunistic infections

Prophylaxis may be introduced to reduce the likelihood of opportunistic infection as the immune system deteriorates e.g. antibiotic therapy such as cotrimoxazole to prevent *Pneumocystis carinii* pneumonia (PCP), pneumococcal pneumonia and cryptosporidial meningitis. Early diagnosis and access to prompt, effective treatment of opportunistic infections such as candidiasis, herpes and tuberculosis is also important.

Anti-retroviral therapy

Anti-retroviral treatment in HIV disease is evolving and considerable improvements have occurred in recent years. Current and new knowledge based on the HIV life cycle provides guidance for treatment strategies, aimed at interrupting replication. Current knowledge recommends the use of combination therapy, using three or more antiretrovirals. Anti-retroviral therapy is costly and is therefore not readily available in all European regions.

Anti-retroviral therapy is not without its difficulties. Resistance to therapy is a real challenge in the long term management of HIV infection. Resistance to therapy is a serious problem and can occur in different ways:

- during HIV replication when HIV cells mutate into variant and resistant strains;
- incomplete suppression of HIV during treatment which encourages the development of mutants usually due to poor compliance; and
- transmission of HIV infection from an individual carrying mutants, usually previously exposed to anti-retroviral therapy.

HIV treatment in pregnancy

Transmission of HIV from mother to child can occur via the placenta, during the delivery, and through breast milk during feeding. Mother-to-

child transmission is a major cause of morbidity and mortality among young children, particularly in areas with a high prevalence of HIV infection. The use of Zidovudine (AZT) in reducing mother to child transmission has been proven since 1994. Trials conducted in Thailand during 1998 demonstrated that the use of even a short course of Zidovudine was effective, providing greater feasibility and affordability. This shorter regime involves administration of Zidovudine to mothers during the last four weeks of pregnancy and during delivery. This reduces transplacental transmission rates by up to 50%.

A recent study in Uganda (Guay et al, 1999) demonstrated that Nevirapine, administered as single dose to the mother at the onset of labour and then to the baby within 72 hours of delivery, significantly reduced the risk of transmission. This study compared the safety and efficacy of short course Nevirapine to Zidovudine in reducing the rate of mother to child transmission. Nearly all babies were breast-fed and were tested for HIV infection at birth, 6–8 weeks and 14–16 weeks. The findings concluded that use of short term Nevirapine lowered the risk of transmission during the first 14–16 weeks of life by 47% similar to a short course of Zidovudine. Whilst 98.8% of infants in the Ugandan study were being breast-fed transmission rates were still significantly reduced. It is, however, important that safe alternatives to breastfeeding should also be considered. The Nevirapine study provides new possibilities in the prevention of mother to child transmission, through a simple low cost regime (approximately US \$4).

Prevention of spread

While expensive antiretroviral drug therapy is beyond the resources of many countries, well

targeted, low-cost prevention measures and care strategies can have a significant impact on the spread of HIV. These include:

- universal HIV testing of blood and blood products prior to transfusion;
- access to cheaper disposable injecting equipment and safe injecting practices;
- effective treatment of other sexually transmitted diseases – which increase the subsequent risk of infection with HIV due to damaged mucocutaneous surfaces;
- experienced HIV counselling including promotion of safer sex;
- counselling and support for HIV infected pregnant women so as to promote the use of antiretroviral drugs around the time of delivery and providing alternatives to breast feeding; and
- sex education in schools (WHO 1999).

REVISION POINT 4

What are the aims of pre-HIV counseling?
What are the benefits of early detection of HIV?

(See pages 241–244 for help.)

Screening and contact tracing

Voluntary HIV testing accompanied by counselling has a vital role to play within a wide range of measures for HIV prevention and support (see pre and post test counselling).

Following a positive HIV test result, the question arises of whether to disclose the diagnosis to others who may have been put at risk or may have been the source of infection. Current and previous sexual partners at risk should have been identified during the pre-test counselling stage. Spouses and partners should usually be told, although this may be a very difficult experience for the patient. Partner notification is voluntary in most European countries. Spouses and previous partners should

be offered HIV counselling and testing where appropriate. Barrier methods such as condoms will reduce the risk of infection to partners but will not exclude it. Contact tracing of previous partners may prove difficult and relies on accurate information being provided by the patient including full name and current address.

Now carry out Learning Activity 4.

The principles of nursing care

Nondiscriminatory care

The ability to recognise the individual's varying needs is achieved through the act of caring. Factors which can influence the quality of patient care include the health care workers own attitudes for example towards homosexuality, illicit drug use, differing religious beliefs and values, and perhaps their own fear of becoming infected. Particular risk groups associated with HIV infection, such as men who have sex with men, and intravenous drug abusers, are often already marginalized from mainstream society. It is therefore important that nurses identify personal attitudes, beliefs and values in themselves that may need to be addressed so that they do not compound any feelings of isolation for the HIV positive patient.

Confidentiality

Due to the stigma associated with HIV infection, confidentiality is vital for the development of trust and a therapeutic relationship between the nurse or midwife and patient. Access to the patient's HIV status should be on an "essential to know only" basis for health care workers directly involved in the patient's care.

Advocacy, education, and empowerment

Advocacy is concerned with promoting the patient's right to choose. Empowerment allows them to

make informed decisions. Patients who are informed about their infection, including its transmission and treatment can take greater control of their own health and lifestyle.

