

GES 107

**REPRODUCTIVE HEALTH, SEXUALLY TRANSMITTED INFECTIONS (STIs) AND
HUMAN IMMUNODEFICIENCY VIRUS (HIV)**

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OVERVIEW OF HEALTHY LIVING

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What is health?

A state of complete physical, mental and social well-being, and not merely the absence of disease (WHO)

Being healthy is more than not being ill

Several factors contribute to health; one of the most important is the behaviour of the individual

Characteristics of Health

It refers to a state of well-being that is complete, whole or full

It has several components including physical, mental and social

It is dynamic i.e. it is active and ever changing

All persons regardless of age, sex, race, have a right to it

It is more than absence of discomfort, pain, disease or infirmity

Determinants of Health

Structural factors

Environment, income, education, policies

Behaviors of individuals

-Practices, lifestyles

Definition of behaviors & lifestyle

Lifestyle or behavior simply refers to

“what people do” or

“what people fail to do” (activities of individuals)

It is also called habits of individuals

Lifestyles are important because of their contributions to between health, disease and quality of life

Lifestyle can ADD or DECREASE a person’s years of potential life (Green & Kreuter, 1991)

Importance of lifestyle

Every disease whose cause is known has a behavioral component

For example, the cause of AIDS is HIV

HIV is transmitted through four behaviors

Sexual intercourse

Breastfeeding

Sharing of skin-piercing instrument

Transfusion of infected blood

These behaviors can be MODIFIED OR CHANGED

Disease	Behavioral risk factors
Cardiovascular disease	Smoking of tobacco products, lack of exercise, use of alcohol
Cancer of the lungs	Smoking tobacco products
HIV/AIDS	Unprotected sex with an infected person
Road traffic accidents	Use of alcohol, smoking, excessive speed, non-use of seat belts
Malaria	Not sleeping under ITN, over-grown weeds
Cancer of the liver	Use of alcohol

Examples of behaviors associated diseases

Key message

If individuals avoid lifestyles associated with diseases, then they can live long healthy lives

Challenges of University life

- Stress of completing all the processes involved in registration
- Making new friends
- Loneliness, feeling homesick and missing close friends and family
- Living and adapting to life in a new environment
- Finding suitable accommodation on campus

Challenges (cont))

- Sharing a room with completely new persons
- Coping with heavy academic workload
- Pressure to become romantically involved
- Having sufficient money to meet needs
- Coping with new freedom and responsibilities (joining clubs on campus)

Three major lifestyle (behaviors) to stay healthy

Three major things we need to do well to stay healthy

- Eat well
- Rest well
- Exercise well

Eat well

- YOUR BODY IS THE TEMPLE OF GOD
- NOURISH IT BY FEEDING IT WELL

“if you don’t take care of your body where will you live?” Aaron Goode, 10 years old

What food is good?

- Eat three meals daily; don’t miss meals
- Eat more foods that are baked, steamed, or grilled, and less of those fried
- Eat a lot more fruits (banana, oranges, pineapple, apple) and vegetables.

- Drink plenty of water; drink a glass of water in the morning after getting up and right before bed.
- Water ensures you have sufficient liquid in your body

Good food

- Limit sugary and caffeinated beverages
- Limit junk food

Eat food low in fat

- Fish
- Chicken without skin
- Lean meat
- Low-fat dairy products

Don't ...

- Don't start to smoke, chew, or inhale any tobacco product (tobacco leaf, cigarette, snuff) at all
- If you are currently using any tobacco product, reduce or quit completely
- Don't start at all or stop heavy drinking of alcohol

Don't start to take psychoactive drugs (cannabis, cocaine, heroine)

- If you are already taking any of these seek help in order to quit

Rest well...

- God (Genesis 2; 2) and Jesus (Luke 8: 23) set good examples for us to rest
- Adults need an average of 8 hours of sleep everyday; children need more
- It is okay to take a nap whenever there is opportunity
- Take some time off from routine; visit friends, travel, go on vacation
- Adequate rest rejuvenate the body so do not miss it

Consequences of not resting well

- Stress_ One is said to be stressed when he/she is tense, anxious, worried and nervous
- Sickness

Are you experiencing stress?

- Not having sufficient rest increase risk of stress
- (always tired even after sleep, being easily angered, having difficulty concentrating?)

- Stress limits our body's ability to prevent diseases

Exercise well

- We need at least 30 minutes of physical activities every day to reap the full benefit of exercise
- Physical activity makes us
 - 1) Feel better
 - 2) Stay at a healthy weight
 - 3) Prevent different diseases including heart disease, high blood pressure, obesity (excess weight), and diabetes

Examples of physical activities are walking, jogging, climbing the stairs

Examples of physical activities

- Walk round the campus frequently
- Park your car a bit far away from the store to enable you walk more distance
- Walk to the restaurant instead of sending someone to buy food for you
- Climb the stairs instead of using the elevator (lift)
- Ride a bicycle
- Wash you car, rearrange your room, dance
- Do something that will enable you walk to and fro

9 Other extras ...

- **Love safely and careful (abstain from sex; use a condom)**
- **Take sufficient clean, fresh air everyday; don't spend all day in the hostel or classroom**
- **Wash your hands with soap after use of the toilet**
- **Wash your hands with soap when you leave a hospital or other public places as soon as you get home**
- **Brush teeth in the morning and last thing before going to bed**

Other extras

Use seat belt even if you are not the person driving

Keep scheduled appointments with health workers

Take medications as prescribed by health workers

Assert yourself: do not allow anyone to cajole or force you to do what you really do not want to do

Summary

Nourish your body by feeding it with appropriate food

Eat more fruits and vegetables to enable your body fight diseases

Drink plenty of water it helps your body

Follow God's examples by taking sufficient rest everyday

Rest also because it prevents stress which is harmful to your body

Strive to have 30 minutes of exercise everyday to maintain health weight

Is knowing sufficient to make a difference?

Knowing what to do is good; it is the starting point

Acting or putting into practice the knowledge gained is better

GES 107: NUTRITION AND HEALTH
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NUTRITION SCIENCE

Nutrition refers to the science that studies the process in which the living organisms take in and make use of food for the production of energy, the functioning of organs and tissues, maintenance of life, growth, reproduction and elimination of waste products from the body.

Nutrition is the science that studies the processes by which living organisms take in food and use the food for energy, various functions growth and maintenance of body cells and tissues, and also for maintenances of good health.

It includes eating the correct quality and quantity (adequate) of foods to satisfy the body's needs (requirements).

It also involves the knowledge of digestion of foods to release nutrients for absorption into the blood stream for cells utilization.

It involves studying the use of individual nutrients by the cells of the body.

WHAT IS FOOD?

Food is what we eat that provides the chemical components which nourish the body and keeps it healthy.

Good food is wholesome, nourishing, and free from toxic substances, parasites and bacterial contamination.

No two foods are identical in their nutrient composition and ability to nourish the body. Combination of varieties of foods is necessary to satisfy body's requirements. Hence, there is need to eat varieties of foods.

Abundance of food does not guarantee of good nutrition. For people to be well nourished, they must have access to adequate quantity and quality of foods they require.

People could have plenty food but if they are not aware of the right quantity and combinations to eat, they will still be poorly nourished, and experience poor health.

TERMS TO NOTE

Nutritional Status: the condition of health of an individual in relation to his nutritional condition.

This can be assessed through dietary, biochemical, anthropometric, and clinical methods.

Diet: is what a person habitually eats; hence everyone is always on a diet.

However, a special diet can be prescribed for an individual. For example, a diet to reduce weight (reducing diet), a diet to maintain normal weight, a diet to reduce a nutrient intake e.g. low protein, low-fat, low sodium etc diet.

Nutrient: is the chemical components of food that the body can use for production of energy, growth and maintenance of good health.

They are grouped into two: Macro and Micronutrients.

Essential Nutrient: is a nutrient which cannot be synthesized in the body but must be obtained from diets.

Food Choice

Prehistoric man had no knowledge about adequate nutrition but was only guided by instinct towards edible and safe foods.

He collected wild fruits and hunted wild animals for his foods. His choice of food was limited to what was available in his environment.

Today civilization has helped man to have unlimited varieties of foods to select.

Man is deviating from naturally available foods to more processed and imported expensive foods. Man is drifting further and further away from nature and is no longer appreciating natural food products which are readily available in his locality, cheap, nutritious and would satisfy his nutritional requirements when well combined.

The knowledge of right food selection, combination and good feeding habits will help an individual to have a measure of control over his nutritional health.

Basic Nutrition Concepts

There is a popular statement that says “Man is what he eats” “whatever a man eats turn into him” which means it is what a man eats that is digested, absorbed and utilized in his body to ensure the growth and maintenance of the body cells, and the proper functions of the organs and tissues.

Good feeding is intrinsically linked to the body components and good health. A man in good health can work more efficiently towards the achievement of his goals and also live a comfortable and happy life.

No single food item can supply all the necessary nutrients.

All the nutrients needed by the body can be obtained from combinations of adequate quantities/proportions of different food items.

Basic Nutrition Concepts

The amount of nutrients needed depends on age, sex, body size, body composition, physical activity and health condition.

Too much food is as harmful to health as too little food. To obtain maximum benefit from food, it must be wholesome, nourishing, free from toxic substances, parasites and bacterial contamination.

Effects of Good Nutrition

Good nutrition will ensure:

Normal weight for height body frame

Erect posture, firm, strong muscles and moderate padding of fat and with no overweight or obesity

Firm clear skin with good colour and healthy pink mucous membranes

Abundance of energy and endurance

Resistance to disease and maintenance of good health

Ability to concentrate with efficient productivity

Effects of Poor Nutrition

Poor nutrition will enhance:

Overweight or underweight, failure to grow (Stunting), underweight and sudden loss of weight (Wasting).

Poor posture, protruding abdomen

Thin flabby muscle, lack of padding of fat or excessive fat in the body (underweight or overweight and obesity)

Dry , scaly, pale skin, pale mucous membranes.

Poor arrangement and texture of teeth

Poor appetite, diarrhea, constipation

Fatigue, lack of endurance for work

Infections, longer convalescence from disease

Short attention span

Your Responsibilities in Nutrition

It is important to have adequate knowledge and understanding that without maintenance of adequate nutrition, health cannot be maintained.

Appreciate the fact that good nutrition has intrinsic relationship with work efficiency and achievement of one's potentials, happiness and long life.

Have the right attitude towards food and nutrition

Select and combine variety of foods to make a good diet

Maintain good feeding habits

Consult nutritionist/ dieticians for reliable sources of information on malnutrition.

NUTRIENTS AND THEIR UTILIZATION

Macro/Micronutrients

The nutrients are grouped into two: the macro and the micronutrients.

a) The macronutrients are protein, fat and carbohydrate.

They are required in larger amounts than micronutrients and are major sources of energy.

Proteins provide amino acids for body building and repair of body tissues while fat provide energy and fat soluble vitamins.

b) The micronutrients consist of vitamin and minerals.

Vitamins are chemical compounds of organic nature that occur in minute quantities in food but are necessary for life and growth.

NUTRIENTS AND THEIR UTILIZATION

Many are components of enzymes and thus facilitate the use of energy giving nutrients and are important regulators of the synthesis of countless body compounds.

Minerals are inorganic substances.

They are found in all body tissues and fluids.

Unlike vitamins, they are not destroyed in food preparation but can dissolve in water and loss will occur if cooking liquids are discarded.

Minerals are important in building body tissues and in the regulation of body metabolism.

CARBOHYDRATES - 1

People depend on carbohydrate- rich food as the principal source of energy. Plants are the main source of all carbohydrates which they manufacture through a process known as photosynthesis.

All carbohydrates contain carbon, hydrogen and oxygen, and the hydrogen and the oxygen are present in the same proportion as found in water (ratio 2:1)

Carbohydrate foods are less expensive than food of animal origin.

There are two types of carbohydrates which can be used in the body as food: starches and sugars.

Starches are complex group of carbohydrates called polysaccharides. The other group of polysaccharides is cellulose and hemicelluloses (they are referred to as fiber)

Starches can be broken down to their simpler form called simple sugars.

CARBOHYDRATES - 2

Sugars may be grouped into simple or complex sugars.

1. The simple sugar consists of one unit sugar called the monosaccharide. These include glucose, fructose and galactose.

Glucose: it is the form in which carbohydrates exist in the blood.

Sources: Fruits, vegetables, corn syrup and hydrolysis of maltose, dextrose and lactose

Fructose: is also called Levulose or fruit sugar

Sources: Honey, fruit and vegetables, corn syrup and also from hydrolysis of sucrose.

Galactose: Milk sugar

Source: obtained only from hydrolysis of lactose (consisting of glucose and galactose).

CARBOHYDRATES - 3

Disaccharides.

They include:

Sucrose: consisting of one molecule of glucose and one molecule of fructose. It is obtained from cane, beet or maple sugar. It is known as table sugar and is mostly used for sweetening foods. Sources include Sugar cane, beet root, maple and small amount from fruits and vegetables.

Maltose: consists of two molecules of glucose. Its sources include fermentation (malting) of cereals and grains, and also from hydrolysis of starch.

Lactose: consists of one molecule of glucose and one molecule of galactose. Its source is milk only – milk is the chief animal source of carbohydrate.

Carbohydrate and sugars vary in their solubility and sweetness.

CARBOHYDRATES - 4

They may be ranked in decreasing order of sweetness as fructose, sucrose, glucose, lactose, dextrin and starch.

Starches are bland in flavor. Ripening changes starch to glucose and thus increase the sweetness. When starch is cooked the granules burst, absorb water and the mixture thickens.

Functions

Carbohydrate-rich food forms the bulk of our diet and also performs the following functions:

The chief function is to provide energy to carry on the voluntary and involuntary work of the body and heat to maintain the body temperature. When carbohydrate is adequate, it spares proteins from being used for energy.

Carbohydrate also furnishes elements that can combine with nitrogen to manufacture non essential amino acids.

FUNCTIONS OF CARBOHYDRATES

Carbohydrates are required for complete oxidation of fats. When too little carbohydrate is available in the cells, intermediate fatty acid metabolism “ketones” accumulate. This condition is common in diabetic patients and is known as diabetic acidosis.

Nervous tissues, cartilage and other number of body compounds (such as heparin, DNA, RNA, genetic materials contain carbohydrates.

Lactose favours the growth of certain intestinal bacteria that synthesizes some of the B-complex vitamins. Lactose increases the absorption of calcium and phosphorous.

Dietary fiber (undigested carbohydrate called cellulose and hemicelluloses) absorbs and holds water and this aids formation of softer and more bulkier stool for easier elimination from the colon.

Starches and sugars give flavours and variety to the diet.

FUNCTIONS OF CARBOHYDRATES - 2

The exact carbohydrate requirements for individual have not been established. The daily diet should contain not less than 100gm carbohydrates.

45-50% daily calorie intake of individuals should consist of carbohydrates.

Regulation of blood glucose:

The product of carbohydrate digestion is glucose, fructose and galactose. These sugars are absorbed from the intestine to the intestinal lumen where fructose and galactose are converted to glucose.

Glucose is the form of sugar in the blood. It is carried by the portal circulation to the liver and is also rapidly withdrawn by all the cells of the body tissues as a source of energy.

FUNCTIONS OF CARBOHYDRATES - 3

In normal health, glucose in excess of the body's need is converted and stored in the liver and the muscle tissues as glycogen and consequently as body fat which can be used later for energy.

The withdrawn blood glucose is constantly replaced by the liver.

The amount of glucose in the blood is primarily regulated by the hormone insulin which is produced by the pancreas. If insufficient insulin is produced, it results into excess sugar in the blood.

Insulin enhances:

The utilization of glucose for energy by the tissues

Conversion of glucose to glycogen in the liver and muscles

Conversion of glucose to fat as a reserve for energy.

DIABETES MELLITUS

Diabetes is a condition in which there is insufficient production of insulin or the insulin produced is ineffective to perform the required functions in the cells

This condition leads to elevation of glucose, weakness, could lead to coma and death. Persons suffering from diabetes are placed on diet restricted in energy giving nutrients, most especially carbohydrates.

A person with diabetes may be treated with diet, hypoglycemic drugs, or regular injections.

Dietary Sources of carbohydrates

Starchy roots, tubers and fruits such as yam, cassava, sweet potatoes, plantain and banana, oranges and also honey.

Cereals such as maize, guinea corn, rice wheat and oats

Clinical Problems Associated with excess Carbohydrate intake

High carbohydrate intake contributes to high calorie intake which could exceed the individual's calorie requirement. Thus overweight and obesity eventually results from habitual high carbohydrates/high calorie intake.

Excess intake of refined sugar may lead to diabetes mellitus.

Dietary goals suggest that processed sugar intake should be reduced to 10 percent total calorie.

Sweets contain sugars frequently snacking with sweets and foods that are high in sugars, leaving plaque acids that lead to tooth decay.

It is advisable to reduce the quantity of sweet and sugar consumed and also to brush teeth after each meal. Also rinse the mouth vigorously with water after consuming sweets or sugar.

Lipids

Fats consist of compounds that are insoluble in water but soluble in organic solvents such as alcohol, ether, chloroform or benzene.

They can be classified into three broad groups namely:

1. Simple lipids, which include triglycerides and waxes.

Triglycerides are generally referred to as neutral fats

2. Compound lipids – phospholipids (contain phosphorus), and glycolipids (contain carbohydrate and nitrogen), while lipoprotein consists fat attached to protein.

3. Derived lipids are lipids derived from hydrolysis of simple or compound lipids they include sterols (cholesterol) and bile salts.

Clinical Problem

Fat is a concentrated source of calories (9kcal/gm) and diet high in fat may rapidly lead to overweight and obesity

Diet rich in saturated fat and/or cholesterol tends to lead to an increase in serum cholesterol.

Elevation of blood lipid or cholesterol is associated with increased incidence of coronary heart and blood vessel diseases (atherosclerosis) and is also reported to be associated with the incidence of cancer in the colon and the breast.

Low cholesterol and saturated fat diet and intake of polyunsaturated fat is beneficial to health as this will reduce the blood cholesterol and other serum lipids.

PROTEIN

Nature and properties

Protein like carbohydrates and fats contain carbon hydrogen and oxygen. In addition, it contains about 16% nitrogen.

Sulfur, phosphorus, iron and sometimes iodine are found in small amounts in proteins.

They are built from 20 molecules called amino acids.

The proteins in different tissues are different from each other because they contain different types of amino acids, e.g. The proteins in the eggs are different from the protein in milk or rice and so on.

Protein Deficiency

There is a continuous loss of protein from the body and the loss must be replaced.

If an individual is deficient in protein, the individual will be in negative nitrogen balance this means that the body is not replacing the protein that is lost from the body at the same rate and the nitrogen excretion is more than it is being supplied by diet.

When negative balance of nitrogen exists, the individual is less able to build immunity to resist infections, less able to withstand the stress of injury and surgery and the general health will deteriorate.

State of growth, injury, infections and surgery increase protein need, but sometimes illness can induce poor appetite and one can go into negative nitrogen balance and protein malnutrition if the illness is prolonged.

Protein Deficiency

Protein-Energy Malnutrition (PEM)

There are 2 forms of Protein Energy Malnutrition (PEM)

(1) Kwashiorkor (2) Marasmus

They are seen in infants and young children in Africa, central and Latin America and Asia. The conditions are seen in severe poverty or as a result of parental ignorance regarding infant feeding or in child neglect.

Kwashiorkor: Usually appear after a child is being introduced to family diets. The infant is given only high carbohydrate; obtain enough calorie but inadequate supply of protein.

The child fails to grow, the appetite is poor, the color of the skin and hair changes.

Marasmus Occurs in infants who are weaned very early and are fed with diet that a low in calories as well as protein.

MINERALS

Minerals represent about 4% of body weight. They are needed by the body to build tissues, regulate body fluids, assist in various body functions, and are found in all body tissues.

They do not produce energy by themselves but they contribute to energy production within the body as body regulators.

They are found in water and in natural unprocessed foods alongside proteins, carbohydrates, fats, and vitamins.

Humans obtain minerals from the soil by eating plants grown in mineral-rich soil or by eating animals that have eaten such plants.

Most minerals in food occur as salts, which are soluble in water, and hence, are easily lost in cooking water.

They are divided into two groups namely: macro minerals and micro minerals/trace minerals. The macro minerals are required in amounts greater than 100mg/day, while micro minerals are needed in amounts smaller than 100mg/day.

MACRO MINERALS - 1

CALCIUM

Human body contains more calcium than any other minerals, and 99% of the calcium is contained in the skeleton and teeth, while the rest 1% is found in the blood.

The best sources of calcium are milk and milk products which provide large quantities of calcium in small servings. Calcium is found in some dark green leafy vegetables, but its bioavailability may be reduced due to the presence of phytic and oxalic acid which binds with it and reduce its absorption.

The absorption of calcium is enhanced by the presence of adequate active vitamin D.

Functions: Calcium, in combination with phosphorus serves as components of bones and teeth to give strength and hardness. It is needed for normal nerve and muscle action, blood clotting, heart function and cell metabolism.

MACRO MINERALS - 2

Requirements : Adequate intake level (AI) for calcium at different ages and conditions are: 9 – 18 years 1,300 mg, 19 – 50 years 1,000 mg, 51 – 70+ years 1,200 mg,

Pregnant women, (14 – 18 years) 1,300 mg, pregnant women, (19 – 50 years) 1,000 mg,

Lactating women - same as for non-lactating women of same age.

Deficiency of calcium: can result in rickets (poorly formed bone structure in early childhood), causes bowed legs, enlarged wrists or ankles, stunted growth, adult rickets (osteomalacia), and weak, fragile bones (osteoporosis).

POTASSIUM

Potassium is an electrolyte found in the intracellular fluid. It is essential for fluid balance and osmosis. It is also necessary for transmitting nerve impulses and muscle contractions.

