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**Ministry of Health, Community  
Development, Gender, Elderly and  
Children**

**PST 04211 Basic  
Pharmacology**

**NTA Level 4 Semester 2**

**Facilitator Guide**



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## **Background**

There is currently an ever increasing demand for pharmaceutical personnel in Tanzania. This is due to expanding investment in public and private pharmaceutical sector. Shortage of trained pharmaceutical human resource contributes to poor quality of pharmaceutical services and low access to medicines in the country (GIZ, 2012).

Through Public-Private-Partnership (PPP) the Pharmacy Council (PC) together with Development Partners (DPs) in Germany and Pharmaceutical Training Institutions (PTIs) worked together to address the shortage of human resource for pharmacy by designing a project named “Supporting Training Institutions for Improved Pharmaceutical Services in Tanzania” in order to improve quality and capacity of PTIs in training, particularly of lower cadre pharmaceutical personnel.

The Pharmacy Council formed a Steering committee that conducted a stakeholders workshop from 18<sup>th</sup> - 22<sup>nd</sup> August 2014 in Morogoro to initiate the implementation of the project.

Key activities in the implementation of this project included carrying out situational analysis, curriculum review and harmonization, development of training manual/facilitators guide, development of assessment plan, training of trainers and supportive supervision.

After the curricula were reviewed and harmonized, the process of developing standardised training materials was started in August 2015 through Writer’s Workshop approach.

The approach included two workshops (of two weeks each) for developing draft documents and a one-week workshop for reviewing, editing and formatting the sessions of the modules.

The goals of writers workshops were to build capacity of tutors in the development of training materials and to develop high-quality, standardized teaching materials.

The training package for pharmacy cadres includes a facilitator guide, assessment plan and practicum. There are 12 modules for NTA level 4 making 12 facilitator guides and one practicum guide.

## Acknowledgment

The development of standardized training materials of a competence-based curriculum for pharmaceutical sciences has been accomplished through involvement of different stakeholders.

Special thanks go to the Pharmacy Council for spearheading the harmonization of training materials in the pharmacy after noticing that training institutions in Tanzania were using different curricula and train their students differently.

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# Introduction

## Module Overview

This module content is a guide for tutors of Pharmaceutical schools for training of students. The session contents are based on sub-enabling outcomes and their related tasks of the curriculum for Basic Technician Course in Pharmaceutical Sciences. The module sub-enabling outcomes and their related tasks are as indicated in the in the Basic Technician Certificate in Pharmaceutical Sciences (NTA Level 4) Curriculum

## Target Audience

This module is intended for use primarily by tutors of pharmaceutical schools. The module's sessions give guidance on the time, activities and provide information on how to teach the session. The sessions include different activities which focus on increasing students' knowledge, skills and attitudes.

## Organization of the Module

The module consists of forty six (46) sessions; each session is divided into several parts as indicated below:

- **Session Title:** The name of the session
- **Total Session Time:** The estimated time for teaching the session, indicated in minutes
- **Pre-requisites:** A module or session which needs to be covered before teaching the session.
- **Learning Tasks:** Statements which indicate what the student is expected to learn by the end of the session
- **Resources Needed:** All resources needed for the session are listed including handouts and worksheets
- **Session Overview:** The session overview box lists the steps, time for each step, the activity or method used in each step and the step title
- **Session Content:** All the session contents are divided into steps. Each step has a heading and an estimated time to teach that step as shown in the overview box. Also, this section includes instructions for the tutor and activities with their instructions to be done during teaching of the contents
- **Key Points:** Key messages for concluding the session contents at the end of a session  
This step summarizes the main points and ideas from the session, based on the learning tasks of the session
- **Evaluation:** The last section of the session consists of short questions based on the learning tasks to check the understanding of students.
- **Handouts:** Additional information which can be used in the classroom while teaching or later for students' further learning. Handouts are used to provide extra information related to the session topic that cannot fit into the session time. Handouts can be used by the students to study material on their own and to refer to them after the session. Sometimes, a handout will have questions or an exercise for the participants including the answers to the questions.

## **Instructions for Use and Facilitators Preparation**

- Tutors are expected to use the module as a guide to train students in the classroom and skills laboratory
- The contents of the modules are the basis for teaching and learning Basic Pharmacology.
- Use the session contents as a guide
- The tutors are therefore advised to read each session and the relevant handouts and worksheets as preparation before facilitating the session
- Tutors need to prepare all the resources, as indicated in the resource section or any other item, for an effective teaching and learning process
- Plan a schedule (timetable) of the training activities
- Facilitators are expected to be innovative to make the teaching and learning process effective
- Read the sessions before facilitation; make sure you understand the contents in order to clarify points during facilitation
- Time allocated is estimated, but you are advised to follow the time as much as possible, and adjust as needed
- Use session activities and exercises suggested in the sessions as a guide
- Always involve students in their own learning. When students are involved, they learn more effectively
- Facilitators are encouraged to use real life examples to make learning more realistic
- Make use of appropriate reference materials and teaching resources available locally

## **Preparation with Handouts and Worksheets**

- Go through the session and identify handouts and worksheets needed for the session
- Reproduce pages of these handouts and worksheets for student use while teaching the session. This will enable students to refer to handouts and worksheets during the session in the class. You can reproduce enough copies for students or for sharing
- Give clear instructions to students on the student activity in order for the students to follow the instructions of the activity
- Refer students to the specific page in the student manual as instructed in the facilitator guide

## **Using Students Manual When Teaching**

- The student manual is a document which has the same content as the facilitator guide, which excludes facilitator instructions and answers for exercises.
- The student manual is for assisting students to learn effectively and acts as a reference document during and after teaching the session
- Some of the activities included in facilitator guide are in the student manual without facilitator instructions



# **Abbreviations/Acronym**

AGS	Gas Gangrene Antitoxin
ARS	Anti Rabies Serum
ARV	Anti-Retroviral
ATS	Tetanus antitoxin
BCG	Bacillus Calmette Guerin
CNS	Central Nervous System
COCs	Combined Oral Contraceptives
COPD	Chronic Obstructive Pulmonary Diseases
CUHAS	Catholic University of Heal and Allied sciences
DPT	Diphtheria Pertussis Tetanus
E.L.C.T	Evangelical Lutheran Church in Tanzania
HKMU	Herbert Kairuki Memorial University
ICP	Increased Intra Cranial Pressure
IGs	Immunoglobulins
ITP	Idiopathic Thrombocytopenic Purpura
JSI	John Snow Inc
KCMC	Kilimanjaro College of Medical Sciences
LZHRC	Lake zone Health Recourse Centre
MAO	Mono Amine Oxidase
MEMS	Mission for Essential Medicine Supply
MMR	Measles, Mumps and Rubella
MoHCGC	Ministry of Health, Community development, Gender, Elderly and children
MUHAS	Muhimbili University of Health and Allied Sciences
NACTE	National Council For Technical Education
NSAIDS	Non-steroidal anti-inflammatory drugs
POPs	Progestogen Only Pills
RuCU	Ruaha Catholic University
SIBS	Spring Institute of Business
SLF	Saint Luke Foundation
USP	United States Pharmacopoeia

# Session 1: Introduction to Pharmacology

**Total Session Time:** 120 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- Define the terms pharmacology, drug and pro-drug and medicine
- List sources of drugs
- Define the term pharmacokinetics and list pharmacokinetics Parameters
- Explain bioavailability and half life of drugs
- Define pharmacodynamic, receptor, agonist, antagonist and synergy
- Explain terms toxic, therapeutic dose and therapeutic index
- Define the terms tolerance, habituation, dependence and addiction

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Overhead projector and Computer

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Objectives
2	10 minutes	Presentation/Buzzing	Definition of Pharmacology, Drug and Pro-drug and medicine
3	10 minutes	Presentation/ Brainstorming	Sources of Drugs
4	20 minutes	Presentation	Definition of Pharmacokinetics and Pharmacokinetics Parameters
5	15 minutes	Presentation	Bioavailability and Half-life of Drugs
6	15 minutes	Presentation	Pharmacodynamics, Receptor, Agonist, Antagonist and Synergy
7	15 minutes	Presentation	Toxic Dose, Therapeutic Dose and Therapeutic Index
8	20 minutes	Presentation	Tolerance, Habituation, Dependence and Addiction
9	05 minutes	Presentation	Key Points
10	05	Presentation	Evaluation

	minutes		
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## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning Objectives (5 minutes)**

**READ or ASK** students to read the learning objectives and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Definition of Pharmacology, Drug and Pro-drug (10 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following questions for 5 minutes

- What is Pharmacology?
- What is a drug?
- What is a Pro-drug?
- What is a medicine?

**ALLOW** few pairs to respond and let other pairs add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY** and **SUMMARIZE** by using the content below and define other terminologies not defined by students

- Pharmacology is a study of the effects of chemical substances on the function of living systems
- A drug may be a substance that brings about a change in biologic functions through its chemical actions
- A pro-drug is a chemical that is converted to active drug/form by biologic processes inside the body
- A medicine is a chemical preparation, which usually but not necessarily contains one or more drugs, administered with the intention of producing a therapeutic effect
- Medicines usually contain other substances (i.e. excipients, stabilisers, solvents, etc.) besides the active drug, to make them more convenient to use
- In everyday parlance, the word drug is often associated with addictive, narcotic or mind-altering substances-an unfortunate negative connotation that tends to bias opinion against any form of chemical therapy

## **STEP 3: Sources of Drugs (10 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are sources of drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Drugs obtain from various sources such as: synthetic chemicals, chemicals obtained from plants, fungal sources, animal sources, marine organisms or products of genetic engineering
- Plant-derived drugs include: quinine, digitalis, atropine, [ephedrine](#), strychnine, vinca alkaloids and others which result from purification of active compounds from these plants. For example, morphine which is purified from opium
- Fungal-derived sources include penicillin, streptomycin and many other antibiotics.
- Animal-derived sources include Insulin, fats containing nutrients/vitamins derived from fish and others
- Natural products, derived mainly from fungal and plant sources, have proved to be a fruitful source of new therapeutic agents, particularly in the field of anti-infective, anticancer and immunosuppressant drugs
- Semi-synthetic drugs are derived from chemical modification of natural products for example Beta-Lactam antibiotics such as cephalosporins
- Nowadays drugs are derived from chemical modifications/reactions in laboratories

## **STEP 4: Definition of Pharmacodynamics and Pharmacokinetics parameters (20 minutes)**

- **Pharmacodynamics** is define as actions of the drug on the body
- **Pharmacokinetics** is define as the actions of the body on the drug
- When a drug is administered it must be absorbed into blood from its site of administration, distributed to its site of action, metabolized (mainly by the liver and other processes) and finally eliminated from the body by excretion and other processes
- In short pharmacokinetics (PK) = Absorption (A), Distribution (D), Metabolism (M) and Elimination (E). Therefore, PK=ADME

- The common terms used in description of pharmacokinetics are: Bioavailability (F) for absorption, Volume of distribution (Vd) for distribution, extraction ratio (ER) for metabolism and Clearance (CL) for elimination

### **STEP 5: Bioavailability and Half-life of Drugs (15 minutes)**

- Bioavailability is the fraction of administered drug that reaches systemic circulation. For example, if 100mg of a drug is administered orally and 80mg of the drug is absorbed, the bioavailability is 80% or 0.8
- The capital letter F is used to represent bioavailability
- When a drug is administered through intravenously, all of the amount reaches systemic circulation, and thus bioavailability is 100% or 1
- Half-life ( $t_{1/2}$ ) is the time required for the concentration of drugs in the body (blood) to remain to half of the original concentration
- Half-life is useful in designing drug dosage regimens, predicting elimination (clearance) and distribution of a drug (volume of distribution)

### **STEP 6: Pharmacodynamics, Receptor, Agonist, Antagonist and Synergy (15 minutes)**

- Pharmacodynamics refers to the relationship between drug concentration at the site of action and the resulting effect, including the time course and intensity of therapeutic and adverse effects
- A drug receptor is a specialized target macromolecule, present on the cell surface intracellularly, that binds a drug and mediates its pharmacological actions
- Receptors are the sensing elements in the system of chemical communications that coordinates the function of all the different cells in the body
- Most drugs must bind to their specific receptors which is followed by a sequence of events before producing their effects
- The effect of a drug present at the site of action is determined by that drug's binding with a receptor
- An agonist is a drug which binds to and activate the receptor to bring a pharmacological effect directly or indirectly
- Antagonist are drugs which act by binding to receptors and therefore prevent the binding of other molecules or drugs to the receptor resulting into diminished/reduced/blocked effects of the molecules or drugs
- The effect of one drug is diminished or completely abolished in the presence of another
- Many therapeutically useful drugs act, either as agonists or antagonists, on receptors for known endogenous mediators
- Drug synergy occurs when drugs can interact in ways that enhance or magnify one or more effects, or side-effects, of those drugs
- Drug interactions can lead to synergistic (when the drug's effect is increased) or antagonistic (when the drug's effect is decreased) effects

## **STEP 7: Toxic Dose, Therapeutic Dose and Therapeutic Index (15 minutes)**

- Therapeutic dose is the dose that produces a clinically desired or effective response.
- Toxic dose is the dose that produces toxicity
- Therapeutic index (TI) of a drug is the ratio of the dose that produces toxicity to the dose that produces a clinically desired or effective response
- Therapeutic Index=Toxic dose/Effective dose=TD/ED
- Therapeutic index is a measure of drug's safety. The higher the TI indicates that there is a wider margin between doses that are effective and doses that are toxic
- The higher TI the higher the safety of the drug and vice versa

## **STEP 8: Tolerance, Habituation, Dependence and Addiction (20 minutes)**

- The term *tolerance* is used to describe a more gradual decrease in responsiveness to a drug, taking days or weeks to develop
- Generally, tolerance is the decrease in pharmacological effect on repeated administration of the drug
- Drug dependence describes the state when drug-taking becomes compulsive, taking precedence over other needs, often with serious adverse consequences. This involves physical and psychological dependence
- Drug dependence is viewed as a reversible pharmacological phenomenon whereas addiction is a chronic, relapsing human condition, a distinct from acute illness that can be cured by abstinence
- Habituation or adaptation is a process which occurs when a drug is given repeatedly or continuously, such that cessation of the drug has an aversive effect, negative reinforcement, from which the subject will attempt to escape by self-administration of the drug

## **STEP 9: Key points (5 minutes)**

- Pharmacology is the study of the effects of chemical substances on the function of living systems
- A drug is defined as a chemical substance of known structure, other than a nutrient or an essential dietary ingredient, which, when administered to a living organism, produces a biological effect
- Drugs and medicines can be obtained from natural and synthetic sources
- Pharmacokinetics (PK) involves Absorption (A), Distribution (D), Metabolism (M) and Elimination (E). Therefore PK=ADME
- Therapeutic index is a measure of drug's safety

- Prolonged drug use may be associated with tolerance, dependence and addiction

### **STEP 10: Evaluation (5 minutes)**

- What is Pharmacology?
- What is a drug?
- What is a pro-drug?
- What are the main sources of drugs?
- What is Pharmacokinetics?
- What is drug bioavailability?
- What is half-life of drugs?
- What is pharmacodynamics?
- What is therapeutic index?
- What do you understand by the terms tolerance, habituation, dependence and addiction?

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## Session 2: General Classification of Medicines

**Total Session Time:** 120 minutes

### Prerequisites

- None

### Learning Tasks

By the end of this session students are expected to be able to:

- Define pharmacological classes of essential medicines
- Describe pharmacological classes of essential medicines

### Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Computer and overhead projector where necessary

### SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Learning Tasks
2	40 minutes	Presentation/ buzzing	Definition of Pharmacological Classes of Essential Medicines
3	65 minutes	Presentation/small group discussion	Description Pharmacological Classes of Essential Medicines
4	05 minutes	Presentation	Key Points
5	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning tasks (5 minutes)**

**READ or ASK** students to read the learning objectives and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Definitions of pharmacological classes of essential medicine (40 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question

- What are the pharmacological classes of medicines?

**ALLOW** few pairs to respond and let other pairs add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY and SUMMARIZE** by using the content below

- There are several pharmacological classes of medicines which are listed in the National essential drug lists. The classes include:
  - Anaesthetics which are used in surgery and intubation
  - Muscle relaxants which are used in surgery
  - Analgesics which are used in management of pain and fever
  - Anti allergies which are used in management of allergic reactions
  - Antidotes which are used in counteracting the effects of a particular poison
  - Anti epileptic which are used in management of epilepsy
  - Anti infective which are used in management of various types of infections
  - Anti-neoplastic/immunosuppressive drugs which are used in immunosuppression especially during organ transplant and management of some cancers
  - Ant parkinsonism which are used in management of Parkinson's disease
  - Blood boaster which are used in management of anemia
  - Anti coagulants which are used as blood thinner and management of thrombosis
  - Cardiovascular medicines which are used in management of heart and problems associated with blood vessels
  - Dermatological medicines which are used in management of skin diseases
  - Gastro intestinal medicines which are used in management of problems in gastrointestinal tracts
  - Hormone and antidiabetic medicines which are used in management of diabetes and other hormonal diseases

- Vaccines which are used in prevention of diseases
- Ophthalmological preparations which are used in management of eye diseases
- Medicine used in ear and nose which are used in management of ear and nose problems
- Oxytocics which are used in management of delayed labour
- Psychotherapeutics which are used in management of psychiatric conditions
- Medicines acting on the respiratory tracts which are used in management of diseases associated with respiratory system
- Solution correcting water and electrolyte which are used in management of fluid and electrolyte imbalances
- Vitamins and minerals which are used in management of vitamin and mineral deficiency

### **STEP 3: Description Of Pharmacological Classes of Essential Medicines (65 Minutes)**

***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- How do we describe pharmacological classes of essential medicines?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

- Pharmacological classes of medicines include drugs which have similar functions. Examples of drugs with similar functions are:
  - Anaesthetics include general anaesthetic (halothane, ketamine, isoflurane and thiopental) and local anaesthetics ( lignocaine and bupivacaine)
  - Muscle relaxants include gallamine, neostigmine, pancuronium, suxamethonium
  - Analgesics is for pain relief and include aspirin, paracetamol, diclofenac, ibuprofen, indomethazine, piroxicam, mefenamic acid, naproxen, they also have antipyretic and antinflammatory effects, narcotics such as tromadol are pain relief and they act in the central nervous system
  - Anti allergies such as chlorpheniramine, loratadine, cetirizine, adrenaline, dopamine hydrocortisone, promethazine, dexamethasone are used in management of allergic reactions
  - Antidotes such as ipecacuanha, activated charcoal, magnesium salt and antivenom used in counteracting the effects of poisons

- Anti epileptics (carbamazepine, diazepam, Phenobarbital, phenytoin and magnesium sulphate) are used in management of epilepsy
- Anti-neoplastic/immunosuppressive ( cyclophosphamide, rituximab and prednisolone) are used in immunosuppression especially during organ transplant and management of some cancers
- Antiparkinsonism such as benztropine, biperidine, bromocriptine and carbidopa are used in management of Parkinson's disease
- Blood booster such as ferrous sulphate, folic acid and vitamin B<sub>12</sub> are used in management of anemia
- Anti coagulants such as aspirin, activated prothrombin, enoxaparin sodium, heparin, vitamin K, protamine sulphate, streptokinase, alteplase, frozen plasma, factor viii and factor ix are used as blood thinner and management of thrombosis
- Cardiovascular medicine; drugs used in management of heart disease and problems associated with blood vessels, they include:
  - Anti anginal drugs ( glyceryl trinitrate, isosorbide mono/dinitrate, nifedipine, clopidogrel and propranolol), used in management of angina
  - Anti arrhythmic drugs, (amiodarone, verapamil, adenosine and lidocaine) are used in management of cardiac arrhythmias
  - Anti-hypertensives such as methyldopa, captopril, nifedipine, atenolol, propranolol, labetalol, bumetanide, perindopril, carvedilol, metoprolol, amlodipine, hydralazine and bisoprolol are used in management of hypertension
  - Cardiac Glycosides such as digoxine is used in management of congestive heart failure
  - Diuretics such as frusemide, bendrofluazide, spironolactone, mannitol and glycerol syrup are used in management of hypertension and extracellular edema
  - Lipid Lowering such as simvastatin and atorvastatin are used in lowering cholesterol level in blood
- Dermatological medicines are used in management of various skin conditions, they include:
  - Anti-inflammatory (steroidal) and Anti-pruritic Medicines such as betamethasone, hydrocortisone, dithranol, clobetasol propionate, para amino benzoic acid and tretinoic acid
  - Fungicides (topical) such as clotrimazole, nystatin, miconazole, tolnaftate, terbinafine and sodium thiosulphate solution
  - Keratolytic Agent such as silver nitrate sticks, podophyllin solution, trichloroacetic acid and sun screen protection factor
  - Anti-infective Agent (topical) such as oxytetracycline, retinoic acid, isotretinoin, chloramphenicol, mupirocin, gentamycin and bezoyl peroxide used in various bacterial infections on the skin
- Gastro-intestinal medicines are drugs which are used in management of various gastrointestinal conditions. They include:
  - Antacids and Anti-ulcers Agents such as cimetidine, ranitidine, omeprazole, lansoprazole esomeprazole and magnesium trisilicate

- Drugs affecting intestinal secretion and antispasmodics ( hyoscine butyl bromide, cholestyramine and ursodeoxycholic acid)
  - Anti-emetics such as promethazine, metochlopramide and prochloroperazine used in management of nausea and vomiting
  - Cathartics (bisacodyl and lactulose) used in management of constipation
  - Anti-Haemorrhoids (Anusal) for haemorrhoid
  - Medicines used in Diarrhoea include, ORS, loperamide and zinc tablets. They are used in management of diarrhea
- Hormones and antidiabetic agents and related medicines are drugs which are used in management of diabetes mellitus and other hormonal disorders. They include:
  - Adrenal Hormones and Synthetic Substitutes include dexamethazone hydrocortisone and prednisolone
  - Oestrogens example ethinyloesradiol
  - Insulin and Anti-diabetic Agents example chlorpropamide, glibenclamide, gliclazide, tolbutamide, metformin, glucagon glipizede and insulin
  - Ovulation inducers example clomiphene
  - Oral Contraceptives example ethinyloestradiol + norgestrel, ethinyloestradiol+levonorgestrel and ethinyloestradiol ethinyloestradiol +desogestrel
  - Barrier and Other Contraceptives which are intra uterine device, male and female condoms
  - Progesterone example levonorgestrel, medroxyprogesterone and hydroxyprogesterone
  - Thyroid, Parathyroid hormones and Antagonists for example carbimazole, iodine solution, levothyroxine and iodized oil capsule
- Sera and immunoglobulins are drugs used in management of immunological problems and preventions of some diseases example gamma globulin, anti D globulin, anti lymphocytes, anti-rabies, antithymocytes, activated prothrombin, factor vii, snake venom polyvalent antiserum and tetanus immunoglobulin
- Vaccines are medicines which are used in prevention of various diseases. Example of vaccines include
  - Vaccines for immunization like BCG, DPT, measles, poliomyelitis and tetanus toxoids
  - Vaccines for specific group of individuals like hepatitis B, meningitis, rabies yellow fever and pneumococcal
- Ophthalmological preparations are drugs which are used in management of various eye problems. They include:
  - Antifungal agents like acyclovir, chloramphenical, gentamycin, povidon iodine, oxytetracycline, ciprofloxacin, econazole and natamycin
  - Steroidal Anti-inflammatory Agents like dexamethazone, prednisolone and triamcinolone acetate

- Antinfective and Antinflammatory Agents like cyclopentolate, atropine, timolol, hydroxypropylmethylcellulose, alomide, sodium chromoglycate, pilocarpine hydrochloride, zinc sulphate, lutanoprost acetazolamide and glycerol syrup
  - Drugs for Trachoma and Onchocerciasis like azithromycin and ivermectine
- Medicines used in ear & nose diseases are drugs which are used in management of ear and nose diseases. They include:
  - Ear drops like chloramphenical, dexamethazone, ciprofloxacin and alluminium acetate
  - Oral antiseptics like chlorhexidine gluconate solution and potassium permanganate solution
  - Nasal preparations like beclomethazine spray and ephedrine nasal drops
- Oxytocics, myometrial relaxants (tocolytics) and related medicines are used in smooth muscle relaxation and enclepsia. They include salbutamol, ergometrine, oxytocine misoprostol and magnesium sulphate solutions
- Psychotherapeutic and related medicines are used in psychosis and related diseases. They include carbamazepine, phenytoin, phenobarbitone amirtyptilline, fluvoxamine, citalopram, chlorpromazine, fluphenazine decanoate, haloperidol, imipramine, thioridazine, alprazolam, lorazepam, fluoxetine, olanzapine, resiredone, benzhexol bromocriptine chlordiazepoxide and sodium valproate
- Medicines acting on respiratory tract are used in various diseases of respiratory tract They include:
  - Anti-asthmatics like aminophylline, beclomethazone, cromoglycate, salbutamol, ipratropium bromide and adrenalin
  - Antitussives like expectorants, linctuces and cough syrups
- Solutions, correcting water electrolyte and acid base disturbances, they include dextrose of various concentration, compound sodium lactate, sodium chloride, sodium chloride and dextrose, potassium citrate oral solution and water for injection
- Vitamins and minerals are usually used during deficiency and as supplements
- They include vitamin A, vitamin B group, ascorbic acids, vitamin D, vitamin K, Selenium, calcium gluconate and potassium chloride

#### **STEP 4: Key points (5 minutes)**

- In pharmacological classification, drugs are grouped according to similarity in functions
- Description of those classes is based on the types of drugs composed such classes

#### **STEP 5: Evaluation (5 minutes)**

- What are the anesthetics ?
- What are the antipakinsonism drugs?
- What are vitamins?
- What are the cardiovascular medicines?

## References

- Ministry Of Health and Social Welfare. (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.
- Robert, L., Talbert, Gary C. Yee, Gary R. Matzke, Barbara G. Wells, L. Michael. (2014). *Pharmacotherapy: a pathophysiologic approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Sally S.R, Jeanne C.S. (2000). *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins
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- The Royal Pharmaceutical Society of Great Britain. (2007). *Martindale, the Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.
- The Royal Pharmaceutical Society of Great Britain. (2009). *British National Formulary* (59<sup>th</sup> ed). London, BMJ Group and RPS Publishing.

# Session 3: Description of Anti-infective Medicines

**Total Session Time:** 120 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- Define anti-infective medicine
- Describe pharmacological classes of anti-infective medicine

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Computer and overhead projector where necessary

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Tasks
2	40 minutes	Presentation/ Buzzing	Definition of Anti Infective Medicine
3	65 minutes	Presentation/ small group discussion	Description of Pharmacological Classes of Anti Infective Medicine
4	05 minutes	Presentation	Key Points
5	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning Tasks (5 minutes)**

**READ or ASK** students to read the learning objectives and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Definitions of Pharmacological Classes of Essential Medicine (40 Minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What is anti-infective medicine?

**ALLOW** few pairs to respond and let other pairs add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY** and **SUMMARIZE** by using the content below

- **Ant -infective medicines** are those medicines used to fight against organisms that cause infections
- **Drug, anti-infective:** Something capable of acting against infection, by inhibiting the spread of an infectious agent or by killing the infectious agent outright
- . **Anti-infective** is a general term that encompasses antibacterials, antibiotics, antifungals, antiprotozoans and antivirals.

### **STEP 3: Description of Pharmacological Classes of Anti Infective Medicine (65 Minutes)**

#### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- List the pharmacological classes of anti-infective medicines?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- There are several pharmacological classes of anti-infective medicine which are listed in the National essential drug lists. The classes include:
  - **Antibacterial** : used in treatment of various bacterial infection  
groups of antibiotics include aminoglycosides, antituberculosis and leprosy, fluoroquinolones, penicillins and cephalosporins, macrolides, chloramphenicol, tetracyclines,
  - **Antiprotozoans**: used to treat protozoan infections such as amoebiasis, filariasis, leishmaniasis, malaria, and schistosomiasis and trypanosomiasis
  - **Ant helminthes**: used in treatment of various worm infestation
  - **Fungicides (Systemic and Mucosal)**: used in management of systemic and mucosal fungal infection
  - **Antiviral**: used to treat viral infection

### **STEP 7: Key Points (5 Minutes)**

- In pharmacological classification, anti-infective drugs are grouped according to similarity indication
- The definition of anti-infective drugs are based on their pharmacological action

### **STEP 7: Evaluation (5 Minutes)**

- What is anti-infective medicine?
- What are the main groups of anti-infective medicines?

## References

- Ministry of Health and Social Welfare. (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.
- Robert, L., Talbert, Gary C. Yee, Gary R., Matzke, Barbara, G., Wells, L. Michael. (2014). *Pharmacotherapy: A Pathophysiologic Approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Sally S.R, Jeanne C.S. (2000). *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins.
- School of Pharmaceutical sciences. (2011). *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.
- The Royal Pharmaceutical Society of Great Britain. (2007). *Martindale, the Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.
- The Royal Pharmaceutical Society of Great Britain. (2009). *British National Formulary* (59<sup>th</sup> ed). London, BMJ Group and RPS Publishing.