Communication

Good communication skills are essential in all aspects of nursing care as they improve our understanding of the patient, their needs and concerns. Communication skills include:

- giving the patient time and privacy to talk or express their feelings;
- listening to what the patient is both saying and not saying;
- observing how the patient behaves or acts in certain situations; studying his/her body language; and
- being aware of your own body language: are you giving relaxed and friendly signals if patients need confidence to express their concerns?

Infection control

This is an important aspect of the care of the patient with HIV/AIDS, see universal precautions in Module 1. Also refer to Isolation and Transmission Based Precautions in Module 1 for care of the patient with HIV and certain opportunistic infections.



REVISION POINT 5

List Universal Precautions that may be taken to prevent transmission of HIV.
(See pages 243–244 for help.)

Needle stick and other sharps injuries

In the event of a needle stick injury the wound should be encouraged to bleed and placed under warm running water. A responsible ward or clinic

manager should normally be notified and there should be a procedure in place for the management of such incidents.

Important points to consider include:

- Most needle stick injuries are superficial and do not involve the transfer of infected material or blood.
- The risk of contracting HIV infection from an injury when the “donor” is HIV positive is less than 3%.
- A detailed and accurate history of injury must be obtained and recorded confidentially.
- Following more serious injuries (for example, scalpel injuries during operations), and when it is thought infected material could have been transmitted, post-exposure prophylaxis (PEP) should be considered. This should always be started as soon as possible – ideally immediately – although it may be effective even up to several days after exposure.
- A blood sample should be taken as soon as possible after the injury and stored so that it can be tested if the injured person is later found to be HIV positive – this helps to determine whether the injury itself was responsible.
- Even one antiretroviral drug alone such as zidovudine or niverapine can be effective PEP, although, if facilities allow 3 drugs should be given (ideally different drugs from those the “donor” patient is receiving, although this is not essential). The usual period PEP is administered is for 4–6 weeks.
- In circumstances where needle stick injuries from HIV positive “donors” are more likely, drugs should be stored so that they can be given immediately.
- Careful counselling is essential – health care workers may have similar or more exaggerated concerns than those normally considered to be less informed.
- If PEP is commenced in an emergency by

someone with little experience of such situations, more expert help or a referral should be sought as soon as possible.

- Hepatitis B and C infections are more easily spread than HIV through needle stick injuries and these possibilities may need to be considered in their own right.

Mouth-to-mouth resuscitation

Although HIV may be detected in saliva, spread through this route has rarely been documented. Nevertheless to reduce occupational exposure it is recommended that mouthpieces or other ventilation devices should be used during resuscitation when available.

Now carry out Learning Activity 5.

Nursing care of the patient with symptomatic HIV or AIDS

HIV infection or AIDS can affect many systems within the body including the respiratory tract, central nervous system and gastrointestinal system. The patients' clinical symptoms may change and vary, so it is therefore important that nursing care requirements are assessed, planned and evaluated on a regular basis. The main principles of nursing care should be to promote independence and assist the patient in meeting their individual needs.

For nursing care of some commonly occurring problems in patients with symptomatic HIV or AIDS, see Appendix 2.

Rehabilitation

Loss of self control and uncertainty regarding health or employment can result in feelings of hopelessness and despair. One role of rehabilitation is to help the patient regain a sense of achievement

and self worth. Goals should be realistic and reflect the individual level of impairment and assistance available.

Following initial treatment and an appropriate period of rest, rehabilitation strategies should be introduced. The nurse should assess the patients' needs and abilities, providing assistance where required, for example, assisting them into the bath but encouraging them to wash themselves. This period of assessment and rehabilitation should be carried out prior to discharge, in order to predict problems and improve the patient's ability to manage in their home environment.

The patient's ability to function at home will depend on the stage of their HIV disease and the presence of opportunistic infections. Whenever possible, spouses and family members should be involved in rehabilitation and home discharge planning. Demands on the family are numerous and there may be emotional distress due to their loved one's illness, as well as physical and emotional limitations of caring for them. They may also experience fear about becoming infected with HIV themselves.

It is one of the nurse's and midwife's responsibilities to help prepare, advise, support and educate the family. It is important not to underestimate the level of stress that family caregivers may experience, particularly as a result of long term or terminal care. Access to advice and support including education on infection control and applying universal precautions should be made available.

Rehabilitation and home care offers a number of potential benefits:

- increased self esteem through achievement of manageable goals and increasing independence;

- a return to “normal” activities including returning to work and living independently may be possible;
- family involvement in the planning and provision of patient care is enhanced; and
- the burden on local hospital facilities is reduced.

The hospital service is a vital resource of specialist knowledge and care for patients during periods of acute illness. The primary health care team (GPs, community nurses/midwives, counsellors etc.) are ideally placed to implement health promotional strategies within the local community and in particular, reaching those considered at greater risk of infection who may be marginalized from mainstream society.