It is found in many foods, especially fruits like water bananas, melons, oranges, bananas, etc, and vegetables such as mushrooms, tomatoes, lima beans, carrots, potatoes, Brussels sprouts.

The estimated minimum potassium requirements are: 0 – 5 months 500 mg, 6 – 11 months 700 mg, 1 year 1,000 mg, 2 – 5 years 1,400 mg, 6 – 9 years 1,600 mg, 10 – 18 years 2,000 mg, > 18 years 2,000 mg.

Its deficiency can be caused by diarrhea, vomiting, diabetic acidosis, severe malnutrition, or excessive use of laxatives or diuretics.

Symptoms of its deficiency include nausea, anorexia, fatigue, muscle weakness, and heart abnormalities.

SODIUM

Sodium is an electrolyte which functions in the control of fluid balance and the extracellular fluid of the body, and is essential for osmosis, and participates in the transmission of nerve impulses essential for normal muscle function.

Source: Table salt (sodium chloride), animal foods, fruits and vegetables. Drinking water contains sodium but in varying amounts.

Requirements: vary with age: 1 year 225 mg, 2 – 5 years 300 mg, 6 – 9 years 400 mg, 10–18 years 500 mg, > 18 years 500 mg

Sodium deficiency can occur after severe vomiting, diarrhea, or heavy perspiration which can result in dehydration.

Deficiency of sodium can cause upset in the body fluid balance, upset in the acid-base balance in the body.

Excess of sodium is more common problem, and may add pressure to artery walls, thereby causing hypertension and oedema.

MAGNESIUM

Magnesium is vital to both hard and soft body tissues. It is essential for metabolism and regulation of nerve and muscle function, including the heart, and plays a role in the blood-clotting process.

It is primarily found in plant foods such as green leafy vegetables, legumes, nuts, whole grains, and fruits.

Milk is also a good source if taken in sufficient amount.

It is lost during commercial food processing and in cooking water, hence using vegetables and fruits raw than cooking is preferable to retain the mineral.

Its requirement is based on age, gender and physiological state: Boys and girls: 1 – 3 years, 80 mg, 4 – 8 years, 130 mg, 9 – 13 years, 240 mg, Boys (14 – 18 years) 410 mg, Girls (14 – 18 years) 360 mg, Men (19 – 30 years) 400 mg,

MAGNESIUM

Women (19–30 years) 310 mg, Men (31 – 70+ years) 420 mg, Women (31 – 70+ years) 320 mg, Pregnant women (14 – 18) years 400 mg, (19 – 30 years) 350 mg, (31 – 50 years) 360 mg, Lactating women (14 – 18 years), 360 mg, (19 – 30 years) 310 mg, 31 – 50 years 320 mg.

Its deficiency is not so common among people with normal diets. Experimentally induced deficiency symptoms included nausea, mental, emotional, and muscular disorders.

PHOSPHORUS

Phosphorus, together with calcium, is necessary for formation of strong bones and teeth. It is a constituent of all body cells which is important in the metabolism of carbohydrates, fats, and proteins. It is necessary for proper acid-base balance of the blood, and is essential for effective action of several B-vitamins.

PHOSPHORUS

its absorption is enhanced by the presence of vitamin D.

Its best sources are protein-rich foods such as milk, cheese, meats, poultry, and fish. Cereals, legumes, nuts, vegetables, fruits and soft drinks also contain substantial amount of phosphorus.

Estimated average requirements of phosphorus are: 1-3 years 380 mg, 4-8 years 405mg, 9 – 18 years 1,055 mg, 19 – 70+ years 580 mg, pregnant and lactating women - same as for non pregnant and non lactating women of same age.

Its deficiency is very rare because it is found in many foods. Its deficiency can however be caused by excessive use of antacid.

Symptoms of its deficiency include bone demineralization, fatigue and anorexia.

MICRO (TRACE) MINERALS

IRON

Iron is a component of hemoglobin which allows red blood cells to combine with oxygen in the lungs and carry it to body tissues. It is also a component of myoglobin and other body compounds involved in oxygen transport.

The principal role of iron is to deliver oxygen to the body. It is utilized by enzymes that are involved in synthesis of amino acids, hormones, and neurotransmitters.

Sources: meat, poultry, and fish,(heme iron) whole grain cereals, enriched grain products, vegetables, (non heme iron).

Absorption of non haeme iron is enhanced by presence of vitamin C.

Phytic and oxalic acids reduce absorption of iron in the body.

Requirement is: 10mg for male and 15mg for females.

Its deficiency results in anaemia.

IODINE

Iodine is a component of thyroid hormones. It is necessary for normal functioning of the thyroid gland. Its primary sources are iodized salt, sea foods, and some plants that are grown in soil bordering the sea.

Its requirement is 150 mg/day for adults, but additional amount are needed during pregnancy and lactation. Its deficiency results in formation of goiter in adults, while cretinism (retarded physical and mental development) results in children.

ZINC

Zinc is a co-factor for enzymes, and is essential for growth (especially in children), wound healing, taste acuity, glucose tolerance, and mobilization of vitamin A in the body.

It requirement for adult male is 11 mg and for adult females 8 mg, with increased requirement during pregnancy and lactation. Its deficiency can cause decreased appetite and taste acuity, delayed growth, dwarfism, subnormal development of male sex organ (hypogonadism), poor wound healing, anaemia and impaired immune response.

COPPER

Copper is an essential component of several enzymes. It helps in the formation of haemoglobin, aids in transport of iron to the bone marrow for formation of red blood cells,

and participates in energy production. It is found in all tissues and organs such as muscles, liver, kidneys, and brain, shell fish, legumes, nuts, and whole grain cereals. Its requirement is about 9 mg /day, and its deficiency is very rare among adults.

MANGANESE

Manganese is a constituent of several enzymes involved in metabolism, and is important in bone formation. Its sources include whole grain and tea, vegetables and fruits. Adult male requires 2.3 mg while adult female requires 1.8 mg. its deficiency is not common.

VITAMINS

Vitamins are a group of chemical substances which are vital to the body. They are needed in small amounts and are essential for body processes, but the body cannot make most of them by itself, hence they must be supplied in foods.

They are required for control of metabolic reactions in the cells as well as for regulation of maintenance and growth of the body.

They do not provide energy but enable the body to use energy from fat, carbohydrates and proteins.

They are found in minute amounts in foods, and the specific amounts and types in foods vary.

Some vitamins are easily destroyed by heat, light, air, and water. Lack in one or more vitamins will result in specific deficiency diseases.

CLASSIFICATION OF VITAMINS

Vitamins are classified according to their solubility in water or fats and oils.

Fat soluble vitamins are A, D, E and K, while water soluble ones are the B-complex and vitamin C. Vitamin D is sometimes classified as an hormone, and B-complex group may be classified as catalysts or coenzymes.

Precursor or Provitamin is a substance from which the body can synthesize a specific vitamin.

VITAMIN A

Vitamin A consists of two basic dietary forms: Preformed (Retinol), which is the active form of vitamin A; and Carotenoids – the inactive form, which are found in plants.

Beta carotene gives plant their orange/yellow colour, although in green vegetables, the colour is masked by green chlorophyll. It is converted to retinol in the body, and six (6) parts of beta carotene are required to form one part of retinol.

Vitamin A functions as one of the antioxidant vitamins which prevent cells from damage through free radicals. It is essential for maintaining healthy eyes and skin, needed for normal growth and reproduction, promote healthy immune system and aids in prevention of infections by helping to maintain healthy mucous membranes.

It is stored in the liver, hence daily intake is not always necessary.

Requirements of vitamin A are age and gender dependent. The body requires very small amounts of vitamin A, hence it is measured in microgramme (μg) of Retinol Equivalent (RE).

Children 1-3 years 300 μg , 4-8yrs 400 μg . Male: 9-13 600 μg , 14-18 900 μg , 19-30 900 μg , 31-50 900 μg , 51-70 900 μg , and greater 70 years 900 μg . Female: 9-13years 600 μg , 14-18 700 μg , 19-30 700 μg , 31-50 700 μg , 51-70 700 μg , above 70 years 700 μg . pregnant women 700 μg , lactating mothers 950 μg .

Deficiency of vitamin A can result in night blindness or total blindness (if the situation persists), dry rough skin, and increased susceptibility to infections and reduced resistance to disease, retardation in growth of children.

VITAMIN D

Vitamin D, which contains large amounts of calcium and phosphorus, is required for the proper formation of bones and teeth. It Exists in two forms – D₂ (ergocalciferol) and D₃ (cholecalciferol). Both are formed from provitamin when irradiated with ultraviolet light.

Vitamin D promotes the absorption of calcium and phosphorus in the body thereby raising their concentration in the blood for normal bone and tooth mineralisation.

The best food sources are liver, fish liver oils, oily fish such as herring, pilchard, and sardine; and in small amount in egg yolk, butter, milk, fortified margarine and dairy products.

Requirements: 0 month – 51years 200 IU (5.0 μg), 51 – 70 years 400 IU (10.0 μg), greater than 70 years 600 IU (15.0 μg), Pregnant and lactating women 200 IU (5.0 μg).

VITAMIN D - 2

Deficiency of vitamin D will inhibit calcium and phosphorus absorption in the small intestine, resulting in poor bone and tooth formation..

Young children suffering from vitamin D deficiency may develop rickets (bending of the legs under weight), and their teeth may be poorly formed and late in appearing.

Adults lacking sufficient vitamin D may develop adult rickets (osteomalacia), resulting in serious fractures after a minor fall.

Growth of children is also retarded.

VITAMIN E

Vitamin E, known as Tocopherol is an antioxidant which protects polyunsaturated fatty acids (PUFA) from damage by free radicals, especially in cell membranes in the body. It consists of two groups of chemical compounds namely Tocopherols and tocotrienols. Tocopherols consist of alpha, beta, delta and gamma components, but alpha tocopherol is the most biologically active.

It is helpful in prevention of haemolytic anaemia among premature infants, and may enhance the immune system.

Its sources include vegetable oils made from corn, soybean safflower and cottonseed, margarine, wheat germ, peanuts, seeds and green leafy vegetables. It is also found in milk and milk products, and in egg yolk.

Its requirement increases if the amount of polyunsaturated fatty acids in the diet increases, and its deficiency is rare.

VITAMIN K

Vitamin K is made up of several compounds that are essential to blood clotting. It is destroyed by light and alkalis. It is important in formation of prothrombin which permits proper clotting of the blood.

The best dietary sources of vitamin K are green leafy vegetables such as cabbage, spinach and kale, dairy products, eggs, meats, fruits and cereals. Vitamin K synthesis by bacteria in the small intestine, may be insufficient, and needs to be supplemented by dietary sources.

Adequate intake of vitamin K is 120µg for men and 90µg for women. Infants up to six months should have 2.0µg per day.

Its deficiency results in pronounced loss of blood before coagulation, which is the major sign of deficiency.

Human deficiency may be caused by faulty fat metabolism, antibiotic therapy, inadequate diet, or anticoagulants.

WATER SOLUBLE VITAMINS

Water-soluble vitamins include the B-vitamins and vitamin C.

They are soluble in water and are easily destroyed by air, light and cooking.

They are not stored in appreciable amount in the body, hence they need to be taken on daily basis.

The B-vitamins are many, hence they are commonly referred to as Vitamin B Complex.

Their food sources are cereals, all meat, especially pork, ham, bacon, liver, kidney, heart, eggs, fish roe, and milk.

VITAMIN B COMPLEX

The Vitamin B complex include: Thiamine, Riboflavin, Niacin, B₆, Folate, B₁₂, Pantothenic acid, and Biotin.

THIAMINE (Vitamin B₁)

Thiamine is a co-enzyme named B₁. It is partially destroyed by heat and alkalis, and is lost in cooking water. It is essential for carbohydrates and some amino acids metabolism, as well as for nerve muscle action.

Some of the natural sources of thiamine include unrefined and enriched cereals, yeast, wheat germ, lean pork, organ meats and legumes.

The daily requirement of thiamine for average adult female is 1.1mg, while the average adult male requirement is 1.2mg/day. Its requirements increase during pregnancy and lactation, and during periods of increased metabolism.

Thiamine deficiency may occur through alcoholism, some digestive disorders, pregnancy due to loss of appetite and vomiting. Symptoms of thiamine deficiency include loss of appetite,

fatigue, nervous irritability and constipation. Extreme deficiency results in beriberi, and can occur among alcoholics whose diets include reduced amount of thiamine.

RIBOFLAVIN (Vitamin B₂)

Riboflavin is essential for normal growth and is needed for the release of energy from carbohydrate, fat and protein. It can be stored in small amount in the liver, spleen, and kidneys, but a daily supply is required by all age groups.

It is necessary for tissue maintenance, especially the skin around the mouth, and for healthy eyes. It is destroyed by light and irradiation, and is unstable in alkalis.

It is widely distributed in animal and plant foods in small amount. Some of its rich sources are milk, meat, poultry, fish and enriched bread and cereals.

Average adult female require 1.1mg, while average adult male requires 1.3mg/day. However, requirement increases with increased energy expenditure.

A deficiency of riboflavin can result in failure to grow, sores on the lips and crack at the corner of the mouth, inflammation of the tongue, dermatitis, eye strain in form of itching, burning, and eye fatigue.

NIACIN (Nicotinic acid or Vitamin B₃)

Niacin is the generic name for nicotinic acid and nicotinamide. It is an important factor in the release of energy from food, especially carbohydrates.

It is fairly stable in foods, and can withstand reasonable amount of heat. It serves as coenzyme in energy metabolism and is essential to every cell of the body. It is essential for prevention of pellagra – a disease characterized by sores in the skin, and by diarrhoea, anxiety, confusion, irritability, poor memory, dizziness and death if untreated.

Sources of niacin are meat, poultry, and fish. Peanuts and other legumes, enriched breads and cereals are good sources while vegetables and fruits contain little niacin.

Daily requirement of niacin is 14mg and 16mg/day for adult women and adult men respectively.

Deficiency symptoms include weakness, anorexia, indigestion, anxiety, dermatitis, dementia (loss of memory, confusion, depression), irritability and diarrhoea. In extreme cases, pellagra may occur

VITAMIN B₆

Vitamin B₆ comprises of three related forms namely: pyridoxine, pyridoxal and pyridoxamin. It is stable to heat but sensitive to light and alkalis.

It is important in protein metabolism and absorption, aids in the release of glucose from glycogen, helps in converting excess amino acid to those in which the body is temporarily deficient and serves as catalyst in the conversion of tryptophan to niacin.

Sources of vitamin B₆ include poultry, fish, liver, kidney, potatoes, bananas and spinach. Whole grain, especially oats and wheat are good sources of vitamin B₆.

The need for vitamin B₆ increases as the protein intake increases. Adult female require 1.3 – 1.5mg/day, while adult male require 1.3 – 1.7mg/day.

Vitamin B₆ deficiency can result in irritability, depression, and dermatitis.

FOLATE

Folate is essential for normal growth, formation of red blood cells, and release of energy from food, especially amino acids. It is important for the production of the nucleic acids – DNA and RNA.

A daily supply of folate is required, and its requirements increases in pregnancy.

Deficiency of folate may result in failure to grow properly, enlargement of red blood cells (Megaloblastic anaemia) which cannot give up their oxygen properly to the body cell, development of “spina bifida” in the baby, which causes permanent disability.

Folate is found in potatoes, spinach, green leafy vegetables, Brussels sprout, green beans, peas, okra, bananas, grapes, oranges, yeast extract, bread, cereals, pulses, and dairy products.

COBALAMIN (Vitamin B₁₂)

Cobalamin is produced in the intestines by bacteria, and is only found in useful amount in animal foods.

Cobalamin is required for the metabolism of amino acids as well as other enzyme system throughout the body.

Its requirements are higher during lactation. Deficiency of cobalamin results in megaloblastic anaemia. This may occur in patients with dietary disorders or in old age.

VITAMIN C (Ascorbic acid)

Vitamin C is found mainly in fresh fruits and vegetables such as citrus, strawberries, cabbage, spinach, green peppers, etc.

It is required to make connective tissue which binds the body cells together, for production of blood and the walls of blood vessels, building and maintenance of the skin and linings of the digestive system, assists the absorption of iron, assists in building strong bones and teeth, assist vitamin E in antioxidant activities in prevention of coronary heart disease.

Requirements : 1 – 10years 30mg, adolescents 11 – 14 years 35mg, 15 – 18 years 40mg, adults 19 – 75 years and above 40mg, pregnant women 50mg and lactating women 70mg per day.

Prolonged vitamin C deficiency may lead to connective tissues not made or maintained correctly, wall of blood vessels weakened and haemorrhage under the skin, general weakness, irritability, pain in muscle and joints, loss of weight and fatigue, bleeding gums and loosening of teeth, cuts and wounds fail to heal properly, scar tissue may weaken and break open, anaemia due to iron not being absorbed properly.

WATER

Water is not often considered as a nutrient, like vitamins, minerals, proteins, fats or carbohydrates, and yet, is essential for the human body.

The body cannot store water and must have fresh supplies every day to stay alive and to serve as solvent in which metabolic processes occur. The following are the functions of water in the body:

Water serves as the body's transportation system. It is the medium by which other nutrients and essential elements are distributed throughout the body. It also works as the transport for body waste removal.

Water is a lubricant. The presence of water in and around body tissues helps defend the body against shock. The brain, eyes, and spinal cord are among the sensitive structures that depend on a protective water layer .water. It lubricates and cushions joints, this aids smooth movement of bone joints.

Water is present in the mucous and salivary juices of our digestive systems. This is especially important for moving food through the digestive tract.

Water participates in the body's biochemical reactions. The digestion of protein and carbohydrates to usable and absorbable forms depends on water as part of the chemical reaction.

Water regulates body temperature. Our health and well-being are dependent on keeping body temperature within a very narrow range. The human body, which is made of 60 to 75 percent water, serves this function quite well. Water itself changes temperature slowly and helps regulate body temperature by serving as a good heat storage material.

Evaporation of water from body surfaces also helps cool the body.

Water Requirements: The requirement for water varies from individual to individual. This variability in individuals relate to the climate in which they live, physical activity, age, state of health, and body size.

In general, people who need more water in their diet include those who:

Are children

Are elderly

Have an illness that causes vomiting or diarrhoea

Are physically active

Are exposed to warm or hot conditions

Are on a high fibre diet, as fluids help prevent constipation

Are on long distance flights

MICROBES AND HUMAN HEALTH

Nature of Microorganisms

Microorganisms (microbes) are small, living organisms that are not visible to the naked eye.

Pathogens (germs) are microorganisms that cause disease.

Non-pathogens are microorganisms that do not cause disease; can be beneficial.

Nature of Microorganisms

At times, a microorganism that is beneficial in one body system can become pathogenic when it is present in another body system.

Escherichia coli (E. coli) bacteria:

Large intestine: beneficial, part of the natural flora.

Urinary system: causes an infection.

PATHOGEN PENETRATION

Once pathogens gain entry to a host, almost all of them have some means of attaching themselves to host tissue. The attachment between pathogen and host takes place by means of surface molecules on the pathogen called adhesins or ligands that bind specifically to complementary surface receptors on the cells of certain host tissues. Once attached, the pathogen is ready to invade a sterile body compartment.

Non-Pathogens

Some microorganisms can be beneficial in other kinds of environments:

Support the production of bread, cheese, yogurt, beer, and several other foods and beverages.

Contribute to the health of soil for farming.

Aid in purifying water.

Principles of Infection

Understanding the basic principles of infection is essential for any health care worker in any field of health care.

Disease transmission

Prevention of disease transmission

Causative Agents

Bacteria

Viruses

Fungi

Protozoa

Helminths

Prions

Disease producing characteristics of infectious agents

Invasiveness

Pathogenicity

Virulence

Infectious dose

Viability in the free state

Host specificity

Antigenic variation

Ability to develop resistance to antimicrobial agents

Types of Microorganisms

Bacteria

Simple, one-celled microorganisms that are classified according to their shape and arrangement.

Cause diseases such as strep throat, pneumonia, meningitis and tuberculosis.

Types of Microorganisms

Bacteria, cont. . . .

Antibiotics are used to kill bacteria – however some strains have become resistant.

Less than 1% of bacteria are harmful.

There are more bacteria in our mouths than humans living on the planet.

Streptococci (chains)

Staphylococci (clusters)

Diplococci (pairs)

Micrococci (tiny)

Flagellated forms (tails)

Bacilli (rod-shaped)

Vibrios

Spirilla (spiral)

Spirochetes (comma)

Types of Microorganisms

Fungi

A plantlike organism that lives on dead organic matter.

Yeasts and molds can be pathogenic.

Cause conditions such as ringworm, athlete's foot, yeast infections, and thrush.

Antibiotics do not kill fungi. Antifungal medications are available, but expensive and may cause liver damage.

Types of Microorganisms

Protozoa

One-celled animal like organisms often found in decayed materials and contaminated water.

Many contain flagella which allow them to move freely.

Cause diseases such as malaria, trichomonas, and amebic dysentery.

Types of Microorganisms

Rickettsiae

Parasites that live inside the cells of other living organisms.

Commonly found in fleas, lice, ticks, and mites and are transmitted to humans by the bites of these insects.

Cause diseases such as Rocky Mountain spotted fever and typhus fever.

Antibiotics are effective against many different rickettsiae.

Types of Microorganisms

Viruses

Smallest of all microorganisms – visible only using an electron microscope.

Cannot reproduce unless they are inside another living cell.

Spread by contact with blood and other body fluids.

Difficult to destroy. Not affected by antibiotics.

Associated with diseases such as the common cold, chicken pox, herpes, hepatitis B, measles, warts, polio, influenza, and AIDS.