# Session 4: Description of Penicillin and Cephalosporins

**Total Session Time:** 120 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of penicillins and cephalosporins
- List contraindications of penicillin and cephalosporins
- Describe dose, dosage and course of penicillins and cephalosporins
- List side effects and adverse effects of penicillins and cephalosporins
- Describe interactions and precautions of penicillins and cephalosporins

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Overhead projector and computer

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning tasks
2	20 minutes	Presentation/ Buzzing	Indications of Penicillins and Cephalosporins
3	20 minutes	Presentation/ Brainstorming	Contraindications of Penicillins and Cephalosporins
4	30 minutes	Presentation	Dose, Dosage and Course of Penicillins and Cephalosporins
5	20 minutes	Presentation/ Brainstorming	Listing side effects and adverse effects of Penicillins and Cephalosporins Drugs
6	15 minutes	Presentation	Description of interactions and precautions of Penicillins and Cephalosporin Drugs
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning tasks (5 minutes)**

**READ or ASK** students to read the learning tasks and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Penicillins and Cephalosporins (20 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following questions for 2 minutes

- Mention commonly used penicillins and cephalosporins
- What are indications for cephalosporins and penicillins?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY** and **SUMMARIZE** by using the content below

The remarkably powerful and specific activity of antimicrobial drugs is due to their selectivity for targets that are either unique to microorganisms or much more important in them than in humans

- Penicillins:
  - Have greatest activity against gram-positive organisms, gram-negative cocci, and non-lactamase-producing anaerobes.
  - However, they have little activity against gram-negative rods,
  - They are active against staphylococci and streptococci but not against enterococci, anaerobic bacteria, and gram-negative cocci and rods.
  - Extended-spectrum penicillins (ampicillin and the antipseudomonal penicillins) retain the antibacterial spectrum of penicillin and have improved activity against gram-negative organisms
  - Commonly used Penicillins include:
    - Amoxicillin
    - Flucloxacillin
    - Benzyl penicillin
    - Procaine penicillin
    - Ampicillin

- Cephalosporins:
  - similar to penicillins
  - But more stable to many bacterial lactamases
  - Therefore have a broader spectrum of activity
  - However, strains of *E coli* and *Klebsiella* species expressing extended-spectrum lactamases that can hydrolyze most cephalosporins are becoming a problem
  - Cephalosporins are not active against enterococci and *L monocytogenes*
  - Commonly used Cephalosporins include:
    - Cefuroxime
    - Cefotaxime
    - Ceftriaxone
    - Cefalexin
    - Cefradoxil

### **STEP 3: Contraindications of Penicillins and Cephalosporins (20 minutes)**

***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

What are contraindications of penicillins and cephalosporins?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Penicillins are contraindicated:
  - In patients with renal failure
  - In patients with penicillin hypersensitivity
- Cephalosporins are contraindicated:
  - In patients with cephalosporin hypersensitivity
  - In patients with a history of anaphylaxis to penicillins

### **STEP 4: Dose, Dosage and Course of Penicillins and Cephalosporins (30 minutes)**

- Penicillins
  - Amoxicillin 250-500mg every 6hourly for 5-7 days
  - Ampicillin 250-500mg every 6hourly for 5-7 days
  - Penicillin G up to 2.4mU/dose I.M
- Cephalosporins
  - Orally

- Cephalexin is given orally in dosages of 0.25-0.5 g four times daily (15-30 mg/kg/d)
- Cefadroxil in dosages of 0.5-1 g twice daily.
- Parenterally
  - The usual intravenous dosage for adults is 0.5-2 g intravenously every 8 hours.
  - can also be administered intramuscularly

## **STEP 4: Side Effects and Adverse Effects of Penicillins and Cephalosporins (20 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are side effects and adverse effects of penicillins and cephalosporins?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Penicillin
  - Adverse effects and side effects:
    - The penicillins are remarkably nontoxic
    - Most of the serious adverse effects are due to hypersensitivity.
    - All penicillins are cross-sensitizing and cross-reacting
    - Allergic reactions include anaphylactic shock (serum sickness-type reactions, urticaria, fever, joint swelling, angioneurotic edema, intense pruritus, and respiratory embarrassment variety of skin rashes)
    - Oral lesions, fever, interstitial nephritis vasculitis may also occur
    - Most patients allergic to penicillins can be treated with alternative drugs
- Cephalosporins
  - Adverse effects and side effects:
    - Cephalosporins are sensitizing and may elicit a variety of hypersensitivity reactions that are identical to those of penicillins
    - These include anaphylaxis, fever, skin rashes, nephritis, granulocytopenia, and hemolytic anemia
    - Local irritation can produce severe pain after intramuscular injection and thrombophlebitis after intravenous injection
    - Renal toxicity, including interstitial nephritis and even tubular necrosis.

## **STEP 5: Interactions and Precautions of Penicillins and Cephalosporins (15 minutes)**

- Penicillins
  - Interactions
    - Reduce excretion of cytotoxic like methotrexate
    - Allopurinol increases risk of rash when used with amoxicillin or ampicillin
    - Effects of anticoagulants are altered by penicillin
  - Precautions
    - History of allergy
    - Most patients allergic to penicillins can be treated with alternative drugs.
- Cephalosporins
  - Interaction and precaution
    - Drugs with the methylthiotetrazole ring can also cause severe disulfiram-like reactions: consequently, alcohol and alcohol-containing medications must be avoided

## **Step 7: Key Points (5 minutes)**

- Penicillins have greatest activity against;
  - gram-positive organisms
  - gram-negative cocci
  - non- beta-lactamase-producing anaerobes
- Cephalosporins are similar to penicillins
  - But more stable to many bacterial lactamases
  - Therefore have a broader spectrum of activity
- Penicillins and Cephalosporins are contraindicated in patients with hypersensitivity reactions
- Penicillins and Cephalosporins can be given orally or by injection
- Common side effects of Penicillins and Cephalosporins fever, skin rashes, nephritis

## **STEP 8: Evaluation (5 minutes)**

- What are the indications of Penicillins and Cephalosporin Drugs?
- What are the Contraindication of Penicillins and Cephalosporin Drugs?
- What are the dose, dosage and course of Penicillins and Cephalosporin Drugs?
- What are side effects and adverse effects of Penicillins and Cephalosporin Drugs?

## References

- MoHSW (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam: Tanzania Government Printers.
- Sally, S.R. Jeanne, C.S. (2000). *Introductory Clinical Pharmacology* (6<sup>th</sup>ed) New York, Lippincott Williams and Wilkins.
- School of Pharmaceutical Sciences (2011). *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam: ARDHI University Press.
- Talbert, R. L. Yee, G. C. Matzke, G. R. Wells, B. G. & Michael, L. (2014) *Pharmacotherapy: a pathophysiologic approach* (9<sup>th</sup> ed.). New York: McGraw-Hill Education.
- The Royal Pharmaceutical Society of Great Britain (2007). *Martindale, the Extra Pharmacopoeia* (5<sup>th</sup> ed). London: Pharmaceutical Press.
- The Royal Pharmaceutical Society of Great Britain (2009). *British National Formulary* (59<sup>th</sup> ed). London: BMJ Group and RPS Publishing.
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# Session 5: Description of Macrolide Drugs

**Total Session Time:** 60 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of Macrolide Drugs
- List Contraindications of Macrolide Drugs
- Describe dose, dosage and course of Macrolidede Drugs
- List side effects and adverse effects of Macrolide Drugs
- Describe interactions and precautions of Macrolide Drugs

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Tasks
2	10 minutes	Presentation/ Buzzing	Indications of Macrolide Drugs
3	10 minutes	Presentation/ brainstorming	Contraindications of Macrolide Drugs
4	10minutes	Presentation	The dose, Dosage and Course of Macrolide Macrolide Drugs
5	10 minutes	Presentation/ brainstorming	The Side Effects and Adverse Effects of Macrolide Drugs
6	05minutes	Presentation	Interactions and Precautions of Macrolide Drugs
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP1: Presentation of Session Title and Learning tasks (5 minutes)**

**READ or ASK** students to read the learning tasks and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Macrolide Drugs (10minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What are macrolide antibiotics?
- What are the indications of Macrolide drugs?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY** and **SUMMARIZE** by using the content below

- Macrolide antibiotics includes:
  - Erythromycin
  - Clarithromycin
  - Azithromycin
- The indication of the macrolides:
  - Are effective against gram-positive organisms, especially pneumococci, streptococci, staphylococci, and corynebacteria
  - Also effective to Mycoplasma, legionella, Chlamydia trachomatis, Chlamydia psittaci, Chlamydia pneumoniae, helicobacter, listeria, and certain mycobacteria (*Mycobacterium kansasii*, *M scrofulaceum*)
  - Gram-negative organisms such as *Neisseria* sp, *Bordetella pertussis*, *Bartonella henselae*, and *B quintana* (etiologic agents of cat-scratch disease and bacillary angiomatosis) some *rickettsia* sp, *Treponema pallidum*, and *campylobacter* sp are susceptible.

## **STEP 3: Contraindication of Macrolide Drugs (10minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the contraindications of Macrolide drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Erythromycin is contraindicated in:
  - In patient with hepatic impairment
  - In patient with Renal impairment
- Clarithromycin is contraindicated in:
  - Pregnancy
  - Hepatic dysfunction
  - Renal impairment
- Azithromycin are contraindicated in:
  - Breastfeeding
  - Pregnancy
  - Hepatic dysfunction
  - Renal impairment

## **STEP 4: Dose, Dosage and Course of Macrolide drugs (10minutes)**

- Erythromycin
  - The oral dosage of erythromycin base is 250-500mg every 6 hours (for children, 40 mg/kg/d)
  - Over 8 years 250-500mg every six hours Or 4000mg daily in divided doses in severe infection
  - The dosage of erythromycin ethylsuccinate is 400-600mg every 6 hours
  - Oral erythromycin base (1 g) is sometimes combined with oral neomycin or kanamycin for preoperative preparation of the colon
  - The intravenous dosage of erythromycin gluceptate or lactobionate is 500-1000 mg every 6 hours for adults and 20-40 mg/kg/d for children

- Azithromycin
  - 500mg once daily for 3 days
  - 500mg on the first day then 250mg once daily for 4 days
  - Child over 6 months 10mg/kg once daily for 3 days
- Clarithromycin
  - 250mg every 12 hours for seven days
  - In severe infections 500mg 12 hourly for 14 days
  - Intravenously infusion 500mg twice daily

## **STEP 5: Side Effects and Adverse Effects of Macrolide Drugs(10 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the side effects and adverse effects of macrolide drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

The following are the side effects/adverse effects of macrolides drugs:

- Anorexia, nausea, vomiting, and Diarrhoea occasionally accompany oral administration
- Gastrointestinal intolerance, which is due to a direct stimulation of gut motility,
- Can produce acute cholestatic hepatitis (fever, jaundice, impaired liver function)
- Other allergic reactions include fever, eosinophilia, and rashes

## **STEP 6: Interaction and Precaution of Essential Macrolide drugs(5min)**

- Interaction and precaution:
  - Erythromycin metabolites can inhibit cytochrome P450 enzymes thus increase the serum concentrations of theophylline, oral anticoagulants, cyclosporine, and methylprednisolone
  - Erythromycin increases serum concentrations of oral digoxin by increasing its bioavailability

## **Step 7: Key Points (5 minutes)**

- Macrolide drugs includes erythromycin, Clarithromycin and azithromycin
- Macrolides are effective against gram-positive organisms, especially pneumococci, streptococci, staphylococci, and corynebacteria
- Macrolides are contraindicated in: Pregnancy, Hepatic dysfunction Renal impairment
- Macrolides can be given orally or by injection
- Common side effects of Macrolides are Anorexia, nausea, vomiting, and Diarrhoeadiarrhoea
- Macrolides increases effects of many drugs like digoxin and theophylline

## **STEP 8: Evaluation (5 minutes)**

- What are the indications of Macrolide drug?
- What are the Contraindications of Macrolide drugs?
- What are the dose, dosage and course of Macrolide drugs?
- What are side effects and adverse effects of Macrolide drugs?
- What are the interactions and precautions of Macrolide drugs?

## References

- Robert, L. Talbert, Gary C. Yee, Gary R. Matzke, Barbara G. Wells& L. Michael. (2014). *Pharmacotherapy: a pathophysiologic approach* (9<sup>th</sup>ed.). New York, McGraw-Hill Education.
- Ministry Of Health and Social Welfare. ( 2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.
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- The Royal Pharmaceutical Society of Great Britain. (2007). *Martindale, the Extra Pharmacopoeia* (5<sup>TH</sup>ed). London, pharmaceutical press.
- The Royal Pharmaceutical Society of Great Britain. (2009). *British National Formulary* (59<sup>th</sup> ed). London, BMJ Group and RPS Publishing.

# Session 6: Description of Aminoglycoside Drugs

**Total Session Time:** 120 minutes

## Prerequisites

- Session 3: General Classification of Essential Medicine

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of aminoglycosides
- List contraindications of aminoglycosides
- Describe dose, dosage and course of aminoglycosides
- List side effects and adverse effects of aminoglycosides
- Describe interactions and precautions of aminoglycosides

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning tasks
2	20 minutes	Presentation/ Buzzing	Indications of Aminoglycosides
3	20 minutes	Presentation/ Brainstorming	Contraindications of Aminoglycosides
4	30 minutes	Presentation	Dose, Dosage and Course of Aminoglycosides
5	20 minutes	Presentation/ Brainstorming	Side Effects and Adverse Effects of Aminoglycosides
6	15 minutes	Presentation	Interactions and Precautions of Aminoglycosides
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## **SESSION CONTENTS**

### **STEP 1: Presentation of Session Title and Learning Tasks (5 minutes)**

**READ or ASK** students to read the learning tasks and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Aminoglycosides (20minutes)**

#### ***Activity: Buzzing (5minutes)***

**ASK** students to pair up and buzz on the following questions for 2 minutes

- What are the types of aminoglycosides?
- What are the indications of aminoglycosides?

**ALLOW** few pairs to respond and let other pairs add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY and SUMMARIZE** by using the content below

- The aminoglycosides include streptomycin, neomycin, kanamycin, amikacin, gentamicin, tobramycin
- All aminoglycosides are bactericidal and active against some Gram-positive and many Gram-negative organisms
- Amikacin, gentamicin, and tobramycin are also active against Pseudomonas aeruginosa
- Streptomycin is active against Mycobacterium tuberculosis and is now almost entirely reserved for tuberculosis

### **STEP 3: Contraindications of Aminoglycosides (20 minutes)**

#### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are contraindications of aminoglycosides?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

- The aminoglycosides are contraindicated in:
  - Myasthenia gravis
  - In patients with renal failure
  - Hearing impairment
  - Pregnancy

#### **STEP 4: Dose, Dosage and Course of Aminoglycoside (30 minutes)**

The following are the commonly dose, dosage and courses of common aminoglycosides

- Gentamycin

Multiple daily dose regimen, by intramuscular or by slow intravenous injection over at least 3 minutes or by intravenous infusion, 3–5 mg/kg daily (in divided doses every 8 hours)

- Neomycin

Given by mouth, pre-operative bowel sterilisation, 1 g every hour for 4 hours, then 1 g every 4 hours for 2–3 days, for Hepatic coma, up to 4 g daily in divided doses usually for 5–7 days

- Amikacin

Given by intramuscular or by slow intravenous injection or by infusion, 15 mg/kg daily in 2 divided doses, can be increased to 22.5 mg/kg daily in 3 divided doses in severe infections; max. 1.5 g daily for up to 10 days (max. cumulative dose 15 g)

#### **STEP 4: Side Effects and Adverse Effects of Aminoglycosides (20minutes)**

##### ***Activity: Brainstorming (5 minutes)***

**ASK** students to brainstorm on the following question:

- What are the common side effects/ adverse effects of aminoglycosides?"

**ALLOW** few learners to respond

**WRITE** their responses on the flipchart

**SUMMARIZE** the discussion by the following information

All aminoglycosides are ototoxic and nephrotoxic

- This is more likely to be encountered when therapy is continued for more than 5 days, at higher doses, in the elderly, and in the setting of renal insufficiency)
- Neomycin, kanamycin, and amikacin are the most ototoxic agents
- Streptomycin and gentamicin are the most vestibulotoxic
- Neomycin, tobramycin, and gentamicin are the most nephrotoxic

## **STEP 5: Interactions and Precautions of Aminoglycosides (15minutes)**

Interaction and precaution of the aminoglycosides

- Concurrent use with: loop diuretics eg, furosemide, ethacrynic acid
- Other nephrotoxic antimicrobial agents eg, vancomycin or amphotericin) potentiates nephrotoxicity
- The above drugs should be avoided if possible when using aminoglycosides

## **Step 6: Key Points (5minutes)**

- Commonly used Aminoglycosides are: streptomycin, neomycin, kanamycin, amikacin, gentamicin, tobramycin
- Aminoglycosides are active against gram-negative enteric bacteria
- Aminoglycosides are contraindicated in myasthenia gravis, renal and hearing problems
- Aminoglycosides are mainly given by injection

## **STEP 7: Evaluation (5minutes)**

- What are the indications of aminoglycoside drugs?
- What are the contraindications of aminoglycoside drugs?
- What are the common side effects of aminoglycoside drugs?

## References

- Ministry Of Health and Social Welfare. (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.
- Robert, L. Talbert, Gary C. Yee, Gary R. Matzke, Barbara G. Wells, L. Michael. (2014). *Pharmacotherapy: A Pathophysiologic Approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Sally, S.R, Jeanne C.S. (2000). *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins.
- School of Pharmaceutical sciences. (2011). *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.
- The Royal Pharmaceutical Society of Great Britain. (2007). *Martindale, the Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.
- The Royal Pharmaceutical Society of Great Britain. (2009). *British National Formulary* (59<sup>th</sup> ed). London, BMJ Group and RPS Publishing.



# Session 7: Description of Fluoroquinolone Drugs

**Total Session Time:** 120 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of Fluoroquinolone Drugs
- List Contraindication of Fluoroquinolone Drugs
- Describe dose, dosage and course of Fluoroquinolone Drugs
- List side effects and adverse effects of Fluoroquinolone Drugs
- Describe interaction and precaution of Fluoroquinolone Drugs

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Computer and projector

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning tasks
2	20 minutes	Presentation/ Buzzing	Indications of Fluoroquinolone Drugs
3	20 minutes	Presentation/ brainstorming	Contraindication of Fluoroquinolone Drugs
4	30 minutes	Presentation	Dose, Dosage and Course of Fluoroquinolone Drugs
5	20 minutes	Presentation/ brainstorming	Side Effects and Adverse Effects of Fluoroquinolone Drugs
6	15 minutes	Presentation	Interaction and Precaution of Fluoroquinolone Drugs
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning tasks (5 minutes)**

**READ or ASK** students to read the learning tasks and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Fluoroquinolone Drugs (20minutes)**

#### ***Activity: Buzzing (5 minutes)***

**Ask** students to pair up and buzz on the following questions:

- What are the Fluoroquinolone drugs?
- What are the indications of Fluoroquinolone drugs?

**ALLOW** few pairs to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

- Fluoroquinolones include Nalidixic acid, norfloxacin, ciprofloxacin, oxfloxacin and levofloxacin
- The remarkably powerful and specific activity of antimicrobial drugs is due to their selectivity for targets that are either unique to microorganisms or much more important in them than in humans
- Fluoroquinolones are active against a variety of gram-positive and gram-negative bacteria
- Nalidixic acid and norfloxacin are effective in uncomplicated urinary-tract infections.
- Ciprofloxacin is active against both Gram-positive and Gram-negative bacteria. It is particularly active against Gram-negative bacteria, including salmonella, shigella, campylobacter, neisseria, and pseudomonas
- Ciprofloxacin has only moderate activity against Gram-positive bacteria such as Streptococcus pneumoniae and Enterococcus faecalis; it should not be used for pneumococcal pneumonia. It is active against chlamydia and some Mycobacteria
- Ofloxacin is used for urinary-tract infections, lower respiratory-tract infections, gonorrhoea, and non-gonococcal urethritis and cervicitis
- Levofloxacin is active against Gram-positive and Gram-negative organisms.
  - It has greater activity against pneumococci than ciprofloxacin.
  - Levofloxacin is licensed for community-acquired pneumonia but it is considered to be second-line treatment for this indication

### **STEP 3: Contraindication of Fluoroquinolones Drugs (20 minutes)**

**Activity:** brainstorming (5 minutes)

**ASK** learners to brainstorm on the following question

- What is contraindication of Fluoroquinolone drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flipchart

**CLARIFY** and **SUMMARISE** by using the content below

Fluoroquinolones are contraindicated in:

- Pregnancy
- Patients with a history of tendon disorders related to quinolone use
- Severe hepatic impairment
- Bradycardia
- History of symptomatic arrhythmias
- Heart failure
- Electrolyte disturbances

### **STEP 4: Dose, Dosage and Course of Fluoroquinolone drugs (30 minutes)**

- Ciprofloxacin
  - By mouth, respiratory-tract infections, 500–750 mg twice daily (750 mg twice daily( in pseudomonal lower respiratory-tract infection in cystic fibrosis)
  - Urinary-tract infections, 250–750 mg twice daily (250 mg twice daily for 3 days usually adequate for acute uncomplicated cystitis in women)
  - Acute or chronic prostatitis, 500 mg twice daily for 28 days
  - Gonorrhoea, 500 mg as a single dose
  - Most other infections, 500 mg twice daily (increased to 750 mg twice daily in severe or deep-seated infection)
  - Surgical prophylaxis [unlicensed], 750 mg 60 minute before procedure
  - Prophylaxis of meningococcal meningitis by intravenous infusion over 60 minutes, 400 mg
  - Anthrax (treatment and post-exposure prophylaxis, every 8–12 hours
  - by mouth, 500 mg twice daily
  - By intravenous infusion over 60 minutes, 400 mg every 12 hours
- Levofloxacin
  - By mouth, acute sinusitis, 500 mg daily for 10–14 days
  - Exacerbation of chronic bronchitis, 250–500 mg daily for 7–10 days
  - Community-acquired pneumonia, 500 mg once or twice daily for 7–14 days

- Urinary-tract infections, 250 mg daily for 7–10 days(for 3 days in uncomplicated infection)
- Chronic prostatitis, 500 mg once daily for 28 days
- Skin and soft tissue infections, 250 mg daily

## **STEP 4: Side Effects and Adverse Effects of Fluoroquinolone Drugs** **(20minutes)**

**ACTIVITY:** brainstorming (5 minutes)

**ASK** students to brainstorm on the following question

- What are the side effects and adverse effects of Fluoroquinolone drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flipchart

**CLARIFY** and **SUMMARISE** by using the content below

Adverse effects and side effects of Fluoroquinolones

- Fluoroquinolones are extremely well tolerated
- The most common effects are nausea, vomiting, and diarrhea
- Occasionally, headache, dizziness, insomnia, skin rash, or abnormal liver function tests develop
- Photosensitivity has been reported with lomefloxacin and pefloxacin may damage growing cartilage and cause an arthropathy
- Tendinitis, a rare complication that has been reported in adults

## **STEP 5: Interactions and Precautions of Essential Fluoroquinolone Drugs** **(15 minutes)**

- Interaction of Fluoroquinolones
  - Also should avoided in those receiving quinidin procainamide sotalol, ibutilide, amiodarone)
  - Patients receiving other agent like erythromycin, tricyclic antidepressants should be given fluoroquinolones with caution
- Precaution

Quinolones should be used with caution in:

- Patients with a history of epilepsy or conditions that
- Renal impairment
- Pregnancy
- During breast-feeding
- Quinolones may induce convulsions in patients with without a history of convulsions
- Should be used with caution in condition that predispose to seizures and myasthenia gravis
- Taking nsaid's at the same time may also induce them

## **Step 7: Key Points (5minutes)**

- Some commonly used Fluoroquinolones are: Nalidixic acid and norfloxacin, ciprofloxacin, oxfloxacin and levofloxacin
- Fluoroquinolones are contra-indicated in patients with a history of tendon disorders related to Fluoroquinolones use, patient with hepatic impairment and in pregnancy
- Nausea vomiting and diarrhea are common side effects
- Fluoroquinolones can be given orally or by injection
- Fluoroquinolones can predispose to seizure and myxaenia gravis

## **STEP 8: Evaluation (5minutes)**

- What are the indications of Fluoroquinolone drugs?
- What are the Contraindication of Fluoroquinolone drugs?
- What are the dose, dosage and course of Fluoroquinolone drugs?
- What are side effects and adverse effects of Fluoroquinolones drugs?

## References

- Robert L. Talbert, Gary C. Yee, Gary R. Matzke, Barbara G. Wells & L. Michael. (2014). *Pharmacotherapy: A Pathophysiologic Approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Ministry of Health and Social Welfare. (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.
- Sally S.R & Jeanne C.S. (2000). *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins
- School of Pharmaceutical sciences. (2011). *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.
- The Royal Pharmaceutical Society of Great Britain. (2007). *Martindale, the Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.

# Session 8: Description of Antituberculosis

**Total Session Time:** 120 minutes

## Prerequisites

- None
- **Learning Tasks**

By the end of this session students are expected to be able to:

- List indications of antituberculosis
- List contraindications of antituberculosis
- Describe dose, dosage and course of antituberculosis
- List side effects and adverse effects of antituberculosis
- Describe interactions and precautions of antituberculosis

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Overhead projector and computer

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning tasks
2	20 minutes	Presentation/ Buzzing	Indications of Antituberculosis
3	20 minutes	Presentation/ Brainstorming	Contraindications of Antituberculosis
4	30 minutes	Presentation	Dose, Dosage and Course of Antituberculosis
5	20 minutes	Presentation/ Brainstorming	Side Effects and Adverse Effects of Antituberculosis
6	15 minutes	Presentation	Interactions and Precautions of Antituberculosis
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## **STEP 1: Presentation of Session Title and Learning tasks (5 minutes)**

**READ or ASK** students to read the learning objectives and clarify

**ASK** students if they have any questions before continuing.

## **STEP 2: Indications of Antituberculosis Drugs (20 minutes)**

### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- Which drugs are used in treatment of tuberculosis?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY** and **SUMMARIZE** by using the content below

- Tuberculosis is managed by the following drugs usually in combination to prevent mycobacterium resistance and toxicity
  - Rifampicin symbolized by R
  - Isoniazid symbolized by H
  - Pyrazinamide symbolized by Z
  - Ethambutol symbolized by E
  - Streptomycin symbolized by S
- Tuberculosis is usually managed in two phases, initial phases and continuous phase
  - The initial phase; during this phase combination drugs are continued for 2 months
  - Drugs used in initial phase are rifampicin, isoniazid, pyrazinamide and ethambutol
  - These drugs should be continued until full susceptibility is confirmed, even if this is for longer than 2 months
  - Continuation phase; after the initial phase, treatment is continued for a further 4 months with isoniazid and rifampicin (preferably given as a combination preparation). Longer treatment is necessary for meningitis, direct spinal cord involvement, and for resistant organisms which may also require modification of the regimen
- Other drugs indicated for management of tuberculosis as second line include cycloserine, ethionamide and streptomycin

### **STEP 3: Contraindications of Antituberculosis Drugs (20 minutes)**

#### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the contraindications of antituberculosis drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Rifampicin is contraindicated to patient with jaundice
- Isoniazid is contraindicated to patient with drug induced liver disease
- Pyrazinamide is contraindicated to patient with Hepatic disorders
  - Patients or their careers should be told how to recognize signs of liver disorder, and advised to discontinue treatment and seek immediate medical attention if symptoms such as persistent nausea, vomiting, malaise or jaundice develop
- Ethambutol is contraindicated in optic neuritis and poor vision
- Streptomycin is contraindicated to patient with mythenia gravis
- Cycloserine is contraindicated to patient with epilepsy, depression, severe anxiety, psychotic states, alcohol dependence and acute porphyria

### **STEP 4: Dose, Dosage and Course of Antituberculosis Drugs (30minutes)**

- Rifampicin
  - Is usually given 600 mg/daily (10 mg/kg/d) orally, must be administered with isoniazid or other antituberculosis drugs to patients with active tuberculosis to prevent emergence of drug-resistant mycobacteria
  - Rifampin 600 mg daily or twice weekly for 6 months also is effective in combination with other agents in some atypical mycobacterial infections and in leprosy
- Isoniazid
  - Usual dosage is 5 mg/kg/d; a typical adult dose is 300 mg given once daily. Up to 10 mg/kg/d may be used for serious infections or if malabsorption is a problem
  - A 15 mg/kg dose, or 900 mg, may be used in a twice-weekly dosing regimen in combination with a second antituberculosis agent (e.g., rifampin 600 mg)
  - Pyridoxine, 25-50 mg/d, is recommended for those with conditions predisposing to neuropathy, an adverse effect of isoniazid
  - Isoniazid is usually given by mouth but can be given parenterally in the same dosage

- Pyrazinamide
  - Should be used at a dose of 40-50 mg/kg is used for thrice-weekly or twice-weekly treatment regimens.
  - Pyrazinamide is an important front-line drug used in conjunction with isoniazid and rifampin in short-course (ie, 6-month) regimens as a "sterilizing" agent active against residual intracellular organisms that may cause relapse
- Ethambutol
  - As hydrochloride salt is given at 15-25 mg/kg, is usually given as a single daily dose in combination with isoniazid or rifampin.
  - The higher dose is recommended for treatment of tuberculous meningitis.
  - The dose of ethambutol is 50 mg/kg when a twice-weekly dosing schedule is used.
- Streptomycin
  - The usual dosage is 15 mg/kg/d intramuscularly or intravenously daily for adults (20-40 mg/kg/d, not to exceed 1-1.5 g for children) for several weeks, followed by 1-1.5 g two or three times weekly for several months

## **STEP 5: Side Effects and Adverse Effects of Antituberculosis (20 minute)**

***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

What are the side effects and adverse effects of antituberculosis?