Prevention strategies

These should be integrated into existing systems such as health care, education and community based organizations. Effective and affordable prevention strategies include:

Targeting sexual transmission

- Accessible, cheap condoms
- Use of essential drugs to treat other sexually transmitted diseases
- Development of life skills needed for responsible and safe behaviour
- Good quality sex education programmes which can help delay first intercourse and protect sexually active youth from STIs, HIV and unwanted pregnancy

Reducing blood-to-blood transmission

- Harm reduction methods through information on safe injection practices among the drug injecting community, and needle exchange schemes where possible
- The promotion of universal precautions in all health care settings and the safe handling of sharps

HIV testing and counselling

- Raising awareness of personal risk behaviour
- Counselling and support for people who are HIV positive regarding their sexual and reproductive health and means of minimising transmission to others
- Specific support and counselling for HIV positive pregnant women regarding mother to child transmission
- HIV testing facilities available to expectant mothers considered at risk

Now carry out Learning Activity 6.

Hepatitis B (HBV)

Definition

Hepatitis is an inflammation of the liver. It can be caused by drugs (prescribed and abused substances), toxins, auto-immune disease, excessive alcohol consumption, bacteria and viruses. Viral hepatitis is so-called because the principal cell the virus infects is the liver cell (hepatocyte). In addition to the hepatitis viruses, other viruses (Cytomegalovirus, Epstein-Barr) can also cause hepatitis.

Hepatitis B is a viral infection of the liver and is a major cause of morbidity and mortality worldwide. Hepatitis B is a DNA virus and is part of the Hepadenovirus family. It is made up of a central core, containing core antigen (Hbc Ag), and a protein shell containing surface antigen (HBsAg). Hepatitis B is preventable with a safe and effective vaccine.

Modes of transmission

HBV can be present in serum in large quantities, and can also be detected in semen, saliva, cervical secretions and leukocytes. Its mode of transmission is similar to HIV, but HBV is considered up to 100 times more infectious and is more likely to be transmitted within households, for example, between young children with minor cuts and scratches (WHO 1998).

The main modes of transmission are:

- Sexual: through unprotected vaginal, anal and oral sex - condoms give some protection.
- Direct: via blood to blood contact such as the administration of unscreened blood or blood products (whole blood transfusion or factor VIII), or the sharing of drug injecting equipment.
- Vertical: from mother to baby. This is a major route of transmission worldwide, but is less common in countries where routine HBV

screening of pregnant women and vaccination for neonates is carried out.

- Percutaneous: through contaminated needles and other skin piercing equipment. Only a small amount of infected blood passed into another person may cause infection. Use of contaminated equipment that is inadequately sterilised (e.g. surgical, acupuncture, ear piercing or tattooing equipment) can also transmit infection. HBV is an occupational hazard for health care workers.

Epidemiological summary

Hepatitis B infection is present throughout the world although its distribution varies greatly. There are over 2 billion people infected world wide, and more than 350 million chronic carriers at risk of progressive liver disease, cirrhosis and hepatocellular carcinoma. Hepatitis B is a major cause of mortality worldwide with around 92 000 deaths from acute infection per year and a further 700 000 deaths from cirrhosis and liver cancer.

High prevalence areas include, Southeast Asia, China, Africa, Amazonia and southern parts of Eastern and Central Europe. Infection is less common in Western Europe and North America (WHO 1998).

Now carry out Learning Activity 7.

Manifestations

Incubation can be from 6 weeks to 6 months.

The pre-icteric stage:

- May last approximately 3 days
- Generalized malaise
- Headache
- Fever
- Fatigue
- Nausea and vomiting
- Arthropathy

The icteric stage:

- Jaundice appears (indicated by yellow or yellow/greenish colour to the sclera of the eyes and skin), abdominal pain due to liver tenderness, pruritus, enlarged liver and darkening of the urine
- Usually lasts for 1-2 weeks but may be longer

The post-icteric stage

- Jaundice gradually disappears
- The patient may continue to have symptoms of fatigue, abdominal pain, flatulence and indigestion for many weeks

Prognosis

Of all adults who become infected with hepatitis B virus, full recovery is expected in approximately 90%–95% and these patients will clear the virus and become HbsAg negative within 6 months. Blood tests then indicate previous exposure and immunity with the presence of Anti-HBs and IgG anti-HBc.

Chronic infection

Chronic infection develops in approximately 10% of those infected with HBV. In this 10%, blood tests reveal ongoing, viral replication 6 months after infection and the patient is considered highly infectious. The risk of chronic infection is much greater for babies infected at birth and 90% of infected babies go on to become long term carriers. Chronic infection is indicated by the presence of HBsAg but if HbeAg and DNA are negative, the infectivity is low. The presence of HbeAg and/or DNA imply ongoing viral replication and the patient is considered highly infectious.

Now carry out Learning Activity 8.

Fulminant Hepatitis B

Acute liver failure with coagulopathy, encephalopathy and cerebral oedema develop in approximately 1% of patients with acute infection. Fulminant infection is the result of a heightened immune response to the virus. It can also be associated with coinfection with hepatitis D or C. Hepatitis D is an incomplete virus, requiring HBV to replicate and therefore is only seen in the presence of HBV. Coinfection with hepatitis C increases the risk of chronic active liver disease.

Age groups affected

HBV can affect all ages, although in different settings various risk factors influence the age groups affected.

- Countries where routine antenatal screening is not available experience more infant infection.
- Regions with much intravenous drug abuse and where multiple sexual contacts are usual have increased infection rates among adolescents and young adults.



REVISION POINT 6

Describe the main modes of transmission of Hepatitis B.
(See page 248 for help.)