Viruses

Three viruses are of major concern to the health care worker:

Hepatitis B – leads to destruction and scarring of liver cells. Vaccine is available.

Hepatitis C – also causes serious liver damage. No vaccine. Often misdiagnosed as the flu.

AIDS/HIV – suppresses the immune system. No cure and no vaccine.

Factors That Influence Microbial Growth

Following factors influence microbial growth:

Temperature

pH, or the values used in chemistry to express the degrees of acidity or alkalinity of a substance

Darkness

Food

Moisture

Oxygen

Factors That Influence Microbial Growth

Aerobic microbes – live only in the presence of oxygen.

Anaerobic microbes – grow best in the absence of oxygen.

Causing an Infection

Pathogenic microorganisms cause infection and disease in different ways.

Produce poisons (toxins) which harm the body. Ex: Tetanus.

Allergic reaction in the body causing runny nose, watery eyes, sneezing.

Attack and destroy the living cells they invade. Ex: Malaria (rbc's).

Causing an Infection

Endogenous – disease originates within the body. Ex: metabolic disorders, congenital abnormalities, tumors.

Exogenous – disease originates outside the body. Ex: chemical agents, electrical shock, trauma.

Nosocomial – acquired by an individual in a health care facility (workers to patient).

Many are antibiotic resistant, life-threatening.

Opportunistic – occur when the body's defenses are weak. Ex: pneumonia w/AIDs.

Causing an Infection

In order for disease to occur and spread from one individual to another, certain conditions must be met.

If any one condition is not met, the transmission of the disease will not happen.

Pathogens are everywhere and preventing their transmission is a continuous process.

The chain of infection

Chain of Infection

Chain of infection contains six elements. If broken, infection will not occur.

Chain of Infection

Infectious Agent – pathogen such as a bacteria or virus.

Reservoir – a place the pathogen can live.

Examples: human body, animals, the environment, fomites.

Fomites are objects contaminated with infectious material that contains pathogens.

Ex: doorknobs, bedpans, linens, instruments.

Chain of Infection

Portal of Exit – way to escape from the reservoir in which it has been growing.

Urine

Feces

Saliva

Respiratory tract

Skin

Blood

Gastrointestinal tract

Mucous discharge

Tears

Chain of Infection

Mode of Transmission – way in which it can be transmitted to another reservoir or host where it can live.

Can be through direct contact or airborne droplet.

Contaminated hands are one of the most common sources of direct transmissions.

Hand washing is one of the most effective means of preventing the spread of pathogens.

Chain of Infection

Portal of Entry – way to enter the new reservoir or host.

Respiratory tract, mucous membranes, and gastrointestinal tract are common.

Damaged skin.

Chain of Infection

Susceptible Host – one that is capable of being infected.

Microorganisms must be present in large enough quantity to be virulent.

The host must be susceptible.

Individuals with an immunity to certain pathogens will not be susceptible.

Examples of steps in the chain of infection...Salmonellosis (Typhoid Fever)

Portal of exit: GI tract, GU tract

Modes of transmission

Contact (contaminated hands)

Common vehicle (food, water)

Portal of entry: GI tract

Susceptible host: anyone

OVERVIEW OF DISEASE

Signs & Symptoms of Infection

Redness

Swelling

Tenderness

Warmth

Drainage

Red streaks leading away from wound

Reservoir

Definition:

place in which an infectious agent can survive but may or may not multiply

Common reservoirs

humans

animals

equipment

medication/intravenous fluid

RESERVOIRS OF INFECTION

The reservoirs of infection is important because it affects the extent and distribution of a disease.

Recognizing the reservoir can help protect a population from disease, because measures can then be instituted to prevent the people from coming into contact with the source.

Human Reservoirs

Persons with **acute** or **subclinical** illness

Carriers

during incubation

convalescent carriers

chronic carriers

intermittent carriers

HUMAN RESERVOIRS

SYMPTOMATIC—show signs and symptoms of the disease.

ASYMPTOMATIC CARRIER—do not show signs or symptoms of the disease.

ANIMAL RESERVOIRS

Both wild and domestic animals are living reservoirs of microorganisms that can cause human disease.

Diseases that occur primarily in wild and domestic animals and can be transmitted to humans are called zoonoses.

Examples include rabies, Rocky Mountain spotted fever.

ENVIRONMENTAL RESERVOIRS

The two major nonliving reservoirs of infectious disease are soil and water.

Soil harbors such pathogens as fungi, and *Clostridium botulinum*.

Water that has been contaminated by the feces of humans and other animals is a reservoir for microorganisms which are responsible for gastrointestinal diseases.

Portal of exit

The path by which an infectious agent leaves the reservoir

- respiratory tract

- GU tract

- GI tract

- skin/mucous membrane

- blood

- transplacental

PORTALS OF EXIT

Microorganism must leave one host in order to be transmitted to another.

- Respiratory, saliva

- Skin

- Fecal exit

- Urogenital tract

- Removal of blood

Movement of Pathogen Out of Host

Portal of entry

The path by which an infectious agent enters the susceptible host

respiratory tract

GU tract

GI tract

skin/mucous membrane

parenteral

transplacental

PORTALS OF ENTRY

To cause disease, not only must a pathogen be transmitted from its reservoir to a new host, it must also colonize a surface of or enter the new host.

PORTALS OF ENTRY

Mucous membranes

Skin

Gastrointestinal tract

Respiratory tract

Urogenital tract

SKIN

Some microbes gain access to the body through the openings in the skin, the hair follicles and sweat gland ducts. Examples include some fungi and hookworms.

MUCUS MEMBRANES

Mucus membranes are present in respiratory, gastrointestinal, genitourinary tracts, and the conjunctiva of the eye. The respiratory tract is the easiest and most frequently traveled portal of entry for infectious microbes. Examples include: cold, pneumonia, influenza, measles, and smallpox.

MUCUS MEMBRANES

Microorganisms can gain access to the gastrointestinal tract in food and water. Most microbes that enter the body are destroyed by HCl and enzymes. Those that survive can cause disease. Examples include: hepatitis A, poliomyelitis, typhoid fever, and cholera.

MUCUS MEMBRANES

An important pathogen capable of penetrating the mucous membranes of genitourinary tract is *Trponema pallidum*, the causative agent of syphilis.

PARENTERAL ROUTES

Parenteral routes are the result of penetration or injury to the surface epithelial tissue and connective tissue. Punctures, injections, bites, cuts, surgery call all establish parenteral routes.

Mode of transmission

The mechanism for transfer of an infectious agent **from** a reservoir **to** a susceptible host

Major modes of transmission are:

contact

droplet

airborne

common vehicle

vector-borne

TRANSMISSION

Common vehicle transmission refers to the transmission of disease agents by a common inanimate reservoir (food, drugs, blood) to an individual.

Airborne transmission refers to the spread of agents by droplet nuclei or dust at a distance of more than 1 meter from the reservoir to host.

TRANSMISSION OF DISEASE

The causative agents of disease can be transmitted from the reservoir to a susceptible host by 4 routes.

Contact—Direct

A common vehicle—Indirect

Vectors

DIRECT CONTACT—reservoir to host

Vehicle – inanimate material, food, water, biological products, fomites

Contact transmission

spread, actual physical

contaminated intermediate

most frequent mode of transmission within the healthcare environment

touching open and draining wounds

touching blood

touching rashes or vesicles

touching equipment soiled with body fluids

prevention strategies include:

hand hygiene

cleaning and disinfection of medical devices and equipment

droplets are generated by an infected or colonized person during coughing, sneezing, talking, suctioning, etc

droplets propelled a short distance
(< 1 meter) and deposited on a susceptible host's nasal mucosa or mouth

Droplet transmission

examples

meningococcus

influenza

pertussis

prevention strategy

wear a mask when close to patient (<1 meter)

hand hygiene

Airborne transmission

Droplet nuclei (tiny particles), dust particles or skin squames containing microorganisms are transmitted to a susceptible host by air currents

Airborne transmission

Examples

chickenpox

measles

tuberculosis

Prevention strategies

place patient in separate room with door closed

patient should wear mask when leaving room or facility

staff should be immune to measles and varicella

staff should wear a mask (respirator) if tuberculosis is a possibility

Vector-borne transmission

Transfer of microorganisms by insects, flies, rats, or other vermin

uncommon mode of transmission in healthcare facilities

VECTORS

A vector, animals that carry pathogens from one host to another.

Biological: Bite or feces

Mechanical: Transported on feet

NOSOCOMIAL INFECTIONS

NOSOCOMIAL INFECTIONS

Nosocomial infections are hospital acquired infections.

Not surprising because of the high density of susceptible people.

In the US about 5-6% of patients admitted to the hospital develop a nosocomial infection.

NOSOCOMIAL INFECTIONS

Nosocomial infections are defined as hospital-acquired infections

Infections may range from mild to fatal

Numerous factors determine which organisms and agents are responsible

Length of time of exposure

Manner of exposure

Virulence and number of organisms

State of host defenses

NOSOCOMIAL INFECTIONS

Reservoirs of infectious agents in hospitals

Other patients

Patients can harbor infectious agents and discharge into environment

Hospital environment

Certain bacteria do not require many nutrients and can survive long periods on surfaces

Many of these organism are antibiotic resistant

Due to continual exposure to antibiotics

NOSOCOMIAL INFECTIONS

Transmission of infectious agents in hospitals

Medical devices

Devices routinely breach first-line barriers

Catheterization, mechanical respirators, and inadequately sterilized instruments

Healthcare personnel

Handwashing between patients effective against spread of disease

Airborne

Airflow is regulated to specific parts of hospital

Keeps certain areas contained

Body Defenses

If defense mechanisms are intact and the immune system is functioning, a human can frequently fight off the causative agent and not contract the disease.

Mucous membranes (traps pathogens)

Cilia (propel pathogens out of respiratory tract)

Coughing and sneezing

Hydrochloric acid (stomach)

Tears in the eyes (contain bacteriocidal chemicals)

Fever

Inflammation (wbc's destroy pathogens)

Immune response (produce antibodies)

Susceptible Host

A person lacking effective resistance to a particular pathogenic organism

Host characteristics that influence susceptibility to and severity of disease:

Age

Socioeconomic status

Disease history

Lifestyle

Heredity

Nutritional status

Immunization status

Diagnostic/therapeutic procedures

Medications

Pregnancy

Trauma

Nonspecific Host Defense Mechanisms

Normal (endogenous) flora

Natural antibodies

Natural barriers to entry of microorganisms

- skin and mucous membranes

- respiratory tract; cilia, cough mechanism

- intestinal tract; gastric acid

- GU tract; mechanical flushing

- eye; tears

Nutritional status

Examples of steps in the chain of infection...Salmonellosis

Causative agent: a bacteria, *Salmonella*

- infective dose:** 1 million organisms if host has normal gastric acidity

- viable in free state**

Reservoirs

human > active case, carriers

animals > poultry, cattle, reptiles

environment > contaminated food products, untreated sewage, biologic waste products

HERD IMMUNITY

A phenomenon that occurs when a critical concentration of immune hosts prevent the spread of an infectious agent.

Important steps to prevent and or control spread of infectious pathoges:

1. Reduction of contact rate

- Behaviour change (host and/or source)
- Case finding for intervention (e.g., isolation)
- Contact tracing for intervention (e.g., quarantine)
- Isolation of cases
- Quarantine of exposed (individual, community, geographic boundary [sanitaire])
- “Reverse” isolation (isolation of non-exposed)
- Reduce number of infectious sources
- Social distancing (school closures, restrict mass gatherings, etc.)

2. Interruption of transmission

- Infectious control practices
- Barrier methods (e.g., masks, condoms)
- Insect repellent (e.g., reduce feeding time)

3. Reduction of infectiousness

- Treatment
- Vaccination

4. Reduction of susceptibility

- Vaccination
- Immune globulin
- Treatment (e.g., ulcerative STD)

5. Reduce proportion of infectious sources

- Case finding for intervention (e.g., isolation, treatment)
- Identify and control infectious sources
- Environmental measures

6. Increase herd immunity

Vaccination, consider the following

- Naturally acquired immunity
- Fraction vaccinated
- Vaccine efficacy

OVERVIEW OF THE REPRODUCTIVE SYSTEM AND HEALTH

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SYNOPSIS

The aim of the section is to learn about the essential physiology of the reproductive system, issues related to reproductive system and reproductive health dysfunctions associated with reproductive system considered necessary for this class will be dealt with.

LEARNING OBJECTIVES

To understand, in a simplified manner, the structure and function of the female and male reproductive systems.

To understand basic health issues related to the reproductive system

INTRODUCTION

The reproductive system is unique:

only organ system that is not vital for survival of the organism because an individual can live long, health and happy life without reproducing

major function is to ensure continuity of the species.

achieved with the contribution of other systems in the body, such as the endocrine and urinary systems.

However, if the species is to continue to exist, at least some individuals must produce offspring.

Functions of Reproductive system

Production of egg and sperm cells

Transportation and sustenance of these cells

Nurturing the developing offspring

Production of hormones

The organs of Reproduction

These can be Primary or Secondary

Primary organs are the gonads and include:

ovaries and testes for responsible for

Production of eggs and sperms

Production of hormones for the maturation of the eggs and the sperms and development of secondary sexual characteristics

Secondary organs include:

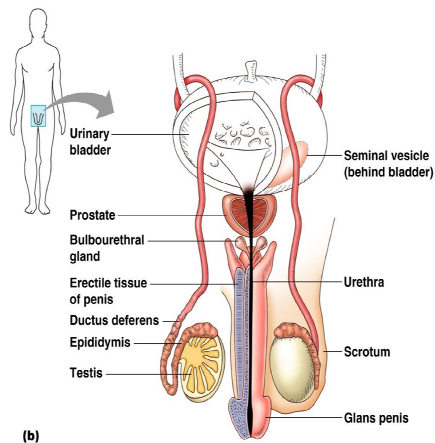
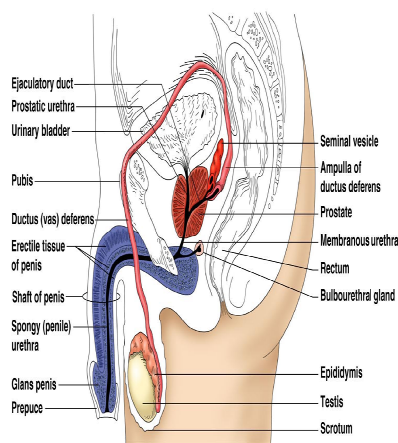
Ducts and glands

They transport and sustain the gametes

They nurture the developing offspring

The Male Reproductive Organs

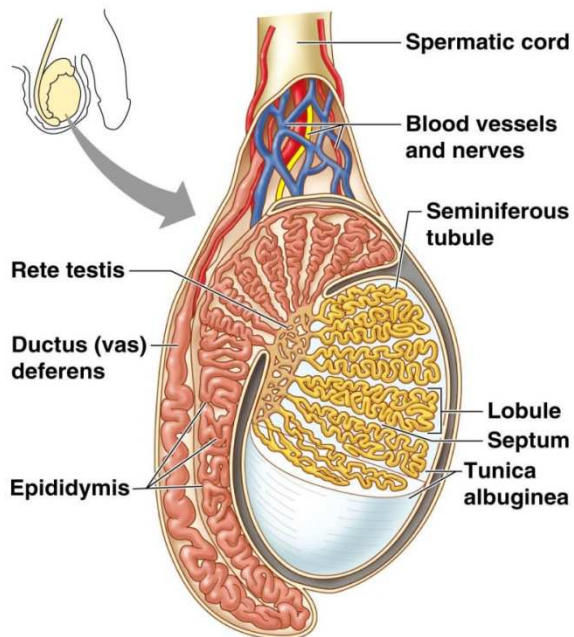
The Male Reproductive Organs



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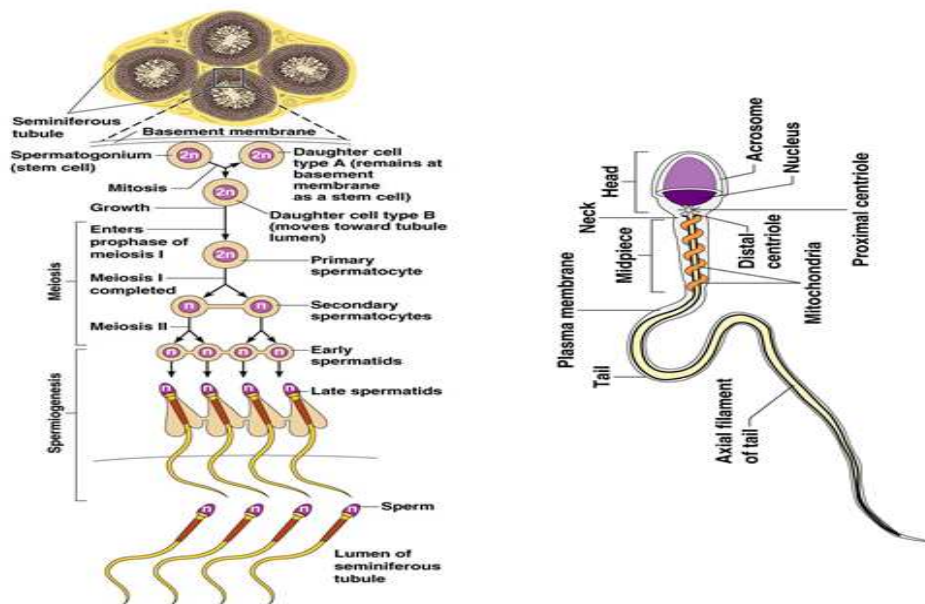
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The Testes and the duct system



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Spermatogenesis



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Associated Problems with the testes

Cryptorchidism -failure of the testes to descend

Vanishing testes syndrome (Bilateral anorchia) in which the patients will present at birth with non-palpable testes and sexual immaturity later in life

Germinal cell aplasia in which there is azoospermia in association with normal virilization, testes of normal consistency but slightly smaller in size, and no gynecomastia.

Gonadotoxins induced germinal cells damage

mumps orchitis

The External genitalia

This consists of:

scrotum sac of cutaneous membrane that hangs outside the abdomino-pelvic cavity at the root of the penis.

Penis functions to deliver spermatozoa into the female reproductive tract.

It consists of an attached root and a free shaft, which ends in an enlarged tip (glans penis).

Problems associated with scrotum and penis

scrotal varicocele which results from backflow of blood secondary to incompetent or absent valves in the spermatic veins.

Physiology of erection and ejaculation

Erection occurs when

During sexual arousal, parasympathetic nerve activity leads to dilation of penile blood vessels and subsequently allowing blood to fill the erectile bodies.

This compresses the veins draining the penis. The result is more blood into the penis and less blood out – yielding an erection.

Erection allows the penis to function as an organ for copulation

It is a spinal reflex action but can be modulated by cerebral input

Physiology of erection and ejaculation

Ejaculation occurs when:

When sexually arousing impulses reach a certain level, a massive increase of penile sympathetic nerve activity occurs

Contraction of reproductive ducts and glands and the emptying of their contents into the urethra

Closing of the internal urethral sphincter to prevent urine expulsion or semen reflux;

Expulsion of semen from the urethra.

The entire ejaculatory event is associated with generalized muscle contraction, increased heart rate, and increased blood pressure.

The semen

Semen is the liquid transport medium for sperm.

It protects, activates, and facilitates the movement of sperm.

10% of semen is sperm and testicular fluid.

60% is seminal fluid.

30% is prostatic fluid.

Semen is ejaculated within the vagina which coagulates rapidly into a gelatinous mass.

The alkaline semen neutralizes the normally acid vagina which permits survival of sperm for several hours.

Of the 20-100 million sperm per ejaculate initially present only a few 100,000 travel through the cervix.

Progress to the uterus depends on the consistency of the cervical mucus.

Erectile and ejaculatory problems

Erectile dysfunction (ED) is sexual dysfunction characterized by the inability to develop or maintain an [erection](#) of the [penis](#) during sexual performance.

It is indicated when an erection is difficult to produce.

Orgasm disorders are persistent delays or absence of orgasm following a normal sexual excitement phase.