**ALLOW** few students to respond?

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

Side effects and adverse effects of antituberculosis drugs include:

- Rifampicin
  - Occasional adverse effects include rashes, thrombocytopenia, and nephritis. It may cause cholestatic jaundice and occasionally hepatitis
  - Rifampin commonly causes light-chain proteinuria
- Isoniazid side effects are dose related
  - They occur in high dose and may include nausea, vomiting, constipation, dry mouth; peripheral neuritis with high doses (pyridoxine prophylaxis, see notes above), optic neuritis, convulsions, psychotic episodes and vertigo

- Pyrazinamide
  - Major adverse effects of pyrazinamide include hepatotoxicity, nausea, vomiting, drug fever, and hyperuricemia
  - Hyperuricemia may provoke acute gouty arthritis
- Ethambutol; the most common serious adverse event is retro bulbar neuritis, resulting in loss of visual acuity and red-green color blindness
- Streptomycin is ototoxic and nephrotoxic
  - Vertigo and hearing loss are the most common side effects and may be permanent.
  - Toxicity is dose-related, and the risk is increased in the elderly
  - Toxicity can be reduced by limiting therapy to no more than 6 months whenever possible

## **STEP 6: Interactions and Precautions of Antituberculosis (20minutes)**

- Interactions:
  - There is no serious interaction between ant tuberculosis drugs and other drugs except that rifampicin reduces plasma concentration of digoxin
  - Absorption of isoniazid is reduced by antacids, Hepatotoxic of isoniazid is potentiated by general anaesthesia and its CNS toxicity is increased by cycloserine
  - Pyrazinamide antagonizes effect of probenecid
- Precautions:
  - Rifampicin should be given with care in hepatic impairment, renal impairment pregnancy and breast-feeding
  - Isoniazid should be given with care in hepatic impairment, renal impairment, slow acetylator status, epilepsy and history of psychosis
  - Pyrazinamide should be given with care in pregnancy, hepatic impairment, diabetes and gout
  - Ethambutol should be given with care in renal impairment, elderly and pregnancy
  - Streptomycin should be given with care in pregnancy, renal impairment,neonates, infants and elderly

## **STEP 7: Key points (5 minutes)**

- Ant tuberculosis drugs should be given in combination to prevent microbial resistance and minimize side effects
- Management of TB is done in two phases, initial phase and continuous phase
- Ant tuberculosis drugs should be given on DOT especially during first phase

## **STEP 7: Assessment (5 minutes)**

- What are the second lines Ant tuberculosis?
- Which Ant tuberculosis used in the first phase?
- Which Ant tuberculosis drugs used in the second phase?
- What is the effect of rifampicin on digoxin?

## References

- Robert L. Talbert, Gary C. Yee, Gary R. Matzke, Barbara G. Wells, L. Michael. 2014. *Pharmacotherapy: a pathophysiologic approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education
- Ministry Of Health and Social Welfare. 2013. *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es Sally salaam, Tanzania government printers .
- S.R, Jeanne C.S. 2000. *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins
- School of Pharmaceutical sciences. 2011. *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.
- The Royal Pharmaceutical Society of Great Britain. 2007. *Martindale, the Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.
- The Royal Pharmaceutical Society of Great Britain. 2009. *British National Formulary* (59<sup>th</sup> ed). London, BMJ Group and RPS Publishing.

# Session 9: Description of Amoebicides

**Total Session Time:** 60 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of Amoebicides
- List Contraindication of Amoebicides
- Describe dose, dosage and course of Amoebicides
- List side effects and adverse effects of Amoebicides
- Describe interaction and precaution of Amoebicides

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Computer and projector

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning tasks
2	10 minutes	Presentation/ Buzzing	Indications of Amoebicides
3	10 minutes	Presentation/ brainstorming	Contraindication of Amoebicides
4	10 minutes	Presentation	Dose, Dosage and Course of Amoebicides
5	10 minutes	Presentation/ Brainstorming	Effects and Adverse Effects of Amoebicides
6	05 minutes	Presentation	Interaction and Precaution of Amoebicides
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning tasks (5 minutes)**

**READ or ASK** students to read the learning objectives and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Amoebicides (10 minutes)**

**Activity:** *Buzzing (5 minutes)*

**ASK** students to pair up and buzz on the following question for 2 minutes

- What are the examples of Amoebicides?
- What are the indications of Amoebicides?

**ALLOW** few pairs to respond and let other pairs add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY and SUMMARIZE** by using the content below

- Amoebicides listed on essential medicine list include metronidazole and tinidazole.
- Indications of Amoebicides
  - **Metrinidazole** is the drug of choice in the treatment of all tissue infections with *E histolytica*. They are not reliably effective against luminal parasites and so must be used with a luminal amebicide to ensure eradication of the infection
  - **Tinidazole like** metronidazole, it is also the drug of choice in the treatment of all tissue infections with *E histolytica*. They are not reliably effective against luminal parasites and so must be used with a luminal amebicide to ensure eradication of the infection

### **STEP 3: Contraindication of Amoebicides (10Minutes)**

**Activity:** *Brainstorming (5 minutes)*

**Ask** students to brainstorm on the following question:

- What are the Contraindications of Amoebicides?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

**Metrinidazole and Tinidazole** are contraindicated to people who have taken alcohol

**STEP 4: Dose, Dosage and Course of Amoebicides (10minutes)**

- Metronidazole
  - By mouth, invasive intestinal amoebiasis, extraintestinal amoebiasis (including liver abscess), 800 mg every 8 hours for 5 days in intestinal infection (for 5–10 days in extra-intestinal infection)
  - Children 1–3 years 200 mg every 8 hours; 3–7 years 200 mg every 6 hours; 7–10 years 400 mg every 8hours
- Tinidazole
  - Intestinal amoebiasis, 2 g daily for 2–3 days;
  - Children 50–60 mg/kg daily for 3 days
  - Amoebic involvement of liver, 1.5–2 g daily for 3–6days
  - Children 50–60 mg/kg daily for 5 days

**STEP 5: Side Effects and Adverse Effects of Amoebicides (10 Minute)**

***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the side effects and adverse effects of Amoebicides?

**ALLOW** few students to respond?

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

- Side and adverse effects of amoebicides
  - Metrinidazole and Tinidazole
  - Gastro-intestinal disturbances (including nausea and vomiting),
  - Taste disturbances, furred tongue, oral mucositis, anorexia
  - Very rarely hepatitis, jaundice, pancreatitis
  - Drowsiness, dizziness, headache, ataxia, psychotic disorders
  - Darkening of urine
  - Thrombocytopenia, pancytopenia
  - Myalgia, arthralgia
  - Visual disturbances
  - Rash, pruritus, and erythema multiform

- On prolonged or intensive therapy peripheral neuropathy, transient epileptiform seizures

## **STEP 6: Interaction and Precaution of Amoebicides (minutes)**

- **Metrinidazole and Tinidazole**

- Disulfiram-like reaction with alcohol, therefore it should never be given with alcohol or where there is a suspected use of alcohol
- Hepatic impairment and hepatic encephalopathy
- Pregnancy
- Breast-feeding
- Avoid in acute porphyria
- Clinical and laboratory monitoring advised if treatment exceeds 10 days

## **STEP 7: Key Points (5 minutes)**

- Metrinidazole and Tinidazole are common medicines in amoebiasis
- Metrinidazole and Tinidazole should not be given to patients who have taken alcohol
- Long term use of Metrinidazole and Tinidazole need clinical and laboratory monitoring
- Long course and higher dose is required in liver abscess

## **STEP 7: Evaluation (5 minutes)**

- What are the indications of Metrinidazole and Tinidazole?
- What is the dose of Metrinidazole and Tinidazole?
- What are the common adverse effects of Metrinidazole and Tinidazole?

## References

- Ministry of Health and Social Welfare. (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.
- Robert L. Talbert, Gary C. Yee, Gary R. Matzke, Barbara G. Wells, L. Michael. (2014). *Pharmacotherapy: A Pathophysiologic Approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Sally S.R, Jeanne C.S. (2000). *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins.
- School of Pharmaceutical sciences. (2011). *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.
- The Royal Pharmaceutical Society of Great Britain. (2007). *Martindale, the Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.
- The Royal Pharmaceutical Society of Great Britain. 2009. *British National Formulary* (59<sup>th</sup> ed). London, BMJ Group and RPS Publishing.

## Session 10: Description of Antimalarial Drugs

**Total Session Time:** 120 minutes + 2 hours Assignment

### Prerequisites

- None

### Learning Tasks

By the end of this session students are expected to be able to:

- List indications of antimalarial drugs
- List contraindications of antimalarial drugs
- Describe dose, dosage and course of antimalarial drugs
- List side effects and adverse effects of antimalarial drugs
- Describe interactions and precautions of antimalarial drugs

### Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Overhead projector and computer

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning tasks
2	20 minutes	Presentation/ Buzzing	Indications of Antimalarial Drugs
3	20 minutes	Presentation/ Brainstorming	Contraindications of Antimalarial Drugs
4	20 minutes	Presentation	Dose, Dosage and Course of Antimalarial Drugs
5	20 minutes	Presentation/ Brainstorming	Side Effects and Adverse Effects of Antimalarial drugs
6	15 minutes	Presentation	Interactions and Precautions of Antimalarial Drugs
7	05 minutes	presentation	Key points
8	05 minutes	presentation	evaluation
9	10 minutes	Presentation	Assignment

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning Tasks (5 minutes)**

**READ or ASK** students to read the learning tasks and clarify

**ASK** students if they have any questions before continuing.

## **STEP 2: Indications of Antimalarial Drugs (20minutes)**

### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What are indications of antimalarial drugs?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY** and **SUMMARIZE** by using the content below

- The indications of antimalarial drugs depends on the stage of disease and are classified as follows:
  - Drugs that eliminate developing or dormant liver forms of malaria parasite are called **tissue schizonticides**
  - Those that act on erythrocytes stage of malarial parasites are **blood schizonticides**
  - Those that kill sexual stages of malaria parasites and prevent transmission to mosquitoes are **gametocides**
  - No one available agent can reliably affect a radical cure, that is, eliminate both hepatic and erythrocytic stages of malaria parasite
  - Few available agents are causal prophylactic drugs, that is, capable of preventing erythrocytic malaria infection
  - However, all effective malaria chemoprophylactic agents kill erythrocytic parasites before they increase sufficiently in number to cause clinical disease
- The indications of different antimalaria drugs:
  - Chloroquine
    - Is a highly effective blood schizonticide
    - It is also moderately effective against gametocytes of *P. vivax*, *P. ovale*, and *P. malariae* but not against those of *p falciparum*
    - Chloroquine is not active against liver stage parasites
    - But its utility against *p falciparum* has been seriously compromised by drug resistance
  - Amodiaquine
    - Amodiaquine is closely related to chloroquine, and it probably shares mechanisms of action and resistance with that drug

- Quinine & Quinidine
  - Quinine is a rapidly acting, highly effective blood schizonticide against the four species of human malaria parasites
  - The drug is gametocidal against *P. vivax* and *P. ovale* but not *P. falciparum*
  - It is not active against liver stage parasites.
  - The mechanism of action of quinine is unknown
- Artemisinin and its derivatives
  - Are very rapidly acting blood schizonticides against all human malaria parasites
  - Artemisinins have no effect on hepatic stages of malaria parasites
  - Artemisinins in particular artesunate and artemether are playing an increasingly important role in the treatment of multidrug-resistant *P. falciparum* malaria
  - They are the only drugs reliably effective against quinine resistant strains

The most important of these analogs are:

- Artesunate (water-soluble; useful for oral, intravenous, intramuscular, and rectal administration)
- Artemether (lipid-soluble; useful for oral, intramuscular, and rectal administration)
- Lumefantrine
  - Is an aryl alcohol related to halofantrine, is available as a fixed-dose combination with artemether as Coartem in some countries
  - Coartem is highly effective in the treatment of falciparum malaria

### **STEP 3: Contraindications of Antimalarial Drugs (20 Minutes)**

#### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

What are contraindications of antimalarial drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Chloroquine is contraindicated in patients with
  - Psoriasis or porphyria, in whom it may precipitate acute attacks of these diseases
  - It should generally not be used in those with retinal or visual field abnormalities or myopathy.
- Quinine (or quinidine)

- Should be discontinued if signs of severe cinchonism, hemolysis, or hypersensitivity occur
  - It should be avoided if possible in patients with underlying visual or auditory problems
- Artemisinins
  - It is contraindicated the first trimester of pregnancy if possible because teratogenicity has been seen in animal studies, but limited inadvertent use in pregnancy has apparently not led to fatal problems
  - Is avoided in breast feeding mother whose infant is below 5kg body weight\
  - **STEP 4: Dose, Dosage and Course of Antimalarial Drugs (30 minutes)**
- Artemether & Lumefantrine
  - Dosage of Artemether 20mg & Lumefantrine 120mg tablets according to weight and age

WT(Kg)	AGE	Day 1 0 hr	Day1 8hrs	Day2 24 hrs	Day2 36 hrs	Day 3 48hrs	Day3 60hrs
5-14	3mon-3yrs	1	1	1	1	1	1
15-24	3yrs-8yrs	2	2	2	2	2	2
25-34	8yrs-12yrs	3	3	3	3	3	3
35 above	12yrs above	4	4	4	4	4	4

- The first dose should be given as Direct Observed Therapy(DOT)
  - The second dose should strictly be given after 8hours
  - Subsequent doses could be given twice daily (morning-evening) until completion of 6 doses
- Quinine
  - Oral dose
    - Adults 600 mg (salt) 8 hourly for 7 days
    - Children 10mg/kg (salt) 8 hourly for 7 days
  - Intravascular route
    - Dilution of Quinine dihydrochloride injection (300 mg/ml) for intra-muscular use dose of 10 mg of salt/kg bodyweight (not exceeding a maximum dose of 600mg)
    - Quinine should be diluted four times in water for injection to a concentration of 60 mg/ml
  - Intravenous route
    - Quinine dose: 10 mg/kg body weight of salt, diluted in 5-10 ml/kg body weight of 5% dextrose or dextrose-saline and infused over 4 hours and repeated every 8 hours

## **STEP 5: Side Effects and Adverse Effects of Antimalarial Drugs**

### **(20 minutes)**

#### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are side effects and adverse effects of antimalarial drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Quinine
  - Adverse effects and side effects
    - Therapeutic dosages of quinine and quinidine commonly cause tinnitus, headache, nausea, dizziness, flushing, visual disturbances and a constellation of symptoms termed cinchonism
    - Mild symptoms of cinchonism do not warrant the discontinuation of therapy
    - More severe findings, often after prolonged therapy, include more marked visual and auditory abnormalities, vomiting, diarrhoea, and abdominal pain
    - Hypersensitivity reactions include skin rashes, urticaria, angioedema, and bronchospasm
    - Therapeutic doses may cause hypoglycaemia through stimulation of insulin release; this is a particular problem in severe infections and in pregnant patients, who have increased sensitivity to insulin
    - Quinine can stimulate uterine contractions, especially in the third trimester
    - However, this effect is mild, and quinine and quinidine remain the drugs of choice for severe falciparum malaria even during pregnancy
    - Intravenous infusions of the drugs may cause thrombophlebitis
- Chloroquine
  - Adverse effects and side effects
    - Pruritus is common, Nausea, vomiting, abdominal pain, headache, anorexia, malaise, blurring of vision, and urticaria are uncommon
    - Large intramuscular injections or rapid intravenous infusions of chloroquine hydrochloride can result in severe hypotension and respiratory and cardiac arrest
- Artemisinins in particular artesunate and artemether
  - Adverse effects and side effects
    - The most commonly reported adverse effects have been nausea, vomiting, and diarrhea

- Irreversible neurotoxicity has been seen in animals, but only after doses much higher than those used to treat malaria

## **STEP 6: Interactions and Precautions of antimalarial drugs (15minutes)**

- Artemisinins in particular artesunate and artemether
  - Interact with the following group of drugs
    - Amiodarone
    - Quinolone
    - Antidepressants
    - Imidazoles
    - Antipsychotics
    - Antivirals
    - $\beta$ -blockers
    - Cimetidine
- Quinine and Quinidine
  - Interact with the following drugs
    - Should not be given concurrently with mefloquine
    - Should be used with caution in a patient with malaria who has previously received mefloquine chemoprophylaxis
    - Absorption may be blocked by aluminium-containing antacids
    - Quinine can raise plasma levels of warfarin and digoxin
    - Do not give concurrent with anti psychotics
  - Precaution
    - Severe hypotension can follow too-rapid intravenous infusions of quinine or Quinidine
    - It must be used with great caution in those with underlying cardiac abnormalities
    - Dosage must be reduced in renal insufficiency
- Chloroquine
  - Interaction
    - The antidiarrheal agent kaolin and calcium- and magnesium-containing antacids interfere with the absorption of chloroquine and should not be co administered with the drug
  - Precaution
    - Chloroquine should be used with caution in patients with a history of liver disease or neurologic or hematologic disorders

## **Step 7: Key Points (5 minutes)**

- The essential antimalarial drugs are ALU, quinine, artesunate rectal, dihydroartemisinin plus piperaquine (DPQ) and chloroquine
- Artemisinin and related compounds are effective in resistant malaria
- Indications for antimalarial drugs depend on the species of malaria parasites and the stage of the disease
- Doses of the antimalarial drugs depends on age and body weight

## **STEP 8: Evaluation (5minutes)**

- What are the indications of Antimalarial drugs?
- What are contraindications of Antimalarial drugs?
- What are side effects and adverse effects of Antimalarial drugs?

## References

- Robert, L. Talbert, Gary C. Yee, Gary R. Matzke, Barbara G. Wells, L. Michael. 2014. *Pharmacotherapy: a pathophysiologic approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Ministry Of Health and Social Welfare. 2013. *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.
- Sally, S.R, Jeanne C.S. 2000. *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins
- School of Pharmaceutical sciences. 2011. *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.
- The Royal Pharmaceutical Society of Great Britain. 2007. *Martindale, the Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.
- The Royal Pharmaceutical Society of Great Britain. 2009. *British National Formulary* (59<sup>th</sup> ed). London, BMJ Group and RPS Publishing.

# Session 11: Description of Anti-schistosomals

**Total Session Time:** 60 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of anti-schistosomals
  - List contraindications of anti-schistosomals
  - Describe dose, dosage and course of anti-schistosomals
  - List side effects and adverse effects of anti-schistosomals
  - Describe interactions and precautions of anti-schistosomals
- 
- **Resources Needed:**
  - Flip charts, marker pens, and masking tape
  - Black/white board and chalk/whiteboard markers

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Tasks
2	10 minutes	Presentation/ Buzzing	Indications of anti-schistosomals
3	10 minutes	Presentation/ Brainstorming	Contraindications of anti-schistosomals
4	10 minutes	Presentation	Dose, Dosage and Course of anti-schistosomals
5	10 minutes	Presentation/ Brainstorming	Side Effects and Adverse Effects of anti-schistosomals
6	5minutes	Presentation	Interactions and Precautions of anti-schistosomals
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning tasks (5 minutes)**

**READ or ASK** students to read the learning tasks and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Anti-schistosomals (10 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following questions for 5 min

What are indications for anti-schistosomals

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY** and **SUMMARIZE** by using the content below

- Schistosomiasis is caused by the fluke schistosome
- Praziquantel is the only drug used in treatment of schistosomiasis in Tanzania
- Praziquantel is used in treatment of the common species found in Tanzania which are *S. haematobium* and *S. mansoni*

### **STEP 3: Contraindications of Anti-schistosomals (10 minutes)**

#### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the contraindications for antischistomiasis drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Praziquantel is contraindicated in ocular cysticercosis, as parasite destruction in the eye may cause irreparable damage

## **STEP 4: Dose, Dosage and Course of Antischistosomiasis Drugs** **(10 minutes)**

- Praziquantel
  - 40mg – 60mg/kg body weight as a single dose  
**Or**  
○ Three doses of 20mg/kg body weight at an interval of 4 to 6 hours for one day

## **STEP 5: Side Effects and Adverse Effects of Antischistosomiasis Drugs** **(10 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are side effects and adverse effects of anti-schistosomals?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

Mild and transient adverse effects are common; they begin within several hours after ingestion and may persist for hours to one day

- Most frequent are headache, dizziness, drowsiness, and lassitude; others include nausea, vomiting, abdominal pain, loose stools, pruritus, urticaria, arthralgia, myalgia, and low-grade fever
- Mild and transient elevations of liver enzymes have been reported
- Several days after starting Praziquantel, low-grade fever, pruritus and skin rashes (macular and urticarial)

## **STEP 6: Interactions and Precautions of Antischistosomals (5 minutes)**

- Because the drug induces dizziness and drowsiness, patients should not drive during therapy and should be warned regarding activities requiring particular physical coordination or alertness
- Some workers also caution against use of the drug in spinal neurocysticercosis

## **Step 7: Key Points (5minutes)**

- Schistosomiasis is caused by the fluke schistosome
- Drug of choice is called Praziquantel
- Praziquantel is contraindicated in ocular cysticercosis

## **STEP 8: Evaluation (5minutes)**

- What are the indications of anti-schistosomals?
- What are the contraindications of anti-schistosomals?
- What are the dose, dosage and course of anti-schistosomals?
- What are side effects and adverse effects of anti-schistosomals?

## References

- Robert, L. Talbert, Gary C. Yee, Gary R. Matzke, Barbara G. Wells, L. Michael. 2014. *Pharmacotherapy: a pathophysiologic approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Ministry Of Health and Social Welfare. 2013. *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.
- Sally, S.R, Jeanne C.S. 2000. *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins
- School of Pharmaceutical sciences. 2011. *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.
- The Royal Pharmaceutical Society of Great Britain. 2007. *Martindale, the Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.
- The Royal Pharmaceutical Society of Great Britain. 2009. *British National Formulary* (59<sup>th</sup> ed). London, BMJ Group and RPS Publishing.

# Session 12: Description of Antihelminthes

**Total Session Time:** 120 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of antihelminthes
- List Contraindication of a antihelminthes
- Describe dose, dosage and course of antihelminthes
- List side effects and adverse effects of antihelminthes
- Describe interaction and precaution of antihelminthes

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Computer and projector

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning tasks
2	20 minutes	Presentation/ Buzzing	Indications of Antihelminthes
3	20 minutes	Presentation/ Brainstorming	Contraindication of Antihelminthes
4	30 minutes	Presentation	Dose, Dosage and Course of Antihelminthes
5	20 minutes	Presentation/ brainstorming	Side Effects and Adverse Effects of Antihelminthes
6	15 minutes	Presentation	Interaction and Precaution of Antihelminthes
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning Tasks (5 minutes)**

**READ or ASK** students to read the learning tasks and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Antihelminthes Drugs (20 minutes)**

#### ***Activity: Buzzing (5minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What is anti helminthes?
- What are the indications of antihelminthes?

**ALLOW** few pairs to respond and let other pairs add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY and SUMMARIZE** by using the content below

- Antihelminthes drugs include; Mebendazole, Albendazole, Ivermectin, Niclosamides and Thiabendazoles. Others include Piperazine and Praziquantal
- The indications of different essential antihelminthes are :
  - Mebendazole is effective in treatment of the following parasitic infestations:
    - Roundworm
    - Thread worms
    - Whipworm
    - Hook worms
  - Albendazole are effective treatment of following parasites:
    - Hookworms
    - Roundworms
    - Tapeworms
    - Strongyloides
    - Cutaneous larva migrans
  - Ivermectin are effective for treatment of:
    - Filariasis
    - Cutaneous larva migrans
  - Niclosamides are effective for treatment of tapeworms
  - Thiabendazoles are used in treatment stronyloides
- Indications of other antihelminthes not in the National Essential Medicine List(NEMLIT) are:
  - Piperazine is effective for threadworms and round worms

- Praziquantal is used in treatment of schistosomiasis

### **STEP 3: Contraindication of Antihelminthes (20 minutes)**

**Activity: Brainstorming (5 minutes)**

**ASK** learners

- What are the contraindications of antihelminthes?

**ALLOW** few learners to respond

**WRITE** their responses on the flipchart

**SUMMARIZE** the discussion by the following information

- The contraindication of the essential antihelminthes drugs are:
  - Pregnancy during first trimester (Mebendazole, albendazole, thiabendazoles)
  - Known hypersensitivity to antihelminthes drugs

### **STEP 4: Dose, Dosage and Course of Antihelminthes (30 minutes)**

- Mebendazole
  - Adult and Children above 2 years 100mg 12 hourly for 3 days  
Or
  - 500mg as a single dose
- Albendazole
  - 400mg as a single dose
- Levamisole
  - Adult 120-150 mg as a single dose
  - Children below 2 years 3 mg/kg body weight as single dose  
Or
  - 2.5 mg/kg body weight as single dose, repeated after 7 days
- Niclosamide
  - Adult: 2g as a single dose. Chew tablets on an empty stomach
  - Children: 30mg/kg body weight starts on an empty stomach
  - For *Taenia solium*, *Taenia saginata* and *Diphyllobothrium latum*
    - Adults and children over 6 years: 2g as a single dose after a light breakfast, followed by a purgative after 2 hours
    - Children 2-6 years: 1g as a single dose after a light meal, followed by a purgative after 2 hours
    - Children under 2 years 500mg as a single dose after a light meal, followed by a purgative after 2 hours
  - For *Hymenolepsis nana*

- Adult and children over 6 years 2g as a single dose on the first day, then 1g daily for 6 days
- Children under 2 years 500mg on the first day as a single dose then 250mg daily for 6 days
- Children 2-6 years 1g on the first day as a single dose then 500mg once daily
- **Ivermectin**
  - 150mcg/kg (0.15mg/kg) body weight as a single dose
    - Treat again at intervals of 6 to 12 months, depending on symptoms or until the adult worms die out
- **Diethylcarbamazine (DEC)**
  - 1mg/kg body weight
    - Increase the dose gradually by 1mg/kg body at an interval of 3 days to maximum of 6mg/kg body weight
    - Duration of treatment is 21 days
- **Thiabendazole**
  - Adults: 25mg/kg body weight (max.1.5g) 12 hourly for 3 days
    - Tablets must be chewed
  - Children Same as for adults

## **STEP 5: Side Effects and Adverse Effects of Antihelminthes (20 minutes)**

**Activity: Brainstorming (5 minutes)**

**ASK** learners

- What side effects and adverse effects of antihelminthes?

**ALLOW** few learners to respond

**WRITE** their responses on the flipchart

**SUMMARIZE** the discussion by the following information

- Mebendazole
  - Side effects and adverse effects:
    - Very rarely abdominal pain, diarrhoea, convulsions (in infants)
    - Rash (including Stevens-Johnson syndrome and toxic epidermal necrolysis)
    - Short-term mebendazole therapy for intestinal nematodes is nearly free of adverse effects
    - Mild nausea, vomiting, diarrhoea, and abdominal pain have been reported infrequently
    - Rare side effects, usually with high-dose therapy, are hypersensitivity reactions (rash, urticaria), agranulocytosis, alopecia, and elevation of liver enzymes
- Niclosamide
  - side-effects and adverse effects:

- Occasional gastro-intestinal upset
  - Lightheadedness
  - Pruritis
  - Infrequent, mild, and transitory adverse events include nausea, vomiting, diarrhea, and abdominal discomfort
- Ivermectin
  - Side-effects and adverse effects:
    - In strongyloidiasis treatment infrequent side effects includes: Fatigue, dizziness, nausea, vomiting, abdominal pain, and rashes.
    - In onchocerciasis treatment, the adverse effects are principally from the Mazotti reaction, due to killing of microfilariae
- Albendazole
  - Side-effects and adverse effects:
    - When used for 1-3 days, albendazole is nearly free of significant adverse effects.
    - Mild and transient epigastric distress, diarrhea, headache, nausea, dizziness, lassitude, and insomnia can occur
    - In long-term use for hydatid disease, albendazole is well tolerated, but it can cause abdominal distress, headaches, fever, fatigue, alopecia, increases in liver enzymes, and pancytopenia. Blood counts and liver function studies should be followed during long-term therapy
- Thiabendazole
  - Side effects and adverse effects include
    - Dizziness, anorexia, nausea, and vomiting
    - Less frequent problems are epigastric pain, abdominal cramps, diarrhea, pruritus, headache, drowsiness, and neuropsychiatric symptoms
    - Irreversible liver failure and fatal Stevens-Johnson syndrome have been reported.

## **STEP 6: Interaction and Precaution of Essential Antihelminthes (15 minutes)**

- Mebendazole
  - Interaction
    - Serum levels of mebendazole may be decreased by concomitant use of carbamazepine or phenytoin and increased by cimetidine
  - Precaution
    - Mebendazole should be used with caution in patients with cirrhosis
    - Mebendazole is teratogenic in animals and therefore contraindicated in pregnancy.
    - It should be used with caution in children younger than 2 years of age because of limited experience and rare reports of convulsions in this age group
- Albendazole
  - Precaution
    - The drug should not be given to patients with known hypersensitivity to other benzimidazole drugs
    - The drug should not be given to patients with cirrhosis.

- The safety of albendazole in pregnancy and in children younger than 2 years of age has not been established
- Thiabendazole
  - Precaution
    - Much more toxic than other benzimidazole or Ivermectin, so other agents are now preferred for most indications
    - Experience with thiabendazole is limited in children weighing less than 15 kg.
    - The drug should not be used in pregnancy or in the presence of hepatic or renal disease
- Niclosamide
  - Precaution
    - The consumption of alcohol should be avoided on the day of treatment and for 1 day afterward
    - The safety of the drug has not been established in pregnancy or for children younger than 2 years of age
- Ivermectin
  - Interaction; It is best to avoid concomitant use of Ivermectin and other drugs that enhance GABA activity for example
    - Barbiturates
    - Benzodiazepines
    - Valproic acid
  - Precaution.
    - Ivermectin should not be used in pregnancy.
    - Safety in children younger than 5 years has not been established

### **Step 7: Key Points (5 minutes)**

- The essential antihelminthes for treatment of parasitic infestation are: Mebendazole, Albendazole, thiabendazole, Niclosamide and Ivermectin.
- Most of antihelminthes are contraindicated in pregnancy especially during first trimester
- Most of antihelminthes are taken orally
- Common side effects are nausea, vomiting and diarrhoea
- Antihelminthes interact with other drugs
- Antihelminthes should be used with caution in person with liver problems

### **STEP 8: Evaluation (5 minutes)**

Ask students the following questions and clarify

- What are the indications of antihelminthes?
- What are the contraindications of antihelminthes?
- What are the dose, dosage and course of antihelminthes?
- What are the side effects and adverse effects of antihelminthes?