Diagnosis

Diagnosis is serological

- HbsAg (found in acute cases and carriers)
- IgM anti-HBc (found in acute infection)
- Hepatitis B virus DNA (HBV DNA) identifies viral replication

Methods of treatment

Post-exposure treatment

Infants born to infectious mothers (HBgAg positive) should ideally receive hepatitis B

immunoglobulin within 12 hours of birth, followed by a course of active vaccine (dose 1 within 12 hours of birth, dose 2 at 1–2 months, dose 3 at 6 months). If immunoglobulin is not available, vaccination alone is usually effective. Individuals recently exposed to HBV e.g. through parental exposure or within 2 weeks of sexual or close personal contact (family members, close personal contacts and sexual contacts) should receive hepatitis B immunoglobulin. This should be followed by hepatitis B vaccination if further exposure is possible.

Treatment of chronic infection

As HBV enters the body, it attacks the liver cells releasing virus particles which enter the blood stream. It is a result of the body's immune response to the virus particles and the development of immune complexes that damage the liver cells.

Chronic hepatitis can be treated with interferon, although many patients (up to 75%) do not respond and relapse is common. The main aim of interferon treatment is to suppress HBV replication, preventing the development of liver disease and progression to cirrhosis and hepatocellular carcinoma. Factors that positively influence treatment outcome include adult acquired infection and absence of co-infections (HIV or hepatitis C or D). Interferon therapy is very expensive, has common side effects such as fever, and is not readily available in many poorer countries.

Liver cancer has a very high mortality, although chemotherapy can prolong life for a few years.

Now carry out Learning Activity 9.

Prevention of spread

Patients who remain carriers or have chronic hepatitis B infection should be informed of the nature of the infection and how to minimise risk of transmission to others. This may include ongoing counselling. Family members and/or sexual partners should also be informed. Health care workers in attendance should be reminded of the need to employ universal precautions.

Screening and contact tracing

Due to the highly infectious nature of HBV it is usually important that family and household members are screened for HBV and vaccinated or treated accordingly. Recent sexual partners should be contacted where possible for counselling and screening. When expectant mothers are found to be carriers of HBV, prompt vaccination of the newborn infants, as already described, can prevent them from becoming carriers.

Nursing care

Infection control is an important aspect of care of the patient with hepatitis B, (see universal precaution in Module 1). For nursing care of some commonly occurring problems in patients with HBV see Appendix 3.

Rehabilitation and patient education

Information and advice regarding lifestyle can aid recovery and help maintain health after discharge from hospital.

- Rest: patients should rest initially, introducing gradual exercise.
- Hygiene: good hygiene will remove potentially contaminated body fluids.
- Sex: patients should be aware of the risk of transmission through unprotected sexual contact.
- Diet: a balanced healthy diet is recommended, unless otherwise prescribed (for example, in

impending liver failure).

- Alcohol: patients are advised to abstain from alcohol, which is hepatotoxic particularly when liver enzymes are raised.
- Blood donation and organ donor card: patients are advised not to donate blood and not to carry an organ donor card.
- Follow-up: patients should be reviewed at regular intervals.

Family education

Nursing care may be provided at home if the diagnosis is confirmed, when the symptoms are mild and for those in the recovery stage. Family education and support is essential, particularly for patients who are chronically infected. The nurse or midwife has a responsibility to advise the family how to care for the patient. Information should focus on preventing the spread of infection by encouraging vaccination and discussing universal precautions. The nurse or midwife should develop an education plan that takes into consideration individual circumstances related to family and lifestyle.

REVISION POINT 7

What is the ideal course of action for an infant born to an HBsAg-positive mother?

(See pages 249–250 for help.)

Prevention strategies

Prevention strategies should be integrated into existing systems (health care, education and community-based organizations; see Prevention strategies for HIV). In addition:

- Vaccination: hepatitis B vaccine has been available since 1982 and has been proven safe and effective. In 1992 the World Health Organization recommended that all children worldwide should receive Hepatitis B vaccination. 100 countries have since included it in their routine immunization programmes (WHO1999).

Definition

Hepatitis C is a viral infection of the liver and is one of the causes of “non-A, non-B” or “post-transfusion hepatitis”. HCV is from the family of flaviviruses which include yellow and dengue fever. There are 6 major genotypes (classified 1–6) and many subtypes (classified a, b, c, etc.). Genotypes 1–3 have a worldwide distribution, genotypes 4 and 5 are found principally in Africa while genotype 6 is found primarily in Asia. Genotypes are determinants of severity of the disease and response to treatment (WHO 1998). Although hepatitis C virus (HCV) is not as infectious as HBV, up to 80% of those infected with HCV are at risk of developing progressive liver disease, cirrhosis and hepatocellular carcinoma (WHO 1997).

Modes of transmission

HCV is carried in the blood and is spread through untested blood transfusion and needle sharing by drug users. Mode of transmission in up to 40% of infections is unknown. The main modes of transmission are:

- Direct: via blood to blood contact such as the administration of untested blood or blood products (for example, whole blood transfusion or factor VIII), or organs for transplantation.
- Needle sharing: or sharing of drug injecting equipment among intravenous drug users.
- Percutaneous: invasive medical or dental procedures involving contaminated or inadequately sterilized equipment, for example, tattooing, earpiercing and acupuncture. Health care workers may be exposed accidentally due to contact with infected blood or needle stick injury.
- Vertical; from mother to baby transmission has been observed globally, but the risk is considered to be less than 5% for each pregnancy, unless the mother is co-infected with HIV. There is no conclusive association with breastfeeding (WHO 1998).