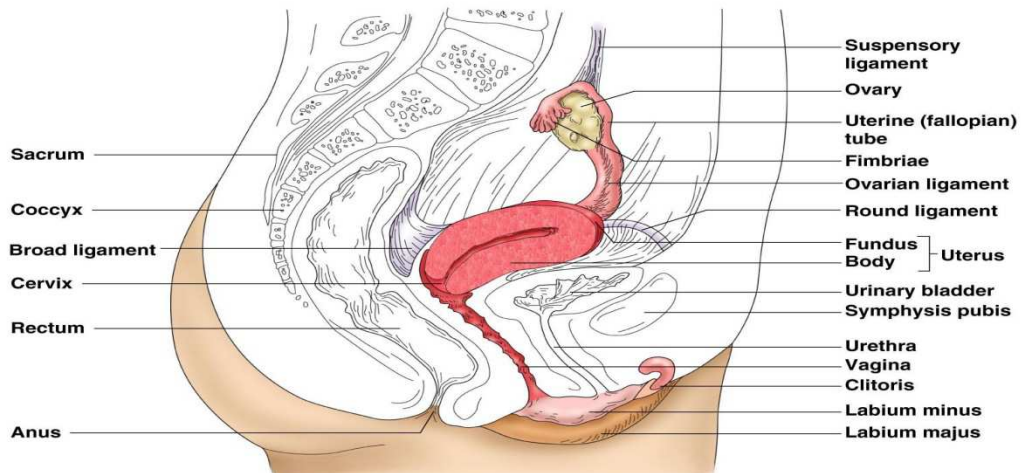
Ejaculation problems when there is problem with squirting semen during orgasm. This can be:

premature ejaculation

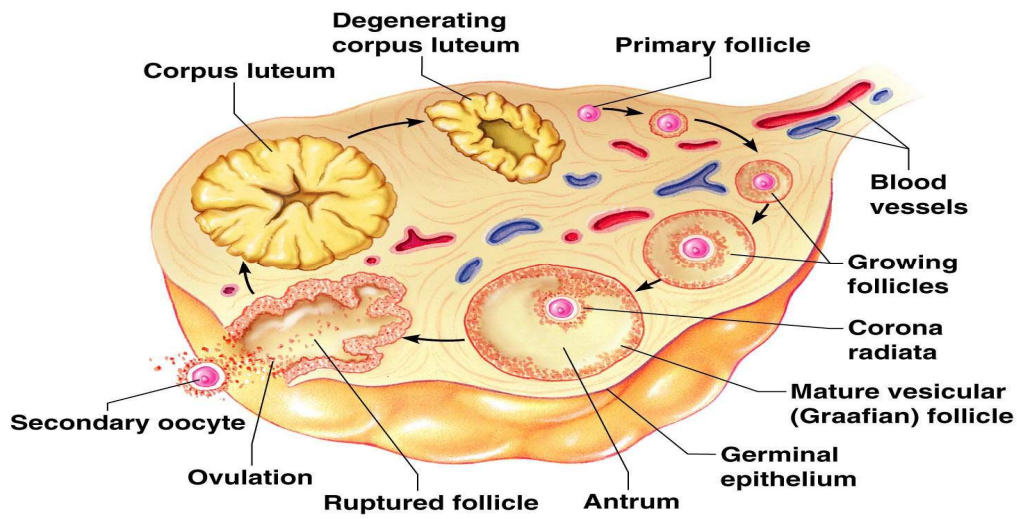
retarded ejaculation

retrograde ejaculation

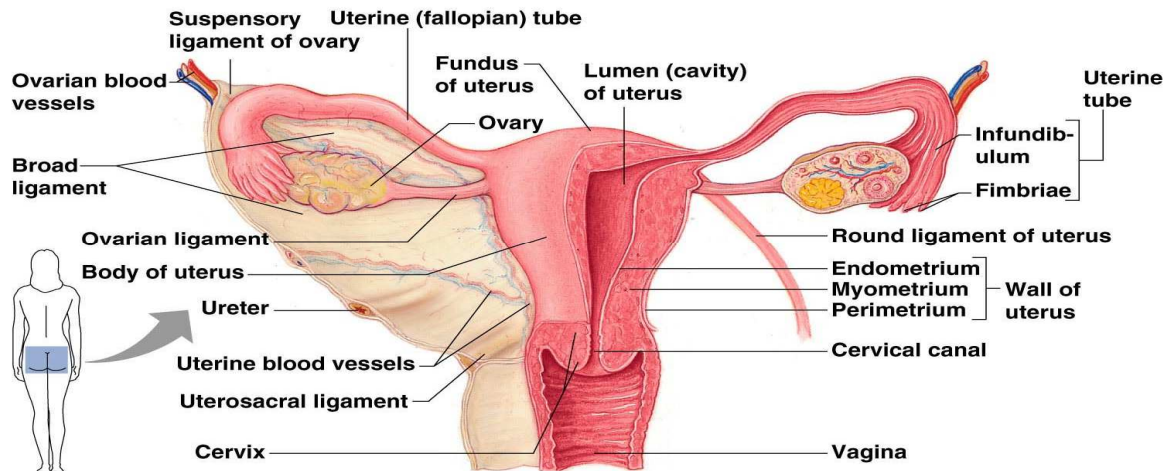
THE FEMALE REPRODUCTIVE SYSTEM



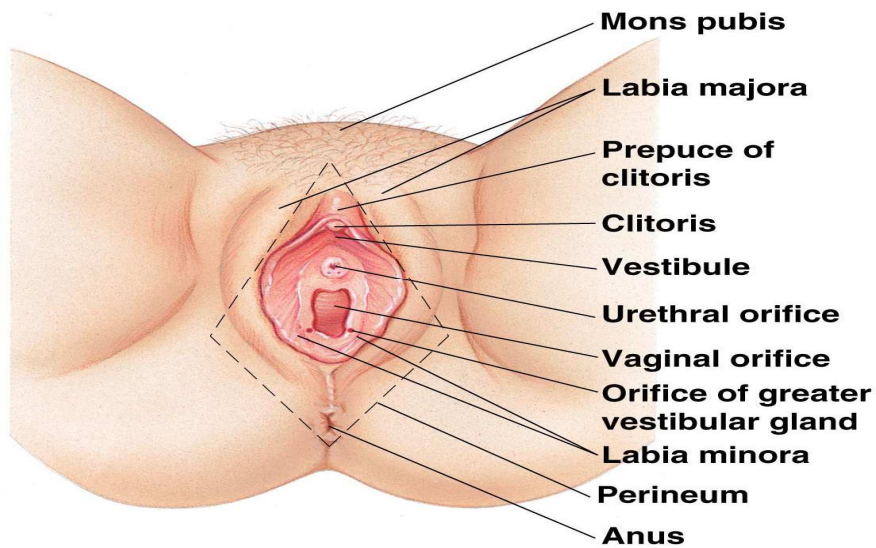
The ovary



The duct system



The external genitalia



The menstrual cycle

series of cyclic changes which take place in the female reproductive system is referred to as menstrual cycle.

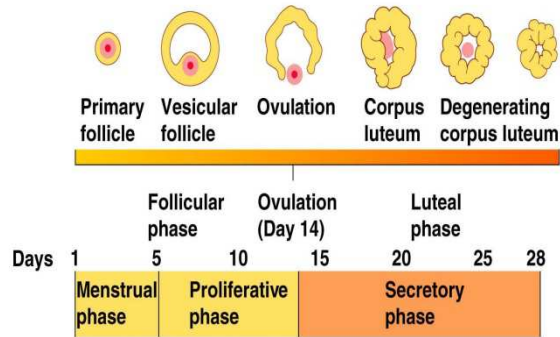
ovary (ovarian cycle),

uterus (uterine cycle),

The menstrual cycle is regulated by cyclic production of estrogens and progesterone modulated by FSH and LH

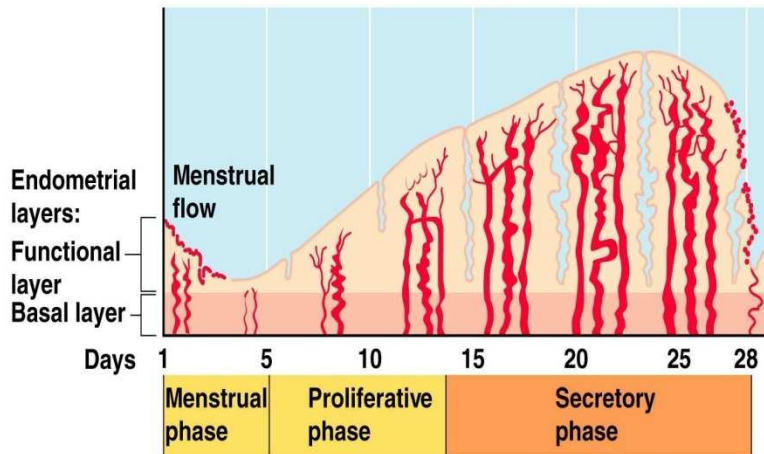
Each cycle is about 28 days in length

The ovarian cycle



the monthly series of events associated with the release of a secondary oocyte and the “just-in-case” preparation for its fertilization and implantation.

The uterine cycle



the cyclical changes that occur in the uterus in response to ovarian hormones

Ovulation problems

Ovulation problems result when one part of the system that controls reproductive function malfunctions.

hypothalamus (an area of the brain), pituitary gland, ovaries, and other glands, such as the adrenal glands and thyroid gland

Causes of ovulatory problem include:

polycystic ovary syndrome which is characterized by excess weight and excess production of male hormones by the ovaries.

Others include diabetes, obesity, excessive exercise, certain drugs (such as estrogens and progestins and antidepressants), weight loss, or psychologic stress

Abnormal menstrual cycle

These are menstrual variation and include:

Menorrhagia: _ is an excessive loss of blood with regular menstruation (menstrual flow either lasting more than 7 days or estimated menstrual loss in excess of 80mls).

Metrorrhagia: _ is regular inter menstrual bleeding.

Polymenorrhoea: _ is menses occurring at < 21 days interval.

Hypermenorrhoea: _ is excessive regular menstrual bleeding.

Menometrorrhagia : _ is prolonged menses and intermenstrual bleeding.

Amenorrhea: _ is absence of menstruation for more than 6 months

Oligomenorrhoea : _ is menses at intervals I of > 35 days.

Puberty

Puberty refers to the stage of physical maturation in which an individual becomes physiologically capable of sexual reproduction

It is characterized by genetically determined profound biological, morphological and psychological change leading to eventual fertility

The biological changes that occur during puberty include several neurosecretory factors and/or hormones, all of which modulate somatic growth, the development of the sex glands, and their endocrine as well as exocrine secretions.

The age of onset of puberty is influenced by hereditary nutritional, psychotically and environment factors.

Tanner staging

Tanner staging is a rating system of pubertal development.

The tanner rating system outline the orderly, progressive development of the breasts and pubic hair in the female genital and pubic hair in males.

These are five developments stage for girls and five for boys.

Breast development in females

Stage 1: prepubertal-no breast tissue

Stage 2: appearance of a breast bud

Stage 3: enlargement of breast and areola

Stage 4: areola and nipple form atop and breast having smooth contour.

stage 5:

development of pubic hair in female

Stage1: prepubertal-no pubic hair

Stage2: sparse downy hair at medial aspect of labia majora

Stage3: darkening, coarsening, curling of hair which extends upwards and laterally.

Stage4: Hair of adult consistency limited to the Mons;

Stage5: Hair spreads to medial aspect of the thighs.

Development of pubic hair in male

Stage1: prepubertal-no pubic hair

Stage2: sparse downy hair at base of the phallus

Stage3: Darkening coarsening, curling of hair, this extends upwards and laterally

Stage4: widening as well as further lengthening of the penis, Further enlargement of testis and shortening, and deepening pigmentation of the scrotal skin

Stage5: Adult configuration and size of genitalia

In the consideration of the tanner classification

NOTE

The first visible evidence of puberty in girl is the breast bud, while in boys it is the darkening and thinning of the scrotum.

Both occur at home the age 10-11 years.

Wide variation however does occur, pubic and auxiliary hair may precede breast budding.

Growth spurt takes place between 11-14.5 years and coincides with sexual development.

Sperm ache (presence of viable sperm in ejaculate and therefore ability to procreate) occurs in early puberty; even before the development of public hair.

In girls, menarche (onset of menstruation) occurs late in puberty.

Problems with Puberty

Any form of secondary sexual characteristic before the age of 8 years is termed **precocious puberty** while absence of sexual hair and breast tissue by the age of 15 years is considered as **delayed puberty**

Menopause

The menopause is the cessation of normal menstruation

The climacteric is a longer period during which time the reproductive organs invite

These time zones overlap each other in time just as they do in young with the two process of menarche and puberty.

The means age of menopause is 51 years with a normal range from 45 to 56 years.

Conventionally a woman has to stop menstruating for one year before she is considered to be post menopausal

Physical change occurring from the menopause

Ovaries

Cortical thinning occurs and the ovaries shrink in size (some hormone synthesis persists).

Change in the vulva and vagina are gradual over many years.

The labia shrink

The skin of the vulva and vagina become atrophic.

The vagina become smoother, narrower, less well lubricated

The pelvic floor muscle become

Human Sexuality and Adolescent Sexual Behaviour

Ademola J. Ajuwon, MPH, PhD

Definition of adolescence

An interface between childhood and adulthood.

According to the World Health Organization an adolescent is someone aged 10-19 years.

Early adolescence (between 10-14 years)

Late adolescence (between 15-19 years)

Other common terms used to describe the young population are “youth” and “young people”.

A youth is someone aged 15-24 years while a young person is an individual aged 10-24 years.

Social definition of adolescence

In some communities participation in some rites of passage confers adulthood to the individual regardless of his/her age.

Thus, among the Yoruba of South West Nigeria, for example, an individual is considered an adult once he/she marries.

Among the Zulu of South Africa, a boy is considered an adult once he becomes circumcised.

One Universally acceptable definition of an adolescent is that the individual is no longer a child but not yet an adult (McCauley and Salter, 1995).

Features of adolescence

A time of self-definition (self consciousness) which is also full of *experimentation*, *spontaneity* in especially in sexual activity and drug use (WHO, 1998).

He/she develops more intense relationship with peers and take major life decisions.

Growth spurt occurs, in which the size and shape of the body change markedly and bring out the differences between boys and girls.

Boys: Increase in the size of the genital organs, growth of hair in the genital area, and deep voice

Girls: Menstruation, growth and development of breast in girls.

Reproductive capacity is established.

Significance of adolescence

1. **Sheer large number** of the Adolescents and Young Persons (AYP) population in the country. For example, according to the 2006 national census, AYP aged 10-24 years constitute **37.1%** of the Nigerian population (UNFPA, 2010).
2. A sizable proportion of AYP engage in **risky sexual practices** including unprotected sex with multiple partners
3. AYP represents the **potential for the future of any community**; therefore necessary investments must be made in the growth and development of this segment of the population.
4. AYP have **enthusiasm, energy and optimism** (UNAIDS, 2004) which must be properly channeled for positive outcomes in Nigeria.

HIV among UI students

A study on sexual behavior conducted among male students in 2003 showed that among 609 male students who were offered opportunity for VCT 51 (8.3%) consented

Of the 51, 8 (15.7%) tested positive for HIV (Adewole and Lawoyin, 2003)

All those with positive results were sexually experienced suggesting that they became infected through sexual activities

Why is HIV hitting young persons so hard?

Multiple factors explain this phenomenon. The important ones are:

Lack of information (ambivalent attitude of parents, policy makers)

Young person's denial that AIDS exists

Perceived invulnerability to HIV (*it cannot happen to me*)

Participation in risky sexual activities (including early sexual debut and sexual networking)

Gender issues

Sexuality defined

Sexuality is a major aspect of being human throughout life (WHO, 2002).

According to the World Health Organization (WHO) sexuality encompasses sex, gender identities and roles, sexual orientation, eroticism, pleasure, intimacy and reproduction.

Sexuality education

Sexuality education is a process of learning about how an individual can be comfortable about all aspects of being human.

Sexuality education is the process of providing information, skills and services that enable persons adopt safe sexual behaviors

- abstinence

- non-penetrative sex such as hugging, and holding hands

- correct and consistent use of condoms.

Sexually healthy behaviors also include seeking care from trained health workers during incidence of any disease such as sexually transmitted infections (STI), unwanted pregnancy, and infertility.

Sexuality education for AYP

Adolescents reach sexual maturity before they develop the mental / emotional maturity and acquire the skills needed to appreciate the consequences of their sexual activity

Unmet needs of AYP in Nigeria are largely unmet

- lack knowledge about reproduction health (pregnancy cannot occur during first sexual episode)

- Sexually active, do not want to become pregnant, but not using any protection

Investment in sexuality education will pay dividend in the long run

Examples of adolescent risky behaviors

1. Early sexual debut
2. Sex with casual partners
3. Sexual intercourse with multiple partners
4. Non-use or inconsistent use of condoms
- 5 Use of psychoactive substance

Early sexual debut

Over 25% of adolescents in Nigeria have had first sexual intercourse by age 15 years.

According to the National Demographic Health Survey (NDHS) of 1999, by age 18 years, over 60% of adolescents have had sexual intercourse.

One study found that by age 13 years over a quarter of a sample of secondary school students in Jos, have had sexual intercourse (Slap et al, 2003).

Social factors

In some parts of Nigeria, girls are forced into early arranged marriages and start childbearing when their reproductive organs are not yet fully developed.

Many of the girls involved in this practice are too young for their consent to be sought or given (UNICEF, 2001).

In many cases such girls are married to men who are much older and who already have other wives, a practice that heightens their risk of infection with STI.

Consequences of early sex

Commence child-bearing too early when girl is not sufficiently emotionally stable; not well educated; creates a cycle poverty

Increase susceptible of girls to infection when they have sex with an infected person (Cates and Stone, 1992).

Female adolescents are particularly vulnerable because the organisms that cause STD can more easily penetrate their cervical mucus than that of older women.

The cervix of a young woman is more susceptible to gonorrheal and Chlamydia infections and sexually transmitted human papilloma virus which causes cervical cancer (McCauley and Salter, 1995) because they have fewer protective antibodies than do older women.

Since the reproductive organ of the adolescent girl is not fully matured, having sex can be painful, and may result in sores or scrapes in the genital area that make infection with STDs easier during sex (Arkutu, 1995).

Sex with casual partners

Sexual intercourse with a casual partner is risky because it increases the chance of encountering someone infected with STI including HIV and AIDS.

According to the 2008 NDHS, among women who had sexual intercourse in the 12 months preceding the study, the proportion who engaged in sexual intercourse with a non-marital, non-cohabiting partner was highest (33%) among those age 15-19 years (NPC, 2008).

The data also show that younger men who had sexual intercourse in the 12 months preceding the survey, the percentage of respondents who had sex with a casual partner was highest among those age 15-19 (95 percent).

Sex with many partners

Heighten risk of encountering someone who is infected with an STI.

The NDHS data shows that women age 15-24 are twice as likely as women aged 40-49 to have had sexual intercourse with two or more sexual partners in the past 12 months.

The same data show similar trend for males; among males surveyed, the highest percentages with two or more sexual partners are seen among men age 20-24 (18 percent).

A study among female UI students show that the number of lifetime sexual partners ranged from 1 to 20 with a mean of 3.4 partners (Iwuagwu et al, 2000).

Non-use of condoms

The risk of the undesirable consequences of risky sexual practices listed above can be reduced or eliminated if an individual uses a condom (male and female)

Unfortunately, not all AYP involved in early sexual debut, sex with a casual partner or sex with multiple partners use condoms consistently.

The information from the National HIV/AIDS and Reproductive Health Survey (NARHS) shows that among the sexually active 15 to 19 year olds, only 34.4% used condoms at the most recent sexual encounter (FMOH, 2003).

According to the study by Iwuagwu and colleagues (2000), only 34% of female university students used condoms consistently with their sexual partners.

Use of psychoactive substance

A psychoactive drug is any substance that affects the mind, mood and behavior.

Examples of mood altering drugs are cigarette, alcohol, cannabis (Indian hemp), heroin, and cocaine.

The abuse of habit-forming drugs can progress from the stage of experimentation through the stage of more frequent use to the stage of drug dependence/addiction.

Although drug abuse is common in all ages, AYP are the group mostly affected. Alcohol is the most widely used drug among young persons in Nigeria.

Alcohol is readily available to adolescents and its consumption has become a normative, rather than an exceptional, behaviour in this population.

The use of alcohol contributes to accidents, suicides, violence, unwanted pregnancies and STD among young persons (WHO, 1998)

Problem with alcohol

Impairs judgment and increases the chances of risky behaviours

Identify other problems

Consequences of risky sex for adolescents

Unwanted pregnancy

Infection with STI/HIV

Unsafe abortion and their sequelae

Dropping out of school

Death

Interventions

Integration of sexuality education should be included in existing curricular at the primary, secondary and tertiary levels of education in Nigeria.

The contents of such curricular should be age specific to ensure that needs of all categories of AYP are met.

Government/private partnership in creating youth-friendly to improve access that AYP to reproductive health services.

More efforts should be made by both governmental and non-governmental organizations about the importance of gender equality.

Young persons need to be fully involved in planning, implementing and evaluating all reproductive health education and service delivery programming affecting them.

SEXUALLY TRANSMITTED INFECTIONS



Introduction and Definition

Sexually Transmitted Infections (STIs) are group of contagious diseases in which the main mode of transmission is by sexual intercourse.

They are often traditionally referred to as venereal diseases.

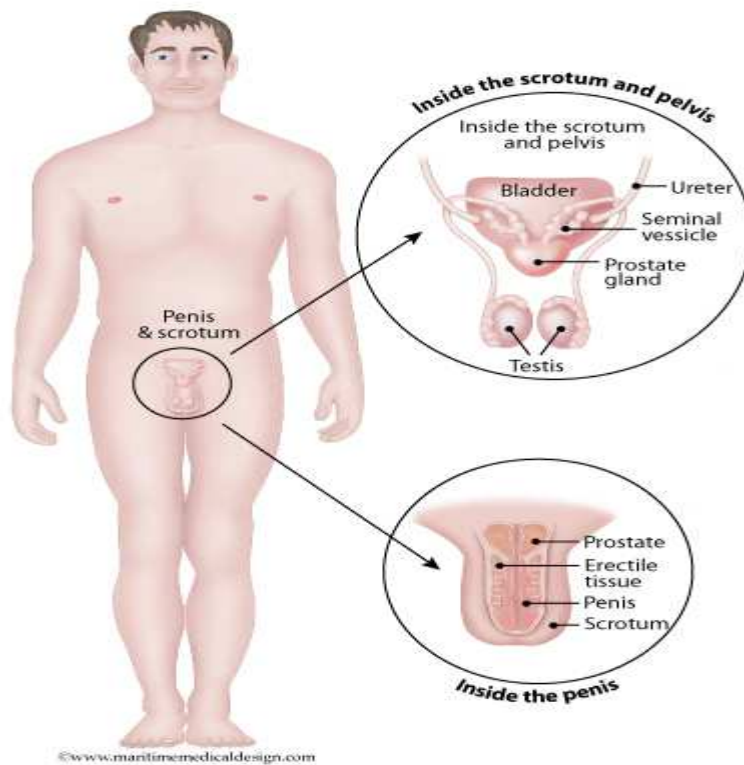
Principal sites of infection include moist mucous surfaces such as penis, vagina and cervix.