## References

- Ministry of Health and Social Welfare. (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.
- Robert L. Talbert, Gary C. Yee, Gary R. Matzke, Barbara G. Wells, L. Michael. (2014). *Pharmacotherapy: A Pathophysiologic Approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Sally S.R, Jeanne C.S. (2000). *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins.
- School of Pharmaceutical sciences. (2011). *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.
- The Royal Pharmaceutical Society of Great Britain. (2007). *Martindale, The Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, Pharmaceutical press.
- The Royal Pharmaceutical Society of Great Britain. (2009). *British National Formulary* (59<sup>th</sup> ed). London, BMJ Group and RPS Publishing.

# Session 13: Description of Antifungal Drugs

**Total Session Time:** 120 minutes

## Prerequisites module

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of systemic and mucosal antifungal drugs
- List contraindications of systemic and mucosal antifungal drugs
- Describe dose, dosage and course of systemic and mucosal antifungal drugs
- List side effects and adverse effects of systemic and mucosal antifungal drugs
- Describe interactions and precautions of systemic and mucosal antifungal drugs

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Overhead projector and computer

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Tasks
2	20 minutes	Presentation/ Buzzing	Indications of Systemic and Mucosal Antifungal Drugs
3	20 minutes	Presentation/ Brainstorming	Contraindications of Systemic and Mucosal Antifungal Drugs
4	30 minutes	Presentation	Dose, Dosage and Course of Systemic and Mucosal Antifungal Drugs
5	20 minutes	Presentation/ Brainstorming	Side Effects and Adverse Effects of Systemic and Mucosal Antifungal Drugs
6	15 minutes	Presentation	Interactions and Precautions of Systemic and Mucosal Antifungal Drugs
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning tasks (5 minutes)**

**READ or ASK** students to read the learning tasks and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Antifungal Drugs (20 Minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What are the indications of antifungal drugs?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY** and **SUMMARIZE** by using the content below

- Amphotericin B
  - Is useful agent for nearly all life-threatening mycotic infections
  - It is often used as the initial induction regimen for serious fungal infections and is then replaced by one of the newer fluconazole
  - Is especially important for immunosuppressed patients and those with severe fungal pneumonia, cryptococcal meningitis with altered mental status, or sepsis syndrome due to fungal infections
- Clotrimazole, Miconazole and Fluconazole
  - Are useful agents in management of candida species, *Cryptococcus neoformans*, the endemic mycoses (blastomycosis, coccidioidomycosis and histoplasmosis)
- Griseofulvin is only use is in the systemic treatment of dermatophytosis example infections of the skin, scalp, hair and nails where topical therapy has failed or is inappropriate
- Nystatin used in treatment of oral candidiasis; and skin infection

## **STEP 3: Contraindications of Antifungal Drugs (20 Minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are contraindications of antifungal drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Amphotericin B is not contraindicated to specific group of individual
- Clotrimazole, Miconazole and Fluconazole are contraindicated in acute porphyria, hepatic impairment and breast-feeding
- Griseofulvin is contraindicated to people with severe liver disease; systemic lupus erythematosus acute, porphyria, pregnancy (avoid pregnancy during and for 1 month after treatment men should not father children within 6 months of treatment) and breast-feeding
- Nystatin is not contraindicated to specific group of individual

## **STEP 4: Dose, Dosage and Course of Systemic and Mucosal Antifungal Drugs (30minutes)**

- Amphotericin B lozenges taken 4 times daily. Allowed to dissolve slowly in the mouth for 10–15 days (continued for 48 hours after lesions have resolved); increased to 8 daily in severe infection
- Clotrimazole
  - 2% cream for vaginal candidiasis. Applied twice a day for 7 days
- Miconazole
  - Topical: 2% cream, is used for vaginal candidiasis, vulvovaginal candidiasis and candidal balanitis
  - 200 mg vaginal suppositories is used for vaginal candidiasis
  - The drug is applied twice daily for 5 to 7 days
- Fluconazole
  - Vaginal candidiasis, Vulvovaginal Candidiasis, and candidal balanitis, ADULT and children over 16 years, by mouth, a single dose of 150 mg.
  - Mucosal candidiasis (except genital), by mouth, 50 mg daily (100 mg daily in unusually difficult infections) given for 7–14 days in oropharyngeal candidiasis

- Griseofulvin
  - Dermatophyte infections, 500 mg once daily or in divided doses
  - In severe infection dose may be doubled, the dose need to be reduced when response occurs children under 50 kg, 10 mg/kg once daily or in divided doses
  - Tinea capitis caused by Trichophyton tonsurans, 1g once daily or in divided doses children under 50 kg, 15– 20 mg/kg once daily or in divided doses
  - Treatment should continue for not less than 21 days
- Nystatin
  - Treatment for adult and children suffering from oral pharyngeal candidiasis 100 000 units 4 times daily after food, usually for 7 days (continued for 48 hours after lesions have resolved)

## **STEP 5: Side Effects and Adverse Effects of Antifungal Drugs**

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### **(20 Minutes)**

#### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the side effects and adverse effects of antifungal drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Amphotericin B
  - When given parenterally it causes anorexia, nausea and vomiting, diarrhoea, epigastric pain, febrile reactions, headache, muscle and joint pain, anaemia disturbances in renal function and renal toxicity
- Clotrimazole
  - The most common adverse reaction is relatively minor gastrointestinal upset and, very rarely, clinical hepatitis
- Miconazole
  - Causes nausea, vomiting; rash; with buccal tablets
  - Abdominal pain, taste disturbance, burning sensation at application site, pruritus, and oedema; with oral gel, very rarely diarrhoea (usually on long term treatment), hepatitis, toxic epidermal necrolysis, and Stevens-Johnson syndrome
- Fluconazole
  - Causes nausea, abdominal discomfort, diarrhea, flatulence, headache and rash

- Griseofulvin
  - Causes nausea, vomiting, diarrhea and headache
  - Less frequently hepatotoxicity, dizziness, confusion, fatigue and sleep disturbances occurs
- Nystatin oral irritation, sensitization and nausea

### **STEP 6: Interactions and Precautions of Antifungal Drugs (15minutes)**

- **Amphotericin B**
  - Increase neurotoxicity of aminoglycoside
  - Increase cellular toxicity of flucytosine
  - There is an increased risk of hypokalemia when used with loop diuretics
  - Increases cardiac toxicity of digoxin.
- Clotrimazole has no important interaction
- Miconazole has no important interaction
- Fluconazole has no important interaction
- Griseofulvin
  - Enhance effect of alcohol
  - Reduces effect of anti coagulants
  - Its absorption is reduced by phenobarbitone
  - Accelerate metabolism of oral contraceptives
- Nystatin has no important interaction

### **STEP 7: Key points (5 minutes)**

- Amphotericin and fluconazole are important for immunosuppressed patients and those with severe fungal pneumonia, cryptococcal meningitis with altered mental status, or sepsis syndrome due to fungal infections
- Systemic and oral of Antifungal Drugs are usually used in candidiasis
- Amphotericin is contraindicated in liver diseases
- Amphotericin should not be given with oral contraceptives.
- Miconazole may cause Stephen Johnson syndrome
- Fluconazole is contraindicated in acute porphyria and hepatic impairment List interactions of griseofulvin
- Griseofulvin requires longer duration of treatment up to 12 months in nail infection

### **STEP 8: Assessment (5 minutes)**

- What are the contra indications of Antifungal Drugs?
- Which drugs interact with amphotericin?
- What is the side effects of clotrimazole?



## References

- Robert L. Talbert, Gary C. Yee, Gary R. Matzke, Barbara G. Wells, L. Michael. 2014. *Pharmacotherapy: a pathophysiologic approach* (9<sup>th</sup> ed.). New York,, McGraw-Hill Education
- Ministry Of Health and Social Welfare. 2013. *Standard Treatment Guidelines & Sally S.R, Jeanne C.S. 2000. *Introductory Clinical Pharmacology* (6<sup>th</sup> ed)* New York, Lippincott Williams and Wilkins
- School of Pharmaceutical sciences. 2011. *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.
- The Royal Pharmaceutical Society of Great Britain. 2007. *Martindale, the Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.
- The Royal Pharmaceutical Society of Great Britain. 2009. *British National Formulary* (59<sup>th</sup> ed). London, BMJ Group and RPS Publishing.

# Session 14: Description of Topical Antiinfective Drugs

**Total Session Time:** 60 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of topical antiinfective drugs
- List contraindications of Topical antiinfective drugs
- Describe dose, dosage and course of topical antiinfective drugs
- List side effects and adverse effects of topical antiinfective drugs
- Describe interactions and precautions of topical antiinfective drugs

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Overhead projector and computer

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Tasks
2	20 minutes	Presentation/ Buzzing	Indications of Topical Antiinfective Drugs
3	05 minutes	Presentation/ Brainstorming	Contraindications of Topical Antiinfective Drugs
4	05 minutes	Presentation	Dose, Dosage and Course of Topical Antiinfective Drugs
5	10 minutes	Presentation/ Brainstorming	Side Effects and Adverse Effects of Topical Antiinfective Drugs
6	05 minutes	Presentation	Interactions and Precautions Topical Antiinfective Drugs
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning Tasks (5 minutes)**

**READ or ASK** students to read the learning Tasks and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Topical Anti-infective Drugs (20 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What are the anti-infective drugs?
- How do we classify topical anti-infective drugs?
- What are indications of topical anti-infective drugs?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY and SUMMARIZE** by using the content below

- Anti-infective Drugs: Are drugs capable of acting against infection, by inhibiting the spread of an infectious agent or by killing the infectious agent outright
- Anti-infective is a general term that encompasses antibacterial, antibiotics, antifungal, antiprotozoans and antiviral
- Topical antifungal preparations:
  - Active against dermatophytes (*epidermophyton*, *microsporum*, and *trichophyton*)
  - Active against yeasts, including *Candida albicans* and *Pityrosporum orbiculare*
- Topical antibacterial:
  - Useful in preventing infections in clean wounds
  - In the early treatment of infected dermatoses and wounds
  - In reducing colonization of the nares by staphylococci, in axillary deodorization
  - Management of acne vulgaris
- Topical antiviral agents:
  - Active against Herpesvirus family, including herpes simplex types 1 and 2
  - Active against VZV Epstein-Barr virus (EBV)
  - Active against Cytomegalovirus (CMV)
  - Active against Human herpesvirus-6 (HHV-6)

### **STEP 3: Contraindications of Topical Anti-infective Drugs (5 minutes)**

#### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

What are contraindications of topical anti-infective drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Hypersensitivity to topically applied anti infectives
- Griseofulvin is contraindicated in patients with porphyria or hepatic failure Topical
- Metronidazole is not indicated in breast feeding mothers and during first trimester

### **STEP 4: Dose, Dosage and Course of Topical Anti-infective Drugs (5 minutes)**

- Topical Antifungal drugs
  - Once- or twice-daily application to the affected area will generally result in clearing of superficial dermatophyte infections in 2-3 weeks
- Topical antiviral drugs
  - Twice a day for 5-7 days
- Topical antibacterial drugs
  - 2-3 times a day for 5-7 days

### **STEP 5: Side Effects and Adverse Effects of Topical Antiiinfective Drugs (10 Minutes)**

#### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are side effects and adverse effects of topical antiinfective drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Topical antifungal preparations
  - Photosensitivity
  - Peripheral neuritis
  - Stinging,
  - Pruritus,
  - Erythema
  - Local irritation.
  - Allergic contact dermatitis appears to be uncommon
  - Gynecomastia,
- Topical antibacterial
  - Burning sensation
  - Drying of the skin
  - Irritation of the skin
  - Stinging sensation
  - Allergic contact dermatitis occurs frequently with bacitracin
- Topical antiviral agents
  - Pruritus
  - Mild pain
  - Transient stinging
  - Burning sensation

### **STEP 6: Interactions and Precautions of Antiinfectives Drugs (5minutes)**

- Topical antibacterial
  - Caution should be exercised when applying metronidazole near the eyes to avoid excessive tearing
- Topical antiviral agents
  - Caution in pregnancy and in breast feeding
- Topical antifungal preparations
  - Contact with mucous membranes should be avoided when using Allyl amines

### **Step 7: Key Points (5minutes)**

- The topical Antiinfectives are antibacterial, antiviral or antifungal drugs
- Topical Antiinfectives are indicated for the bacteria fungi or viral infections on the skin
- Common side effects of most topical Antiinfectives are: irritation, burning, pruritus, drying

## **STEP 8: Evaluation (10 minutes)**

- What are indications of Antiinfectives drugs?
- What are the contraindications of Antiinfectives drugs?
- What are the dose, dosage and course of Antiinfectives drugs?
- What are side effects and adverse effects of Antiinfectives drugs?

## References

- Robert L. T., Gary C. Y., Gary R. M., Barbara G. W., Michael, L.. (2014). *Pharmacotherapy: a Pathophysiologic Approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Ministry of Health and Social Welfare. ( 2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.
- Sally S.R., Jeanne C.S. (2000). *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins.
- School of Pharmaceutical sciences. (2011). *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.
- The Royal Pharmaceutical Society of Great Britain. (2007). *Martindale: the Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.
- The Royal Pharmaceutical Society of Great Britain. (2009). *British National Formulary* (59<sup>th</sup> ed). London, BMJ Group and RPS Publishing.

# Session 15: Description of Antiviral Drugs

**Total Session Time:** 120 minutes

## Prerequisites

None

### Students Learning Tasks

By the end of this session students are expected to be able to:

- List indications of antiviral drugs
  - List contraindication of antiviral drugs
  - Describe dose, dosage and course of antiviral drugs
  - List side effects and adverse effects of antiviral drugs
  - Describe interaction and precaution of antiviral drugs
- 
- **Resources Needed:**
  - Flip charts, marker pens, and masking tape
  - Black/white board and chalk/whiteboard markers
  - Computer and LCD Projector

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Objectives
2	15 minutes	Presentation Brainstorming	Indications, dosage, side effects, contraindications, interactions and precaution of acyclovir
3	15 minutes	Presentation	Indications, dosage, side effects, contraindications, interactions and precaution of gancyclovir
4	30 minutes	Presentation Buzzing	Indications, dosage, side effects, contraindications, interactions and precaution of nucleoside reverse transcriptase inhibitors
5	30 minutes	Presentation	Indications, dosage, side effects, contraindications, interactions and precaution of non-nucleoside reverse transcriptase inhibitors
6	15 minutes	Presentation Brainstorming	Indications, dosage, side effects, contraindications, interactions and precaution of protease inhibitors
7	05 minutes	Presentation	Key Points

8	05 minutes	Presentation	Evaluation
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## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning Objectives (5 minutes)**

**READ or ASK** students to read the learning objectives and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications, Dosage, Side Effects, Contraindications, Interactions Precaution of Acyclovir (15 minutes)**

#### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are indications of acyclovir?

**ALLOW** few students to respond?

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

Antiviral drugs are a class of medication used for treating viral infections

#### **Indications**

Acyclovir is indicated to treat;

- Herpes simplex virus (hsv) infections
- Varicella-zoster virus (vzv) infections

#### **Dose and Dosage**

- Herpes Simplex
  - Acyclovir (O) 400mg 8 hourly for 7 – 10 days

- Herpes Zoster (Shingles)
  - Acyclovir cream 5% applied until vesicles desapear.

Plus

- Acyclovir (O) 800 mg 5 times a day until no new lesions appear

#### **Side effects**

- Nausea and vomiting,
- Abdominal Pain,
- Diarrhoea,
- Headache,
- Fatigue,
- Rash, urticaria and pruritus,
- Photosensitivity

## **Contraindications**

Hypersensitivity to acyclovir or other related drugs

## **Interactions**

Interactions do not apply to topical aciclovir preparations

- Ciclosporin: increased risk of nephrotoxicity when aciclovir given with ciclosporin
- Probenecid: excretion of aciclovir reduced by probenecid (increased plasma concentration)

## **Precautions**

- Maintain adequate hydration
- In renal impairment
- In elderly

## **STEP 3: Indications, Dosage, Side Effects, Contraindications, Interactions Precaution of Ganciclovir (15 minutes)**

### **Indications**

Ganciclovir is used to treat cytomegalovirus (cmv) infections

### **Dose and Dosage**

By intravenous infusion,

Initially (induction) 5mg/kg every 12 hours for 14–21 days for treatment

### **Side effects**

- Diarrhoea,
- Nausea, Vomiting,
- Dyspepsia,
- Abdominal Pain,
- Constipation,
- Flatulence,
- Dysphagia,
- Taste Disturbance,
- Leucopenia, Thrombocytopenia,

### **Contraindications**

- Hypersensitivity to ganciclovir, aciclovir,
- Abnormally low haemoglobin, neutrophil, or platelet counts

### **Interactions**

- Probenecid: excretion of ganciclovir reduced by probenecid
- Hence increased plasma concentration and risk of toxicity

### **Precautions**

- Close monitoring of full blood count
- Ensure adequate hydration during intravenous administration

## **STEP 4: Indications, Dosage, Side Effects, Contraindications, Interactions**

### **Precaution of Nucleoside Reverse Transcriptase Inhibitors (30 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What are commonly used nucleoside reverse transcriptase inhibitors?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY** and **SUMMARIZE** by using the content below

Nucleoside Reverse Transcriptase Inhibitors (NRTIs) include:

- Zidovudine (AZT)
- Lamivudine (3TC)
- Abacavir (ABC)
- Emtricitabine (FTC)
- Stavudine (d4T)
- Tenofovir (TDF)
  - Tenofovir is classified as Nucleotide Reverse Transcriptase Inhibitor

#### **Indications**

Nucleoside Reverse Transcriptase Inhibitors (NRTIs) are antiretroviral drugs that are indicated for treatment of HIV/AIDS in combination with other antiretrovirals

#### **Dose and Dosage**

Zidovudine (AZT) 300 mg PLUS Lamivudine (3TC) 150 mg twice daily

OR

Tenofovir (TDF) 300mg PLUS Lamivudine (3TC) 150 mg twice daily

#### **Side effects**

- Gastrointestinal disturbances (nausea, vomiting, abdominal pain, diarrhoea)
- Lactic acidosis
- Lipodystrophy
- Anaemia by Zidovudine
- Hypersensitivity by Abacavir
- Peripheral neuropathy by Stavudine
- Nephrotoxicity by Tenofovir

### **Contraindications**

- Zidovudine is contraindicated to patients with Anaemia
- Patients who are hypersensitive to the NRTIs
- Tenofovir is contraindicated to patients with renal failure

### **Interactions**

Increased risk of haematological toxicity when Zidovudine given with NSAIDs

### **Precautions**

- Monitor liver function when using NRTIs
- Monitor renal function when using Tenofovir
- Monitor red blood cell count when using Zidovudine

## **STEP 5: Indications, Dosage, Side Effects, Contraindications, Interactions**

### **Precaution of Non-Nucleoside Reverse Transcriptase Inhibitors (30 minutes)**

Non-nucleoside reverse transcriptase inhibitors (NNRTIs) include:

- Nevirapine (NVP)
- Efavirenz (EFV).

### **Indications**

Non-nucleoside reverse transcriptase inhibitors are antiretroviral drugs used for the treatment of HIV/AIDS in combination with other antiretrovirals

### **Dose**

- Efavirenz (EFV) 600 mg once daily at night.  
or
- Nevirapine (NVP) 200mg twice a day

### **Side effects**

- Rashes due hypersensitivity reaction by Nevirapine
- CNS disturbances, abnormal dreams, hallucinations by Efavirenz

### **Contraindications**

Efavirenz and Nevirapine are contraindicated in patients with acute porphyria

### **Interactions**

Clarithromycin increase plasma levels of Efavirenz leading to increased risk of rash

### **Precautions**

- Monitor liver function
- Close follow up when using Efavirenz inpatients with history of mental illness or seizures

## **STEP 6: Indications, Dosage, Side Effects, Contraindications, Interactions**

### **Precaution of Protease Inhibitors (15 minutes)**

#### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are commonly used protease inhibitors?

**ALLOW** few students to respond?

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

Protease Inhibitors (PIs) include;

- Lopinavir (LPV)
- Atazanavir(ATV)

#### **Indications**

Protease Inhibitors (PIs) are antiretroviral drugs used to treat HIV/AIDS combination with other antiretrovirals

#### **Dose**

- Lopinavir 800mg/Ritonavir 200mg

OR

- Atazanavir 300mg/Ritonavir 100mg.

#### **Side effects**

- Gastrointestinal disturbances (nausea, vomiting, abdominal pain, flatulence)
- Lipodystrophy syndrome (fat redistribution, insulin resistance and dyslipidaemia)
  - Fat redistribution presents as loss of subcutaneous fat, increased abdominal fat ‘buffalo hump’ and breast enlargement
- Blood disorders (anaemia, neutropenia and thrombocytopenia)

#### **Contraindications**

PIs should not be given in patients with acute porphyria

#### **Interactions**

Ritonavir inhibit Lopinavir metabolism and increase plasma concentration of Lopinavir

#### **Precautions**

- Monitor blood sugar when PIs are used in Diabetic patients as they are associated with hyperglycemia
- Monitor liver function

## **STEP 7: Key Points (5 minutes)**

- Acyclovir is antiviral indicated for treatment of Herpes simplex virus (hsv) and varicella-zoster infections
- The use of Ganciclovir is associated with blood abnormalities therefore close monitoring of blood count is important
- Commonly used nucleoside reverse transcriptase include Zidovudine, Stavudine, Lamivudine and Stavudine
- Efavirenz, a non-nucleoside reverse transcriptase inhibitors should be cautiously in patients with history of mental illness and seizures
- Lopinavir is usually combined with another protease inhibitor Ritonavir, because it increases plasma concentration of Lopinavir to therapeutic levels.

## **STEP 8: Evaluation (5 minutes)**

- What are the indications of acyclovir?
- What are the side effects of ganciclovir?
- What are commonly used nucleoside reverse transcriptase inhibitors?
- What are the precautions for using non-nucleoside reverse transcriptase Efavirenz?
- What is the advantage of Lopinavir-Ritonavir drug interaction?

## References

- Talbert, R. L. Yee, G. C. Matzke, G. R. Wells, B. G. & Michael, L. (2014) *Pharmacotherapy: a pathophysiologic approach* (9<sup>th</sup> ed.). New York: McGraw-Hill Education.
- MoHSW(2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam: Tanzania Government Printers.
- Sally, S.R. Jeanne, C.S. (2000). *Introductory Clinical Pharmacology* (6<sup>th</sup>ed) New York, Lippincott Williams and Wilkins
- School of Pharmaceutical Sciences (2011).*Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam: ARDHI University Press.
- The Royal Pharmaceutical Society of Great Britain (2007). *Martindale, the Extra Pharmacopoeia* (5<sup>th</sup> ed). London: Pharmaceutical Press.
- The Royal Pharmaceutical Society of Great Britain (2009). *British National Formulary* (59<sup>th</sup> ed). London: BMJ Group and RPS Publishing.

# Session 16: Description of Antinflamatory and Antipruritic Drugs

**Total Session Time: 60 minutes**

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of Antinflamatory and Antipruritic Drugs
- List Contraindication of Antinflamatory and Antipruritic Drugs
- Describe dose, dosage and course of Antinflamatory and Antipruritic Drugs
- List side effects and adverse effects of Antinflamatory and Antipruritic Drugs
- Describe interaction and precaution of Antinflamatory and Antipruritic Drugs

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Computer and projector

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Tasks
2	10 minutes	Presentation/ Buzzing	Indications of Antinflamatory and Antipruritic Drugs
3	10minutes	Presentation/ brainstorming	Contraindication of Antinflamatory and Antipruritic Drugs
4	10 minutes	Presentation	Dose, Dosage and Course of Antinflamatory and Antipruritic Drugs
5	10 minutes	Presentation/ brainstorming	Side Effects and Adverse Effects of Antinflamatory and Antipruritic Drugs
6	05minutes	Presentation	Interaction and Precaution Antinflamatory and Antipruritic Drugs
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning Tasks (5 minutes)**

**READ or ASK** students to read the learning Tasks and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Topical Anti inflammatory and Antipruritic Drugs (10minutes)**

#### ***Activity: Buzzing (5minutes)***

**ASK** students to pair up and buzz on the following questions for 5minutes

- What essential topical anti inflammatory and anti pruritic drugs are used in clinical practice?
- What are the indications of topical anti inflammatory and antipruritic drugs?

**ALLOW** few learners to respond

**WRITE** their responses on the flipchart

**CLARIFY and SUMMARIZE** by using the content below

- Topical anti-inflammatory preparations include betamethazone, hydrocortisone, clobetasol propionate.
- They are used in management of:
  - Inflammatory conditions of the skin
  - Contact dermatitis
  - Insects sting
  - Eczema
  - Psoriasis
- Topical antipruritic agents include calamine, dithranol, tretinoin acid, para amino benzoic acid and calcipotriol. They are used in the management of Pruritus associated with:
  - Mild eczematous dermatoses
  - Pruritus associated with atopic dermatitis
  - Lichen simplex chronicus

### **STEP 3: Contraindication of Topical Anti inflammatory and Antipruritic Drugs (10 minutes)**

***Activity: brainstorming (5 minutes)***  
students to brainstorm on the following question:

- What are the contraindications of topical anti inflammatory and antipruritic drug?

**ALLOW** few learners to respond

**WRITE** their responses on the flipchart

**CLARIFY and SUMMARIZE** by using the content below

- Topical anti-inflammatory preparations are contraindicated to:
  - Those who demonstrate hypersensitivity to them
  - In untreated infections
  - Wide spread plaque psoriasis
- Topical antipruritic are contraindicated to:
  - Acute exudative dermatoses

### **STEP 4: Dose, Dosage and Course of Topical Anti inflammatory and Antipruritic Drug (10minutes)**

- Topical anti-inflammatory preparations:
  - Topical preparations should be applied once daily
- Topical antipruritic
  - Topical application of the cream should be performed four times daily for up to 8 days of therapy

### **STEP 5: Side Effects and Adverse Effects of Topical Anti inflammatory and Antipruritic Drug (10 Minutes)**

***Activity: brainstorming (5 minutes)***  
students to brainstorm on the following question:

- What are the side effects and adverse reaction of topical anti inflammatory and antipruritic drug?

**ALLOW** few learners to respond

**WRITE** their responses on the flipchart

**CLARIFY and SUMMARIZE** by using the content below

- Topical anti-inflammatory preparations: (corticosteroids)
  - Skin atrophy
  - Purpura
  - Ecchymosis
  - Steroid rosacea,
  - Erythema
  - Perioral dermatitis
  - Steroid acne
  - Hypopigmentation
  - Hypertrichosis
  - Allergic contact dermatitis
- Topical antipruritic
  - Transient burning
  - Stinging
  - Drowsiness
  - Rash
  - Irritation

### **STEP 6: Interaction and Precaution of Topical Anti inflammatory and Antipruritic Drug (5 minutes)**

- Topical anti-inflammatory preparations:
  - avoid prolonged use on the face and in the children
- Topical antipruritic
  - Interact tricyclic antidepressants
  - Avoid near eyes
  - Avoid in broken skin

### **Step 7: Key Points (5minutes)**

- Topical anti inflammatory are used for the inflammatory condition of the skin
- Topical antipruritic are used for pruritus condition
- The topical anti-inflammatory is contraindicated untreated infection and hypersensitivity
- The topical antipruritic are contraindicated in acute exudative dermatoses

### **STEP 8: Evaluation (5minutes)**

- What are indications of anti inflammatory and antipruritic drugs?
- What are the contraindications of anti inflammatory and antipruritic drugs?
- What are the dose, dosage and course of anti inflammatory and antipruritic drugs?
- What are side effects and adverse effects of anti inflammatory and antipruritic drugs?

## References

- Ministry of Health and Social Welfare. ( 2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.
- Robert L. T., Gary C. Y., Gary R. M., Barbara G. W., Michael, L.. (2014). *Pharmacotherapy: A Pathophysiologic Approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Sally S.R., Jeanne C.S. (2000). *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins.
- School of Pharmaceutical sciences. (2011). *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.
- The Royal Pharmaceutical Society of Great Britain. (2007). *Martindale: The Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.
- The Royal Pharmaceutical Society of Great Britain. (2009). *British National Formulary* (59<sup>th</sup> ed). London, BMJ Group and RPS Publishing.