- Sexual: this is uncommon unless there are other risk factors.

Now carry out Learning Activity 10.

Epidemiological summary

The incidence of HCV worldwide is not yet well established. With the data that exists however, WHO (1999) estimate that 3% of the world's population have been infected with HCV and that there are 170 million carriers worldwide (see Table 4).

Seroprevalence data from different countries can be grouped into high (>10%), intermediate (2-10%) and low (<2%) prevalence rates. Existing data indicates a wide variation in prevalence rates from region to region, with some countries in Africa, Eastern Mediterranean, South-East Asia and Western Pacific having high prevalence rates. It should be noted that seroprevalence studies taken from each country may involve different population groups and may not be entirely representative.

Now carry out Learning Activity 11

Manifestations

- Up to 90% of people infected are asymptomatic.
- Incubation period varies from 15 to 150 days.
- Acute infection may present with fatigue and jaundice.
- Approximately 80% of acute infections result in

persistent infection; the natural history and clinical outcomes vary.

- A significant number of chronic infections are asymptomatic with normal liver enzymes and relatively normal liver histology; these patients show little or no disease progression.
- 20% of patients with chronic infection develop cirrhosis.
- Between 1% and 5% of cirrhotic patients eventually develop liver cancer – this can take up to 20 years.
- HCV is a chronic infection and cirrhosis or liver cancer can take up to 20 years to develop.

Risk factors

- Recipients of unscreened blood, blood products and organ transplants
- Intravenous drug users
- Healthcare workers
- Those undergoing any invasive procedure such as skin piercing and tattooing

Diagnosis

HCV is diagnosed from a blood sample through the detection of specific antibodies by an enzyme linked immunosorbent assay (ELISA). However, false positives are common and confirmatory tests (Recombinant Immunoblot Assay (RIBA)) must be carried out when possible. The presence of HCV RNA in serum indicates the presence of chronic active infection. This is detected by the

Table 4. (WHO 1999)

High %		Intermediate %		Low %	
Egypt	18.1	Republic of Moldova	4.9	Belarus	1.4
Rwanda	17	Romania	4.5	Bulgaria	1.1
Cameroon	12.5	Russian Federation	2	Croatia	1.4
Bolivia	11.2	Thailand	5.6	France	1.1
Mongolia	10.7	Cambodia	4	Poland	1.4
Guinea	10.7	Central African Republic	4.5	Ukraine	1.2

use of the reverse transcription-polymerase chain reaction (RT-PCR), which is also used in determining response to treatment (PCR positive = active infection; PCR negative = no active infection).

Methods of treatment

Many patients do not require treatment since they do not develop significant liver damage. Patients should be advised to see a doctor or attend a health facility every 6–12 months so that their liver function can be monitored.

For patients with significant and persistent liver inflammation treatment may be required. Current treatment is based on interferon in combination with ribavirin, which significantly improves sustained response rates to 30%–40%. Interferon is administered subcutaneously 3 times a week.

Treatment is expensive and those at greater risk of progressing to cirrhosis receive priority, until the natural history of HCV is better understood. Unfortunately, those at greater risk of progressing to cirrhosis are also less likely to respond to treatment.

Aim of treatment

- To reduce or eliminate inflammation in the liver in order to prevent progression to cirrhosis
- To reduce or eliminate the amount of virus in the blood and, in particular, the liver

Patients suitable for therapy

- Those with chronic infection
- When liver biopsy shows evidence of fibrosis and a moderate or severe degree of inflammation
- When ALT has been elevated for at least 6 months

Indicators for sustained response

- Genotype 2 or 3
- Female
- < 40 years old
- Minimal fibrosis
- A low viral load

Now carry out Learning Activity 12.

Prevention of spread

Patients should be informed and advised regarding the nature of HCV infection, its routes of transmission and means of preventing spread to others. They should be advised that the risk of HCV transmission to their spouse or partner through sexual activity is small but is possible. The risk of transmitting HCV sexually is likely to be increased by the presence of an STI. Individuals with HCV who have unprotected penetrative sexual intercourse in serial relationships may be at risk of contracting a STI. Couples in a monogamous relationship are not normally advised to use condoms although some may choose to do so. Patients should be advised not to share household items such as razors or toothbrushes.

Screening and contact tracing

The reasons for screening for HCV infection include:

- the prevention of HCV transmission to others; and
- the identification of infected individuals for counselling and medical management.

It is recommended that screening should be accompanied by pre and post test counselling. Counselling should include information regarding risk factors and preventing transmission, the nature of HCV infection and possible complications.

In areas where resources and priorities allow, screening is recommended for:

- donors of blood, organ or tissue transplant material;
- recipients of multiple plasma derived products (for example, clotting factors);
- intravenous drug users;
- chronic renal haemodialysis patients;
- healthcare workers who sustain a percutaneous or mucosal exposure to HCV positive blood;
- individual consideration should be given to testing the partner of a HCV positive person; and
- routine screening is not currently recommended for pregnant women unless risk factors are present (WHO 1998).