Other parts of the body like lips, oropharynx, anus and rectum are increasingly becoming important sites of infections with the advent of new ways of sexual intercourse such as oral sex and rectal sex as seen in homosexuals.

In Nigeria, and in many other countries of the world, STIs are of significant public health importance (1).

Its epidemic is driven by behaviors such as multiple sexual partners, unprotected sexual contact with high risk persons, intravenous drug use, use of contaminated instruments and unsafe blood transfusion (1).

Human genitals



Classification and types of STIs

STIs can be classified into two namely:

1. Aetiological classification
2. Clinical classification

Aetiological classification

This is based on the aetiological or causative agent of STIs such as:

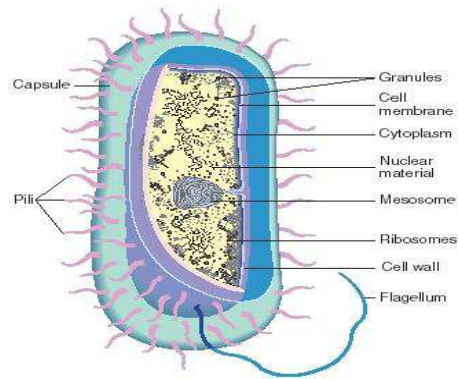
Bacterial causes,

Viral causes,

Fungi

Protozoa causes of STIs.

Characteristics of a bacterium

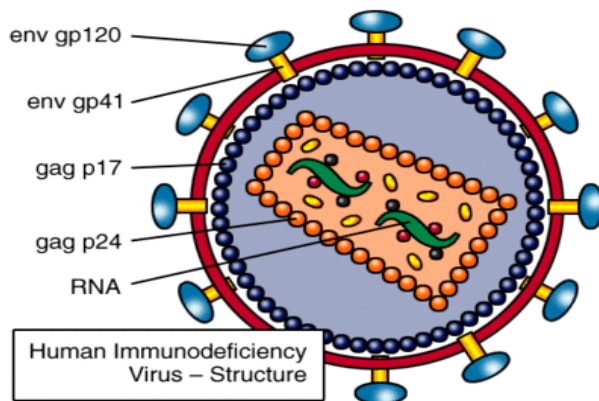


Very small organisms that can only be seen with aid of a microscope

It does not has a nucleus

All bacteria have the same basic structure as shown in this picture

Characteristic of a Virus



HIV virus

Spherical in shape with a diameter of about 1/10,000 of a millimeter

Outer coat is called viral envelop

Embedded from the viral envelopes are viral proteins and also proteins from the host cell

Characteristics of Fungus



Fungi are distinct from plants and animals

They cause mild infections in people of good immunity but severe infections in immunocompromised individuals eg AIDS patients

Bacterial causes of STIs

<i>Neisseria gonorrhoeae</i>	Gonorrhea
<i>Chlamydia trachomatis</i> cervicitis (NGU/C)	(i) Non- gonococcal urethritis or (ii) Lymphogranuloma venereum (LGV)
<i>Ureaplasma urealyticum</i> cervicitis (NGU/C)	Non-gonococcal urethritis or
<i>Haemophilus ducreyi</i>	Chancroid
<i>Treponema pallidum</i>	Syphilis
<i>Calymmatobacterium granulomatis</i>	Granuloma inguinale
<i>Gardnerella vaginalis</i>	Bacteria vaginosis

Gonorrhea

Causative organism is *Neisseria gonorrhoeae*.

It is a diplococcus (appears in twos), intracellular, Gram negative rod

It has affinity for columnar epithelia cells found in the external orifices eg male urethral, cervix in females, oropharynx, conjunctiva of the eyes.

NGU/C

Whitish urethral discharge while straining.

Mild difficulty in passing urine

Have the same complications as gonococcal urethritis

Chancroid

Multiple necrotic, dirty ulcers on the genitals

Can cause amputation of the genitals

Syphilis

Single painless ulcer called Chancre

Can heal on its own even without antibiotics to progress to latent stage

Viral causes of STIs

Human immunodeficiency virus (HIV) - Acquired Immune Deficiency Syndrome (AIDS)

Herpes simplex virus - Genital herpes

Papilloma virus - Genital warts

Hepatitis B virus - Viral hepatitis (sexual transmission among male homosexuals)

HIV/AIDS

HIV virus is a retrovirus

Has affinity for CD4 lymphocytes

Causes immunosuppression leading to AIDS

Herpes genitalis

Multiple vesicles on the genitals

May break down to form shallow ulcers

The ulcers can heal on their own even without antibiotics

It can reoccur

Genital Warts

Fleshy mass as a result of uncontrolled growth

Usually painless

It can lead to cancer especially cancer of the cervix

Clinical Classification

Based on presence or absence of Ulcers/Sores at the genital areas.

1. Genital Ulcer Diseases (GUD).

2. Non Genital Ulcer Diseases (NGUD)

Genital Ulcer Diseases (GUD)

Examples of Genital Ulcer Diseases are:

Syphilis

Chancroid

Herpes genitalis

Lymphogranuloma venereum (LGV)

Granuloma inguinale (GI)

Distinguishing clinical features of different ulcerative STIs (GUD)

	Diseases				
	Syphilis	Chancroid	Herpes	LGV	GI
Clinical Fx					
1.No of Ulcer	Single	Multiple	Multiple	Single	Variable
2.Type of Ulcer	Clean	Dirty	Clean	variable	variable
3.Induration	Firm	Soft	variable	variable	firm
4. Pain	Absent	Present	Present	variable	rare
5. Groin Enlarged nodes	Present on pain	Tender with abscess	Tender no abscess	Mild tender	Mid tender

Syphilitic ulcer (Chancre)

Chancroid ulcers

Herpes

Non Genital Ulcer Diseases

Examples of Non genital Ulcer Diseases:

Gonorrhea

Non-gonococcal urethritis or cervicitis

Genital candidiasis

Trichomoniasis

Bacterial vaginosis

Genital warts

Epidemiology of STIs

Globally, STIs are public health problem.

In Nigeria, it is one of the leading causes of outpatient visits with an average prevalence rate of 9.3% (2).

The burden of STIs is further compounded with the advent of HIV infection.

The epidemiology of STIs involves the study of sexual behavior.

STIs affect sexually active reproductive age groups in the community.

It affects all strata on the society but commoner among people of low socioeconomic class (2).

Adolescents are particularly prone to STIs because of the influence of peer pressure and the urge to experiment sexual activity.

People of poor socioeconomic class are prone to STIs because of their poverty level and the need to use sexual activity as means of their livelihood.

This is commonly the case with Commercial sex workers (CSWs) and also married women in polygamous settings who seek financial assistance outside their marriage to keep aloft (3).

People in the high socioeconomic class may also be infected with STIs through extra marital activities as ways of showing their affluence.

It affects both sexes and occur at any time of the year.

Risk factors for STIs including HIV/AIDS

Adolescent age group is at risk of contacting STIs including HIV/AIDS because of their high sexual activity resulting from peer group pressure.

Female gender is more likely to be prone to STIs than their male counterparts because of the tendency to have their first sexual experience at a younger age.

Some occupations such as members of the armed forces, long truck distant drivers and salesmen are at risk of contacting STIs because of their high mobility.

Stable marital status where both couple is staying together is a protection against acquisition of STIs. Husbands who are living away from their spouses are prone to acquire STIs.

Poverty which often co-exists with low level of occupation is associated with STIs (4, 5). Even though the disease is known to cut across all social strata (6, 7), people with lower education which translates to lower social status are prone to STIs because they are not well informed.

Having multiple sexual partners is regarded as a guarantee for acquisition of STIs and HIV/AIDS infections (1). The association is further reinforced in the presence of an ulcerative genital lesion such as syphilis, chancroid, herpes genitalis, lymphogranuloma venereum and granuloma inguinale thus increases the chances of acquiring HIV infection by 100 fold (8, 9).

Promoting safer sexual behavior has been the most important strategy of the national STIs/HIV/AIDS control program.

The primary aim of the program is to delay first sex among young people and to encourage lifelong mutually monogamous partnerships. Recognizing, however, that such partnerships are more of the exception than the norm, the program also aim to encourage people to reduce the overall number of sexual partners, and to use condoms especially with partners other than their spouses.

Attention should be focused on young people who are not yet sexually active, or who are just embarking on their sexual activity.

Untreated STIs both ulcerative and non-ulcerative lesions are of particular importance in the sexual transmission of HIV/AIDS.

Use of intravenous drugs has also been identified as a risk factor for acquisition of STIs including HIV/AIDS (9).

This reinforced the fact that transmission through intravenous drug use is increasingly becoming important in our community.

Adolescents and Truck drivers

Signs and symptoms

STIs commonly affect genital organs in both sexes.

In heterosexual male (male who practices penile to vagina intercourse): signs and symptoms include

(i) urethral discharge which may be of acute onset, profuse or frank pussy discharge. This is typically seen in gonococcal urethritis caused by *Neisseria gonorrhoeae*. In non-gonococcal urethritis, commonly caused by *Chlamydia trachomatis*, the urethral discharge is of insidious onset, with scanty milky discharge on straining.

(ii) Difficulty in passing urine (Dysuria)

(iii) Presence of genital Ulcer as seen in genital ulcer disease

(iv) Presence of inguinal lymph nodes enlargement

In homosexual male (male practices penile to anal or rectal sex)

There may be (i) rectal discharge; (ii) Rectal pain; (iii) rectal bruises

In heterosexual females

Foul smelling vaginal discharge as commonly seen in candidiasis (caused by *Candida albicans* - a fungus); Trichomoniasis (caused by a protozoa parasite- *Trichomonas vaginalis*) and bacterial vaginosis (caused by a bacterium called *Gardnerella vaginalis*)

Difficulty in passing urine (Dysuria)

Presence of genital ulcers or sores

Vaginal itching

In females who practice oral sex

Difficulty in swallowing (Dysphagia)

Hoarseness of voice

Throat pain

Patients with urethral discharges and cervical discharge

Management

Specimen collection:

For urethritis in heterosexual male, one will collect urethral swab for microscopy, culture and sensitivity and also urine specimen for microscopy. For homosexual male, one should collect rectal swab for microscopy, culture and sensitivity.

For heterosexual females: you collect both high vaginal swab and endocervical swab for microscopy, culture and sensitivity and also urine sample for microscopy.

For females who practice oral sex: you collect throat swab for microscopy, culture and sensitivity.

Pic of Lab and urethral swab

Transport of specimen to the laboratory: The specimen collected should be transported in a specially made medium to the laboratory for immediate processing.

Laboratory analysis: The specimen will be processed using standard laboratory technique (13)

Treatment

Treatment modalities include (a) Prescription of oral drugs to be taken once by the patient. This is to ensure patient compliance and prevent development of resistant organisms.

Recommended drugs for treatment of gonococcal infections include quinolones group of antibiotics such as ciprofloxacin, ofloxacin and perfloxacin.

Data from Ibadan, Nigeria showed that penicillin G was no longer useful for the treatment of gonococcal infections because about 98.6% of *Neisseria gonorrhoeae*, the bacterium causing gonorrhea were resistant to penicillin (14).

Oral doxycycline is reserved for treatment of non-gonococcal urethritis/cervicitis while vaginal candidiasis responds to topical clotrimazole or nystatin vaginal cream.

Oral metronidazole is prescribed for trichomoniasis while co-trimoxazole tablets are effective for treatment of chancroid.

It is very important to screen and treat sexual partner or partners of the patient through contact tracing.

This is to ensure eradication of the pool or reservoir of infection to prevent re-infection.

A Nurse administering drug at STC clinic

Drugs are taken by the patients in the presence of health care worker in order to ensure drug compliance

Prevention and control of STIs

Ensure proper and adequate management of STI cases in order to eliminate disease transmission in the community

Routine screening for STIs among high risks population that may serve as pockets or reservoir of infection eg Commercial sex workers.

Preaching of good sexual behavior to people: (i) Abstain from premarital sex, (ii) Encourage monogamous sexual relationship, (iii) Discourage people from risky sexual habits.

Be faithful to your partner if you are married

Use condom if you engaged in premarital or extra-marital sexual relationship.

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TRANSMISSION, PREVENTION AND CONTROL OF HIV

Introduction

The world most devastating epidemic

Physical, social, psychological and economic effects

Individuals, families and society.

No vaccines

Prevention of HIV- reliable and secure way to protect against infection

THREE MAJOR MODES OF TRANSMISSION

SEXUAL CONTACT

MOTHER TO CHILD

BLOOD and BLOOD PRODUCTS/CONTAMINATED SHARP OBJECT

Sexual Transmission

- * **Heterosexual**
- * **Homosexual**

Influenced by:

- **Host infectiousness**
Viral load, other STIs, sex during menstruation
- **Viral infectivity**
Virulence, subtype
- **Host susceptibility**

other STIs, sex during menstruation, etc

Mother to child

- **During pregnancy**
- **During delivery**
- **During breast feeding**

Contaminated blood and blood products

Blood Transfusion

Semen, vaginal fluids

Use of contaminated needle and syringes

other sharp objects/ sharing/ contaminated

HOW HIV IS NOT TRANSMITED

Casual contact e.g. social kissing, public venues (pools, theaters, bathrooms), sharing drinks or eating utensils, etc.

Hugs

Dancing

Sharing food or drinks

Using a shower, bath, or bed used by an HIV+ person

Sharing exercise equipment

HOW HIV IS NOT TRANSMITED

Insect bites.

MYTHS ABOUT TRANSMISSION OF HIV

I'm safe because I'm a virgin.

The reality: Virgin is just a label. If you have had no sexual contact at all, you're fine. If you have had oral or anal sex, but consider yourself a 'virgin' because you haven't had vaginal sex, you are still at risk.

MYTHS ABOUT TRANSMISSION OF HIV

Straight people don't get HIV.

The reality: The majority of HIV+ people worldwide are heterosexual. Men infect women, and women infect men. Risk is not about labels, it is about behavior. A 'straight' woman who has unprotected sex with men is at more risk for HIV than a 'gay' man who always practices safe sex.

MYTHS ABOUT TRANSMISSION OF HIV

I'm safe because I'm in a monogamous relationship (or married).

The reality: Were you tested for HIV before you got into the relationship? Was your partner? Were both tests negative? And do you spend 24 hours a day together? If you're faithful, but he or she is not, or he or she was already HIV+ before you met, you can still get HIV.

Prevention

Primary prevention

IEC, BCC, positive behaviour

Secondary

Early diagnosis and treatment

Tertiary

Minimize morbidity and mortality

PREVENTION

Sexual

A- abstain

B- Be mutually faithful

C- Condom use (properly and regularly) in casual sex

Blood transfusion

Screen all blood

Transfuse only when absolutely necessary

Sharp object

Don't share sharp objects

PMTCT

Test women of child bearing age

Test all pregnant women

ARV for positive pregnant women

Abstinence

Say no and keep saying no as many times as it takes

Practice what you would say if someone pressured you.

Get out of a troublesome situation by walking away and staying away

Use body language. *Stand tall, speak clearly and confidently.*

“Everybody's doing it”

PREVENTION

Post- exposure prophylaxis

Needle stick injury

Sexual exposure

Treatment of HIV/AIDS

>30 antiretrovirals

Highly active antiretroviral therapy (HAART)

PREVENTION

Who qualifies for antiretroviral therapy?

Willingness and readiness of the patient to begin therapy.

The stage of the infection

Other health problems e.g. co-infection with other pathogens like hepatitis B/ C

Treatment as a prevention measure

CONTROL

INCREASE AWARENESS

PROPER EDUCATION

TREATMENT OF POSITIVE PEOPLE

ARV reduces viral level and therefore reduce rate of transmission

The role of youths

The role of youths in HIV prevention, treatment, care and support

Be informed and act responsibly

Respect others

Show care and support

Conclusion

Comprehensive HIV prevention program

Strong political leadership

Stigma and discrimination

Gender inequality and promoting human rights

PMTCT, medications, a cure for HIV/ AIDS

KNOW YOUR HIV STATUS AND PROTECT YOURSELF FROM HIV INFECTION.

Female Condom



HIV COUNSELLING AND TESTING(HCT), TREATMENT, CARE AND SUPPORT

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Department of Obstetrics and Gynaecology, College of Medicine, UI

LESSON OBJECTIVES

Understand the integration of HIV Counselling and Testin into HIV prevention programmes

Discuss Health providers' role in maintaining confidentiality

Provide information to pregnant women about HIV testing

Explain the meaning of positive and negative HIV test results

identify needs of the newly diagnosed HIV-positive woman

Introduction

HIV/AIDS is one of the world most devastating epidemics with physical, social, psychological and economic effects on individuals, families and society.

The young people are particularly at risk for HIV infection for a number of reasons:

incorrect and incomplete knowledge about the virus, the risk associated with its transmission, its prevention/control measures and available treatment and support services in our society

Definitions

HIV counselling is an interaction between a counsellor and a counsellee on HIV and AIDS issues with the purpose of empowering the counsellee to make informed decisions and face the challenges associated with his/her HIV status.

It is a Confidential discussion(s) between an individual and the care provider to examine HIV transmission risk and explore HIV testing

Counselling can be:

Pre-HIV test Counselling

Post-HIV test Counselling

On-going HIV counselling

Guiding Principles for Counselling and Testing

Information on HIV status kept private

Information shared only with providers directly involved in care—and only on a “need to know” basis

Medical records kept in safe place

Importance of HIV Counselling and Testing (CT)

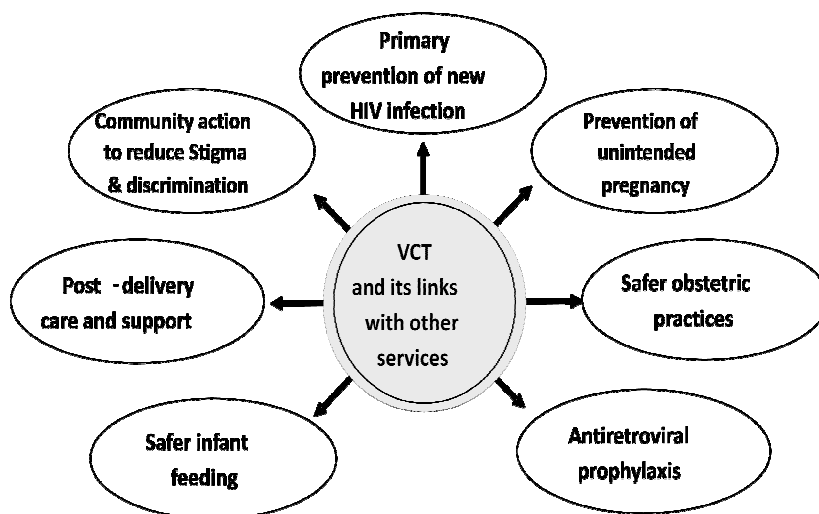
Is vital for identifying HIV-positive persons to provide services

Provides an entry point to comprehensive HIV/AIDS treatment, care and support

Helps identify and reduce behaviors that increase HIV transmission risks

Becomes available to all Young people and women of childbearing age and their male partners

Counseling and Testing as an Entry Point to MCH/HIV Prevention



Components of HIV Counseling and Testing

Informed Consent

Pre-test Counselling /HIV Education

HIV testing

Post-test counselling

Referral to HIV prevention and care services

Informed Consent

Counselling and testing must be truly voluntary and individuals should be able to opt out or refuse counselling or testing if they do not think that it is in their best interest.

Guiding Principles for Counselling and Testing

Information on HIV status kept private

Information shared only with providers directly involved in care—and only on a “need to know” basis

Medical records kept in safe place

Pre-HIV test Counselling

This is a counselling session taken before HIV test is performed

This session provides the opportunity to discuss issues related to:

- Level of counsellee’s knowledge of HIV and AIDS

- Updating the counsellee’s knowledge of HIV and AIDS

- HIV risk assessment

- HIV test results and interpretation

- Assurance of confidentiality

- Management/coping strategies

- Linkage with service points and other support systems

- Consent to undergo the test

Types of pre-HIV test counselling technique

‘Opt-in’ technique

- The counsellee requests for the service

‘opt-out’ technique

- The counsellor offer the service

Process of Counselling and Testing

Pre-test Group education

‘opt-out’ technique

Identifies:

Purpose of testing and processes involved

Benefits and risks of testing

Available treatment and support

Respects Individual’s autonomy and right to confidentiality

Post-HIV test Counselling

This session is influenced by the result of HIV test which could either be positive or negative.

Process of Counselling and Testing

Post-test support and services

Always give results in person

Provide appropriate post-test information

Offer counselling and referral

Post-Test Counselling

Provide the woman with her HIV test result

Help her understand what the result means

Provide Post-test counselling essential messages when indicated

Provide support, information, and referral when indicated

Encourage risk- reducing behavior

Encourage disclosure and partner testing

Post-Test Counselling

HIV-negative

- Review window period if indicated
- Prevent future infection
- Review risk with new infection
- Educate partner and encourage partner testing

Post-Test Counselling

HIV-positive result

- Clarify understanding
- Acknowledge feelings
- Review benefits of knowing HIV status
- Address immediate concerns
- Schedule follow-up visit
- Provide support ,name and telephone number of contact person

Post-test Counselling

For a positive HIV test result, post test counselling must dwell on the issues of:

- Disclosure of result
- Coping with emotions and challenges
- Need for confirmatory test
- Need for healthy/positive living
- Regular counselling
- Linkage with support groups
- Management of opportunistic infections
- Drug therapy

Pre-HIV test counselling-sexual assault

What constitutes sexual assault

Rape is the most common form. Rape is committed when a person's resistance is overcome by force or fear or under coercive conditions

Insertion of objects into genital openings

Oral or anal intercourse

Attempted rape²

Key differences in sexual assault client presentation to HCT services

Such client is:

Highly emotional

Anxious

Depressed

Non-communicative and in shock.