# Session 17: Description of Keratoplastic and Keratolytic Agents

**Total Session Time:** 60 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- Outline indications of keratoplastic and keratolytic agents
- List contraindications of keratoplastic and keratolytic agents
- Describe dose, dosage and course of keratoplastic and keratolytic agents
- List side effects and adverse effects of keratoplastic and keratolytic agents
- Describe interactions and precautions of keratoplastic and keratolytic agents

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Overhead projector and computer

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Objectives
2	20 minutes	Presentation/ Buzzing	Indications of Keratoplastic and Keratolytic Agents
3	05 minutes	Presentation/ Brainstorming	Contraindications of Keratoplastic and Keratolytic Agents
4	05 minutes	Presentation	Dose, Dosage and Course of Keratoplastic and Keratolytic Agents
5	05 minutes	Presentation/ Brainstorming	Side effects and adverse effects of Keratoplastic and Keratolytic Agents
6	10 minutes	Presentation	Interactions and precautions Keratoplastic and Keratolytic Agents
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning tasks (5 minutes)**

**READ or ASK** students to read the learning tasks and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Keratoplastic and Keratolytic Agents (20 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What are the keratoplastic and keratolytic agents that are used in clinical practice?  
What are indications of keratoplastic and keratolytic agents?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY** and **SUMMARIZE** by using the content below

- A keratolytics are agents that induces sloughing of cornified epithelium (horny or hard layer of the skin)
- Keratolytic drugs act to damage the cornifled layer of skin that is then sloughed off to whatever depth the agent has acted
- A keratoplastic (mild keratolytic) effect is seen when the drug does not produce a rapid destruction and sloughing, thereby softening the keratin and loosening the cornified epithelium
- Keratolytic agents are used to remove warts and corns. They are also used in the treatment of severe acne
- Keratoplastic agents are used in the treatment of acne, eczema, psoriasis, and seborrheic dermatitis
- Coal Tar (chemical name). This agent is used as a keratoplastic in the treatment of eczema, psoriasis, and seborrheic dermatitis
- Salicylic Acid (chemical name). It is used as a keratolytic when present in concentrations of from 5% to 20%. It is used as a kerato- plastic when present in concentrations of from 1% to 2%
- Sulfur (chemical name). Sulfur is used as a keratoplastic in the treatment of acne and seborrheic dermatitis, it is used for the treatment of skin fungal infection
- Tretinoin (topical) (Retin A®). This agent is used in the treatment of severe acne. The application of this agent to the skin will produce a horny layer of skin that is more easily removed

- Salicylic Acid 2% and Sulfur 2% (Fostex®). This preparation is available in cream or soap. It is used to treat acne
- Salicylic Acid 2% and Sulfur 2% shampoo (Sebulex® or Sebra®). This shampoo is used to treat dandruff
- Salicylic Acid 2%, Coal Tar 0.5%, and Sulfur 2% Shampoo (Sebutone® or Sebra T®). This product is used to treat dandruff

### **STEP 3: Contraindications of Keratoplastic and Keratolytic Agents** **(5 minutes)**

***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

What are contraindications of keratoplastic and keratolytic agents?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

Contraindicated in:

- Children
- Diabetic patients
- Patients with hypersensitivity to be to the drugs
- removal of birth marks, facial warts, warts on mucous membrane
- Infected skin
- Avoid on broken skin
- Not suitable for internal genital what should be avoided in uncircumcised males

### **STEP 4: Dose, Dosage and Course of Keratoplastic and Keratolytic Agents** **(5 minutes)**

- Podophyllotoxin  
Apply twice daily for three consecutive days
- Silver nitrate  
Apply moisture caustic pencil tip 1-2 minutes repeat after 24 hours up to maximum 3 application for warts and six application for verrucas, for umbilical granuloma apply 1-2 minutes while protecting skin with soft paraffin
- Retinoic acid topically 0.025-0.05% at night if unresponsive refer to specialist for oral retinoids (isotretinoin 0.5 -1mg/kg)
- Crude Coal tar 5% in Vaseline in the morning (Acne)

- Salicylic acid 5% in Vaseline to descale (Psoriasis)

## **STEP 5: Side Effects and Adverse Effects of Keratoplastic and Keratolytic Agents (5 Minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

What are side effects and adverse effects of keratoplastic and keratolytic agents?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Topical use may be associated with:
  - Local irritation,
  - Acute inflammation
  - Ulceration
- Chemical burns on surrounding skin
- Stain skin and fabric

## **STEP 6: Interactions and Precautions of Keratoplastic and Keratolytic Agents (10minutes)**

- Precautions
- Particular care must be exercised when using the drug on the extremities of diabetics or patients with peripheral vascular disease.
- Silver nitrate is not suitable for application to face, ano-genital region, or large area
- Tretinoin
  - The medicine should not be applied to windburned or sunburned skin.
  - It should not be applied to open wounds
  - The medication should not be applied inside the nose, around the eyes, or around the mouth
  - While the patient is using the medication, he should avoid exposing the area being treated to too much wind or sun (or sun lamp)
  - When the patient begins using this product, he may find that he is more sensitive to cold temperatures and to wind than before; therefore, protection should be worn until the person sees how he reacts
- If you handle these chemicals, remember that they are irritating to the skin. You should wash your hands immediately after working with them

## **Step 7: Key Points (5 minutes)**

- Indicated for removal of skin warts, acne and also in the cauterization
- Contraindicated in hypersensitivity, open wound and on facial warts
- Applied occlusive on the skin or by tip of pencil
- Topical use may be associated with:
  - Local irritation
  - Acute inflammation
  - Ulceration

## **STEP 8: Evaluation (5 minutes)**

- What is keratolytic and keratoplastic agent?
- What are the indications of keratolytic and keratoplastic agent?
- What are the contra indications of keratolytic and keratoplastic agent?
- What are side effects of keratolytic and keratoplastic agent?
- What are the cautions to be taken when handling or using keratolytic and keratoplastic agent?

## References

- Ministry of Health and Social Welfare. ( 2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.
- Robert L. T., Gary C. Y., Gary R. M., Barbara G. W., Michael, L.. (2014). *Pharmacotherapy: A Pathophysiologic Approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Sally S.R., Jeanne C.S. (2000). *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins.
- School of Pharmaceutical sciences. (2011).*Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.
- The Royal Pharmaceutical Society of Great Britain. (2007). *Martindale: the Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.
- The Royal Pharmaceutical Society of Great Britain. (2009). *British National Formulary* (59<sup>th</sup> ed). London, BMJ Group and RPS Publishing.

# Session 18: Description of Analgesics

**Total Session Time:** 120 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of analgesics
- List contraindication of analgesics
- Describe dose, dosage and course of analgesics
- List side effects and adverse effects of analgesics
- Describe interaction and precaution of analgesics

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Computer and overhead projector

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Objectives
2	20 minutes	Presentation/ Buzzing	Indications of Analgesics
3	20 minutes	Presentation/ brainstorming	Contraindication of Analgesics
4	30 minutes	Presentation	Dose, Dosage and Course of Analgesics
5	20 minutes	Presentation/ brainstorming	Side Effects and Adverse Effects of Analgesics
6	15 minutes	Presentation	Description of Interaction and Precaution of Analgesics
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning tasks (5 minutes)**

**READ or ASK** students to read the learning objectives and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of analgesics (20 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What are the indications of analgesics?

**ALLOW** few pairs to respond and let other pairs add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY and SUMMARIZE** by using the content below

- Most drugs which have analgesic properties are also anti inflammatory and antipyretics; they include; Paracetamol, Aspirin and Others are Diclofenac, Ibuprofen, indomethacin, Piroxicam, Mefenamic acid and Naproxen
- Narcotic analgesics like tramadol are used in the management of pain only, have no antiinflammatory or antpyretic effects
- They are used in management of pain, fever and inflammation
  - Paracetamol and aspirin are used in management of pain and fever
  - Diclofenac, ibuprofen, indomethacin. Piroxicam, Mefenamic acid, and Naproxen are used in management of pain, fever and inflammation

### **STEP 3: Contraindication of Analgesics (20 minutes)**

#### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the Contraindications of analgesics?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

- Most individual drug which can be used as analgesic has different properties which make them to be contraindicated to patient with some conditions
  - Aspirin in children under 16 years and in breast-feeding due to Reye's syndrome, previous or active peptic ulceration and haemophilia
  - Diclofenac, ibuprofen, indomethacin, piroxicam, mefenamic acid, and naproxen are contra-indicated in patients with a history of hypersensitivity to aspirin or any other NSAID
  - Diclofenac, ibuprofen, indomethacin, piroxicam, mefenamic acid, and naproxen are contraindicated in severe heart failure and ischemic heart disease

#### **STEP 4: Dose, Dosage and Course of Analgesics (30 minutes)**

- Dose dosage and course of analgesics
  - **Aspirin**
    - By mouth, 300–900 mg every 4–6 hours when necessary, maximum dose 4 g daily
    - By rectum, 450–900 mg every 4 hours maximum dose 3.6 g daily
    - Intensive care, ADULT and CHILD over 1 month, by intravenous injection, initially 300–600 micrograms/kg then by intravenous infusion 4.5–29.5 micrograms/kg/minute
    - Duration of the course should not exceed 5 days in case of pain and inflammation
  - **Paracetamol**
    - By mouth, ADULT 0.5–1 g every 4–6 hours to a maximum dose. of 4 g daily
    - CHILDREN 2 months 60 mg for post-immunisation pyrexia, repeated once after 6 hours if necessary
    - CHILDREN 3 months–1 year 60–120 mg, 1–5 years 120–250 mg,
    - 6–12 years 250–500 mg; these doses may be repeated every 4–6 hours when necessary (max. of 4 doses in 24 hours)
    - By rectum, ADULT and CHILD over 12 years 0.5–1 g every 4–6 hours to a max. of 4 g daily; CHILD under 3 months
    - Duration of the course should not exceed 3 days
  - **Diclofenac**
    - By mouth, 75–150 mg daily in 2–3 divided doses
    - By rectum in suppositories, 75–150 mg daily in 2-3 divided doses.
    - Duration of the course should not exceed 5 days
  - **Ibuprofen**
    - ADULT and CHILD over 12 years, initially 300–400 mg 3–4 times daily; increased if necessary to max. 2.4 g daily; maintenance dose of 0.6–1.2 g daily may be adequate
    - Duration of the course should not exceed 5 days

- **Indomethacin**
  - By mouth, rheumatic disease, 50–200 mg daily in divided doses
  - Acute gout, 150–200 mg daily in divided doses
  - Dysmenorrhoea, up to 75 mg daily
  - By rectum in suppositories, 100 mg at night and in dose 150–200 mg
- **Mefenamic acid**
  - CHILDREN 12–18 years, acute pain including dysmenorrhoea,
  - ADULT over 18 years, 500 mg 3 times daily
  - In menorrhagia, 500 mg 3 times daily
  - Duration of the course should not exceed 5 days
- **Naproxen**
  - Acute musculoskeletal disorders and dysmenorrhoea, 500 mg initially, then 250 mg every 6–8 hours as required; maximum dose after first day 1.25 g daily.
  - Duration of the course should not exceed 5 days
- **Piroxicam**
  - By mouth, rheumatic disease, initially 20 mg daily, increased if necessary to 30 mg daily in single or divided doses
  - CHILD (6–18 years), juvenile idiopathic arthritis, under 15 kg, 5 mg daily; 16–25 kg, 10 mg; 26–45 kg, 15 mg; over 46 kg, 20 mg
  - Duration of the course should not exceed 14 days
- **Indomethacin**
  - By mouth, rheumatic disease, 50–200 mg daily in divided doses;
  - Acute gout, 150–200 mg daily in divided doses
  - Dysmenorrhoea, up to 75 mg daily
  - By rectum in suppositories, 100 mg at night and in the morning if required
  - Combined oral and rectal treatment, maximum total daily dose 150 - 200 mg
  - Duration of the course should not exceed 5 days

## **STEP 5: Side Effects and Adverse Effects of Analgesics (20 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the side effects and adverse effects of analgesics?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- **Side and adverse effects of analgesics**
  - **Aspirin**
    - Generally, causes mild and infrequent but high incidence of gastro-intestinal irritation with slight asymptomatic blood loss
    - Increased bleeding time
    - Bronchospasm and skin reactions in hypersensitive patients
  - **Paracetamol**
    - Rashes
    - Blood disorders (including thrombocytopenia, leucopenia, neutropenia)
    - Hypotension also reported on infusion
    - Liver damage and less frequently renal damage
  - **Diclofenac, ibuprofen, indomethacin, piroxicam, mefenamic acid, and naproxen**
    - Gastro-Intestinal Discomfort
    - Nausea
    - Diarrhea
    - Occasionally Bleeding and Ulceration Due to Gastro-Intestinal damage
    - Dyspepsia.
    - Hypersensitivity Reactions (Particularly Rashes, Angioedema, and Bronchospas)
    - Headache
    - Dizziness
    - Nervousness
    - Depression
    - Drowsiness
    - Insomnia
    - Vertigo, Hearing Disturbances Such as Tinnitus,
    - Photosensitivity
    - Haematuria

## **STEP 6: Interaction and Precaution of Analgesics (20 Minutes)**

- Interaction and precaution of analgesics
- Diclofenac, ibuprofen, indomethacin, piroxicam, mefenamic acid, and naproxen
  - Interaction:
    - They increase risks of renal impairment when given with ACE inhibitors
    - They antagonize effect of ACE inhibitors
  - Precaution is advised in patients with renal or cardiac impairment, also should be used with caution in hepatic impairment

## **STEP 7: Key points (5 minutes)**

- Analgesics are used in pain, fever and some of them are useful in inflammation
- Aspirin should not be used in children
- High dose of paracetamol and pronged use causes liver damage
- Diclofenac, ibuprofen, indomethacin. Piroxicam, mefenamic acid, and naproxen should be used with renal impairment and heart diseases

## **STEP 7: Evaluation (5 minutes)**

- What are the indications of analgesics?
- What are the contra indications of analgesics?
- What is the common adverse effect of aspirin?
- Which group of drug which has interaction with analgesics?

## References

- Ministry Of Health and Social Welfare. (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.
- Robert L. Talbert, Gary C. Yee, Gary R. Matzke, Barbara G. Wells, L. Michael. 2014. *Pharmacotherapy: A Pathophysiologic approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Sally S.R, Jeanne C.S. (2000). *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins.
- School of Pharmaceutical sciences. (2011). *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.
- The Royal Pharmaceutical Society of Great Britain. 2007. Martindale, *The Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.
- The Royal Pharmaceutical Society of Great Britain. (2009). *British National Formulary* (59<sup>th</sup> ed). London, BMJ Group and RPS Publishing.

# Session 19: Description of Anti-allergies

**Total Session Time:** 120 minutes

## Prerequisites

- PST04211\_S3\_ General Classification of Medicines

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of anti-allergies
- List Contraindication of anti-allergies
- Describe dose, dosage and course of anti-allergies
- List side effects and adverse effects of anti-allergies
- Describe interaction and precaution of anti-allergies

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Computer and overhead projector

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Tasks
2	20 minutes	Presentation/ Buzzing	Indications of Anti-allergies
3	20 minutes	Presentation/ Brainstorming	Contraindication of Anti-allergies
4	30 minutes	Presentation	Dose, Dosage and Course of Anti-allergies
5	20 minutes	Presentation/ brainstorming	Side Effects and Adverse Effects of Anti-allergies
6	15 minutes	Presentation	Interaction and precaution of Anti-allergies
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning tasks (5 minutes)**

**READ or ASK** students to read the learning objectives and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Anti Allergies (20 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- Which anti allergies are listed in essential medicine list?
- What are the indications of anti-allergies?

**ALLOW** few pairs to respond and let other pairs add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY** and **SUMMARIZE** by using the content below

- Anti-allergies listed in essential medicine list include; Chlorpheniramine maleate, Cetirizine Hydrochloride, Loratadine, Promethazine hydrochloride, Adrenalin, Hydrocortisone, Dexamethasone and Calamine lotion
- Indications of drugs with anti-allergies properties are;
  - **Chlorpheniramine maleate** is used in symptomatic relief of allergy such as hay fever, urticaria; emergency treatment of anaphylactic reactions
  - **Cetirizine Hydrochloride, Loratadine** are used in symptomatic relief of allergy such as hay fever and chronic idiopathic urticaria
  - **Promethazine hydrochloride** is used in symptomatic relief of allergy such as hay fever and urticaria; emergency treatment of anaphylactic reactions; sedation nausea and vomiting
  - **Adrenalin** is used in emergency treatment of acute anaphylaxis, angioedema and cardiopulmonary resuscitation
  - **Hydrocortisone** is used in adrenocortical insufficiency, hypersensitivity reactions e.g. anaphylactic shock and angioedema asthma, severe inflammatory bowel disease, haemorrhoids and rheumatic disease
  - **Dexamethasone** is used in suppression of inflammatory and allergic disorders, diagnosis of Cushing's disease, congenital adrenal hyperplasia, cerebral oedema associated with malignancy, nausea and vomiting with chemotherapy
  - **Calamine lotion** is indicated for pruritus

### **STEP 3: Contraindication of Anti-allergies (20 minutes)**

#### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the Contraindications of anti-allergies?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Most individual drug which can be used as anti-allergies has different properties which make them to be contraindicated to patient with some specific conditions.
  - **Chlorpheniramine maleate** like many antihistamines it should be avoided in acute porphyria
  - **Cetirizine Hydrochloride and Loratadine** like many antihistamines they should be avoided in acute porphyria they should also be avoided in pregnancy and breast-feeding
  - **Promethazine hydrochloride** like many antihistamines it should be avoided in acute porphyria
  - **Hydrocortisone and dexamethasone** are contraindicated to patients with systemic infection (unless specific therapy given):
    - Live virus vaccines should also be avoided due to possible suppression of immunity because serum antibody response diminished)

### **STEP 4: Dose, Dosage and Course of Anti-allergies (30 minutes)**

- **Chlorpheniramine maleate**
  - By mouth, 4 mg every 4–6 hours, max. 24 mg daily Children, 1–2 years 1 mg twice daily; 2–6 years 1 mg every 4–6 hours, maximum 6 mg daily; 6–12 years 2 mg every 4–6 hours, max. 12 mg daily
  - By intramuscular injection or by intravenous injection over 1 minute, 10 mg, repeated if required up to 4 times in 24 hours; CHILD under 6 months 250 micrograms/kg (max. 2.5 mg), repeated if required up to 4 times in 24 hours; 6 months–6 years 2.5 mg, repeated if required up to 4 times in 24 hours; 6–12 years 5 mg, repeated if required up to 4
- **Cetirizine Hydrochloride and Loratadine**
  - ADULT and CHILD over 6 years 10 mg once daily; CHILD 2–6 years 5 mg once daily

- **Promethazine hydrochloride**
  - By mouth, 10–20 mg 2–3 times daily; CHILDREN under 2 years not recommended, 2–5 years 5–15 mg daily in 1–2 divided doses, 5–10 years 10–25 mg daily in 1–2 divided doses
  - By deep intramuscular injection, 25–50 mg; max. 100 mg; CHILD 5–10 years 6.25–12.5 mg
  - By slow intravenous injection in emergencies, 25–50 mg as a solution containing 2.5 mg/mL in water for injections; max. 100 mg
  - The drug should be administered twice daily for not more than five days
- **Adrenalin**
  - Acute anaphylaxis, by intramuscular injection of 1 in 1000 (1 mg/mL) solution.
  - Acute anaphylaxis when there is doubt as to the adequacy of the circulation, by slow intravenous injection of 1 in 10 000 (100 micrograms/mL) solution
- **Hydrocortisone**
  - By mouth, replacement therapy, 20–30 mg daily in divided doses, CHILDREN 10–30 mg
  - By intramuscular injection or slow intravenous injection or infusion, 100–500 mg, 3–4 times in 24 hours or as required; CHILDREN by slow intravenous injection up to 1 year 25 mg, 1–5 years 50 mg, 6–12 years 100 mg
- **Dexamethasone**
  - By mouth, usual range 0.5–10 mg daily; CHILDREN 10–100 micrograms/kg daily
  - By intramuscular injection or slow intravenous injection or infusion (as dexamethasone phosphate), initially 0.5–24 mg
  - CHILDREN 200–400 micrograms/kg daily Cerebral oedema associated with malignancy (as dexamethasone phosphate), by intravenous injection, 10 mg initially, then 4 mg by intramuscular injection every 6 hours as required for 2–4 days then gradually reduced and stopped over 5–7 days
- **Calamine lotion** should be applied occlusive to the affected part

## **STEP 5: Effects and Adverse Effects of Anti-Allergies (20 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the side effects and adverse effects of anti-allergies?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

## CLARIFY and SUMMARISE by using the content below

- Side and adverse effects of ant allergies
  - **Chlorpheniramine maleate and Promethazine Hydrochloride**
    - Drowsiness
    - Headache
    - Psychomotor impairment
    - Antimuscarinic effects such as urinary retention, dry mouth, blurred vision, and gastro-intestinal disturbances
    - Other rare side-effects of antihistamines include hypotension, palpitation, arrhythmias, extrapyramidal effects, dizziness, confusion, depression, sleep disturbances, tremor, convulsions, hypersensitivity reactions (including bronchospasm, angioedema, and anaphylaxis, rashes, and photosensitivity reactions)
    - Dermatitis and tinnitus reported
  - **Cetirizine Hydrochloride and Loratadine**
    - Psychomotor impairment
    - antimuscarinic effects such as urinary retention, dry mouth, blurred vision, and gastro-intestinal disturbances
    - Other rare side-effects of antihistamines include hypotension, palpitation, arrhythmias, extrapyramidal effects, dizziness, confusion, depression, sleep disturbances, tremor, convulsions, hypersensitivity reactions (including bronchospasm, angioedema, and anaphylaxis, rashes, and photosensitivity reactions)
  - **Adrenalin**
    - Nausea, vomiting, tachycardia, arrhythmias, palpitation, cold extremities, hypertension (risk of cerebral haemorrhage); dyspnoea, pulmonary oedema (on excessive dosage or extreme sensitivity); anxiety, tremor, restlessness, headache, weakness, dizziness; hyperglycaemia; urinary retention; sweating
    - Tissue necrosis at injection site
  - **Hydrocortisone and Dexamethasone**
    - Mineralocorticoid side-effects include hypertension, sodium and water retention, and potassium and calcium loss
    - Glucocorticoid side-effects include diabetes and osteoporosis which is a danger, particularly in the elderly, as it can result in osteoporotic fractures for example of the hip or vertebrae
    - Other side-effects include: gastro-intestinal effects: dyspepsia, abdominal distension, acute pancreatitis, oesophageal ulceration and candidiasis
    - Musculoskeletal effects: muscle weakness, vertebral and long bone fractures, tendon rupture
    - Endocrine effects: menstrual irregularities and amenorrhoea, hirsutism, weight gain
  - **Calamine lotion**

- No reported side effect so far

## **STEP 6: Interaction and Precaution of Anti-allergies (20 minutes)**

- Drug interactions:
  - Chlorpheniramine maleate, Cetirizine Hydrochloride, Loratadine and Promethazine hydrochloride being antihistamine when given with MAOI example phenelzine their sedative and antimuscarinic effects is increased
  - Adrenalin no serious interaction
  - Hydrocortisone and Dexamethasone like other corticosteroids increases hematological effect of methotrexate
  - Calamine lotion no serious interaction
- Precautions and cautions:
  - Chlorpheniramine maleate, Cetirizine Hydrochloride, Loratadine and Promethazine hydrochloride should therefore be used with caution in prostatic hypertrophy, urinary retention, susceptibility to angle-closure glaucoma, and pyloroduodenal obstruction and in hepatic disease
  - Adrenalin should be given with caution heart disease, hypertension, arrhythmias, cerebrovascular disease, phaeochromocytoma; diabetes mellitus, hyperthyroidism; susceptibility to angle-closure glaucoma; elderly
  - Hydrocortisone and Dexamethasone Abrupt withdrawal after a prolonged period can lead to acute adrenal insufficiency, hypotension or death
    - Withdrawal can also be associated with fever, myalgia, arthralgia, rhinitis, conjunctivitis, painful itchy skin nodules and weight loss

## **STEP 7: Key points (5 minutes)**

- Antihistamine are common medicines in most allergic condition
- Adrenaline is useful in emergency allergic condition like anaphylactic shock
- Corticosteroid therapy should not be stopped abruptly
- Patient taking antihistamine should not drive or operate the machines

## **STEP 7: Evaluation (5 minutes)**

- What are the indications of antihistamine?
- What is the use of corticosteroids?
- Which adult dose of promethazine hydrochloride
- What is the common adverse effect of hydrocortisone?
- Which group of drug which has interaction with antihistamine?

## References

- Ministry of Health and Social Welfare. (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.
- Robert L. Talbert, Gary C. Yee, Gary R. Matzke, Barbara G. Wells, L. Michael. (2014). *Pharmacotherapy: A Pathophysiologic Approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Sally S.R, Jeanne C.S. (2000). *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins.
- School of Pharmaceutical sciences. (2011). *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.
- The Royal Pharmaceutical Society of Great Britain. (2007). *Martindale, The Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.
- The Royal Pharmaceutical Society of Great Britain. (2009). *British National Formulary* (59<sup>th</sup> ed). London, BMJ Group and RPS Publishing.

# Session 20: Description of Antiacids and Antiulcer Drugs

**Total Session Time:** 120 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- Outline indications of antacids and antiulcer drugs
- List contraindication of antacids and antiulcer drugs
- Describe dose, dosage and course of antacids and antiulcer drugs
- List side effects and adverse effects of antacids and antiulcer drugs
- Describe interaction and precaution of antacids and antiulcer drugs

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Overhead projector and computer

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Objectives
2	20 minutes	Presentation/ Buzzing	Indications of Antacids and Antiulcer Drugs
3	15 minutes	Presentation/ Brainstorming	Contraindications of Antacids and Antiulcer Drugs
4	30 minutes	Presentation	Dose, Dosage and Course of Antacids and Antiulcer Drugs
5	20 minutes	Presentation/ Brainstorming	Side Effects and Adverse Effects of Antacids and Antiulcer Drugs
6	20 minutes	Presentation	Interactions and Precautions of Antacids and Antiulcer Drugs
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning Objectives (5 minutes)**

**READ or ASK** students to read the learning objectives and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Antacids and Antiulcer Drugs (20 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What are the indications of antacids?
- What are the indications of antiulcer drugs?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY** and **SUMMARIZE** by using the content below

#### **• Antacids**

- Antacids are weak bases that react with gastric hydrochloric acid to form a salt and water
- Antacids have been used for centuries in the treatment of acid-peptic disorders
- Antacids (usually containing aluminium or magnesium Compounds) can often relieve symptoms in ulcer dyspepsia and in non-erosive gastro-oesophageal reflux
- Antacids are also sometimes used in functional (non-ulcer) dyspepsia
- Aluminium hydroxide is used in management of dyspepsia and hyperphosphatemia
- Magnesium trisilicate is used in management of dyspepsia

#### **• Anti-Ulcer Drugs**

- Histamin (H<sub>2</sub>-receptor) antagonists (e.g. cimetidine, famotidine and ranitidine)
  - These drugs are indicated for gastroesophageal reflux disease (GERD), peptic ulcer disease, non-ulcer dyspepsia, acute gastritis, Zollinger-Ellison Syndrome and prevention of bleeding from stress-related gastritis
- Proton Pump Inhibitors (PPI) (e.g. Omeprazole and Lansoprazole)
  - These drugs are indicated for gastroesophageal reflux disease (GERD), H pylori-associated ulcers, NSAID-associated ulcers, Prevention of re-bleeding from peptic ulcers, nonulcer dyspepsia, acute gastritis, prevention of stress-related mucosal bleeding, gastrinoma and other hypersecretory conditions
- Drugs for Treatment of Helicobacter Pylori

- Omeprazole + Amoxycillin + plus Metronidazole
- Lansoprazole + Clarithromycin + plus Tinidazole
- Then Lansoprazole for one month

### **STEP 3: Contraindications of Antacids and Antiulcer Drugs (15 minutes)**

***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the Contraindication of antacids and antiulcer drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- **Antacids**
  - Magnesium Carbonate is contraindicated in hypophosphatemia
  - Magnesium trisilicate is contraindicated in hypophosphatemia
  - Aluminium hydroxide is contraindicated in hypophosphatemia, neonates and infants
  - Both magnesium and aluminum are absorbed and excreted by the kidneys. Hence, patients with renal insufficiency should not take these agents long-term

### **STEP 4: Dose, Dosage and Course of Antacids and Antiulcer Drugs (30 minutes)**

- **Antacids**
  - Magnesium trisilicate 250 mg 1–2 tablets chewed when required
  - Magnesium Trisilicate Mixture/ Suspension 5% each of magnesium trisilicate, 10–20 mL in water 3 times daily or as required
  - Dried aluminium hydroxide 220 mg/5 mL: 10–20 mL 3 times daily, 20–60 minutes after meals, and at bedtime or when required

- **Antiulcer Drugs**

### **H-<sub>2</sub> Antagonists**

- Cimetidine 400 mg twice daily (with breakfast and at night) or 800 mg at night (benign gastric and duodenal ulceration) for at least 4 weeks (6 weeks in gastric ulceration, 8 weeks in NSAID-associated ulceration). When necessary the dose may be increased to 400 mg four times daily
- Cimetidine is used in Prophylaxis of stress ulceration, 200–400 mg every 4–6 hours
- Ranitidine is administered as 150 mg twice daily or 300 mg at night for 4–8 weeks in benign gastric and duodenal ulceration, up to 6 weeks in chronic episodic dyspepsia, and up to 8 weeks in NSAID-associated ulceration
- In duodenal ulcer 300 mg Ranitidine can be given twice daily for 4 weeks to achieve a higher healing rate

- **Proton Pump Inhibitors**

- Lansoprazole in Benign gastric ulcer, 30 mg daily in the morning for 8 weeks
- Lansoprazole in Duodenal ulcer, 30 mg daily in the morning for 4 weeks; maintenance 15 mg daily
- Lansoprazole NSAID-associated duodenal or gastric ulcer, 30 mg once daily for 4 weeks
- Lansoprazole when used in eradication of Helicobacter pylori associated with duodenal ulcer see eradication regimens below
- Omeprazole when used benign gastric and duodenal ulcers, 20 mg once daily for 4 weeks in duodenal ulceration or 8 weeks in gastric ulceration; in severe or recurrent cases increase to 40 mg daily; maintenance for recurrent duodenal ulcer, 20 mg once daily
- Omeprazole when used for NSAID-associated duodenal or gastric ulcer and gastro duodenal erosions, 20 mg once daily for 4 weeks, continued for further 4 weeks if not fully healed
- Omeprazole in Duodenal or benign gastric ulcer associated with Helicobacter pylori, see eradication regimens on below

- **Drugs for Treatment of Helicobacter Pylori**

- Omeprazole 40mg once daily+ Amoxycillin 500mg 8 hourly + plus Metronidazole 400mg 8 hourly for 7 days
- Lansoprazole 30mg once daily+ Clarithromycin 250mg 12 hourly + plus Tinidazole 500mg once daily for 7 days
- Then Lansoprazole 30mg once daily for one month

## **STEP 5: Side Effects and Adverse Effects of Antacids and Antiulcer Drugs (20 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are side effects and adverse effects of antacids and antiulcer drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

### **Antacids**

- Constipation (Aluminium hydroxide) e may produce
- Diarrhoea (magnesium hydroxide)
- Sodium bicarbonate (systemic alkalosis and liberate Co<sub>2</sub> causing belching and flatulence)

### **Antiulcer Drugs**

#### **H<sub>2</sub>-Receptor Antagonists (e.g. cimetidine, famotidine and ranitidine)**

- H<sub>2</sub> antagonists are safe drugs (with an exception of cimetidine to some extent) Adverse effects occur in fewer than 3% of patients and include diarrhoea, headache, fatigue, myalgias, and constipation
- Mental status changes (confusion, hallucinations, agitation) may occur with administration of intravenous H<sub>2</sub> antagonists, especially in patients in the intensive care unit who are elderly or who have renal or hepatic dysfunction. These events may be more common with cimetidine
- Cimetidine when used long-term or in high doses, it may cause gynecomastia or impotence in men and galactorrhea in women
- Alopecia may occur though rarely with cimetidine
- Rapid intravenous infusion may cause bradycardia and hypotension through blockade of cardiac H<sub>2</sub> receptors; therefore, intravenous injection should be given over 30 minutes

#### **Proton Pump Inhibitors (PPI) (e.g. Omeprazole and Lansoprazole)**

- Proton pump inhibitors are extremely safe and well tolerated. Diarrhoea, headache and abdominal pain are reported in 1-5% of patients

## **STEP 6: Interactions and Precautions of Antacids and Antiulcer Drugs (20 minutes)**

### **Antacids**

- It is usually advisable to avoid concurrent administration of antacids and other drugs.
- By altering gastric and urinary pH or delaying gastric emptying, antacids can affect rates of dissolution and absorption, bioavailability, and renal elimination of many drugs
- By binding to drugs (for example, tetracycline), Aluminium compounds can form insoluble complexes that are not absorbed
- On the other hand, antacids can increase the rate of absorption of some drugs, for example levodopa

### **Antiulcer Drugs**

#### **H2-Receptor Antagonists (e.g. cimetidine, famotidine and ranitidine)**

- Cimetidine can slow metabolism (and thus potentiate the action) of several drugs (for example; warfarin, diazepam, phenytoin, quinidine; carbamazepine, Theophylline, imipramine), sometimes resulting in serious adverse clinical effect
- Negligible interaction occurs with nizatidine and famotidine
- H<sub>2</sub>-antagonists compete with certain drugs (e.g. procainamide) for renal tubular secretion
- All of these agents except famotidine inhibit gastric first-pass metabolism of ethanol, especially in women resulting to increased bioavailability of ethanol thus increased blood ethanol levels
- H<sub>2</sub>-antagonists should not be administered to pregnant women unless absolutely necessary
- The H<sub>2</sub> antagonists are secreted into breast milk and may therefore affect nursing infant

#### **Proton Pump Inhibitors (PPI) (e.g. Omeprazole and Lansoprazole)**

- Omeprazole interferes in the oxidation of warfarin, phenytoin, diazepam and cyclosporine
- Lansoprazole is associated with minimal drug interactions

## **STEP 7: Key Points (5 minutes).**

- Common antacids used are Magnesium trisilicate, magnesium hydroxide and aluminium hydroxide
- Common Antiulcer drugs used are H-2 antagonists (mainly cimetidine and ranitidine) and Proton pump inhibitors (particularly omeprazole and lansoprazole)

- Antiulcer Drugs are associated with significant drug interactions
- Antacids and Cimetidine may have serious adverse effects
- Special precaution may be needed when using Antacids and antiulcer drugs

### **STEP 8: Evaluation (5 minutes)**

- What are the indications of antacids and antiulcer drugs?
- What are the contraindications of antacids and antiulcer drugs?
- Describe dose, dosage and course of cimetidine, omeprazole, lansoprazole and antacids.
- What drugs are used in the treatment regimen for eradication of?
- How are do we describe the dose, course and dosage for eradication of Helicobacter Pylori in patients with ulcers
- What are side effects and adverse effects of antacids and antiulcer drugs?
- What are the interactions of Antacids and Antiulcer drugs?