Risk factors more likely to be associated with progressive liver disease

- Genotype 1
- A high viral load
- Male
- Infection occurring after 40 years of age
- Associated alcohol abuse
- Coinfection with either HIV or HBV
- Iron excess in liver
- Severe liver damage at initial biopsy

Cirrhosis and hepatocellular carcinoma

For patients with decompensating cirrhosis, liver transplantation may be considered although response is varied. For patients who go on to develop liver cancer, the outlook is poor, but chemotherapy may prolong life for a few years.

Nursing care

Infection control

The principles of universal precautions should be applied (see Module 1).

Nursing interventions

As discussed earlier many patients with HCV

infection are asymptomatic and only require to attend clinic appointments to monitor any deterioration. For patients with progressive liver disease, nursing care shares common principles with care of patients with HBV (see Appendix 3).

Rehabilitation

It is important to discuss and explain to the patient and their family about issues of diet and lifestyle. The patient should be advised to abstain from alcohol or limit their intake to an occasional glass of beer or wine. A normal healthy diet is usually appropriate for people with HCV infection. Many patients worry about transmitting the infection to family or friends. The low risk of sexual and household transmission should be discussed. Patients should be advised to cover any cuts or wounds with waterproof dressing. Advice and information should be realistic and appropriate to the individual.

Prevention strategies

As current treatment is costly and a vaccine is not available, prevention is very important. HCV prevention strategies include:

- reducing blood to blood transmission (as for HIV); and
- raising public awareness through health promotion.



REVISION POINT 8

What are the aims of treatment of HCV and who is suitable for therapy?
(See pages 253 for help.)

Summary of key points

- HIV/AIDS, Hepatitis B, and Hepatitis C cause significant morbidity and mortality globally.
- Infection can often, but not always, be prevented. An understanding of modes of transmission can allow individuals to reduce their risk of contracting infection.
- Certain groups and activities are considered High Risk for transmission.
- There are similarities and differences in the way the three infections are transmitted.
- Treatment is expensive and unavailable in many socioeconomically disadvantaged countries.
- Counseling, education, and health promotion are important in the care of individual patients and in the prevention of spread.
- Everyone has a responsibility in the control and prevention of spread of such infections.

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Appendix 1

Opportunitisc infection	Presentation	Diagnosis	Treatment
Toxoplasmosis	Can spread to all tissues of the body, but mainly affects the brain causing: neurological symptoms, headache, nausea and confusion	CT scan (rarely biopsy)	Pyrimethamine plus sulphadiazine and folic acid or Cotrimoxazole alone
Atypical mycobacterium (MAI) infection	May affect gastrointestinal (GI) tract, bone marrow, liver, lungs, adrenal glands, brain, lymph nodes and kidneys	Acid fast bacilli on microscopy confirmed by culture	Anti tuberculosis medication although resistance is common to usual drugs
Cryptosporidiosis	Damages GI mucosa causing profuse watery diarrhoea, abdominal pain, flatulence, malaise, malabsorption and weight loss	Stool sample and microscopy	No established specific therapy - effective anti-retroviral treatment usually results in improvement
Pneumocystis carinii pneumonia (PCP)	Respiratory distress and fever, dry cough and dyspnoea	Induced sputum, bronchial lavage/	Cotrimoxazole (IV/oral) Pentamidine (IV/nebulized)
Tuberculosis (TB)	See Module 5	biopsy, positive culture	Antituberculosis medication (see Module 5)
Cytomegalovirus (CMV)	May result in retinitis and more rarely, encephalitis, colitis and oesophagitis	Sputum culture, chest radiography, sometimes biopsy	Foscarnet or Ganciclovir (IV fusion)
Progressive multifocal leucoencephalopathy (PML)	Affects the central nervous system, causing multiple lesions in the white matter of the cerebrum and deterioration in general mental function and possible paralysis	Ophthalmological examination or biopsy of infected tissue	There is no established treatment other than alleviation of symptoms - anti-retroviral therapy should be used where possible
Candida albicans	A common cause of mouth problems - painful white plaques which may coat the buccal mucosa, tongue and mouth. May affect the whole GI tract resulting in oesophagitis with nausea, vomiting and weight loss	Endoscopy examination and swabs	Nystatin, Fluconazole or Itraconazole
Herpes simplex	Causes oral, oesophageal, anorectal and genital ulceration	Swab and culture	Acyclovir or Famcyclovir (locally or systemically)
Cryptococcosis	Meningitis is the most common presentation but may also affect other organs	Microscopy and culture of cerebrospinal fluid	Fluconazole (IV/oral) Amphotericin B
Kaposi's sarcoma (KS)	Predominantly affects gay men: purple infiltrating lesions found on the skin, also affects the GI tract and brain	Biopsy	Radiotherapy or chemotherapy

Nursing care of the patient with symptomatic HIV or AIDS

The following are examples of nursing interventions:

Impaired respiratory function

Symptoms: dyspnoea, cough, increased respirations, cyanosis.

Possible causes: Pneumococcal or Pneumocystis carinii pneumonia, tuberculosis, anaemia, Kaposi's sarcoma, Cytomegalovirus (CMV) pneumonia.

Aims of care: promote optimal respiratory function, alleviate cough, maintain adequate oxygenation.