Principles of HCT for sexual assault client

Counselling should be offered to the client but they should not be pressured to undertake it

Counselling is more effective when the person is ready for it

Counselling should be carried out as soon as possible by health care professionals with appropriate training, e.g. in the field of pre- and post- test counselling, where the client has agreed to HIV testing, and crisis management

Counsellors should practise active listening, all the time respecting the survivor's wishes and choices and maintaining the survivor's confidentiality Immediate intervention can help to minimise the severity of psychological trauma in the long-term

Objectives of counselling for sexually assaulted

Help clients to develop a sense of control over their lives and to overcome their feelings of guilt

Help clients to realise they are not responsible for the attack, to stop blaming themselves and to understand that they are not alone and that many other people have overcome similar experiences and still lead normal lives

Help clients to understand feelings of anger and fear and to help them express anger towards their attacker in order to alleviate feelings of self-blame

Help to break the client's feelings of isolation by linking them to support groups and networks and helping them to integrate into community activities

Support the survivor in resolving family and community disputes (where appropriate)

Targeted HCT intervention – Youth

Why target young people?

Young people encompass a significant demographic of the population affected by HIV in any country.

Young people aged 15 to 24 years old account for more than 50% of all HIV infections worldwide (excluding perinatal cases)

More than 6,000 young people are newly infected with HIV each day throughout the world.¹

HCT services for young people

There is no one particular best practice model for delivery of HCT services to young people

Integration into existing health care services (e.g. primary health care, STI clinics and TB clinics) with designated “youth-friendly corners”

Integration into school and college health care services

Outreach/mobile with links to fixed site

Youth friendly centres

Mix of peer educator/support workers and youth-friendly adult professionals

Targeted “tribe” campaigns (soccer, disco, etc)

Elements of youth-friendly services

Offers a broad array of youth-oriented services, including counselling services and life-skills training.

This is to help with peer pressure, self-esteem, negotiation skills, risk-taking and experimentation as related to developing safer behaviours and setting limits

Provides health education which is non-judgemental and realistic. Asks few questions

Offers free testing (and condoms). For youth who generally do not have an income, cost can be an important obstacle to accessing services and products

.

Elements of youth-friendly services

Convenient hours and location (public transport)

Assures confidentiality

Does not require parental consent

Offers choice between oral/blood-drawn tests

Enables participation of young people in decision-making, planning and delivery of services

Barriers to VCT

Fear

No cure or treatment

Stigma

No need: I'm faithful

Partner with a negative HIV result

Gender inequalities

Lack of perceived benefit

Lack of access to care and support services

HIV testing

HIV testing is a procedure that determines the presence of antibodies and/or antigen to HIV in the blood with a view to ascertaining one's HIV status

The process that determines whether a person is infected with HIV or not

This can be:

Screening

Confirmatory

Selection of the HIV Test

Is site-specific based on:

National/local policies

Availability of supplies and laboratory support

Availability of trained personnel

Evaluation of specific tests in the country

Costs

The Testing Process

Test sample

Blood, saliva, urine

Process the sample, on-site or in lab

Obtain results

Keep confidential

Method determined by clinic protocols and client

Provide results to client

Provide post-test counselling, support and referral

The Testing Techniques

Antibody testing

Rapid HIV test

ELISA

Western blot

Antigen testing and viral assays

What is the “Window Period”

A period of 4-6 weeks after HIV exposure when antibodies to HIV are not detectable in the blood

	ELISA	Rapid Tests
Sample	blood from arm	blood from finger prick, saliva swabs
Lab	special equipment	limited facilities
Ease	trained technician	minimal training
Result time	up to 1 weeks	less than 30 minutes

A person at high risk who initially tests negative should be retested at 3 months to confirm diagnosis

ELISA vs Rapid Tests for HIV

HIV Antigen Tests and Viral Assays

HIV antigen tests detect the presence of HIV in blood and must be done by laboratory personnel

Types

PCR (polymerase chain reaction) tests detect DNA or measure RNA (viral load) in the blood

P24 antigen tests measure one of the proteins found in HIV

Require trained personnel and specialized laboratory

Diagnosing HIV in HIV-Exposed Infant

ARV prophylaxis reduces but does not eliminate Mother to child transmission of HIV infection

Since maternal antibodies cross the placenta, antibody testing is not recommended prior to 18 months of age

Infants who are breastfeeding require additional testing 6 weeks after complete cessation of breastfeeding

HIV PCR is used for diagnosis of HIV infection in the infant

HIV Disclosure

In the context of HIV/AIDS, UNAIDS and WHO encourage beneficial disclosure of HIV/AIDS status

The disclosure should be:

- voluntary;

- respects the autonomy and dignity of the affected individuals;

- maintains confidentiality as appropriate;

- leads to beneficial results for the individual, their sexual and drug-injecting partners, and family;

- leads to greater openness in the community about HIV/AIDS;

- meets ethical imperatives so as to maximise good for both the uninfected and the infected.

Disclosure of HIV status

Ensure confidentiality

Respect woman's choices

Encourage partner testing

Review prevention of transmission

Identify support

Treatment of HIV/AIDS

In the early years of the HIV/AIDS epidemic, people with HIV/AIDS were not likely to live longer than a few years mainly because their suppressed immune system could not fight opportunistic infection.

Although, there is currently no cure for HIV or AIDS, medications are available to effectively fight HIV and its complications.

Treatments are designed to reduce the quantity of HIV in the body, keep the immune system as healthy as possible and decrease the occurrence of opportunistic infections.

Antiretroviral drugs (ARVs)

Antiretroviral drugs are medications for the treatment of infection by [retroviruses](#), primarily [HIV](#)

As at today, there are over 30 **antiretroviral drugs** (ARVs) approved by the Food and Drug Administration of the United States of America to treat HIV infection

To treat HIV several of such drugs, typically three or four, are taken in combination

This approach is known as **Highly Active Antiretroviral Therapy**, or **HAART**.

The advantage of HAART over mono/single drug treatment is the ability to maximally suppress the virus because each of the drugs in the combination interferes with different points of the virus replication (multiplication) thereby increasing response to treatment.

Classes of ARVs and some examples

Nucleoside reverse transcriptase inhibitors (NRTIs/NtRTIs)	Nucleotide reverse transcriptase inhibitors(NtRTIs)	Non-nucleoside reverse transcriptase inhibitors (NNRTIs):	Protease inhibitors	Integrase inhibitors
3TC (lamivudine)	tenofovir	efavirenz	atazanavir	raltegravir
abacavir		Nevirapine	darunavir	

State	Location	Name of Centre	State
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AZT (zidovudine)			fosamprenavir	
ddI (didanosine,)			lopinavir/ritonavir	
emtricitabine)			ritonavir , used as a boosting agent	
Stavudine			saquinavir	

List of some HIV/AIDS treatment Centres in Nigeria.

Oyo State	Ibadan	University College Hospital	Oyo State
	Ibadan	Adeoyo Maternity	
	Ibadan	St. Mary Catholic Hospital	
	Ibadan	Oluyoro Catholic Hospital	
	Ogbomosho	Oyo State Specialist Hospital	
	Ogbomosho	Baptist Medical Centre	
	Saki	General Hospital	
	Saki	Baptist Medical centre	
	Oyo town	State Hospital	
Nation wide	State Capitals	Federal Teaching Hospitals and Medical Centres	Nation wide

Antiretroviral drugs (ARVs)

These drugs do not cure people of HIV or AIDS.

Rather, they suppress the virus, by preventing its rapid multiplication, even to undetectable levels,

By suppressing the amount of virus in the body, people infected with HIV can now lead longer and healthier lives.

However, they can still transmit the virus and must continuously take antiretroviral drugs and practice other secondary preventive measures in order to maintain their health quality.

Who qualifies for antiretroviral therapy?

It is not everyone who is HIV positive that requires anti-retroviral drugs.

There are criteria that a person with HIV must meet before initiating (starting) ARVs.

Willingness and readiness of the patient to begin therapy

The stage of the infection

Presence of other health problems

Presence or absence of co-infection with other pathogens like Hepatitis B, Hepatitis C and Tuberculosis will determine which drug regimen and when to commence

Knowledge of the state of the liver, bone marrow and kidney will contribute whether to start or not the ARVs, the type of regimen to use, when to reduce or withhold the ARVs

Treatment as a prevention measure

The principle of antiretroviral therapy is to interfere with the replication (multiplication) cycle of HIV reducing the number of new virus produced and thus reducing the quantity of virus circulating in the blood.

The drugs are capable of decreasing the virus load to an undetectable level.

Studies have shown that when the virus level is so low, the chance of transmitting the virus is also low.

Hence HIV therapy in addition to its benefit to PLWA is of great public health importance in preventing HIV transmission in the public.

However, this should not mean people should disregard the “ABC” of primary HIV prevention bearing in mind that treatment as a prevention measure is not 100% proven to be protective.

Care and Support for PLWAs

Care and support for PLWAs have broader scope and covers many elements including the following:

policy to prevent, protect, treat and care for PLWAs and their families,

medical care (treatment of and prophylaxis against opportunistic infections, and use antiretrovirals),

HIV nursing care

laboratory services,

pharmacological services

counselling, social support

self-help group activities,

home and community-based care

health promotion

The role of Youths in HIV Prevention, Treatment, Care and Support

The youths and the young ones are disproportionately affected by HIV.

They are at the disadvantage of having to cope with this epidemic in the society for a longer period.

As such they need to play important roles in preventing, control and care for the people living with HIV in the society. The following are some of the ways by which the youths can contribute to the preventive measures of HIV/AIDS:

The role of Youths in HIV Prevention, Treatment, Care and Support

The following are some of the ways by which the youths can contribute to the preventive measures of HIV/AIDS

Be informed and act responsibly

Respect others

Show care and support

Conclusion

HIV PREVENTION IS BETTER THAN CURE

PREVENTION BEGINS WITH KNOWING ONE'S STATUS

SO, KNOW YOUR HIV STATUS AND PROTECT YOURSELF FROM HIV INFECTION.

SICKLE CELL DISEASE

By Dr F.A. Fasola Haematology

Department College of medicine Ibadan.

Haemoglobin

Haemoglobin (Hb) is the red pigment in the red cell which carries oxygen around the body.

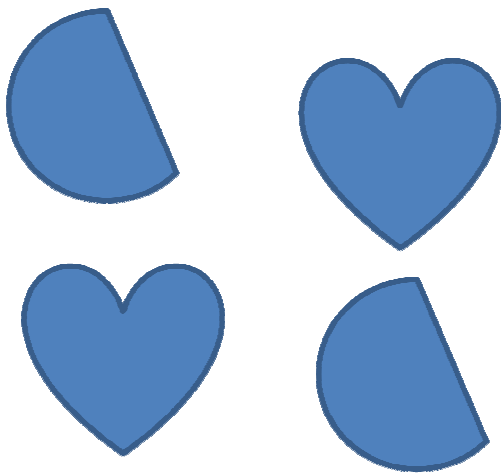
During intra-uterine life, the haemoglobin in the unborn baby is HbF.

After birth, HbF level falls rapidly so that by six months of age, HbF contributes less than 1% to the total Hb of a normal infant.

After 6 months of age, over 95% of Hb is HbA, <4% is HbA₂ and <1% is HbF.

Diagram of the haemoglobin

Haemoglobin molecule is a tetramer. It is made up of two pairs of unlike globin polypeptide chains - $2\alpha : 2\beta : 2\gamma : 2\delta$



Attached to each chain is an iron-containing haem group.

Normal haemoglobin has two α and two non- α globin chains.

The two non- α globin chains are determined by the type of Hb.

These could be β (beta), γ (gamma), δ (delta), ϵ (epsilon) or ζ (zeta).

The two non- α chains in normal adult HbA are β polypeptide globin chains.

The nomenclature for HbA is written as $\alpha^2 \beta^2$.

Globin portion of haemoglobin

The globin chains are made of amino acids.

The gene which codes for the amino acid in the β chains is not the same in every one.

Mutation of the gene will result in a variant gene (allele).

Such inherited mutation is the cause of sickle cell haemoglobin in sickle cell disease

definitions

Sickle-cell disease: the condition resulting from the inheritance of two abnormal allelemorphic genes controlling the formation of the β globin chains of haemoglobin, at least one of which is the sickle gene; e.g Hb-SS, Hb-SC, Hb-S/ β thal and other doubly heterozygous conditions

OR

Is a compound heterozygote state with one mutation that causes HbS and another abnormal Hb allele

Sickle-cell anaemia (Hb-SS): the condition resulting from the inheritance of two sickle Hb genes. OR

Homozygous state for the mutation that causes HbS

Sickle-cell trait (Hb-AS): the inheritance of one normal gene controlling the formation of the β chains of haemoglobin and one sickle gene; OR

Heterozygote state with one sickle cell gene and one normal adult Hb gene

Are asymptomatic. Hb concentration is normal, total Hb-A is greater than Hb-S, with normal proportion of Hb-F.

Introduction

Sickle Cell Disease (SCD) is a haemoglobinopathy .

Sickle cell Hb is the commonest abnormal Hb resulting from the substitution of valine for glutamic acid in the sixth position of the β -chain.

The α - chain is normal.

The single point mutation in DNA code for abnormal globin chains of the hb molecule resulting in an abnormal type of Hb

There are other abnormal haemoglobins-C,D,O Arab,

Hx

1910 – James Herrick reported the observation of peculiar elongated sickle shaped cells in the blood film of a dental student from Grenada

1922 – named SCA by Vernon Mason.

1949 – Linus Pauling linked it to abnormality of Hb molecule.

1st molecular disease identified

Distribution

Sickle cell trait is seen at an incidence of 20 – 40% in black population of Africa.

High incidence in middle East (Arabia and Iran), South East Asia (India). Mediterranean (Turkey, Greece, Italy, Sicily). Afro-caribbeans.

Incidence in Nigeria-

2% of Nigeria have SCA. Trait – 30% in northern Nigeria, 24% in Southern forest part of Nigeria.

INHERITANCE

Sickle cell disease is inherited from both parents.

Each cell in a person with sickle cell anaemia contain 2 copies of each gene, one maternal in origin (from the mother) and one paternal in origin (from the father)

It is present at birth and remains throughout life

inheritance

. An individuals with blood haemoglobin genotype AS are called carriers of the disease or said to have sickle cell trait.

The individual has inherited one gene for HbA from one of the parents and the other gene for HbS from the other parent.

Individuals with sickle cell trait do not have any health problem but can transmit the disease.

In the inheritance of sickle cell anaemia, two copies of the β polypeptide gene of the parents could be

HbSS, HbSC, HbAS, HbS β thal, or HbSD –These are referred to as the genotypye.

The observable characteristics of the individual with these genotype is called phenotype

Genotype phenotype

HbAA Normal

HbAS Normal but with sickle cell trait

HbSS sickle cell anaemia

Inheritance

The inheritance follows the simple mendelian law. The Haemoglobins are co-dominant.

Both parents AS (carriers)- have a child – 1:4 (25%)chances that the child develop disease and 1:2 chances that child is a carrier

One Parent HbSS and other trait AS- 50% chance of SS & 50% chance of having AS

SC, S β thal

A S A S Parents

AS AS AS SS Offspring

N N N A health status

S S A S Parents

AS AS SS SS Offspring

N N A A health status

HbSC disease results from a compound heterozygous inheritance of a sickle cell gene from one parent and an HbC gene from the other. The parents could be a couple with haemoglobin genotype AS and AC. Sickle cell – β -thalassemia results from the compound inheritance of a sickle gene from one parent and a β -thalassemia gene from the other.

Concept of balanced polymorphism – is the balance of deleterious and advantageous effects of a gene which allows it to remain at a relatively constant level in a population

Deleterious effect –early death of homozygote =loss of 2 genes

*Survival advantage of trait hence its prevalence rises with increase intensity of *P. falciparum* malaria transmission.

lower malaria density than in HbAA. Therefore less likely to have cerebral malaria,blackwater fever,death

RES removes the sickled parasitized red cells

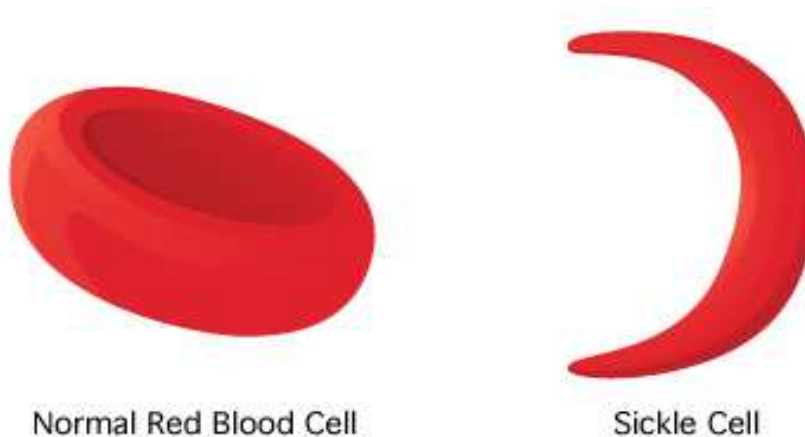
Growth of *P. falciparum* within the RBC is inhibited by sickling process

CAUSATION

This surrounds the basic molecular abnormality due to a single amino acid change in the β - globin chain at position 6 of the globin chain($\beta^{6\text{glu}\rightarrow\text{val}}$ or β^6)

HbS becomes insoluble at low O₂ tension forming polymers within the red cells

Red cells become sickle shaped,rigid with consequent membrane damage



Deoxygenation of haemoglobin takes place in tissue capillaries .

Deoxygenation of Hb leads to conformational change that exposes a hydrophobic patch on the surface of the β s globin chain on the β site of valine. It binds to a complimentary hydrophobic site on a β sub unit of another Hb tetramer. This initiates intracellular polymerisation of Hbs tetramers. Aggregates of sickle Hb mol arrange themselves in parallel, rod like fibres.

valine stabilizes the molecular stacks resulting in deformation of the red cells to the abnormal sickle shape

During their passage through the circulation, red cells containing HbS go through a series of cycle of sickling and desickling,

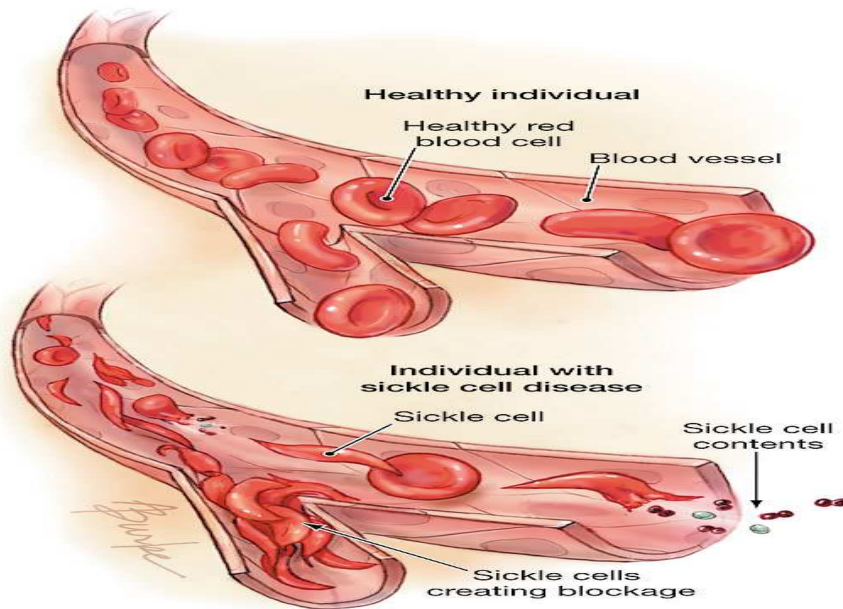
Repeated or prolonged sickling damages the red cell membrane .

Sickled red cells becomes sticky

Sludging of cells occur in the post capillary venules.

This lead to vascular stasis, blockage of small vessels and tissue ischemia.

result in vaso-occlusion and tissue infarction.



Chronic haemolysis occurs .