## References

- Ministry Of Health and Social Welfare. (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4th ed.). Dar es salaam, Tanzania government printers.
- Robert, L. T., Gary, C.Y., Gary, R.M, Barbara, G. W., Michael, L. (2014). *Pharmacotherapy: A Pathophysiologic Approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Sally S.R, & Jeanne C.S. (2000). *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins.
- School of Pharmaceutical sciences. (2011). *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.
- The Royal Pharmaceutical Society of Great Britain. (2007). *Martindale: The Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.
- The Royal Pharmaceutical Society of Great Britain. (2009). *British National Formulary* (59<sup>th</sup> ed). London, BMJ Group and RPS Publishing.

# Session 21: Description of Antiemetic Drugs

**Total Session Time:** 120 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of antiemetic drugs
- List contraindications of antiemetic drugs
- Describe dose, dosage and course of antiemetic drugs
- List side effects and adverse effects of antiemetic drugs
- Describe interactions and precautions of antiemetic drugs

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Overhead projector and computer

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Tasks
2	20 minutes	Presentation/ Buzzing	Indications of Antiemetic Drugs
3	20 minutes	Presentation/ Brainstorming	Contraindications of Antiemetic Drugs
4	30 minutes	Presentation	Dose, Dosage and Course of Antiemetic Drugs
5	20 minutes	Presentation/ Brainstorming	Side Effects and Adverse Effects of Antiemetic Drugs
6	15 minutes	Presentation	Interactions and Precautions Antiemetic Drugs
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## **STEP 1: Presentation of Session Title and Learning Tasks (5 minutes)**

**READ or ASK** students to read the learning tasks and clarify

**ASK** students if they have any questions before continuing.

## **STEP 2: Listing Indications of Antiemetic Drugs (20minutes)**

**Activity: Buzzing (5 minutes)**

**ASK** students to pair up and buzz on the following question for 2 minutes

- Mention antiemetic drugs used in clinical practice.
- What are indications of antiemetic drugs?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY and SUMMARIZE** by using the content below

- Antiemetic drugs used in clinical practice include:
  - Chlorpromazine
  - Metoclopramide
  - Promethazine hydrochloride
  - Droperidole
  - Donperidone
- Are indicated for treatment of nausea and vomiting due to:
  - Adverse effects from medications
  - Systemic disorders: pregnancy, vestibular dysfunction, increased pressure, hepatobiliary disorders, radiation or chemotherapy, and gastrointestinal obstruction, dysmotility
  - Infections: central nervous system infection, peritonitis
- Used in intractable hiccoughs and vertigo
- Are indicated in post operative

### **STEP 3: Contraindications of Antiemetic Drugs (20 minutes)**

#### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

What are contraindications of antiemetic drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Antiemetic drugs are contraindicated in patients with known hypersensitivity to these drugs
- Prochlorperazine is contraindicated in patients with:
  - Narrow angle glaucoma
  - Severe liver disease
  - Cardiovascular disease

### **STEP 4: Dose, Dosage and Course of Antiemetic Drugs (30 minutes)**

- Chlorpromazine 10-25 mg PO q4-6 h prn
- Metoclopramide 1-2mg/kg iv 15-30 min
- Promethazine hydrochloride 20-25mg at bed time
- Droperidol 0.625-1.25mg 30 min before end of the surgery
- Donperidone 10-20mg 3-4 times daily

## **STEP 5: Side Effects and Adverse Effects of Antiemetic Drugs (20 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

What are side effects and adverse effects of antiemetic drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Side effects of antiemetic drugs are:
  - Headache
  - Dizziness
  - Constipation
  - Drowsiness
  - Sedation
  - Dry mouth
  - Hypertension
  - Hypotension
  - Nasal congestion
  - Diarrhea

## **STEP 6: Interactions and Precautions of Antiemetic Drugs (15minutes)**

- Precaution should be taken in:
  - Severe nausea and vomiting
  - Obstructive diseases of gastro intestinal or genitourinary system
- To be used with caution to patients with:
  - Hypertension
  - Sleep apnea
  - Epilepsy
- Antiemetics interact with:
  - Central nervous system depressants such as:
    - Sedatives
    - Antidepressants
    - Opiates
    - Hypnotics

- Antianxiety drugs
- Also exaggerate the anticholinergic effects of antihistamine, antidepressants, phenothiazines and disopyramide
- Antacids decrease absorption of antiemetic

### **Step 7: Key Points (5 minutes)**

- Antiemetic drugs are indicated in patients with nausea and vomiting due to infections, systemic disorders and effects of other medications
- Antiemetic drugs are contraindicated in patients with known hypersensitivity and severe liver and cardiovascular diseases
- The side effects of Antiemetic drugs are headache, dizziness, constipation diarrhea and sedation
- Caution should be taken to patient with severe nausea and vomiting and genitourinary and gastrointestinal obstructive condition
- Antiemetic drugs react with different drugs central nervous depressant and increases effects of anticholinergic drugs

### **STEP 8: Evaluation (5 minutes)**

- What are antiemetic drugs?
- What are indications of antiemetic drugs?
- What are the contraindications of antiemetic drugs?
- What are the dose, dosage and course of antiemetic drugs
- What are side effects and adverse effects of antiemetic drugs?
- Describe interaction and precaution of antiemetic drugs?

## References

Ministry Of Health and Social Welfare. (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.

Robert, L. Talbert, Gary C. Yee, Gary R. Matzke, Barbara G. Wells, L. Michael. (2014). *Pharmacotherapy: A Pathophysiologic Approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.

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The Royal Pharmaceutical Society of Great Britain. (2009). *British National Formulary* (59<sup>th</sup> ed). London, BMJ Group and RPS Publishing.

## Session 22: Description of Drugs Used in Diarrhoea

**Total Session Time:** 120 minutes

### **Prerequisites**

- None

### **Learning Tasks**

By the end of this session students are expected to be able to:

- List indications of drugs used in diarrhoea
- List contraindications of drugs used in diarrhoea
- Describe dose, dosage and course of drugs used in diarrhoea
- List side effects and adverse effects of drugs used in diarrhoea
- Describe interactions and precautions of drugs used in diarrhoea

### **Resources Needed:**

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Overhead projector and computer

### **SESSION OVERVIEW**

<b>Step</b>	<b>Time</b>	<b>Activity/ Method</b>	<b>Content</b>
1	05 minutes	Presentation	Introduction, Learning tasks
2	20 minutes	Presentation/ Buzzing	Indications of Drugs Used in Diarrhoea
3	20 minutes	Presentation/ Brainstorming	Contraindications of Drugs Used in Diarrhoea
4	30 minutes	Presentation	Dose, Dosage and Course of Drugs Used in Diarrhoea
5	20 minutes	Presentation/ Brainstorming	Side Effects and Adverse Effects of Drugs Used in Diarrhoea
6	15minutes	Presentation	Interactions and Precautions of Drugs Used In Diarrhoea
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning Tasks (5 minutes)**

**READ or ASK** students to read the learning tasks and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Drugs Used in Diarrhoea (20minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What are drugs indicated in patient with diarrhea?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY and SUMMARIZE** by using the content below

- Indications
  - Loperamide is useful in symptomatic treatment of acute diarrhoea adjunct to rehydration in adults and children over 4 years. It is also used for chronic diarrhoea in adults only
  - Zinc is used for treatment of acute [diarrhoea](#) and prevention of zinc deficiency and its consequences, including stunted growth in children, and slow wound healing
  - Oral rehydration salt is useful in replacement of fluid and electrolyte loss in diarrhoea

### **STEP 3: Contraindications of Drugs Used in Diarrhoea (20 minutes)**

#### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are contraindications of drugs used in diarrhea?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

- Loperamide is contraindicated in conditions where inhibition of peristalsis should be avoided, where abdominal distension develops and in conditions such as active ulcerative colitis or antibiotic-associated colitis
- Zinc is not contraindicated to any specific group of individual Oral rehydration is not contraindicated to any specific group of individual

#### **STEP 4: Dose, Dosage and Course of Drugs Used in Diarrhoea (30 minutes)**

- Loperamide
  - Acute diarrhea, 4 mg initially followed by 2 mg after each loose stool for up to 5 days. Usual dose 6–8 mg daily, maximum 16 mg daily, children 4–8 years, 1 mg 3–4 times daily for up to 3 days only, 8–12 years, 2 mg 4 times daily for up to 5 days
  - Chronic diarrhea, in adults initially 4–8 mg daily in divided doses, subsequently adjusted according to response and given in 2 divided doses for maintenance, maximum 16 mg daily
  - Fecal incontinence initially 500 micrograms daily, adjusted according to response, maximum 16 mg daily in divided doses
- Zinc
  - For diarrhea in malnourished or zinc-deficient children: 10-40 mg elemental zinc daily
  - For preventing and treating pneumonia in undernourished children in developing countries, 10-70 mg/day
  - For hypogeusia, (sense of taste is abnormal), 25-100 mg zinc
  - For the eating disorder anorexia nervosa: 100 mg of zinc gluconate daily
  - For treating stomach ulcers, zinc sulfate 200 mg three times daily
  - For muscle cramps in zinc deficient people with liver disease zinc sulfate 220 mg twice daily
  - For osteoporosis, 15 mg zinc combined with 5 mg manganese, 1000 mg calcium, and 2.5 mg copper has been used
  - For sickle cell disease, zinc sulfate 220 mg three times daily
  - To increase growth and weight gain in children with sickle cell disease who have not reached puberty, 10 mg elemental zinc per day
- Oral rehydration salt is given to fluid loss, usually 200–400 mL solution after every loose motion; infant 1–1½ times usual feed volume; child 200 mL after every loose motion

## **STEP 5: Side Effects and Adverse Effects of Drugs Used in Diarrhea** **(15 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the side effects and adverse drug reactions of drugs used in diarrhoea?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Loperamide, abdominal cramps, dizziness, drowsiness, and skin reactions including urticaria; paralytic ileus and abdominal bloating also reported
- Zinc, zinc cause nausea, vomiting, diarrhea, metallic taste, kidney and stomach damage, and other side effects. On broken skin zinc may cause burning, stinging, itching and tingling sensation
- ORS when given in excess may cause oedema and hyperchloraemic acidosis

## **STEP 6: Interactions and Precautions of Drugs Used in Diarrhoea** **(15minutes)**

- Loperamide increases plasma concentration of oral desmopressin
- Zinc decrease absorption of antibiotic in the GIT there by decreasing their effectiveness  
For example:
  - Zinc can attach to tetracyclines in the stomach. This decreases the amount of tetracyclines that can be absorbed. Taking zinc with tetracyclines decrease the effectiveness of tetracyclines. To avoid this interaction take zinc 2 hours before or 4 hours after taking tetracyclines
  - Penicillamine interacts with zinc decrease how much penicillamine your body absorbs and decrease the effectiveness of penicillamine
  - Alcoholism, Long-term, excessive alcohol drinking is linked to poor zinc absorption in the body
- Oral rehydration salt no known interactions since most components used are normal elements in the body

## **Step 7: Key Points (5minutes)**

- Loperamide, zinc and ORS are indicated for diarrhea
- Excessive intake of oral rehydration salt may cause oedema
- Long term use of alcohol causes poor absorption of zinc
- Loperamide is used in management of acute and chronic diarrhoea
- Zinc interact and decreases absorption of some antibiotics

## **STEP 8: Evaluation (10minutes)**

- What drugs are used in patient with diarrhea?
- What are the indications of drugs used in diarrhea?
- What are the contraindications of drugs used in diarrhea?
- What are the dose, course and dosage of drugs used in treatment of diarrhea?
- What are the side effects of drugs used in diarrhea?
- What the interactions and precautions are of drugs used in treatment of diarrhea?

## References

- Robert, L. T., Gary ,C.Y., Gary,R.M, Barbara,G.W., & Michael, L. (2014). *Pharmacotherapy: A pathophysiologic approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
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# Session 23: Description of Solutions for Correcting Electrolyte Imbalance

**Total Session Time:** 120 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of solutions for correcting electrolyte imbalance
- List contraindications of solutions for correcting electrolyte imbalance
- Describe dose, dosage and course of solutions for correcting electrolyte imbalance
- List side effects and adverse effects of solutions for correcting electrolyte imbalance
- Describe interactions and precautions of solutions for correcting electrolyte imbalance

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Computer and projector

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Objectives
2	20 minutes	Presentation/ Buzzing	Indications of Solutions for Correcting Electrolyte Imbalance
3	20 minutes	Presentation/ brainstorming	Contraindications of Solutions for Correcting Electrolyte Imbalance
4	30 minutes	Presentation	Dose, Dosage and Course of Solutions for Correcting Electrolyte Imbalance
5	15 minutes	Presentation/ brainstorming	Side Effects and Adverse Effects of Solutions for Correcting Electrolyte Imbalance
6	20 minutes	Presentation	Interactions and Precautions of Solutions for Correcting Electrolyte Imbalance
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning Objectives (5 minutes)**

**READ or ASK** students to read the learning objectives and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Solutions for Correcting Electrolyte Imbalance (20 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following questions for 2 minutes

- What are the solutions used for correcting electrolyte imbalance?
- What are the indications of solutions for correcting electrolyte imbalance?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY and SUMMARIZE** by using the content below

- Solution for correcting electrolyte imbalance include dextrose solution, sodium lactate solution, sodium chloride solution, potassium chloride solution and potassium citrate oral solution
- General indications/uses:
  - Administration of concentrated drugs which require dilution
  - To minimize/control side effects of some drugs (e.g. Quinine in Dextrose to avoid hypoglycemic effect)
  - Correction of electrolyte and acid-base disorders/imbalances for example in conditions like severe diarrhea, severe vomiting
  - To correct hypotension by restoring blood volume in conditions like anaphylactic shock, poisoning
  - Correction of shock and establish proper tissue perfusion
  - When a quick effect of a drug is required through I.V administration
- Sodium Chloride (Normal Saline):
  - Principal fluid used for intravascular resuscitation and replacement of salt loss e.g. diarrhoea and vomiting
  - Hypovolemic shock
  - Stroke

- Used as a sterile irrigation medium
- Sodium Lactate compound (Ringers Lactate):
  - Hypovolemic shock
  - Burns
  - Diarrhoea
  - Intraoperative
  - Intravenous fluid and electrolyte replacement
  - As a source of bicarbonate in treatment of mild to metabolic acidosis associated with potassium deficiency
- Dextrose 5%:
  - Primarily used to maintain water balance in patients who are not able to take anything by mouth i.e. starvation deficit
  - Commonly used post-operatively in conjunction with salt retaining fluids i.e. saline
- Dextrose 10%:
  - As Intravenous solution for fluid replenishment
  - caloric supply in single dose container for intravenous administration
  - As parenteral nutrient
- Dextrose 50%:
  - Hypoglycemia
  - Status epilepticus
  - Coma
  - Altered mental status
- Sodium chloride+ Dextrose (Dextrose saline):
  - Similar indications to 5% dextrose
  - Provides  $\text{Na}^+$  30mmol/l and  $\text{Cl}^-$  30mmol/l i.e. a sprinkling of salt and sugar
  - Does not commonly cause water or salt overload
- Potassium chloride Solution:
  - Hypokalemia

### **STEP 3: Contraindications of Solutions for Correcting Electrolyte Imbalance (20 minutes)**

#### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are contraindications of solutions for correcting electrolyte imbalance?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

- Sodium Chloride (Normal Saline):
  - Severe Hypertension
  - Pulmonary edema
  - Congestive cardiac failure
  - Oedema
  - Severe renal impairment
  - Liver cirrhosis
- Dextrose 5%:
  - Hyperglycemia
- Dextrose 50%:
  - Cerebral vascular accident in presence of normal blood sugar.
  - Hyperglycemia
  - Increased Intracranial pressure(ICP)
  - Intracranial hemorrhage
- Sodium Lactate Compound (Ringers Lactate):
  - Known hypersensitivity to sodium lactate
  - Congestive heart failure
  - Severe renal impairment
  - Lactic acidosis

**STEP 4: Dose, Dosage and Course of Solutions for Correcting Electrolyte Imbalance (30 minutes)**

- Dextrose 5%; 500ml, 1000ml. Provides some calories [approximately 10% of daily requirements]. Regarded as ‘electrolyte free’ – contains NO Sodium, Potassium, Chloride or Calcium
- Dextrose 10%;500ml
- Dextrose 25%, 50%; 50ml, 100ml
- Sodium lactate compound (Ringer’s solution) 500ml, 1000ml. Each liter provides approximately Na+ 131 mmol, K 5mmol, Ca++ 2mmol, Cl- 111mmol and HCO<sub>3</sub><sup>-</sup> (lactate) 29mmol
- Sodium chloride+ Dextrose(Dextrose saline), 0.9%+5%; 500ml, 1000ml
- Potassium chloride Solution 7.4% 10ml Vial
- Potassium citrate oral solution containing potassium citrate

## **STEP 5: Side Effects and Adverse Effects of Solutions for Correcting Electrolyte Imbalance (15 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are side effects and adverse effects of solutions for correcting electrolyte imbalance?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

- Sodium Chloride (Normal Saline):
  - Common cause of iatrogenic hyponatremia in surgical patients.
  - Reactions which may occur because of the solution or the technique of administration include febrile response, infection at the site of injection, venous thrombosis or phlebitis extending from the site of injection, extravasation, and hypervolemia
- Dextrose 5%:
  - Hyponatremia
  - Pain, burning and phlebitis at site of injection
  - Hyperglycemia especially with Dextrose 50%

## **STEP 6: Description of Interactions and Precautions of Solutions for Correcting Electrolyte Imbalance (20 minutes)**

- Precaution:
  - Drugs should only be added to infusion containers when constant plasma concentrations are needed or when the administration of a more concentrated solution would be harmful
  - In general, only one drug should be added to any infusion container and the components should be compatible
  - Ready-prepared solutions should be used whenever possible
  - Drugs should not normally be added to blood products, mannitol, or sodium bicarbonate
  - Solutions should be thoroughly mixed by shaking and checked for absence of particulate matter before use

- Strict asepsis should be maintained throughout and in general the giving set should not be used for more than 24 hours (for drug admixtures)
  - The infusion container should be labelled with the patient's name, the name and quantity of additives, and the date and time of addition (and the new expiry date or time). Such additional labelling should not interfere with information on the manufacturer's label that is still valid
  - When possible, containers should be retained for a period after use in case they are needed for investigation
  - It is good practice to examine intravenous infusions from time to time while they are running. If cloudiness, crystallization, change of colour, or any other sign of interaction or contamination is observed the infusion should be discontinued
  - The accidental entry and subsequent growth of micro-organisms converts the infusion fluid pathway into a potential vehicle for infection with micro-organisms, particularly species of *Candida*, *Enterobacter*, and *Klebsiella*
- Interactions:
  - When drugs are added to infusion fluids or when infusion fluids are mixed; physical and chemical incompatibilities may occur with loss of potency, increase in toxicity, or other adverse effect. The solutions may become opalescent or precipitation may occur as a result of pH, concentration changes, 'salting-out' effects, complexation or other chemical changes
  - A number of preparations undergo significant loss of potency when added singly or in combination to large volume infusions. Examples include ampicillin in infusions that contain glucose or lactates
  - Because of the large number of incompatibilities, drugs should not normally be added to blood and blood products for infusion purposes. Examples of incompatibility with blood include hypertonic mannitol solutions (irreversible crenation of red cells), dextrans (interference with cross-matching), glucose (clumping of red cells), and oxytocin (inactivated)
- Dextrose :
  - To be avoided in hypovolemic shock as it is ineffective in raising blood volume and leads to urinary fluid loss
  - Avoided in stroke.
  - Few known significant drug interactions
  - Possible interaction with antidiabetic drugs
- Sodium Chloride (Normal saline solution):
  - Co-medication of drugs inducing sodium retention may exacerbate any systemic effects

## **STEP 7: Key Points (5 minutes)**

- Solutions for correcting electrolyte imbalances have various indications/use depending on composition and concentrations

- Solutions for correcting electrolyte imbalances are contraindicated in some conditions
- Various precautions need to be taken when handling and using solutions for electrolyte imbalances

### **STEP 8: Evaluation (5 minutes)**

- What are indications for Sodium Chloride (Normal saline), Sodium Lactate compound (Ringer's Lactate) and Dextrose?
- What are contraindications for Sodium Chloride (Normal saline), Sodium Lactate compound (Ringer's Lactate) and Dextrose?
- What are the side effects of Sodium Chloride (Normal saline) and Dextrose?
- What precautions should be taken when administering solutions for correcting electrolyte imbalance?
- What are interactions of solutions for correcting electrolyte imbalance?

## References

- Ministry of Health and Social Welfare. (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.
- Robert L. Talbert, Gary C. Yee, Gary R. Matzke, Barbara G. Wells,& L. Michael. (2014). *Pharmacotherapy: a pathophysiologic approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Sally S.R & Jeanne C.S. (2000). *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins
- School of Pharmaceutical sciences. (2011). *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.
- The Royal Pharmaceutical Society of Great Britain. (2007). *Martindale, the Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.
- The Royal Pharmaceutical Society of Great Britain. (2009). *British National Formulary* (59<sup>th</sup> ed). London, BMJ Group and RPS Publishing.

# Session 24: Description of Cathartic Drugs

**Total Session Time:** 60 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of cathartics drugs
- List contraindications of cathartics drugs
- Describe dose, dosage and course of cathartics drugs
- List side effects and adverse effects of cathartics drugs
- Describe interaction and precaution of cathartics drugs

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Overhead projector and computer

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Tasks
2	10 minutes	Presentation/ Buzzing	Indications of Cathartic Drugs
3	10 minutes	Presentation/ Brainstorming	Contraindications of Cathartic Drugs
4	10 minutes	Presentation	Dose, Dosage and Course of Cathartic Drugs
5	10 minutes	Presentation/ Brainstorming	Side Effects and Adverse Effects of Cathartics Drugs
6	05minutes	Presentation	Interactions and Precautions of Cathartic Drugs
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## **SESSION CONTENTS**

### **STEP 1: Presentation of Session Title and Learning tasks (5 minutes)**

**READ or ASK** students to read the learning tasks and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Cathartic Drugs (10 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- Mention cathartic drugs.
- What are indications of cathartic drugs?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY and SUMMARIZE** by using the content below

- Also called stimulus laxatives and include lactulose and bisacodyl
- Cathartic drugs are indicated in :
  - Constipation
  - Preparation for radiological procedure
  - Preparation for surgery
  - Lactulose is indicated in hepatic encephalopathy (portal systemic encephalopathy)
- Commonly cathartics are bisacodyl and lactulose

### **STEP 3: Contraindications of Cathartic Drugs (10 minutes)**

#### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are contraindications of cathartic drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

- Lactulose are contraindicated in patients with :
  - Intestinal obstruction
  - Galactosaemia
- Bisacodyl are contraindicated in:
  - Acute surgical condition

- Acute inflammatory bowel diseases
- Severe dehydration

#### **STEP 4: Dose, Dosage and Course of Cathartic Drugs (10 minutes)**

- Bisacodyl
  - For treatment of constipation:
    - 5-10mg orally at night
    - Or suppositories 10mg in the morning
  - Preparation for surgery and radiological procedures:
    - 10-20 mg orally the night before procedure
    - Suppositories 10mg 1-2 hours before procedure
- Lactulose
  - For treatment of constipation
    - 15ml twice daily adjust according to response
  - Hepatic encephalopathy
    - 30-50ml three times daily

#### **STEP 5: Side Effects and Adverse Effects of Cathartic Drugs (10 Minutes)**

**Activity:** *Brainstorming (5 minutes)*

**Ask** students to brainstorm on the following question:

- What are side effects and adverse effects of cathartic drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- The side effects and adverse effects of Lactulose are:
  - Nausea
  - Vomiting
  - Flatulence
  - Cramps
  - Abdominal discomfort
- The side effects and adverse effects of bisacodyl are:
  - Nausea
  - Vomiting
  - Colitis
  - Local irritation on suppository application

## **STEP 6: Interactions and Precautions of Cathartic Drugs (5 minutes)**

- Interactions
  - Lactulose enhances the anticoagulant effect of coumarins
- Precautions
  - Avoid lactulose in lactose intolerance
  - Avoid excessive use in hypokalaemia

## **Step 7: Key Points (5minutes)**

- Cathartic drugs are indicated to patients with constipation and in preparation for surgical and radiological procedures
- Cathartic drugs are contraindicated in patients with intestinal obstruction and severe dehydration
- Cathartic drugs can be given orally or as suppositories
- Nausea and vomiting are common side effects of Cathartic drugs
- Caution should be taken to patient with lactose intolerance

## **STEP 8: Evaluation (5minutes)**

- What are the indications of Cathartic drugs?
- What are the Contraindication of Cathartic drugs?
- What are side effects and adverse effects of Cathartic drugs?

## References

- Robert L. Talbert, Gary C. Yee, Gary R. Matzke, Barbara G. Wells, L. Michael (2014). *Pharmacotherapy: a pathophysiologic approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Ministry Of Health and Social Welfare. 2013. *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.
- Sally S.R, Jeanne C.S. 2000. *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins
- School of Pharmaceutical sciences. 2011. *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.
- The Royal Pharmaceutical Society of Great Britain. 2007. *Martindale, the Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.