Possible interventions

- Assess respiratory function and vital signs – findings should be recorded as a baseline assessment and 4 hourly thereafter. Skin colour, cough and mental status should also be noted.
- Position the patient to maximise respiratory function, sitting upright and well-supported.
- Chest physiotherapy may be required to establish and maintain clear lung fields.
- Breathing exercises should be demonstrated, encouraging relaxation and conserving oxygen, when breathing is difficult.
- Administer oxygen and any medications as prescribed.
- Offer reassurance to the patient as they may feel anxious.

Changes in bowel habits

Symptoms: diarrhoea related to opportunistic infection

Possible causes: Cryptosporidiosis, Kaposi's sarcoma in G.I. tract, Cytomegalovirus (CMV) enteritis

Aims of care: prevent dehydration, alleviate distress, restore normal elimination habits.

Possible interventions

- Assess for signs of dehydration. The patient's weight should be taken daily and an accurate record of fluid intake and output maintained.
- Encourage frequent small amounts of oral fluids such as water and fruit juice to replace lost fluids and electrolytes.
- Administer anti-diarrhoeals and IV fluids as prescribed.
- Perianal skin care may be required as a result of chronic diarrhoea and if the patient is in a weakened state. The skin should be cleaned after each bowel movement with warm soapy water. Gently pat the skin dry with a soft cloth or towel rather than wiping it to prevent fragile skin from tearing. Apply skin protection, such as an emollient cream.

Gastrointestinal disturbance

Symptoms:	Nausea and vomiting
Possible causes:	Cryptosporidiosis, Cryptococcal meningitis, Cytomegalovirus enteritis, atypical mycobacterium medications.
Aims of care:	prevent dehydration, alleviate distress, restore normal dietary habits.

Possible interventions

- Assess for signs of dehydration. The patient's weight should be recorded daily and an accurate record of fluid intake and output should be maintained.
- Initially the patient should avoid anything by mouth for 2 hours, then offer ice cubes to suck and then clear fluids as tolerated.
- Administer I.M. anti-emetics and IV fluids as prescribed.
- Regular oral hygiene should be provided - a mouthwash/rinse, toothbrush and paste, or simply fresh water and ice to suck. If the patient is very weak or unconscious it may be necessary for the nurse to provide oral care using gauze soaked in mouthwash or fresh water, and using the index finger, gently cleanse the mouth, applying petroleum jelly to lips to prevent cracking.

Alteration in body temperature

Symptoms:	fevers and night sweats.
Possible causes:	HIV infection itself, CMV, PCP, Cryptosporidiosis, atypical mycobacterium, fever of unknown origin.
Aims of care:	assist in maintaining normal body temperature (36-37.5° C), keep the patient comfortable.

Possible interventions

- Assessment of vital signs and body temperature should be recorded 4 hourly. Night sweats are common and should be documented.
- Administer antipyretic as prescribed.
- Encourage fluids as tolerated.
- Ensure comfort by providing light, clean and dry bedclothes. Tepid baths or sponging may prove useful.

Pain related to HIV and/or opportunistic infections

Symptoms: Pain

Possible causes: Candidia or herpetic infection (for example, neuropathic pain including tingling and numbness), encephalitis (headaches), pressure sores.

Aims of care: Alleviate pain

Possible Interventions

- Assess the location, type, intensity and persistence of the pain.
- Administer analgesics and other medication as prescribed (for example, anti-herpetic).
- Monitor response to analgesics by asking the patient, where possible, to grade the pain experienced on a scale of 0 to 10.
- Assist the patient into a position that will provide greater comfort.

Cognitive impairment

Symptoms: Alteration in thought processes i.e. memory loss, poor concentration.

Possible causes: CNS opportunistic infections, Cerebral Toxoplasmosis, HIV dementia, depression.

Aims of care: minimise the effects of neurological dysfunction, maintain a safe environment.

Possible Interventions

- Assess baseline mental status, including the patient's ability to understand.
- Communication skills are essential when assisting the patient. Speak in a calm and relaxed manner, give one instruction at a time, and repeat information as necessary.
- Use memory "prompts" such as memory diaries and photographs of familiar objects.
- Prevent injury by keeping the environment clear of unnecessary hazards.
- Provide family and care giver support and instructions regarding the above interventions.

Inadequate nutrition**Symptoms:** weight loss**Possible causes:** diarrhoea, nausea and vomiting, anorexia, difficulty in swallowing due to Kaposi's sarcoma lesions in G.I. tract, oesophageal candidia.**Aims of care:** keep the patient well nourished, prevent further weight loss, attain normal body weight**Possible interventions**

- Assess previous dietary patterns including food likes and dislikes and any known allergies.
- Administer anti-emetics and any other medication as prescribed for treatment of cause and vitamin supplements.
- Provide small frequent meals, which may be better tolerated. Dietary supplements should be used as appropriate.
- Naso-gastric feeding may be required for patients unable to be maintained on oral nutrition.

Depression**Symptoms:** isolation, feelings of despair and hopelessness.**Possible causes:** HIV status, isolation/rejection for family and friends, loss of independence and fear of death.**Aims of care:** establish a trusting/therapeutic relationship, improve motivation and self esteem, reduce the risk of self harm.**Possible interventions**

- Set time aside to talk to the patient. Encourage them to share their fears and concerns.
- Identify ways in which the patient has coped with problems in the past to identify strengths and weaknesses.
- Assist them in identifying small achievable goals, to improve self esteem (for example, getting dressed independently or going for a short walk).
- Involve the patient in planning and providing their own care wherever possible or practical.
- Identify the patient's interests or hobbies and explore means of involvement (for example, reading).