Red cell survival is 4-25 days

Hb F- do not interact with Hb-S in gel formation

Haplotype-Arab-India haplotype is less severe than African haplotype(Bantu&CAF)

Presence of compound heterozygote

Clinical features

Varies among patients.more severe features in homozygous SS

Modified by genetic factors ,socio-economic and environmental factors,

Present from infancy with lifelong anaemia and jaundice,

Hand –foot syndrome /dactylitis may be the first presentation in <2yrs child

Recurrent bone pains

Hepatosplenomegaly

Sickle cell trait-frontal/parietal bossing, protrusion of upper teeth overriding the lower ones (gnathopathy) MAXILLA PROMINENCE WITH RESULTANT DEPRESSION OF NOSE

Acute and long term complications of chronic haemolysis and vaso-occlusion

Sickle cell crisis

Sickle cell crisis-acute, episodic and sometimes life threatening exacerbation of the illness

Factors precipitating the attack-

Infections (malaria, bacteria, viral)

Cold and wet weather

Exertion

Conditions causing dehydration and/or acidosis

Starvation

More frequent in harmattan and rainy season

4 types

Vaso-occlusive/infarctive crisis-is often a painful crisis e.g. hand foot syndrome, lung, brain syndrome, priapism, abdominal crisis

Haemolytic crisis-more intense jaundice and severe anaemia, could result in CCF

Hypoplastic crisis-due to parvovirus infection, red cell production from BM is shut down, results in anaemia,

Sequestration crisis-severe anaemia due to trapping of rbc in liver and spleen, complications

Susceptibility to Infections- Malaria, sepsis, pneumonia

Renal disorder

Respiratory-acute chest syndrome, pulmonary hypertension

Reproductive-delayed puberty/menarche

Brain –stroke,intracranial haemorrhage

MSS-leg ulcer ,avascular necrosis of femora/humeral head, bone&joint infection

CVS-CCF,

GIT-Liver

Visual impairment

Retardation in physical and sexual growth

Impairment of resistance of infection in sickle-cell disease

. it is a common cause of death in sickle-cell anaemia

Investigation and diagnosis

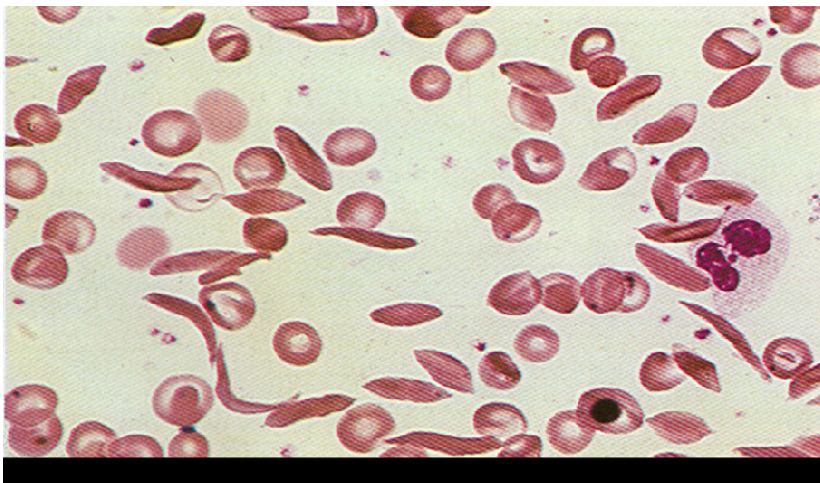
FBC-PCV-low(STEADY STATE -6-8gm/dl)

Hb electrophoresis –cellulose acetate pH 8.4 S moves with D&G ,no H b A

citrate ager electrophoresis pH6-2- to separate Hb S,D,G,

Sickling test+

Solubility test –turbid in HbS



MANAGEMENT

Advantage if parent(s)/carer is intelligent,

Parents – intelligent

- careful
- well educated
- of good economic state

Protection against or absence of malaria

Good hygiene

Good nutrition

Accessible medical care

Management ctd

Counsel / educate patient about maintenance, precipitating factors for crisis e.g To avoid infections, hypoxia, dehydration, exhaustion, psychological problems.

Oral penicillin from infancy to adolescence

Beside routine vaccine – give

Pneumococcal

Meningococcal

Haemophilus influenzae

Malaria prophylaxis

Routine daily folic acid

Early treatment of infection

management of pain – adequate analgesia hydration (IVF),

RX underlying cause

± O2 therapy

Routine Clinic Visit with PCV and retics check

Blood transfusion when required

co-manage patient with specialist in other field when necessary e.g stroke children (neurologist)

Anti-sickling agent – Hydroxyurea increases

HbF level in selected patient

Bone marrow transplantation is controversial

Psychosocial issue

Recurrent bone pain and unpredictable course of illness can be responsible for high risk of depression and poor family relationship

Dealing with pains ,loss of school time ,Job complication, setting limits on having fun ,it may also affect relationship and having children

,therefore integrated medical care and social support is important

Preventive management

Genetic counseling

Education of community

Prenatal diagnosis

Screening women at ANC

Neonatal /infant screening-PCR

DRUGS and MANKIND

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Introduction

- Modern medicines or drugs have brought significant benefits to our lives offering reduction in morbidity and mortality.
- The improving health status (including lifespan) of increasing number of the population can be attributed to drugs.
- Drugs play an important role in protecting, maintaining and restoring health since most people would have no confidence in a health care system which could not deliver medicines.

Definitions of a drug

A drug is a pharmaceutical product used in or on the human body for the prevention (prophylaxis), mitigation, diagnosis and/or treatment of diseases, or for the modification of physiological function.

WHO definitions

Any substance or product that is used or intended to be used to modify or explore physiological systems or pathological systems for the benefit of the recipient.

A drug is a single chemical substance that forms the active ingredient of a medicine (a substance or mixture of substances used in restoring or preserving health). A medicine/drug product may contain many other substances to deliver the accurate drug in a stable form, acceptable and convenient to the patient.

Principal reasons for use of drugs

to cure disease

to control or eliminate symptoms

to arrest disease progression (especially in chronic diseases such as HIV/AIDS, hypertension, diabetes mellitus, rheumatoid arthritis etc.)

to prevent diseases (prophylaxis)

Curative purposes of drugs

Primary therapy: - when the disease is eliminated and the drug is withdrawn e.g. bacterial and parasitic infections or

Auxiliary therapy: e.g. use of anaesthetics to induce unconsciousness during surgery, and use of ergometrin and oxytocin to induce labour in obstetrics.

Suppressive purpose of drugs

Suppression of diseases or symptoms is used continuously or intermittently to maintain good health without attaining cure (as in hypertension, diabetes mellitus, epilepsy, asthma) or to control symptoms (e.g. pain and cough) while awaiting recovery from the causative disease.

Preventive attribute of drug

In primary prevention, the person does not have the condition but is to be prevented from getting it e.g. in malaria, contraceptive, vaccination.

Quote of Quotes

“Poisons in little amounts are useful drugs and drugs in too large amounts are poisons”

Naming of Drugs

- **Full chemical name:** too long and complicated to use regularly e.g. 4-para amino acetamido phenol (i.e. paracetamol), acetyl salicylic acid (ie. Aspirin)
- **Generic/approved/non-proprietary name:** accepted internationally as common name. it is shorter e.g. Paracetamol, chloroquine. It is more acceptable for prescriptions.
- **Brand/Trade/Proprietary name:** Name given by the Pharmaceutical manufacturer for its own particular brand or formulation. It is followed by ®e.g. Panadol®, Septrin®, Amalar®, Fansidar®
- Amalar and Fansidar are the same drugs with the same generic name – Sulphadoxine-Pyrimethamine
- Use of generic names enables any suitable product to be dispensed thereby saving time and cost for the patient.
- Use of proprietary names applies to products supplied by the owners of the trade marks

Prescription (Rx) drugs

Prescription: is a written order signed by a physician or doctor, directing a pharmacist to prepare or dispense a remedy or drug. It contains the name of the drug, the amount or quantity, the dosage regimen (or how it is to be taken).

Prescription only Medicine (POM): Drugs that must be given to patients or taken by patients or purchased by patients only with a doctor's prescription e.g. Antibiotics such as fluconazole, augmentin, sedatives such as diazepam (Valium[®])

Non-Prescription medicine

Also known as “over the counter medicine” (OTC)

These are drugs that do not require doctor's prescription. They are safer (i.e. less side effects), easier and simpler to take than POM e.g. paracetamol, aspirin, Vitamins.

Routes of drug administration

We have two broad routes:

Systemic: The drug is taken inside the body and it is absorbed into the system e.g. Chloroquine, Fansidar[®]

Non-systemic: The drug is either taken inside or rubbed on the body (topically), but it is not absorbed into the blood (circulatory) system. The drugs act on the surface on the body. e.g. creams such as canestin[®], ointments such as sulphur, salt antacids such as milk of magnesia. They are also called localized drug.

Systemic routes - Enteral routes

The drugs enter the body through the gastro-intestinal tract (GIT) before getting into the blood. These include:

Oral - through the mouth such as tablets, capsules, (e.g. paracetamol tablets, ampiclox capsules)

Sublingual/buccal-under the cheek and tongues e.g. nitroglycerin and lozenges

Rectal- through the rectum or anus such as suppositories (e.g. Dulcolax or bisacodyl)

Systemic routes - Parenteral routes

- Drugs that enter the body outside the GIT. They are mostly injections.
- Intramuscular (i.m.) - injection through the buttocks or upper arm e.g. chloroquine injection.
- Intravenous (i.v) -through the veins and straight into the blood. This is used during severe illness such as in coma e.g. Quinine injection or infusion, i.v. fluids such as dextrose and normal saline (drip)
- Inhalation- e.g. inhalers used during asthma such as Ventolin (salbutamol)

Non-Systemic routes

Topical preparations: Rubbed on the skin e.g. sulphur ointment, Eye preparations: e.g. chloramphenicol eye drop.

Types of dosage forms or formulations

A. Solid Dosage Form

Powders e.g. Alabukun[®] Andrews Liver- salt (ALS)

Tablets e.g. Paracetamol, Aspirin[®], Septrin,

Capsules e.g. Ampiclox[®], tetracycline (yellow and red)

B. Suppositories

Dulcolax[®] or Bisacodyl used as laxatives.

Artesunate - (an anti-malaria drug), paracetamol

C. Liquid and Semi-solid dosage forms

Injectables - e.g. chloroquine injecton, Phenergan[®] (promethazine) injection

Syrups - e.g. Paracetamol syrup chloroquine syrup. These contain sugars.

Tonics - e.g. Iron tonic such as Ferbelan[®]

Solutions and suspensions - e.g. hydrogen peroxide, eye drops (chloramphenicol), and ear drops

Creams - e.g. Canaestin[®], Betnovate[®]

Ointments - e.g. terramycin, sulphur.

Sources of drugs

Natural: This comes from nature. Examples are from:

- Plants: from different parts of plants such as leaves, barks, roots and flowers. They are used to prepare herbal medicines e.g. Traditional Dogonyaro, Agbo, Energy 2000, Swedish bitters. Some have been made into tablets and capsules, e.g. digoxin, digitalis, ginger, aloe vera, garlic etc.
- Animals: honey from bees, oils of certain fish, (e.g. cod-liver oil, shark liver oil). Some controversial ones used by alternative practitioners are cow urine and human urine.
- Microorganisms: microorganisms are also natural sources of drugs called antibiotics e.g. penicillins are drugs obtained from fungi.

Many drugs originated from natural sources. If the active ingredient or compound is isolated; such can be synthesized in large quantities by the chemist in the laboratory.

- Synthetic: Various chemical reactions can be carried out in the laboratory to obtain potent or active drugs. The drugs from synthetic sources are usually, larger in quantity than those from natural sources. e.g. Paracetamol, aspirin, metronidazole (Flagyl[®]), Chloroquine.
- Semi-synthetic:- When the active compounds of some natural products are isolated, they can be used to carry out further reactions in the laboratory to produce other active compounds e.g. artesunate from artemisinin.

Classification of drugs according to diseases and symptoms

Most of the classes start with 'anti' meaning 'against' the disease mentioned.

Examples are:

Analgesics:- drugs used to relieve pain e.g. paracetamol.

Antipyretic:- lowers body temperature in fever condition.

These go together at times. They can also be called Non-opioid analgesics/antipyretic e.g. aspirin, paracetamol, Ibuprofen"

- Anti-inflammatory:- treats pain and inflammation such as in arthritis e.g. ibuprofen (mottin[®], brufen[®]), Indomethacin (Indocid[®])
- Opioid analgesic: (narcotics):- used to relieve moderate to severe pain such as in cancer patients. Repeated intake can cause drug dependence or addiction. These drugs must be taken under medical supervision. They are POM drug e.g. Morphine, codeine, cocaine.

- Anti-histamine:- blocks action of histamine such as in cold and catarrh. It is used in allergic reactions with itching e.g. promethazine (phenergan[®]), piriton[®]
- Anti-emetic:- prevents nausea and vomiting e.g. Promethazine (Phenergan, Avomine[®]), Prochlorperazine (stemetil[®])
- Antacid: Neutralises acid produced in the stomach e.g. Gelusil (Aluminum hydroxide), Gestid (Aluminium hydroxide and magnesium hydroxide), Maalox plus (Al hydroxide and Mag. Hydroxide), Polycrol (Al hydroxide/ Mag. Carbonate), Milk of Magnesia (Mag. Hydroxide), Mist Mag. (Mag. Trisilicate).
- Anti-convulsant/anti-epileptic - stops or prevents epileptic seizures e.g. Phenytoin (Epanutin[®]), carbamazepine (Tegretol[®])
- Anti-tussive: Suppresses cough e.g. Codeine (M&B cough mixture), Benylin, Coflin[®]
- Anti-hypertensive: lowers blood pressure e.g. methyl dopa (Aldomet[®], Dopamet[®]) Nifedipine, Clonidine (Catapres[®]), Captopril (Capoten[®]).
- Anti-diabetic: lowers sugar in the blood and urine e.g. Insulin injection, Chlorpropamide (Diabenese[®])
- Anxiolytic: reduces, anxiety e.g. Diazepam (valium[®]), lexotan.
- Anti-infectives: These fight infections. These include:

Antibacterials/antibiotics/antimicrobial e.g. Penicillin, tetracycline, ampicillin, ampiclox-cloxacillin (Ampiclox[®]), Septrin[®], Ciprotab[®]. Others are Amoxil[®] for typhoid, Flagyl[®] for dysentery and STIs (Sexually Transmitted Infections)

Anti-tuberculosis e.g. Isoniazid, streptomycin.

Anti-malaria: Kills malaria parasites e.g. Chloroquine, quinine, artesunate, sulphadoxine-pyrimethamine branded as Fansidar[®] Amalar[®] or maloxine[®]

Anthelmintic or anti-helmintic: expels worms e.g. Combantrin[®], Ketrax[®], Zentel[®]

Anti-fungal e.g. Griseofulvin (Fulcin[®])

Anti-cancer drugs - destroy cancer cells e.g. Tamoxifen, cytarabin (Alexan[®])

Anti-retroviral drugs (ARV):- anti-HIV/AIDS drugs e.g. stavudine, nevirapine, lamivudine. HIV/AIDS is real and still kills. These medicines when used as prescribed do not cure but help to manage or mitigate the suffering of the patients, and arrest the progression of HIV infection to AIDS. The users must be monitored for adverse drug reactions.

Adverse Drug Reactions and Pharmacovigilance

The WHO defines Adverse Drug Reactions (ADR) as a response to a medicine, which is noxious (unwanted or harmful) and unintended, and which occurs at doses normally used in human for the prophylaxis, diagnosis or therapy of disease, or for the modification of physiological function.

The important issue here is that a patient experiences unwanted or harmful or 'Bad' reaction following drug therapy.

Side effects

ADR is slightly different from side effects. A *side effect* is defined as "any unintended effect of drug product occurring at doses normally used in humans, which is related to the pharmacological properties of the drug.

Such effects may be good (beneficial) or bad (not beneficial) However, in pharmacovigilance, all drug related reactions including side effects are important and should be reported.

Other terminologies

Unexpected adverse reaction: “an adverse reaction whose nature or severity is not consistent with drug labeling or expected from characteristics of the drug”.

Adverse Event/experience –“any untoward medical occurrence that may present during treatment with a pharmaceutical product but which does not necessarily have a causal relationship with this treatment”.

Adverse event is a broad term comprising of ADR and time of occurrence which may or may not be related to the drug.

Serious Adverse Event (SAE) / experience or reaction- “any untoward medical occurrence that at any dose results in death, is life threatening, requires patient hospitalization, results in disability or incapacitation, causes birth defect, and requires an intervention to prevent permanent damage.

Contraindications stipulate conditions for which a drug should not be used e.g. Aspirin should not be used in ulcer patients.

Pharmacovigilance This is the science and activities relating to the knowledge, detection, assessment and prevention of adverse effects or any drug-related problem.

- NAFDAC launched the National pharmacovigilance Center (NPC) in 2004. All health practitioners in the country are to report ADRs to the NPC.
- The aims of pharmacovigilance include:

Early detection of increases in unknown ADRs

Detection of increase in known ADRs

Identification of risk factors underlying ADRs

DRUG ABUSE/MISUSE

Any taking of a drug, which harms or threatens to harm the physical or mental health or social well-being of an individual or other individuals of society at large or which is illegal.

Examples: injecting illicit heroin, a drunken driver injuring a pedestrian, a housewife who takes overdose of large amounts of diazepam (Valium®) to get through the day.

People confuse drug misuse, drug abuse, drug addiction, drug dependence and drug tolerance or think they all mean the same thing but they do not.

Drug addiction

This word was used by WHO between 1950 and 1963 to mean: “a state of periodic or chronic intoxication produced by repeated consumption of a drug (natural or synthetic)”. It is characterized by:- an overwhelming desire or need (compulsion) to continue taking the drug and to obtain it by any means

- a tendency to increase the dose
- a psychic (psychological) and generally a physical dependence on the effects of the drugs detrimental effect on the individual and on the society

This definition affected opium cannabis, coca and their products and derivatives

Drug Dependence

In order to include other substances abused, this definition was changed by WHO to drug dependence.

A state of psychic (psychological) and sometimes also a physical state resulting from the interaction between a person and a drug, characterized by behavioral and other response that always include a compulsion to take the drug on a continuous or periodic basis in order to experience its psychic effect, and sometimes to avoid the discomfort of its absence. Tolerance may or may not be present. A person may be dependent on more than one drug.

Tolerance

This is an adaptive state characterized by diminished response to the same quantity of drug or by the fact that a large dose is required to produce the same degree of pharmacodynamic effect or response.

Opioids

Substances that are naturally present in opium or that can be derived chemically from opium e.g. morphine, codeine, heroin (obtained chemically from morphine), methadone, pethidine.

Opioids have calming effects on the mind and this is enhanced by intravenous injection. They have inhibitory effect on nerve impulses. Codeine and other opioids like pholcodine are present in cough and analgesic medicines/mixtures.

DF118- paracodin, propoxyphene, pethidine are used as analgesics.

Sedatives

Stimulant

Caffeine- the most commonly taken stimulant is caffeine. It exerts activating effect on the brain and mental processes. It is contained in coffee, tea and kola nuts.

Amphetamine-like drugs e.g. amphetamine (Benzedrine), methylamphetamine (methedrine)

Cocaine

Students are fond of using stimulants to keep awake but they are more harmful than helpful.

Cannabis: the most extensively used illicit drug.

Hallucinogens: hallucination is a perception that originates from a process within the brain. Such drugs elicit illusion (altered perceptions of sensations), delusions (false beliefs), mood alterations (ecstasy, excitements, anxiety, fear). Many plants contain hallucinogens. Example of hallucinogens is LSD – Lysergic acid diethyl amide

Volatile inhalants e.g. ether, chloroform

Drugs of abuse generally have destroyed the lives and future of many young people. They must be avoided by all.

RATIONAL DRUG USE (RDU)

Rational Drug Use (RDU) as defined by WHO means that "appropriate drug be prescribed, that it be available at the right time, at a price people can afford, that it be dispensed correctly and that it be taken in the right dose at the right intervals and for the right length of time".

Rational stands for accordance with reason or principle or understanding and not upon simple experience. The elements of RDU therefore include:

1. Appropriate diagnosis
2. Appropriate drugs
3. Appropriate dose and dosage forms
4. Appropriate usage and duration of usage
5. Appropriate cost

Prescribers or Physicians

There are 3 major actors that should be targeted for rational drug use:

Prescribers/Physicians: The physician or prescriber has the most burden because his ability to make the correct diagnosis will determine the compliance of the patient and the treatment outcome.

Rational prescribing considers appropriate therapy for the patient, cost in the context of the socioeconomic status of the patient and appropriate counseling of the patient on the choice of drug and the need to comply.

Pharmacists

Pharmacists: All efforts of rational prescribing will be nullified if dispensing is inappropriately carried out. The pharmacist is the last person the patient comes in contact with before leaving the hospital or health facility.

The prescription must be read and interpreted correctly so as to ensure that the right drug is delivered in the correct dose, correct dosage form, effective form, with clear directions, in a safe and potent retaining package, to the right person and that the patient is counseled on the rational use of his/her drugs.

Patients

Patients: The success of the therapeutic process still hinges on the patient's decision to comply after receiving the right prescription and information.

Patients are to take all medications as directed. They are to avoid medication-sharing and self-medication, are to seek clarification when in doubt and should report any adverse reactions (ADR).

Patients must read and understand the information given by the doctor or pharmacist as well as the leaflet/literature accompanying drug purchased for use.

IRRATIONAL USE OF DRUGS

This is defined as the use of non-essential pharmaceuticals, drugs with doubtful efficacy, wrong or unsafe drugs, incorrect dosage and routes of administration, self medication, over-prescribing and other wrong practices with drugs.

Studies have shown that irrational prescribing and drug use are not limited to developing countries like Nigeria, but are of a global dimension.

Overprescribing: “A pill for every ill” syndrome encourages this and makes the patient think that they need medications for all conditions e.g. the periodic blood cleansing by Onitsha market business men.

Self Medication (SM): Use of medicines not prescribed by the physician or other qualified health practitioners. (See below for more facts on SM). Studies amongst OAU, Ile-Ife students and Lagos residents showed that between 73-87% of them self-medicate with prescription drugs and in Lagos study a greater percentage of the elite were guiltier.

Overuse and underuse of antibiotics: This is a threat in Nigeria to curtailing infectious diseases because of the gross abuse involved.

All grades of antibiotics can be found in every nook and corner and by every Tom, Dick and Harry in this country, thus leading to wastage of resources.

While overuse could lead to adverse drug reactions, underuse could lead to therapeutic failure and resistance by microorganisms to antibiotics/antimicrobials.

Use of wrong drugs: This includes use of drugs of uncertain safety status such as phenylbutazone ('buta'), which is withdrawn by other countries and Novalgine® which causes life-threatening adverse effects.

Safer drugs can be used instead. Others are the use of drugs with doubtful potency, use of wrong drugs for illnesses (e.g. using antibiotics for simple diarrhoea), use of incorrect dosage (e.g. underdose of chloroquine injections for malaria or use of 2 tablets instead of 10 tablets for a complete treatment).

Overuse of injections: Patients wrongly believe that injections are better than oral drugs.