# Session 25: Description of Anti Hemorrhoid Drugs

**Total Session Time:** 60 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of anti hemorrhoid drugs
- List contraindication of anti hemorrhoid drugs
- Describe dose, dosage and course of anti hemorrhoid drugs
- List side effects and adverse effects of anti hemorrhoid drugs
- Describe interactions and precautions of anti hemorrhoid drugs

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Overhead projector and computer

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Tasks
2	10 minutes	Presentation/ Buzzing	Indications of Anti hemorrhoid Drugs
3	05 minutes	Presentation	Contraindications of Anti hemorrhoid Drugs
4	10 minutes	Presentation	Dose, Dosage and Course of Anti hemorrhoid Drugs
5	15 minutes	Presentation/ Brainstorming	Side effects and Adverse Effects of Anti hemorrhoids Drugs
6	05 minutes	Presentation	Interactions and Precautions of Anti hemorrhoid Drugs
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning Tasks (5 minutes)**

**READ or ASK** students to read the learning tasks and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Anti hemorrhoid Drugs (10 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What are the indications of anti hemorrhoid drugs?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY and SUMMARIZE** by using the content below

- Anusol suppository/or ointment which contains: Benzyl benzoate 33 mg, bismuth oxide 24 mg, bismuth subgallate 59 mg, hydrocortisone acetate 10 mg, Peru balsam 49 mg and zinc oxide 296 mg is used in management of hemorrhoids in adults
  - Ingredients contained in anusol suppository such as bismuth subgallate, zinc oxide are mild astringents which give symptomatic relief in hemorrhoids
- Bismuth subgallate: With 1% hydrocortisone ointment is used in management of hemorrhoids. Hydrocortisone helps to relieve rectal pain, itching, bloody diarrhoea, and bleeding by reducing swelling (inflammation) directly in the rectum and anus
- Paracetamol is used to relieve pain and inflammation in hemorrhoids
- Proctosedyl suppository or ointment is used as a second choice in hemorrhoids
- Many proprietary preparations also contain lubricants, mild antiseptics or vasoconstrictors that reduce swelling and relieve itching and discomfort by tightening blood vessels
- Phenylephrine is an example of a vasoconstrictor (contained in Preparation) used in hemorrhoids

### **STEP 3: Contraindications of Anti hemorrhoids Drugs (5 minutes)**

- Anti hemorrhoid drugs containing local anaesthetics should be avoided in infants and children
- Allergic reactions/hypersensitivity to any of the ingredients of anti hemorrhoid preparation

## **STEP 4: Dose, Dosage and Course of Anti hemorrhoid Drugs (10 minutes)**

- One Anusol suppository is inserted night only OR and morning after bowel movement for a maximum of seven days
- A second choice Proctosedyl suppository or ointment is used once or twice a day, that is 12 hourly
- Bismuth subgallate with 1% hydrocortisone ointment is used once or twice a day, that is 24 hourly or 12 hourly

## **STEP 5: Side Effects and Adverse Effects of Anti hemorrhoids Drugs (15 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are side effects and adverse effects of anti hemorrhoid drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Side effects of anti hemorrhoid drugs are rare: Burning, itching, dryness, skin/hair follicle irritation, and changes in skin colour around the rectal area may occur
- Rarely, it is possible corticosteroids and other ingredients of anusol will be absorbed into the bloodstream leading to toxicity. Refer Lecture on corticosteroids for side effects

## **STEP 6: Interactions and Precautions Anti hemorrhoids Drugs (5 minutes)**

- Anusol suppository and most anti hemorrhoid drugs are not recommended in children
- Precaution should be taken when using anti hemorrhoid preparations containing vasoconstrictors such phenylephrine if a patient has hypertension, heart problems, thyroid problems or diabetes
- Interactions of anti hemorrhoid drugs are rare, may occur when corticosteroids and other ingredients are absorbed into blood stream

## **STEP 7: Key Points (5 minutes)**

- Only few drugs are available for management of hemorrhoids
- Early stages of the disease could be effectively managed lifestyle changes, fiber supplement, use of food softeners, and drugs mainly topical ointments and suppositories
- The more advanced hemorrhoid stages need some type of surgery
- Astringents (drying agents) help shrink hemorrhoids by pulling water out of the swollen tissue. This, in turn, helps relieve itching, burning, and irritation

## **STEP 8: Evaluation (5 minutes)**

- What drugs are indicated for Hemorrhoids?
- What are contraindications of anti hemorrhoids?
- What are the dose, dosage and course of anti hemorrhoid drugs?
- What are side effects of anti hemorrhoids?

## References

- Ministry Of Health and Social Welfare. (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4th ed.). Dar- es-salaam, Tanzania government printers.
- The Royal Pharmaceutical Society of Great Britain. (2009). *British National Formulary* (59th ed). London, BMJ Group and RPS Publishing.
- Sally, S.R., & Jeanne, C.S. (2000). *Introductory Clinical Pharmacology* (6th ed). New York, Lippincott Williams and Wilkins.
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# Session 26: Description of Antispasmodic Drugs

**Total Session Time:** 60 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of antispasmodic drugs
- List Contraindication of antispasmodic drugs
- Describe dose, dosage and course of antispasmodic drugs
- List side effects and adverse effects of antispasmodic drugs
- Describe interaction and precaution of antispasmodic drugs

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Computer and LCD

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Tasks
2	10 minutes	Presentation Brainstorming	Indications of antispasmodic drugs
3	05 minutes	Presentation Buzzing	Contraindications of antispasmodic drugs
4	10 minutes	Presentation	Dose, dosage and course of antispasmodic drugs
5	10 minutes	Presentation Brainstorming	Side effects and adverse effects of antispasmodic drugs
6	10 minutes	Presentation	Interactions and precautions of antispasmodic drugs
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning tasks (5 minutes)**

**READ or ASK** students to read the learning tasks and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Antispasmodic Drugs (10 minutes)**

#### ***Activity: Brainstorming (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What are the indications of antispasmodic drugs?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY and SUMMARIZE** by using the content below

- Antispasmodic drugs are relaxants of intestinal smooth muscles.
  - They include drugs such as Atropine sulfate, Dicycloverine hydrochloride, Belladonna and Hyoscine butyl-bromide
- Indications  
The smooth muscle relaxant properties of anti-muscarinic and other antispasmodic drugs may be useful in providing symptomatic relief gastro-intestinal disorders characterized by smooth muscle spasms, especially in:
  - Dysmenorrhea ( Hyoscine butyl-bromide)
  - Irritable bowel syndrome
  - Diverticular disease ( a condition associated with lower abdominal pain, anorexia, fevers and disturbed bowel habit)

### **STEP 3: Contraindication of antispasmodic drugs (5 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the contraindications of antispasmodic drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

- Anti-muscarinic drugs are contraindicated in myasthenia gravis
- Dicyclomine hydrochloride is contraindicated to infants under 6 months

#### **STEP 4: Dose, Dosage and Course of Antispasmodic Drugs (10 minutes)**

- Atropine sulfate
  - 0.6-1.2 mg at night
- Dicycloverine hydrochloride
  - 10–20mg 3 times daily; INFANT 6–24 months 5–10mg 3–4 times daily, 15 minutes before feeds; CHILD 2–12 years 10mg 3 times daily
- Belladonna
  - 12.5mg every 8 hours
- Hyoscine butyl-bromide
  - By mouth: smooth muscle spasm, 20mg 4 times daily; CHILD 6– 12 years, 10mg 3 times daily. Irritable bowel syndrome, 10mg 3 times daily, increased if required up to 20mg 4 times daily
  - By intramuscular or slow intravenous injection, acute spasm and spasm in diagnostic procedures, 20mg repeated after 30 minutes if necessary (may be repeated more frequently in endoscopy), max. 100mg daily

#### **STEP 5: Side effects and adverse effects of antispasmodic drugs (10 minutes)**

**Activity:** *Brainstorming (5 minutes)*

**Ask** students to brainstorm on the following question:

- What are the side effects and adverse effects of Antispasmodic drugs

**ALLOW** few students to respond?

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

Side and adverse effects of Antispasmodics drugs:

- Anti-muscarinic drugs have side effects which include
  - Constipation
  - Transient bradycardia (followed by tachycardia, palpitation and arrhythmias)
  - Reduced bronchial secretions

- Urinary urgency and retention
- Dilatation of the pupils with loss of accommodation
- Photophobia
- Dry mouth
- Flushing
- Dryness of the skin
- Side-effects that occur occasionally include:
  - Confusion (particularly in the elderly)
  - Nausea
  - Vomiting
  - Giddiness
  - Angle-closure glaucoma may occur.

### **STEP 6: Interaction and Precaution of Antispasmodic Drugs (10 minutes)**

- Antimuscarinics should be used with caution in Down's syndrome, in children and in the elderly
- They should also be used with caution in gastro-oesophageal reflux disease
- Diarrhoea
- Ulcerative colitis
- Hypertension

### **STEP 7: Key points (5 minutes)**

- These are relaxants of intestinal smooth muscles
- They are useful in providing symptomatic relief of gastro-intestinal disorders characterized by smooth muscle spasms, especially in irritable bowel syndrome
- They are contraindicated in myasthenia gravis
- Their common side effects include: Constipation, urinary retention, dry mouth and dryness of the skin
- They should be used with caution in Down's syndrome, in children and in the elderly

### **STEP 7: Evaluation (5 minutes)**

- What are the indications of antispasmodic drugs?
- What are the contraindications of antispasmodic drugs?
- What are the side effects and adverse effects of antispasmodic drugs?
- What are the interactions and precautions of antispasmodic drugs?

## References

- Ministry of Health and Social Welfare. (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.
- Robert L. Talbert, Gary C. Yee, Gary R. Matzke, Barbara G. Wells &, L. Michael. (2014). *Pharmacotherapy: a pathophysiologic approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Sally S.R & Jeanne C.S. 2000. *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins
- School of Pharmaceutical sciences. (2011). *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.
- The Royal Pharmaceutical Society of Great Britain. (2007). *Martindale, the Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.
- The Royal Pharmaceutical Society of Great Britain. (2009). *British National Formulary* (59<sup>th</sup> ed). London, BMJ Group and RPS Publishing.

## Session 27: Description of Drugs affecting Blood

**Total Session Time:** 60 minutes

### **Prerequisites**

- None

### **Learning Tasks**

By the end of this session students are expected to be able to:

- List indications of drugs affecting blood
- List contraindications of drugs affecting blood
- Describe dose, dosage and course of drugs affecting blood
- List side effects and adverse effects of drugs affecting blood
- Describe interactions and precautions of drugs affecting blood

### **Resources Needed:**

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers

## **SESSION OVERVIEW**

<b>Step</b>	<b>Time</b>	<b>Activity/ Method</b>	<b>Content</b>
1	05 minutes	Presentation	Introduction, Learning Objectives
2	10 minutes	Presentation/ Buzzing	Indications of Drugs Affecting Blood
3	10 minutes	Presentation/ Brainstorming	Contraindications of Drugs Affecting Blood
4	10 minutes	Presentation	Description of Dose, Dosage and Course of Drugs Affecting Blood
5	10 minutes	Presentation/ Brainstorming	Side Effects and Adverse Effects of Drugs Affecting Blood
6	05 minutes	Presentation	Interactions and Precautions of Drugs Affecting Blood
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## **SESSION CONTENTS**

### **STEP 1: Presentation of Session Title and Learning tasks (5 minutes)**

**READ or ASK** students to read the learning objectives and clarify

**ASK** students if they have any questions before continuing.

## **STEP 2:Indications of drugs affecting blood (10 minutes)**

### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- Mention drugs affecting blood
- What are the indications of drugs affecting blood?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY and SUMMARIZE** by using the content below

- **Ferrous sulphate:** used in management of iron deficiency anaemia
- **Folic acid:** used in management of anaemia and neuro tube defect
- **Hydroxocobalamin:** is also known as vitamin B<sub>12</sub>, it is used in management of megaloblastic anaemia
- **Iron dextran Injection:** used in management of iron deficiency anaemia

## **STEP 3: Contraindications of Drugs Affecting Blood (10 Minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the contraindications of drugs affecting blood?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

- Ferrous sulphate is not contra-indicated to specific group of individual but should be given with care to those people with peptic ulcers

- Folic acid is not contra-indicated to specific group of individual but should never be given alone for pernicious anaemia and other vitamin B12 deficiency states since it may precipitate subacute combined degeneration of the spinal cord
- Hydroxocobalamin is not contra-indicated to specific group of individual but should not be given before diagnosis fully established
- Iron dextran Injection is contra-indicated to those with history of allergic disorders including asthma and eczema, infection, active rheumatoid arthritis, severe hepatic impairment and acute renal failure

#### **STEP 4: Dose, Dosage and Course of Drugs Affecting Blood (10 minutes)**

- Ferrous sulphate
  - Dose prophylactic, 1 tablet (200mg) daily; therapeutic, 1 tablet 2–3 times daily until signs and symptoms disappear
- Folic acid
  - Folate-deficient megaloblastic anaemia, by mouth, adult and child over 1 year, 5 mg daily for 4 months (until term in pregnant women); up to 15 mg daily may be required in malabsorption state
  - Children under 1 year, 500 micrograms/kg daily (max. 5 mg) for up to 4 months; up to 10 mg daily may be required in malabsorption states
- Hydroxocobalamin
  - By mouth, vitamin B12 deficiency of dietary origin, 50–150 micrograms daily taken between meals children 50–105 micrograms daily in 1–3 divided doses.
  - By intramuscular injection, initially 1 mg repeated 10 times at intervals of 2–3 days, maintenance 1 mg every month
- Iron dextran Injection
  - By deep intramuscular injection into the gluteal muscle or by slow intravenous injection or by intravenous infusion, 50 mg/mL, 2ml ample or calculated according to bodyweight and iron deficit
  - The product is not recommended to children under 14 years

#### **STEP 5: Side Effects and Adverse Effects of Drugs Affecting Blood**

## **(10 Minute)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the side effects and adverse effects of drugs affecting blood?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Ferrous sulphate: Main side effects include;
  - Gastro-intestinal irritation can occur with iron salts example ferrous sulphate.
  - Nausea and epigastric pain are dose-related and occur with high dose
  - Oral iron, particularly modified-release preparations, can exacerbate diarrhea
- Folic acid: Not common, rarely gastro-intestinal disturbances
- Hydroxocobalamin: Main side effects include;
  - Nausea, headache, dizziness and fever
  - Hypersensitivity reactions (including rash and pruritus) may occur.
  - Injection-site reactions
  - Hypokalaemia
  - Thrombocytosis
  - Chromaturia
- Iron dextran Injection: Not common, they may include;
  - Nausea, vomiting and abdominal pain
  - Flushing, dyspnoea and anaphylactic reactions
  - Numbness, cramps and blurred Vision
  - Pruritus, and rash;

### **STEP 6: Interactions and Precautions of Drugs Affecting Blood (5 minutes)**

- Ferrous sulphate
  - Absorption of Ferrous sulphate is reduced by oral magnesium salts, calcium salts and zinc
  - Ferrous sulphate reduces absorption of ciprofloxacin and other fluoroquinolones, levodopa, mycophenolates, Penicillamine, bisphosphonates and levothyroxines
- Folic acid; usually does not interact with any specific group of drugs or any individual drug
- Hydroxocobalamin; usually does not interact with any specific group of drugs or any individual drug

- Iron dextran Injection; usually does not interact with any specific group of drugs or any individual drug

### **STEP 7: Key points (5 minutes)**

- Most drugs which affect blood are used in management of iron deficient anemia and megaloblastic anemia.
- Oral iron preparation should be given with care because they interact with more drugs than other preparations
- Iron dextran is not recommended to children under 14 years,
- Folic acid should never be given alone for pernicious anaemia and other vitamin B12 deficiency states

### **STEP 8: Assessment (5 minutes)**

- What are the indication of ferrous sulphate preparation?
- What are the indication of folic acid?
- What are the indication of cyanocobalamin?
- What is the usual dose of iron dextran injection?
- Which drugs interact with oral iron preparations?

## References

- Robert L. Talbert, Gary C. Yee, Gary R. Matzke, Barbara G. Wells, L. Michael. 2014. *Pharmacotherapy: a pathophysiologic approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Ministry Of Health and Social Welfare. 2013. *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.
- Sally S.R, Jeanne C.S. 2000. *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins.
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- The Royal Pharmaceutical Society of Great Britain. 2007. *Martindale, the Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.
- The Royal Pharmaceutical Society of Great Britain. 2009. *British National Formulary* (59<sup>th</sup> ed). London, BMJ Group and RPS Publishing.

# Session 28: Description of Antihypertensive Drugs

**Total Session Time:** 120 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- Outline classes of antihypertensive drugs
- List indications of antihypertensive drugs
- List contraindications of antihypertensive drugs
- Describe dose, dosage and course of antihypertensive drugs
- List side effects and adverse effects of antihypertensive drugs
- Describe interactions and precautions of antihypertensive drugs

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Overhead projector and computer

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Objectives
2	10 minutes	Presentation	Classes of Antihypertensives
3	15 minutes	Presentation/ Buzzing	Indications of Antihypertensive Drugs
4	10 minutes	Presentation/ brainstorming	Contraindications of Antihypertensive Drugs
5	30 minutes	Presentation	Dose, Dosage and Course of Antihypertensive Drugs
6	20 minutes	Presentation/ brainstorming	Side Effects and Adverse Effects of Antihypertensive Drugs
7	15 minutes	Presentation	Interactions and Precautions of Antihypertensive Drugs
8	05 minutes	Presentation	Key Points
9	10 minutes	Presentation	Evaluation

## **SESSION CONTENTS**

### **STEP 1: Presentation of Session Title and Learning Tasks (5 minutes)**

**READ or ASK** students to read the learning tasks and clarify

**ASK** students if they have any question(s) before continuing.

### **STEP 2: Classes of Antihypertensives (10minutes)**

- Antihypertensive are a class of drugs that are used to treat hypertension (high blood pressure). Antihypertensive therapy seeks to prevent the complications of high blood pressure, such as stroke and myocardial infarction
- Hypertension is categorized as follows:
  - Mild hypertension: Diastolic Blood Pressure range of 90 – 99 mm Hg and Systolic Blood Pressure range of 140-159mm Hg
  - Moderate hypertension: Diastolic Blood Pressure range of 100 – 109 mm Hg and Systolic Blood Pressure range of 100-180mmHg
  - Severe hypertension: Diastolic Blood Pressure range of 110 mm Hg or above and Systolic Blood Pressure range of 180mm Hg and above
  - Malignant hypertension: Severe hypertension associated with retinal exudates, haemorrhages or papilledema
- There are many classes of antihypertensives, which lower blood pressure by different means. Among the most important and most widely used classes are:
  - Thiazide Diuretics
  - Loop Diuretics
  - Potassium Sparing Diuretics
  - Central Adrenergic Inhibitor
  - Beta Blockers
  - Alpha& Beta blockers
  - Angiotensin Converting Enzyme Inhibitors (ACEI)
  - Angiotensin II Receptor Agonist (ARB's)
  - Calcium Channel Blockers (CCB)
  - Direct vasodilators

### **STEP 3: Indications of Antihypertensive Drugs (15 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What are the indications of antihypertensive drugs?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY** and **SUMMARIZE** by using the content below

Table 17.1: Indications of various classes of Antihypertensives

<b>Compelling indications</b>	<b>Drug class</b>
Angina	• β-blocker or Long acting calcium channel blocker
Prior or Post-myocardial infarct	• β-blocker and ACE inhibitor • If s-blocker contraindicated: Long acting calcium channel blocker eg verapamil
Heart failure For volume overload:	• ACE inhibitor and Carvedilol • Diuretics – Spironolactone Furosemide
Left ventricular hypertrophy (confirmed by ECG)	ACE inhibitor or ARB
Stroke: secondary prevention	Hydrochlorothiazide or Indapamide and ACE inhibitor
Diabetes Mellitus	ACE inhibitor or ARB, usually in combination with diuretic
Chronic kidney disease	ACE inhibitor, usually in combination with diuretic
Isolated systolic hypertension	Hydrochlorothiazide or Long acting calcium channel blocker
Pregnancy	Methyldopa or Hydralazine (Avoid ACEI/ARB teratogenic)
Prostatism	alpha-blocker
Elderly	CCB

### **STEP 3: Contraindications of Antihypertensive Drugs (10 minutes)**

#### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are contraindications of antihypertensive drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Patient with known hypersensitivity reaction to the individual drug.
- Methyldopa is contraindicated in patient with active hepatic disease.
- Alpha and B-blocker and calcium channel blockers are contraindicated in patient with:
  - Heart block
  - Cardiogenic shock
  - Heart failure
- The use of ACE inhibitors is contraindicated during the second and third trimesters of pregnancy
- Captopril, is contraindicated particularly when given in high doses to patients with renal insufficiency

## **STEP 5: Dose, Dosage and Course of Antihypertensive Drugs (30 minutes)**

Table 17.2: Antihypertensives and their corresponding doses

<b>Sn</b>	<b>Class</b>	<b>Drug</b>	<b>Dosage</b>
1	Thiazide Diuretics	Bendroflumethiazide Hydrochlorothiazide	5mg once daily 12.5mg once daily
2	Loop Diuretics	Furosemide Torasemide	40mg- 80mg daily 2.5mg-5mg daily
3	Potassium Sparing Diuretics	Spirinolactone Eplerenone	25mg once daily 25mg once daily
4	Central Adrenergic Inhibitor	Methyldopa	250mg 12hrly
5	Beta Blockers Non selective Selective  Alpha& Beta blockers	Propranolol Atenolol Metoprolol  Carvedilol	80mg 12 hrly 50 – 100mg once daily 100mg 12hrly  12.5 -25mg daily
6	ACE Inhibitors  Angiotensin II Receptor Agonist (ARB's)	Captopril Enalapril Losartan	12.5mg- 25mg 12hrly 5- 20mg daily 50mg-100mg daily
7	Calcium channel blockers (CCB)	Nifedipine SR Amlodipine	10- 20mg 12hrly 5 – 10mg once daily
8	Direct vasodilators	Hydralazine	25mg 12hrly

## **STEP 6: Side Effects and Adverse Effects of Antihypertensive Drugs (20 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are side effects and adverse effects of antihypertensive drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

Table 17.3: Classes of Antihypertensives and their Side Effects

Sn	Class	Side effects
1	Thiazide Diuretics	Orthostatic hypotension(upon sitting or standing, the blood pressure drops, causing dizziness or fainting). Severe side effects are difficulty urinating, gout, and hives
2	Loop Diuretics	Hypokalemia, or low potassium, dry mouth, weakness, diarrhea and headache
3	Potassium Sparing Diuretics	Include nausea, headache and stomach upset.
4	Central Adrenergic Inhibitor	Dizziness • light-headedness • drowsiness • headache • weakness. Severe; jaundice, fever, pale stool, dark urine, numbness, slow pulse, chest pain, larger breast than normal
5	Beta Blockers Non selective Selective Alpha& Beta blockers	Fatigue, dizziness and weakness
6	ACE Inhibitors Angiotensin II Receptor Agonist (ARB's)	Diarrhea, headache and joint pain, fever and chills Severe side effect is trouble breathing or jaundice and cough
7	Calcium channel blockers	Headache and flushing , tachycardia and palpitation, swelling of ankles and occasionally hands
8	Direct vasodilators	Tachycardia, palpitation, angina. Excessive hypotension , headache anorexia, nasal congestion, dizziness, rash, constipation

### **STEP 7: Interactions and Precautions of Antihypertensive Drugs (15minutes)**

- Many drugs interact with antihypertensive drugs and decrease their effectiveness
- Interactions with potassium supplements or potassium-sparing diuretics result in hyperkalemia
- Nonsteroidal anti-inflammatory drugs may impair the hypotensive effects of ACE inhibitors
- These drugs are antidepressants monoamine oxidase inhibitors antihistamines and sympathomimetic bronchodilators
- Cimetidine and verapamil increase effects of  $\beta$ -adrenergic blocking drugs

## **Step 8: Key Points (5minutes)**

- Antihypertensive are a class of drugs that are used to treat hypertension (high blood pressure)
- There are many classes of antihypertensives, which lower blood pressure by different means
- There is no single best antihypertensive. Combination therapy is necessary
- Antihypertensive are contraindicated in some groups of people or conditions
- The use of most antihypertensives is associated with side effects and adverse effects
- Many drugs interact with antihypertensive drugs and decrease their effectiveness

## **STEP 9: Evaluation (10minutes)**

- What is hypertension?
- How do we classify hypertension?
- What are the indications of antihypertensive drugs?
- What are contraindications of antihypertensive drugs?
- What are side effects and adverse effects of antihypertensive drugs?

## References

- Ministry Of Health and Social Welfare. (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4th ed.). Dar es salaam, Tanzania government printers.
- Robert, L. T., Gary, C.Y., Gary, R.M, Barbara, G.W., Michael, L. (2014). *Pharmacotherapy: A Pathophysiologic Approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Sally S.R, & Jeanne C.S. (2000). *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins.
- School of Pharmaceutical sciences. (2011). *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.
- The Royal Pharmaceutical Society of Great Britain. (2007). *Martindale: The Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.
- The Royal Pharmaceutical Society of Great Britain. (2009). *British National Formulary* (59<sup>th</sup> ed). London, BMJ Group and RPS Publishing.
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# Session 29: Description of Anti-angina and Anti-Arrhythmic Drugs

**Total Session Time:** 120 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- Outline classes of anti-angina and anti-arrhythmic drugs
- List indications of anti-angina and anti-arrhythmic drugs
- List Contraindication of anti-angina and anti-arrhythmic drugs
- Describe dose, dosage and course of anti-angina and anti-arrhythmic drugs
- List side effects and adverse effects of anti-angina and anti-arrhythmic drugs
- Describe interaction and precaution of anti-angina and anti-arrhythmic drugs

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Overhead projector and computer

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Objectives
2	10 minutes	Presentation	Classes of Anti-angina and Anti-arrhythmic Drugs
3	15 minutes	Presentation/ Buzzing	Indications of Anti-angina and Anti-arrhythmic Drugs
4	10 minutes	Presentation/ brainstorming	Contraindications of Anti-Angina and Anti-arrhythmic Drugs
5	30 minutes	Presentation	Dose, Dosage and Course of Anti-angina and Anti-Arrhythmic Drugs
6	20 minutes	Presentation/ brainstorming	Side Effects and Adverse Effects of Anti-angina and Anti-arrhythmic Drugs
7	15 minutes	Presentation	Interactions and Precautions of Anti-Angina and Anti-Arrhythmic Drugs
8	05 minutes	Presentation	Key Points
9	10 minutes	Presentation	Evaluation

## **SESSION CONTENTS**

### **STEP 1: Presentation of Session Title and Learning Tasks (5 minutes)**

**READ or ASK** students to read the learning tasks and clarify

**ASK** students if they have any question(s) before continuing.

### **STEP 2: Classes of Anti-angina and Anti-arrhythmic Drugs (10 minutes)**

- Antianginal drugs are drugs that are used to manage angina by either improving perfusion of the myocardium, reducing the metabolic demand of the heart, or both
- There are three classes of antianginal drugs; organic nitrates, Beta-adrenoreceptor antagonists and calcium channel blockers
- Organic Nitrates and adrenoceptor antagonists are vasodilators and improve myocardial perfusion, and reduced metabolic demand of the myocardium
- Beta-adrenoreceptor antagonists slow the heart rate therefore reduces metabolic demand of the heart
- Antiarrhythmic drugs are a group of pharmaceuticals that are used to suppress abnormal rhythms of the heart (cardiac arrhythmias), such as atrial fibrillation, atrial flutter, ventricular tachycardia, and ventricular fibrillation
- They are classified according to their general effect;
  - Class I: Fast sodium (Na) channel blockers
  - Class II: Beta blockers
  - Class III: Potassium (K) channel blockers
  - Class IV: Slow calcium (Ca) channel blockers

### **STEP 3: Indications of Anti-angina and Anti-arrhythmic Drugs (15 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What are the indications of anti-angina and anti-arrhythmic drugs?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY** and **SUMMARIZE** by using the content below

- **Anti-angina drugs**
  - Nitrates (Nitroglycerin - glyceryl trinitrate, isosorbide dinitrate and isosorbide-5-mononitrate) are indicated for:
    - Unstable angina
    - Immediate treatment of angina (s.l.)
    - Severe, recurrent rest angina (i.v.)
    - Maintenance therapy of angina (slow release forms)
    - Prinzmetal's angina
    - Control myocardial ischemia,
    - Reduce infarction size
    - Treatment of acute angina episodes
    - Prophylaxis of chronic angina
    - Treatment of moderate to severe congestive heart failure and myocardial infarction
    - Control of blood pressure in cardiac surgical procedure
  - Calcium channel blockers (Nifedipine, Verapamil) are indicated for:
    - Stable angina
    - Unstable angina
    - Variant angina
  - Beta-adrenoreceptor (Atenolol, Metoprolol, Nadolol, Propranolol) are indicated for;
    - Stable angina
    - Unstable angina
    - Acute myocardial infarction
- **Anti-arrhythmic drugs**
  - Class I: Fast sodium (Na) channel blockers (Lidocaine) are indicated for the treatment of ventricular arrhythmias
  - Class II: Beta blockers (Atenolol, propanolol) are indicated for
    - Treatment of hypertension,
    - Reduce infarct size in the periinfarction period, as adjuncts for rate control in atrial fibrillation or flutter
  - Class III: Potassium (K) channel blockers(Amiodarone) are effective for both supraventricular and ventricular arrhythmias
  - Class IV: Slow calcium (Ca) channel blockers (Amlodipine, verapamil) are not effective antiarrhythmic drugs because they have little effect on cardiac Ca<sup>2+</sup> channels

### **STEP 3: Contraindications of Anti-angina and Anti-arrhythmic Drugs**

(10 minutes)

#### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the contraindications of anti-angina and anti-arrhythmic drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

Table 16.1: Contraindications of anti-angina and anti-arrhythmic drugs

<b>Drug class</b>	<b>Contraindications</b>
Nitrates	<ul style="list-style-type: none"><li>• Hypersensitivity</li><li>• Head trauma</li><li>• Cerebral hemorrhage</li><li>• Severe anemia</li><li>• Pericardial tamponade</li><li>• Constrictive pericarditis</li></ul>
Calcium channel blockers	<ul style="list-style-type: none"><li>• Severe hypotension</li><li>• Severe aortic stenosis</li><li>• Extreme bradycardia</li><li>• Moderate to severe heart failure</li><li>• Cardiogenic shock</li><li>• Sick sinus syndrome</li></ul>
Beta-adrenoreceptor	<ul style="list-style-type: none"><li>• Contraindicated in variant angina</li><li>• Bradyarrhythmias</li><li>• Atrioventricular block</li><li>• Peripheral vascular disease</li></ul>
Anti-arrhythmic drugs	<ul style="list-style-type: none"><li>• Hypersensitivity to the antiarrhythmic drugs</li><li>• During pregnancy and lactation.</li><li>• Second- or third-degree atrioventricular block (if the patient has no artificial pacemaker)</li><li>• Severe congestive heart failure (CHF)</li><li>• Aortic stenosis</li><li>• Hypotension</li><li>• Cardiogenic shock</li></ul>