Nursing care of the patient with hepatitis B infection

The following are examples of nursing interventions:

Anxiety

Symptoms: expressions of worry and anxiety.

Possible causes: concerns regarding their recovery.

Aims of care: establish a relationship in which the patient feels able to discuss their concerns, reduce/alleviate anxiety.

Possible interventions

- Set time aside to spend with the patient and encourage them to express their worry by asking open-ended questions.
- Offer clear and understandable information regarding their infection and treatment - avoid the use of complicated medical terms and jargon.
- Do not overload the patient with information and check they have understood what has been said.
- Information leaflets can reinforce what has been discussed.
- Involve the patient's family whenever possible, to improve their knowledge and understanding as well as reducing their own fears of infection.

Weakness and fatigue

Possible causes: Weakness and fatigue are common during acute and in chronic end-stage liver disease.

Aims of care: to ensure personal hygiene needs are met, to ensure patient comfort, to ensure adequate rest is achieved, to promote self care when appropriate.

Possible interventions

- Assist the patient with washing or bathing according to their needs and wishes
- Assist the patient with toileting as the patient requires
- Assist the patient in achieving a comfortable position to promote rest and sleep, whilst preventing risk of pressure sore development
- Promote self care and independence when appropriate, assessing and reviewing the patients needs continuously.

Inadequate nutritional intake

Symptoms: Loss of appetite is common and is often complicated by nausea and vomiting.

Aims of care: Ensure adequate intake of nutritional needs

Possible interventions

- Patients with nausea and vomiting may require intravenous fluids of glucose and saline.
- Anti-emetics should be administered if prescribed.
- A diet of clear fluids should be given initially, progressing to supplements and light diet.
- Nurses and midwives should discuss with the patient the need for a high protein diet. This may be necessary due to the increased protein catabolism that occurs with acute liver disease and it can promote liver tissue repair.
- The patient's dietary and fluid intake and output should be monitored and recorded.
- Small meals should be provided at frequent intervals and based on patient preference.

Jaundice

Impaired liver function inhibits the body's ability to excrete bile salts normally. Excess bile salts are excreted and deposited in the skin resulting in jaundice and generalized itching.

Symptoms: yellow sclera and skin, pruritus.

Aims of care: to reduce discomfort and itching.

Possible interventions

- Administer antipruritics as prescribed (often not very effective).
- Provide and/or assist the patient in frequent tepid water sponging.
- Bed linen should be changed daily to keep patient comfortable.
- Low fat diet.

Possible complications due to cirrhosis**Ascities**

Damage to liver cells can cause disturbance in the body's excretory system, causing fluid to accumulate in the abdominal cavity.

Aims of care: to reduce abdominal distension.

Possible interventions

- Observe all patients with hepatitis B for possible accumulation of fluid in the abdomen.
- Medication, i.e. diuretics should be administered as prescribed.
- The patient should be weighed regularly to monitor fluid gain or loss.
- The circumference of the abdomen should be measured daily.
- Fluid input and output should be monitored to assess excretory function and fluid retention.
- Low salt diet may be helpful.

Encephalopathy

Symptoms: signs of disturbed mental functioning - lethargy or restlessness, incoherent speech, emotionally labile. This may progress in terminal illness to incontinence of urine and faeces and coma.

Aims of care: Protect the patient from injury due to altered mental state.

Possible Interventions

- Observe the patient for early signs of altered mental functioning and report any changes promptly.
- Protect the patient from self injury (i.e. closely observe the patient). This may require positioning the patient's bed in close to the nurses' station.
- A calm and quiet environment may reduce agitation.
- Depending on local hospital policy, the use of side rails may be placed on the patient's bed.
- If the patient is in an extremely restless or agitated state then he should be supervised by a special nurse at all times, using an hourly or half hourly change over.
- Monitor and record the patients vital and neurological signs every 30 minutes, reporting any deterioration promptly to the physician.
- Ensure regular bowel elimination.
- Restrict dietary protein.
- Administer drugs as prescribed.

Risk of haemorrhage

The liver may be unable to metabolise Vitamin K, in order to produce prothrombin (clotting factor), therefore the patient is potentially at risk of haemorrhage.

Aims of care: to prevent injury through bleeding.

Possible interventions

- Observe stools for frank or occult blood.
- Observe for external bleeding (nose bleeds, leaking needlestick sites, or bleeding gums).
- Administer vitamin K as prescribed.
- Monitor blood pressure and pulse 4 hourly. Alert physician to any changes.
- Stay in constant attendance during episodes of bleeding.
- Introduce measures to prevent trauma: gentle nose blowing, care when brushing teeth, no blade razors, limit invasive procedures, and maintain adequate pressure on injection sites.

Risk of haemorrhage due to oesophageal varices

Oesophageal varices are dilated, tortuous veins in the lower oesophagus, and are due to portal hypertension.

Aims of care: to minimize risk of haemorrhage

Possible interventions

- Observe for symptoms of anxiety, epigastric fullness, restlessness and weakness, which may indicate bleeding.
- Monitor vital signs regularly.
- Administer medication for bleeding as prescribed.