Factors contributing to irrational use of drugs

Deregulation and expansion of the private sector as source of drugs

Widespread and availability of prescription drugs from unqualified drug sellers ,

Descheduling of drugs - prescription-only medicine drugs (POMs) can now be obtained as OTC drugs e.g. cimetidine.

Increase in advertising of drugs and new forms of market promotions.

Lack of political will to implement programmes of RDU.

Lack of research into extent and impact of irrational drug use.

SELF MEDICATION (SM)

Self medication has been defined to comprise at least:

1. Use of non-prescription medicine bought in pharmacies
2. Use of vitamins and tonics
3. Use of home remedies
4. Use of herbal medicine
5. Use of non-authorised healers
6. Use of prescription-only-medicines (POM) not advised by a doctor
7. Use of preparations obtained from family, friends, lay referrals etc.
8. Contact with physicians about POM
9. Non-compliance with, overuse, underuse, misuse of prescribed medicines

Some mother-initiated medical behaviours (MIMB) can also be termed as self-medication.

Factors that favour self-medication

Need for quick relief (SM can provide quick relief where hospitals are not easily accessible)

Economic - reduction in health care costs

Long queues at the hospital or clinics before the doctor is consulted (SM can reduce long queues and physician utilization rates)

Need for a first aid or emergency treatment where clinics or hospitals are not within reach

Lackadaisical attitude and harsh treatment by hospital staff

Lack of drugs in public or governmental health institutions

Poor consulting environment in hospitals in which privacy is lacking thereby not promoting confidentiality between patient and physicians

Uncontrolled access to POM, OTC and herbal medicines in poorly regulated medicine outlets

THE PHARMACY PROFESSION

A Pharmacist is a custodian of medicines who handles, prepares, dispenses, distributes, provides information, and provides counsel to patients and other health care professionals on appropriate use of drugs.

To practice in any country as a pharmacist you must be registered with the pharmacy body in that country e.g. In Nigeria you must register with the Pharmacists Council of Nigeria (PCN).

PCN is established by a decree of the land. To be fully registered as a pharmacist under this decree, the person must be:

(1) of good character and proper person

(2) has attended a course of training approved by the council (PCN)

(3) holds a qualification approved by the council e.g. B.Pharm. (Bachelor Pharmacy)

(4) has undergone internship training for not less than one year under another registered pharmacist.

(5) Pay the prescribed fee

Role of a Pharmacist

A Pharmacist can be a Hospital Pharmacist who dispenses prescribed drugs, procures, keeps records, provides counsel and drug information to patients and other health care team, monitors adverse effects.

Community Pharmacist- possesses a drug outlet such as retail or wholesale pharmacy stores where drugs are sold; dispenses prescriptions brought by patients provides counsel and information.

Industrial Pharmacist- works in the drug industry such as Emzor, May and Baker. He/she is involved in production, quality control, sales and marketing, Research and Development.

Administrative/Regulatory Pharmacist- works in government parasatals such as in PCN, NAFDAC, NDLEA, Ministry of Health etc.

Academic/Research Pharmacist specializes in a particular area of Pharmacy such as Pharmacology, Clinical Pharmacy, Pharmaceutical Chemistry, Pharmaceutics, Pharmaceutical Microbiology and Pharmacognosy.

They carry out teaching and research in Universities and research centers e.g. Faculty of Pharmacy, U.I., Nigeria Institute of Pharmacy Research and Development, (NIPRD), Abuja etc.

DRUG REGULATORY AGENCIES (DRAs) IN NIGERIA

Pharmacist Council of Nigeria (PCN)

PCN decree was established on 15th December, 1992

The PCN (Council) is charged with the following:

Determining the standards of knowledge and skill to be attained by those seeking to be registered Pharmacists

Securing the establishment and maintenance of registers of those entitled to practice the Pharmacy profession

Regulating and controlling the practice of pharmacy in all its aspects and ramifications

National Agency for Food and Drugs Administration and Control (NAFDAC)

Regulates and controls the importation, exportation, manufacture, advertisement, distribution, sale and use of food, drugs, cosmetics medical devices, packaged water, bottled water and chemicals.

NAFDAC ensures safety of foods and drugs. It was established by a decree of 1993.

The current Director General is Dr Paul Orhi. He was appointed January 11, 2009 to succeed Prof. Dora Akunyili.

NAFDAC is in charge of registration of all food and drugs and related products in Nigeria. They must have NAFDAC number.

National Drug Law Enforcement Agency (NDLEA)

Adopts measures to identify, trace, freeze, confiscate or seize goods from drug-related offences.

Adopts measures to eradicate illicit cultivation of narcotic plants, use of narcotic and psychotropic substances such as cocaine, morphine etc.

NDLEA Act commenced on 29th December 1989 called CAP 253, which reads: “An act to establish the NDLEA to enforce laws against the cultivation, processing, sale, trafficking and use of hard drugs and to empower the Agency to investigate persons suspected to have dealings in drugs and other related matters”.

Introduction 1

How to use this module

Introduction 2

Epidemiology 1

Epidemiology

In 2008:

An estimated 33.4 million people were living with HIV

2.7 million people acquired HIV

In 2008: AIDS killed 2.0 million people.

The number of people living with HIV continues to rise in every region, with the steepest increases occurring in East and Central Asia and in Eastern Europe reflecting the combined effects of continued high rates of new HIV infections and the beneficial impacts of ART

Sub-Saharan Africa remains by far the worst affected region in the world, with 22.4 million people living with HIV in 2008

About two-thirds (67%) of all people living with HIV are in sub-Saharan Africa

More than three quarters (76%) of all women living with HIV live in sub-Saharan Africa

Global epidemiology of HIV/AIDS

Molecular epidemiology

HIV-1 strains can be classified into 3 groups: M (major), N (non-M) and O (outlier)

Groups N and O are limited to Cameroon and neighbouring countries

Group M is further divided into 9 subtypes (A,B,C,D,F,G,H,J and K) and several circulating recombinant forms

Subtype C is the most predominant globally and in Southern Africa

Subtype A is common in Central, West and East Africa

Subtype B in USA and Western Europe

All HIV-1 groups and subtypes have been reported in central Africa

Morphology of HIV

It is icosahedral in shape

Outer envelope studded with spikes formed by envelope (gp120) and transmembrane (gp41) glycoproteins

Central core contains consist of

viral proteins (e.g. p24)

HIV RNA genome

enzymes

Cell invasion and viral replication

Question 1: Regarding HIV

Write “T” or “F” on the answer sheet. When you have completed all 4 questions, click on the box and mark your answers

How is HIV transmitted?

Transmission routes:

Sexual contact: sexual intercourse (vaginal, oral or anal)

Direct contact with HIV-infected body fluids such as semen, cervical and vaginal secretions

Maternal-to-child transmission (MTCT): from mothers who are HIV-positive to their infants during pregnancy, labour, delivery, and breast-feeding

Blood-to-blood transmission: transfusion or direct contact with HIV-infected blood

HIV infection occurs in people of all ages, races and nationalities, the rich and the poor. Now that you know how HIV is transmitted, list 5 groups of people who are particularly at risk of acquiring infection. *Answers on the next slide.*

Major groups at risk of HIV infection
3

Outcomes of infants born to women infected with HIV

HIV cannot be transmitted by:

Coughing or sneezing

Being bitten by an insect

Touching or hugging

Holding a baby

Going to a public bath/pool

Using a public toilet

Shaking hands

Using telephones

Working or going to school with a person who is HIV-infected

Drinking water or preparing or eating food

Sharing cups, glasses, plates, or other utensils

Two measures of the progression of HIV infection

CD4 count

When HIV multiplies, it infects and kills CD4 T cells

Because of their key role in protecting against infection, the CD4 count reflects the functional state of the immune system

normal count in a healthy adult = 600 - 1,200 cells/mm³

CD4 count of <200 cells/mm³ in an adult increases greatly the risk of opportunistic and serious infection

Viral load

Viral load is the amount of HIV in the blood

It can be measured by the HIV ribonucleic acid polymerase chain reaction blood test (HIV-RNA PCR)

Viral load is very high shortly after primary HIV infection

It falls steeply when the body develops antibodies and rises again after a number of years as the CD4 count drops

High viral load leads to higher transmission risk

High viral load is a sign of more severe disease as people develop AIDS

Viral load is also used to assess the response to antiretroviral (ARV) treatment

Testing for HIV

Tests for HIV detect either antibodies or antigens associated with HIV in whole blood, saliva, or urine

A person whose blood test results show HIV infection is said to be “seropositive” or “HIV-positive”

A person whose blood test results do not show HIV infection is said to be “seronegative” or “HIV-negative”

Seroconversion

People infected with HIV usually develop antibodies 4 to 6 weeks after being infected, but it may take as long as 3 months for antibodies to develop

Some people may experience a glandular fever-like illness (fever, rash, joint pains, and enlarged lymph nodes) at the time of seroconversion

The period of time between when a person is infected with HIV and when the antibody test result is positive is called the "**window period.**"

Despite being seronegative, the person may be infectious during the window period

Assessing the stage of disease

There are several classification or staging systems in use

The US Centers for Disease Control and Prevention (CDC) categorizes HIV infection in adults on the basis of:

Associated clinical conditions (3 categories)

CD4+ T lymphocyte count (3 ranges)

This results in a matrix of nine mutually exclusive categories (next slide)

Using this system

Any HIV-infected individual with a CD4+ T cell count of <200/ml has AIDS (regardless of the presence of symptoms or opportunistic diseases), and

Any HIV-infected individual with an AIDS indicator (category C) condition has AIDS

CDC 1993 revised classification system for adolescents and adults

AIDS-indicator conditions (1)

Opportunistic infections

Candidiasis (oesophagus, bronchi, trachea, and lungs)

Coccidioidomycosis (disseminated or extrapulmonary)

Cryptococcosis, extrapulmonary

Cryptosporidiosis, chronic intestinal (>1 month duration)

Cytomegalovirus disease (other than liver, spleen, or nodes)

Herpes simplex: chronic ulcer(s) (>1-month duration) or bronchitis, pneumonitis, or oesophagitis

Histoplasmosis, disseminated or extrapulmonary

Isosporiasis, chronic intestinal (> 1-month) *Mycobacterium avium* complex or *Mycobacterium kansasii*, disseminated or extrapulmonary

Mycobacterium tuberculosis, any site (pulmonary or extrapulmonary)

Pneumocystis jiroveci pneumonia

Pneumonia, recurrent

Progressive multifocal leucoencephalopathy

Salmonella septicaemia, recurrent

Toxoplasmosis of brain

AIDS-indicator conditions (2)

Neoplasia

Kaposi's sarcoma

Lymphoma (Burkitt's, immunoblastic, primary in brain)

Invasive cervical cancer

General

Wasting syndrome, HIV-related

Encephalopathy, HIV-related

WHO staging system for HIV infection and disease in adults (1)

WHO identifies 4 clinical stages based on the performance level of the person and the associated illnesses:

Clinical stage I

Asymptomatic

Generalised lymphadenopathy

Performance Scale 1: asymptomatic, normal activity

Clinical Stage II

Weight loss <10% of body weight

Minor mucocutaneous manifestations (seborrhoeic dermatitis, prurigo, fungal nail infections, recurrent oral ulcerations, angular cheilitis)

Herpes zoster within the last 5 years

Recurrent upper respiratory tract infections (e.g., bacterial sinusitis)

And/or Performance Scale 2: symptomatic, normal activity

WHO staging system for HIV infection and disease in adults (2)

Clinical stage III

Weight loss >10% of body weight

Unexplained chronic diarrhoea lasting for more than 1 month

Unexplained prolonged fever (intermittent or constant) lasting for more than 1 month

Oral candidiasis (thrush)

Oral hairy leukoplakia

Pulmonary tuberculosis

Severe bacterial infections (e.g., pneumonia, pyomyositis)

And/or Performance Scale 3: bedridden less than 50% of the day during the past month

Clinical Stage IV

HIV wasting syndrome

Pneumocystis jiroveci pneumonia

Toxoplasmosis of the brain

Cryptosporidiosis with diarrhoea lasting more than 1 month

Cryptococcosis, extrapulmonary

Cytomegalovirus (CMV) disease of an organ other than liver, spleen or lymph node (e.g., retinitis)

Herpes simplex virus (HSV) infection, mucocutaneous (lasting for more than 1 month), or visceral

Progressive multifocal leukoencephalopathy (PML)

Any disseminated endemic mycosis

Candidiasis of the oesophagus, trachea, bronchi

Atypical mycobacteriosis, disseminated or pulmonary

Non-typhoid salmonella septicaemia

Extrapulmonary tuberculosis

Lymphoma

Kaposi's sarcoma (KS)

HIV encephalopathy

And/or Performance Scale 4: bedridden more than 50% of the day during the past month

WHO staging system for HIV infection and disease in children

Clinical stage I

Asymptomatic

Generalised lymphadenopathy

Clinical stage II

Chronic diarrhoea lasting more than 30 days in the absence of known etiology

Severe persistent or recurrent candidiasis outside the neonatal period

Weight loss or failure to thrive in the absence of known etiology

Persistent fever lasting longer than 30 days in the absence of known etiology

Recurrent severe bacterial infections other than septicaemia or meningitis (e.g., osteomyelitis, bacterial (non-TB) pneumonia, abscesses)

Clinical Stage III

AIDS-defining opportunistic infections

Severe failure to thrive (wasting) in the absence of known etiology

Progressive encephalopathy

Malignancy

Recurrent septicaemia or meningitis

The 3 phases of HIV infection

Phases 1, 2 and 3

1. The early, acute phase

Initial response of an immunocompetent adult to HIV infection

High level of virus production and viraemia

widespread viral seeding of the lymphoid tissues

Approximately 100 billion new viral particles are produced every day

1-2 billion CD4+ T-cells die each day

Clinically, this stage is characterized by infectious mononucleosis-like features of sore throat, myalgias, fever, weight loss, and fatigue all of which are self-limiting

2. The middle, chronic phase

Relative containment of the virus and clinical latency

Virus replication continues for several years, predominantly in the lymphoid tissues

Immune system largely intact

Clinically, patients are either asymptomatic or develop persistent generalized lymphadenopathy (PGL).

Many patients have herpes zoster, oral thrush or thrombocytopaenia

Acute retroviral syndrome

The majority of people do not show any signs of illness when they acquire HIV infection.

However, some people do show the following symptoms and signs of Acute Retroviral Syndrome:

Fever

Diarrhea

Headache

Nausea/vomiting

Adenopathy

Pharyngitis (non exudative)

Rash (morbilliform, maculopapular)

Neurological (Guillain – Barre Syndrome, encephalitis, aseptic meningitis)

Tuberculous adenitis in a confirmed HIV-infected patient (with discharging abscesses on the right and suprasternal area)

HIV-associated malignancy

Question 2: The following are recognised manifestations of Acute retroviral syndrome: Write “T” or “F” on the answer sheet. When you have completed all 5 questions, click on the box and mark your answers.

Diagnosis (1)

Confirmation of HIV infection can be done by

isolation of the virus

detection of viral antigen

detection of viral antibody

Detection of viral antigen and virus isolation are expensive and technically demanding. Therefore, testing for antibodies to HIV in serum or plasma is the mainstay of laboratory diagnosis.

In patients with suspected or confirmed HIV, a wide range of additional clinical and laboratory investigations is often indicated to detect opportunistic infections and neoplasia.

Screening tests

ELISA

Latex agglutination

Confirmatory tests

Western Blot

Indirect immunofluorescence antibody assay

Radioimmunoprecipitation assay

Supplemental tests

HIV-1 culture

PCR

ELISA for P24 antigen

Diagnosis (2)

Where diagnostic facilities are limited, AIDS can be diagnosed using the WHO Clinical Case Definition in adults :

AIDS defined by the existence of

AT LEAST 2 major signs associated with

AT LEAST 1 minor sign

in the absence of known causes of immunosuppression

Major signs

Weight loss >10% body weight

Chronic diarrhoea (lasting >1 month)

Fever intermittent or constant (lasting >1 month)

Minor signs

Persistent cough (>1 month)

Generalized pruritic dermatitis

Recurrent herpes zoster

Oropharyngeal candidiasis

Chronic progressive and disseminated herpes virus infection

Generalized lymphadenopathy

Diagnosing HIV infection and AIDS in children

< 18 months

seropositive (test again after 18 months) or born to positive mother with positive HIV culture, DNA PCR

Or

Meets clinical criteria for AIDS

And/or

CD4 percentage < 20%

>18 months

positive antibody tests

Or

Meets clinical criteria for AIDS.

NB

Testing is performed in the immediate newborn period, at 1-2 months and 3-6 months of age. False negative are sometimes observed in the newborn period but the sensitivity of the test after

1 month is about 99%. If the child is being breastfed the test should be performed 3 months after cessation of breastfeeding).

The diagnosis of HIV amongst children begins with the diagnosis in the mother

In infected women, the maternal HIV antibody is passively transmitted across the placenta to the fetus during pregnancy.

A single positive HIV-I DNA PCR test result should be interpreted with caution. Any infant with a positive result should be retested immediately.

Clinical management

Goals of treatment

Clinical

Prolong survival

Prevent disease progression

Minimize drug toxicity

Virological

Maximal and durable suppression of viral load for as long as possible to below detectable levels (currently defined as <50 copies/ml)

Immunological

Preserve immune function (CD4 cell count in normal range)

Public health

Reduce HIV transmission

Preserve future treatment options

Antiretroviral drug treatment

Drugs from different classes are used in combination to prevent emergence of resistance to single agents

Critical questions are:

When to initiate therapy?

What is the optimal initial therapy?

When to change therapy?

What are the optimal subsequent therapies?

Benefits of early therapy

Control of viral replication easier

Prevention of immune system compromise

Lower risk of resistance with complete viral suppression

Possible decreased risk of HIV transmission

Avoid irreversible immune system depletion

Risks of early therapy

Drug-related reduction in quality of life

Greater cumulative drug-related adverse events

Earlier development of drug resistance

Limitation of future antiretroviral treatment options

Antiviral Agents

Nucleoside Reverse Transcriptase Inhibitors (e.g. Zidovudine, Lamivudine, Didanosine)

Non-nucleoside Reverse Transcriptase Inhibitors (e.g. Nevirapine, Efavirenz, Delavirdine)

Protease inhibitors (e.g. Indinavir, Nelfinavir, Ritonavir, Saquinavir, Amprenavir, Lopinavir)

Entry inhibitors (e.g. Enfuvirtide)

Coreceptor antagonists (e.g. Maraviroc)

Highly active antiretroviral therapy (HAART)

Guidelines for starting HAART

All patients with WHO stage 3 and 4 irrespective of CD4+ cell count

CD4+ count $<350/\text{mm}^3$ irrespective of HIV RNA level

CD4+ cell count between $200\text{--}350/\text{mm}^3$ and HIV RNA level $>20,000$ copies/mL

CD4+ cell count $>350/\text{mm}^3$ and HIV RNA level $>55,000$ copies/mL

HIV+ child aged < 12 months

HIV+ children over 1 year old who are symptomatic or immunosuppressed

Monitoring HAART

Measure plasma HIV RNA levels

Immediately prior to initiation of Rx

At 2-8 weeks after Rx

Repeat every 3-4 months while being on therapy

In case of a clinical event or a significant decline in CD4+ T cells

CD4+ T cell count at the time of diagnosis and generally every 3-6 months thereafter

Criteria for treatment failure

Clinical

Onset of new or recurrence of opportunistic infections

Onset or recurrence of WHO stage III-defining condition

Immunological

Return of CD4 count to pretherapy level

30% fall CD4 count from peak level during therapy

Failure to achieve CD4 cell count increase of 50-100 cells per year

Virological

Viral load not suppressed to undetectable levels after 4-6 months of ART

A persistent increase in viral load following a period of adequate suppression

Highly active antiretroviral therapy (HAART) in special circumstances

Guidelines for starting HAART for HIV/TB co-infection

All patients with active TB irrespective of HIV RNA level or CD4+ cell count

TB treatment should be commenced first and ART commenced subsequently, as soon as possible and within the first 8 weeks of starting TB treatment.

The recommended 1st line ART regimen in patients on TB treatment is AZT+3TC+EFV or TDF+(3TC or FTC)+ EFV. For those unable to tolerate or have contraindications to an EFV-based regimen, AZT+3TC+NVP or TDF+3TC or FTC+NVP or a triple NRTI regimen are recommended

Guidelines for starting HAART for HIV/HBV co-infection

In those who require treatment for HBV infection, ART should be initiated irrespective of CD4 cell count or WHO clinical stage.

In those eligible for treatment, 1st line regimen should include TDF and 3TC or FTC

In those failing treatment, 2nd and subsequent ART regimens should include TDF+3TC or FTC, both should be continued in the 2nd line regimen for anti-HBV activity & to reduce the risk of hepatic flares, irrespective of the 2nd line regimen

ART for pregnant women

Treat all pregnant women with CD4 count <350, irrespective of WHO clinical stage

Treat all pregnant with WHO stage 3 and 4, irrespective of CD4 count

One of the following regimens should be used for ART naïve pregnant women initiating ART

AZT +3TC+EFV (preferred)

AZT +3TC+NVP (preferred)

TDF+(3TC or FTC)+EFV

TDF+(3TC or FTC)+NP

It is recommended that an EFV-based 1st-line regimen should not be initiated during the first trimester of pregnancy

What to start

It is recommended that one of the following regimens is used to initiate ART in ART-naïve individuals

AZT+3TC+EFV

AZT+3TC+NVP

TDF+(3TC or FTC)+EFV

TDF+(3TC or FTC)+NVP

Fixed dose combinations or co-packaged formulations are recommended wherever possible.

Prevention

Prevention

Prevention

Question 3: Following exposure to HIV: Write “T” or “F” on the answer sheet. When you have completed all 4 questions, click on the box and mark your answers.

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End of module

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