## **STEP 5: Dose, Dosage and Course of anti-angina and anti-arrhythmic Drugs (30 minutes)**

- Nitroglycerin
  - PO Immediate-release tablets, 2.5–9 mg 2 or 3 times per day PO
  - Sustained-release tablets or capsules, 2.5 mg 3 or 4 times per day
  - SL 0.15–0.6 mg PRN for chest pain
  - Translingual spray, one or two metered doses (0.4 mg/dose) sprayed onto oral mucosa at onset of anginal pain, to a maximum of 3 doses in 15 min
  - Transmucosal tablet, 1 mg q3–5h while awake, placed between upper lip and gum or cheek and gum
  - Topical ointment, 1/2–2 inches q4–8h; do not rub in Topical transdermal disc, applied once daily IV 5–10 mcg/min initially, increased in 10- to 20-mcg/min increments up to 100 mcg/min or more if necessary to relieve pain
- Isosorbide dinitrate
  - Treatment and prevention of angina SL 2.5–10 mg PRN or q2–4h PO Regular tablets, 10–60 mg q4–6h PO Chewable tablets, 5–10 mg q2–3h PO Sustained-release capsules, 40 mg q6–12h
- Isosorbide mononitrate
  - Treatment and prevention of angina, PO 20 mg twice daily, with first dose on arising and the second dose 7 h later PO. Extended-release tablets 30–60 mg once daily in the morning, increased after several days to 120 mg once daily if necessary
- Lidocaine
  - Ventricular arrhythmias 50—100 mg IV bolus, 1—4 mg/min IV infusion 20- 50 g/kg/min; 300 mg IM
- Propanolol
  - Cardiac arrhythmias: 10—30mg, PO 3-4 times daily
  - Life-threatening arrhythmias: 1—3 mg IV, repeat once in 2 min
  - Angina pectoris: 80—320 mg/d PO in 2—4 divided doses
  - Hypertension: initially, 40 mg PO BID or 80 mg sustained released once daily
  - Maintenance dose: up to 640 mg/d PO in divided doses
  - Long-term management of angina, to reduce frequency and severity of anginal episodes, PO 10–80 mg 2 to 4 times per day IV 0.5–3 mg q4h until desired response is obtained
- Atenolol
  - Long-term management of angina, to reduce frequency and severity of anginal episodes, PO 50 mg once daily, initially, increased to 100 mg/d after 1 week if necessary
- Amiodarone
  - Life-threatening Malaise, fatigue, tremor: Loading dose: 800–1600 mg/d PO in divided doses
  - Maintenance dose: 400 mg/d PO; up to 1000 mg/d over 24 h IV

- Verapamil
  - Supraventricular arrhythmia, atrial flutter/fibrillation, (Adults) Oral—initial dose 80–120 mg TID; maintenance dose 320–480 mg/d, 240 mg PO
  - Angina, PO 80–120 mg 3 times daily
- Amlodipine
  - Angina, PO 5–10 mg once daily
- Nifedipine
  - Angina, immediate-release, PO 10–30 mg 3 times daily, sustainedrelease, PO 30–60 mg once daily

## **STEP 6: Side Effects and Adverse Effects of anti-angina and anti-arrhythmic Drugs (20 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are side effects and adverse effects of antihypertensive drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Nitrates: Headache, postural hypotension, tachycardia, increased intraocular pressure, methemoglobinemia
- Calcium channel blocker: Sinus bradycardia, Conduction disturbances, Constipation (Verapamil). Fatigue, nonspecific gastrointestinal complaints, rarely elevations of hepatic enzymes and acute hepatic injury (all Ca-blockers)
- Beta-blockers: Bradyarrhythmias, Bronchoconstriction, hypoglycemia, Impotence Depression, Sleep disturbances
- Class I (lidocaine): Light-headedness, nervousness, generic bradycardia, hypotension, drowsiness, apprehension
- Class II (propanolol): Fatigue, weakness, depression, bradycardia, dizziness, vertigo, hypertension, rash, decreased libido, hypotension, hyperglycemia
- Class III( amlodarone): Malaise, fatigue, tremor, nausea, vomiting, constipation, ataxia, anorexia, bradycardia, photosensitivity
- Class IV (verapamil): Constipation, dizziness, , light-headedness, headache, asthenia, nausea, peripheral edema, hypotension, proarrhythmias, Congestive Heart Failure

## **STEP 7: Interactions and Precautions of anti-angina and anti-arrhythmic Drugs (15minutes)**

- Precautions during Nitrate therapy:
  - Never stop nitrate therapy suddenly
  - Do not take double dose. (to prevent Nitate syncope from happening only in case combined with Nitroglycerine in attacks otherwise we don't give double dose)
  - Do not use it after expiry date; nitroglycerin is volatile; shelf-life ~6w after opening must be stored in cool, tightly capped, dark container
  - Nitrates and Phosphodiesterase inhibitors are both vasodilatror and should not be taken together because they will lead to syncope and sever drop in blood pressure and thus lead to reflect tachycardia and impairment of coronary syndrome so it can precipitate acute attack
  - Use with caution in patient with Glaucoma, hypertrophic cardiomyopathy, Renal and liver disease, ventricular outflow obstruction and mitral valve syndrome
- $\beta$ - blockers
  - Should be withdrawn gradually as sudden stoppage give rise to a withdrawal manifestations: Rebound angina, arrhythmia, myocardial infarction and hypertension because of up-regulation of  $\beta$ -receptors
  - Non-selective are better avoided as they blocks vasodilatory effects of sympathetic stimulation, afterload an oxygen consumption
  - Not used in variant angina as it worsen symptoms and aggrevate condition
  - Should be given with caution to diabetics with ischemic heart disease [Benefits > hazards)
- Anti-arrhythmic drugs
  - Should be used cautiously in patients with renal or hepatic disease

## **Step 8: Key Points (5minutes)**

- Antianginal drugs are drugs that are used to manage angina by either improving perfusion of the myocardium, reducing the metabolic demand of the heart, or both
- There are three classes of antianginal drugs; organic nitrates, Beta-adrenoreceptor antagonists and calcium channel blockers
- Antiarrhythmic drugs are a group of pharmaceuticals that are used to suppress abnormal rhythms of the heart (cardiac arrhythmias), such as atrial fibrillation, atrial flutter, ventricular tachycardia, and ventricular fibrillation
- Antiarrhythmic drugs are classified according to their general effect as; Class I: Fast sodium (Na) channel blockers, Class II: Beta blockers, Class III: Potassium (K) channel blockers and Class IV: Slow calcium (Ca) channel blockers

### **STEP 9: Evaluation (10minutes)**

- What are the anti-angina and anti-arrhythmic drugs?
- How do we classify anti-angina and anti-arrhythmic drugs?
- What are the indications of anti-angina and anti-arrhythmic drugs?
- What are the contraindications of anti-angina and anti-arrhythmic drugs?
- What are the side effects and adverse effects of anti-angina and anti-arrhythmic drugs?

## References

- Ministry Of Health and Social Welfare. (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4th ed.). Dar es salaam, Tanzania government printers.
- Robert, L. T., Gary, C.Y., Gary, R.M, Barbara, G.W., Michael, L. (2014). *Pharmacotherapy: A Pathophysiologic Approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Sally S.R, & Jeanne C.S. (2000). *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins.
- School of Pharmaceutical sciences. (2011). *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.
- The Royal Pharmaceutical Society of Great Britain. (2007). *Martindale: The Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.
- The Royal Pharmaceutical Society of Great Britain. (2009). *British National Formulary* (59<sup>th</sup> ed). London, BMJ Group and RPS Publishing.

# Session 30: Description of Cardiac Glycosides

**Total Session Time:** 60 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of cardiac glycosides
- List Contraindication of cardiac glycosides
- Describe dose, dosage and course of cardiac glycosides
- List side effects and adverse effects of cardiac glycosides
- Describe interaction and precaution of cardiac glycosides

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Overhead projector and computer

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning tasks
2	05 minutes	Presentation/ Buzzing	Indications of Cardiac Glycosides
3	10 minutes	Presentation/ Brainstorming	Contraindications of Cardiac Glycosides
4	10 minutes	Presentation	Dose, Dosage and Course of Cardiac Glycosides
5	10 minutes	Presentation/ Brainstorming	Side Effects and Adverse Effects of Cardiac Glycosides
6	10 minutes	Presentation	Interactions and Precautions of Cardiac Glycosides
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning tasks (5 minutes)**

**READ or ASK** students to read the learning tasks and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Cardiac Glycosides (5minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- list glycosides that are used in clinical practice
- What are indications of cardiac glycoside drugs?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY and SUMMARIZE** by using the content below

- The common cardiac glycosides drugs are digoxin and digitoxin
- Cardiac glycosides are also called cardiotonics or digitalis glycosides
- Cardiac glycosides are indicated in patients with:
  - Heart failure
  - Atrial fibrillation
  - Dilated heart cardiomyopathies
- Digoxin is the commonly used cardiac glycosides
- Digoxin is used for acute and chronic conditions while digitoxin is used for maintenance

### **STEP 3: Contraindications of Cardiac Glycosides (10 minutes)**

#### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

What are contraindications of cardiac glycosides?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Cardiac glycosides are contraindicated in patients with :
  - Known hypersensitivity
  - Ventricular failure
  - Ventricular tachycardia
  - Digitalis toxicity

### **STEP 4: Dose, Dosage and Course of Cardiac Glycosides (15 minutes)**

- When symptoms are mild, slow loading (digitalization) with 0.125-0.25 mg per day is safer than and just as effective as the rapid method 0.5-0.75 mg every 8 hours for 3 doses, followed by 0.125-0.25 mg per day
- It is usually given only if diuretics and ACE inhibitors have failed to control symptoms
- Digoxin is rapidly absorbed after oral administration
- Cardiac glycosides are widely distributed to tissues, including the CNS

### **STEP 5: Side Effects and Adverse Effects of Cardiac Glycosides (10 minutes)**

#### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

What are the side effects and adverse effects of cardiac glycosides?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- The major signs of digitalis toxicity are arrhythmias, nausea, vomiting, and diarrhea
- This toxicity may be partially caused by direct effects on the gastrointestinal tract but is also the result of central nervous system actions
- Central nervous system effects include disorientation and hallucinations especially in the elderly and visual disturbances are noted
- Gynecomastia is a rare effect reported in men taking digitalis

## **STEP 6: Interactions and Precautions of Cardiac Glycosides Drug (15 minutes)**

### **Precaution**

- Caution should be taken when giving cardiac glycosides to patient with:
  - Electrolyte imbalance (especially hypokalaemia and hypomagnesemia)
  - Severe carditis
  - Heart block
  - Acute glomerulonephritis
  - Pregnancy

### **Interaction**

- Cardiac glycosides react with different drugs
- Drugs that increases the plasma level of digitalis are:
  - Benzodiazepines
  - Nifedipine
  - Captopril
  - Verapamil
- Drugs that Decreases the Plasma Level of Cardiac Glycosides
  - Antihistamine
  - Barbiturates
  - Thyroid hormones

## **Step 7: Key Points (5minutes)**

- Cardiac glycosides are indicated in patients with:
  - Heart failure
  - Atrial fibrillation
  - Dilated heart cardiomyopathies
- Cardiac glycosides are contraindicated in patients with :
  - Known hypersensitivity
  - Ventricular failure
  - Ventricular tachycardia
  - Digitalis toxicity
- Loading (digitalization) with 0.125-0.25 mg per day is safer than and just as effective as the rapid method 0.5-0.75 mg every 8 hours for 3 doses, followed by 0.125-0.25 mg per day
- The major signs of digitalis toxicity are arrhythmias, nausea, vomiting, and diarrhea
- Caution should be taken to patient with electrolyte imbalance

## **STEP 8: Evaluation (5minutes)**

- What glycosides are used in clinical practice?
- What are indications of cardiac glycosides drugs?
- What are the contraindications of cardiac glycosides drugs?
- What are the dose, dosage and course of cardiac glycosides drugs?
- What are the side effects and adverse effects of cardiac glycosides drugs?
- What are the interaction and precaution of cardiac glycosides drug?

## References

- Ministry Of Health and Social Welfare. (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4th ed.). Dar es salaam, Tanzania government printers.
- Robert, L. T., Gary, C.Y., Gary, R.M, Barbara, G.W., Michael, L. (2014). *Pharmacotherapy: A Pathophysiologic Approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Sally S.R, & Jeanne C.S. (2000). *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins.
- School of Pharmaceutical sciences. (2011). *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.
- The Royal Pharmaceutical Society of Great Britain. (2007). *Martindale: The Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.

# Session 31: Description of Lipid Lowering Drugs

**Total Session Time:** 60 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of lipid lowering drugs
- List contraindications of lipid lowering drugs
- Describe dose, dosage and course of lipid lowering drugs
- List side effects and adverse effects of lipid lowering drugs
- Describe interactions and precautions of lipid lowering drugs

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Overhead projector and computer

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning tasks
2	10 minutes	Presentation/ Buzzing	Indications of Lipid Lowering Drugs
3	10 minutes	Presentation/ Brainstorming	Contraindications of Lipid Lowering Drugs
4	10 minutes	Presentation	Dose, Dosage and Course of Lipid Lowering Drugs
5	10 minutes	Presentation/ Brainstorming	Side Effects and Adverse Effects of Lipid Lowering Drugs
6	05 minutes	Presentation	Interactions and Precautions of Lipid Lowering Drugs
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## **SESSION CONTENTS**

### **STEP 1: Presentation of Session Title and Learning Tasks (5 minutes)**

**READ or ASK** students to read the learning tasks and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Lipid Lowering Drugs (10minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What lipid lowering drugs are used in clinical practice?
- What are the indications of lipid lowering drugs?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY** and **SUMMARIZE** by using the content below

- Lipid Lowering drugs include simvastatin and atovastatin which are in a group of statins used in lowering cholesterol level in blood
- Statins are group of lipid lowering drugs
- Lipid lowering drugs are indicated in patients with:
  - Primary hypercholesterolemia
  - Homozygous familial hypercholesterolemia
  - Combined (mixed) hyperlipidemia in patients who have not responded adequately to diet and other appropriate measures
  - Prevention of cardiovascular events in patients with atherosclerotic cardiovascular disease or diabetes mellitus

### **STEP 3: Contraindications of Lipid Lowering Drugs (10 minutes)**

#### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

What are contraindications of lipid lowering drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

- Lipid lowering drugs are contraindicated in patients with :
  - Active liver disease
  - Persistently abnormal liver function tests
  - In pregnancy (adequate contraception required during treatment and for 1 month afterwards)
  - Who are breast-feeding

**STEP 4: Dose, Dosage and Course of Lipid Lowering Drugs (10 minutes)**

**Dose of Simvastatin**

- Primary hypercholesterolemia, combined hyperlipidemia, 10–20 mg daily at night, adjusted at intervals of at least 4 weeks; usual range 10–80 mg once daily at night
- Homozygous familial hypercholesterolemia, 40 mg daily at night or 80 mg daily in 3 divided doses (with largest dose at night)
- Prevention of cardiovascular events, initially 20–40 mg once daily at night adjusted at intervals of at least 4 weeks; max 80 mg once daily at night

**STEP 5: Side Effects and Adverse Effects of Lipid Lowering Drugs (10 minutes)**

***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

What are the side effects and adverse effects of lipid lowering drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

- **Side effects of simvastatin are:**
  - Constipation is common,
  - Diarrhoea
  - Nausea, vomiting
  - Gastro-intestinal discomfort
  - Hypertriglyceridaemia may be aggravated
  - An increased bleeding tendency has been reported due to hypoprothrombinemia associated with vitamin K deficiency



## **STEP 6: Interactions and Precautions of Lipid Lowering Drugs (5minutes)**

- **Precautions:**

- Bile acid sequestrates interfere with the absorption of fat-soluble vitamins; supplements of vitamins A, D, and K may be required when treatment is prolonged

## **Step 7: Key Points (5minutes)**

- Lipid lowering are indicated in hypercholesterolemia, hyperlipidemia and in prevention of cardiac events in patients with cardiac diseases and in diabetic patients
- Lipid lowering are contraindicated in liver failure, pregnancy and during breast feeding
- The side effects of lipid lowering drugs are nausea, vomiting ,constipation and abnormal bleeding
- Dose of simvastatin ranges from 10-80mg once a day
- When using lipid lowering drugs caution as it interfere with absorption of fat soluble vitamins

## **STEP 8: Evaluation (5minutes)**

- What are the indications of lipid lowering drugs?
- What are the contraindications of lipid lowering drugs?
- What are the dose, dosage and course of lipid lowering drugs?
- What are side effects and adverse effects of lipid lowering drugs?
- What are the interactions and precautions of lipid lowering drug?

## References

- Ministry Of Health and Social Welfare. (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4th ed.). Dar es salaam, Tanzania government printers.
- Robert, L. T., Gary, C.Y., Gary, R.M, Barbara, G.W., Michael, L. (2014). *Pharmacotherapy: A Pathophysiologic Approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Sally S.R, & Jeanne C.S. (2000). *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins.
- School of Pharmaceutical sciences. (2011). *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.
- The Royal Pharmaceutical Society of Great Britain. (2007). *Martindale: The Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.
- The Royal Pharmaceutical Society of Great Britain. (2009). *British National Formulary* (59<sup>th</sup> ed). London, BMJ Group and RPS Publishing.

## Session 32: Description of Adrenal Hormones and Synthetic Substitutes

**Total Session Time:** 120 minutes

### **Prerequisites**

- None

### **Learning Tasks**

By the end of this session students are expected to be able to:

- List indications of adrenal hormones and synthetic substitutes
- List contraindications of adrenal hormones and synthetic substitutes
- Describe dose, dosage and course of adrenal hormones and synthetic substitutes
- List side effects and adverse effects of adrenal hormones and synthetic substitutes
- Describe interactions and precautions of adrenal hormones and synthetic substitutes

### **Resources Needed:**

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Overhead projector and computer

### **SESSION OVERVIEW**

<b>Step</b>	<b>Time</b>	<b>Activity/ Method</b>	<b>Content</b>
1	05 minutes	Presentation	Introduction, Learning Tasks
2	25 minutes	Presentation/ Buzzing	Indications of Adrenal Hormones and Synthetic Substitutes
3	10 minutes	Presentation/ Brainstorming	Contraindications of Adrenal Hormones and Synthetic Substitutes
4	30 minutes	Presentation	Dose, Dosage and Course of Adrenal Hormones and Synthetic Substitutes
5	20 minutes	Presentation/ Brainstorming	Side Effects and Adverse Effects of Adrenal Hormones and Synthetic Substitutes
6	20 minutes	Presentation	Interactions and Precautions of Adrenal Hormones and Synthetic Substitutes
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning Tasks (5 minutes)**

**READ or ASK** students to read the learning tasks and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Adrenal Hormones and Synthetics Substitutes (25minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What are the common hormones and synthetic substitutes used in clinical practice?
- What are indications for adrenal hormones and synthetic substitutes used in clinical practice?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY and SUMMARIZE** by using the content below

- The commonly used are dexamethasones, prednisolone and hydrocortisone
- Dexamethasones drugs are indicated in the:
  - Suppression of inflammatory condition
  - Suppression of allergic condition
  - Patients with raised intracranial pressure
  - Patients with cerebral edema
  - Stimulation of lung maturation in the fetus
  - Rheumatoid disease
- Prednisolone are indicated in the:
  - In treating asthma
  - In suppression of inflammatory condition
  - Suppression of allergic disorder
  - Inflammatory bowel disease
  - Rheumatoid disease
- Hydrocortisone are indicated in the:
  - In treating asthma
  - Suppression of inflammatory condition
  - In treating hemorrhoids
  - In management of shock eg anaphylactic shock

- Rheumatoid disease
- Used in inflammatory and pruritus skin conditions

### **STEP 3: Contraindications of Adrenal Hormones and Synthetic Substitutes (10 minutes)**

***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are contraindications of adrenal hormone and synthetic substitutes?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

- Adrenal Hormone and Synthetic Substitute are contraindicated in :
  - Patient with peptic ulcer
  - Heart disease
  - Systemic infections
  - Hypertension with heart failure
  - In infection such varicella, psychosis, diabetes, osteoporosis or glaucoma

### **STEP 4: Dose, Dosage and Course of Adrenal Hormones and Synthetic Substitutes (30 minutes)**

- Dexamethasone can be given orally or parenterally:
  - 0.5-10 mg orally daily in adults
  - 10-100micrigrams/kg daily in children
  - Intravenous or intramuscular 0.5-24mg in adults or 200-400micrograms/kg daily in children
- Hydrocortisone can be given orally or parenterally:
  - 20-30 mg per orally daily in divided dose in adults
  - 10-100micrigrams/kg daily in children
  - Intravenous or intramuscular 100-500mg,3-4 times in 24 hours in adults
  - or in children, up to 1 year 25mg,1-5 years 50mg,6-12 years 100mg
- Prednisolone can be given orally or parenterally
  - 10-20 mg daily (severe disease up to 60 mg daily)
  - 2.5-25 mg as maintenance dose
  - Intramuscular injection prednisolone acetate 25-100mg once or twice weekly

## **STEP 5: Side Effects and Adverse Effects of Adrenal Hormones and Synthetic Substitutes (20 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the side effects and adverse drug reactions of adrenal hormone and synthetic substitutes?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- The side effects and adverse effects of the adrenal hormones and synthetic substitute includes:
  - Hypertension
  - Sodium and water retention
  - Potassium and calcium loss
  - Osteoporosis
  - Diabetes
  - Muscle wasting
  - Peptic ulceration or perforation
  - Gastrointestinal effects : dyspepsia
  - Abdominal distension, acute pancreatitis, esophageal ulceration
  - Musculoskeletal effects: muscle weakness, vertebral and long bone fracture, tendon rupture
  - Endocrine effects: menstrual irregularities, hirsutism, weight gain, increased appetite
  - Neuropsychiatric: insomnia, aggregation of epilepsy
  - Skin : urticaria, skin atrophy, bruising

## **STEP 6: Interactions and Precautions of Adrenal Hormones and Synthetic Substitutes (20 minutes)**

- Interaction
  - Interactions do not generally apply to corticosteroids used for topical action (including inhalation)
  - Corticosteroids antagonize hypertensive effects of:
    - ACE inhibitors

- Adrenergic neuron blockers
  - Alpha blockers
- Corticosteroids increases risk of gastro-intestinal bleeding when given with NSAIDs
- Corticosteroids may enhance or reduce anticoagulant effects of coumarins
- Metabolism of corticosteroids is accelerated by carbamazepine, phenytoin, primidone, barbiturates
- Corticosteroids antagonizes effects of:
  - Diuretics
  - Calcium channel blockers
- Precaution
  - Adrenal hormones and synthetics substitute oral or parenteral preparation should be taken with caution in patients with renal impairments
  - Adrenal hormones and synthetics substitute should be used with caution in pregnant and breastfeeding mothers
  - Adrenal hormones and synthetics substitute oral or parenteral preparation should be taken with caution in patients with hepatic impairments
  - Adrenal hormones and synthetics substitute oral or parenteral preparation should be taken with caution in patients with:
    - Glycosuria
    - Hyperglycaemia
    - Hypertension
    - hidden infection

### **Step 7: Key Points (5minutes)**

- Adrenal hormones and synthetics substitute are indicated in suppression of inflammatory condition and suppression of allergic condition
- Adrenal hormones and synthetics substitute are contraindicated in patients with peptic ulcer, heart diseases and severe systemic diseases
- Caution should be taken to patient renal and hepatic impairment
- Adrenal hormones and synthetics substitute react with different drugs ACE inhibitors adrenergic neuron blockers

### **STEP 8: Evaluation (5minutes)**

- What are the indications of Adrenal hormones and synthetics substitute drugs?
- What are the Contraindication of Adrenal hormones and synthetics substitute drugs?
- What are the dose, dosage and course of Adrenal hormones and synthetics substitute drugs?
- What are side effects and adverse effects of Adrenal hormones and synthetics substitute drugs?
- What are the interaction and precaution of Adrenal hormones and synthetics substitute drug?

## References

- Robert, L. T., Gary, C.Y., Gary, R.M, Barbara, G.W., Michael, L. (2014). *Pharmacotherapy: A Pathophysiologic Approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Ministry Of Health and Social Welfare. (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4th ed.). Dar es salaam, Tanzania government printers.
- Sally S.R, & Jeanne C.S. (2000). *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins.
- School of Pharmaceutical sciences. (2011). *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.

# Session 33: Description of Thyroid, Parathyroid Hormones and Their Antagonists

**Total Session Time:** 120 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of thyroid and parathyroid hormones and antagonists
- List contraindication of thyroid and parathyroid hormones and antagonists
- Describe dose, dosage and course of thyroid and parathyroid hormones and antagonists
- List side effects and adverse effects of thyroid and parathyroid hormones and antagonists
- Describe interactions and precautions of thyroid and parathyroid hormones and antagonists

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Overhead projector and computer

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Tasks
2	10 minutes	Presentation/ Buzzing	Indications of Thyroid and Parathyroid Hormones and Antagonists
3	10 minutes	Presentation/ Brainstorming	Contraindications of Thyroid and Parathyroid Hormones and Antagonists
4	20 minutes	Presentation	Dose, Dosage and Course of Thyroid and Parathyroid Hormones and Antagonists
5	20 minutes	Presentation/ Brainstorming	Side Effects and Adverse Effects of Thyroid and Parathyroid Hormones and Antagonists
6	35 minutes	Presentation	Interactions and Precautions of Thyroid and Parathyroid Hormones and Antagonists
7	10 minutes	Presentation	Key Points
8	10 minutes	Presentation	Evaluation

## **SESSION CONTENTS**

### **STEP 1: Presentation of Session Title and Learning Tasks (5 minutes)**

**READ or ASK** students to read the learning tasks and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Thyroid, Parathyroid Hormones and their Antagonists (10 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What are the indications of thyroid hormones and Antithyroid drugs?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY and SUMMARIZE** by using the content below

- Carbimazole
  - Hyperthyroidism
- Iodine (Lugol's solution) Solution and Iodized oil Capsules
  - Hyperthyroidism (thyrotoxicosis)
- Levothyroxine
  - Hypothyroidism (decreased production or secretion of thyroid hormone)

### **STEP 3: Contraindications of Thyroid, Parathyroid Hormones and their Antagonists (10 minutes)**

#### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the contraindications of thyroid hormones and antithyroid drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

- Levothyroxine
  - Thyrotoxicosis
- Carbimazole
  - Severe blood disorders
- Iodine (Lugol's solution) Solution and Iodized oil Capsules
  - Potassium iodide is contraindicated in patients with hypersensitivity to iodine
  - Potassium iodide should be avoided in patients with hyperthyroidism Hyperkalaemia, and acute bronchitis also during pregnancy (category D) and lactation

#### **STEP 4: Dose, Dosage and Course of Thyroid and Parathyroid Hormones and Antagonists (20 minutes)**

- Levothyroxine
  - Available as Levothyroxine Tablets (sodium salt) 0.05g
  - To maintain normal TSH levels
    - Levothyroxine 1.5 $\mu$ g/kg. Maximum dose 100 -150 $\mu$ g daily
  - Hypothyroidism after treatment of grave disease
    - Levothyroxine 75 $\mu$ g to 125 $\mu$ g/day
- Carbimazole
  - Available as carbimazole tablets 5mg
    - Carbimazole 40mg (O) once daily for 3 weeks then 20mg daily for 3 weeks
    - Maintenance dose 5mg for up to one year
- Iodine (Lugol's solution) Solution
  - Available as Iodine (Lugol's solution) Solution containing 5 percent iodine and 10 percent potassium iodide
  - Three (3) drops (21mg) once each month for up to one year

#### **STEP 5: Side Effects and Adverse Effects of Thyroid, Parathyroid Hormones and their Antagonists (20 minutes)**

***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the side effects of thyroid hormones and antithyroid drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Carbimazole
  - Side-effects
    - Nausea, mild gastro-intestinal disturbances, taste disturbance, headache, fever, malaise, rash, pruritus, arthralgia; rarely myopathy, alopecia, bone marrow suppression (including pancytopenia and agranulocytosis)
- Levothyroxine sodium (Thyroxine sodium)
  - Side-effects usually at excessive dosage
    - Diarrhoea, vomiting, anginal pain, arrhythmias, palpitation, tachycardia, tremor, restlessness, excitability, insomnia; headache, flushing, sweating, fever, heat intolerance, weight-loss, muscle cramp, and muscular weakness and transient hair loss in children
  - Hypersensitivity reactions
    - Rash, pruritus and oedema
- Iodine (Lugol's solution) and Iodized oil Capsules
  - Side-effects
    - Headache, lacrimation, conjunctivitis, pain in salivary glands, laryngitis, bronchitis, rashes; on prolonged treatment depression, insomnia, impotence; goitre in infants of mothers taking iodides

## **STEP 6: Interactions and Precautions of Thyroid, Parathyroid Hormones and their Antagonists (35 minutes)**

- Iodine (Lugol's solution) and Iodized oil Capsules
  - Precaution
    - Potassium iodide should be used cautiously in patients with renal impairment, cardiac disease, pulmonary tuberculosis, and Addison's disease
    - Iodine and iodide should be used with cautions in children
    - Can cause neonatal goitre and hypothyroidism in pregnancy
    - Iodine and iodide appears to be concentrated in milk thus stop breast-feeding due to danger of neonatal hypothyroidism or goitre
  - Drug Interactions
    - Lugol's solution can increase the risk of hypothyroidism if taken concurrently with lithium
    - Potassium-sparing diuretics, potassium supplements, and ACE inhibitors increase the risk of hyperkalemia
- Levothyroxine
  - Precaution
    - Caution in Panhypopituitarism or predisposition to adrenal insufficiency (corticosteroid therapy should be initiated before starting levothyroxine)

- Care in elderly, cardiovascular disorders (including hypertension, myocardial insufficiency or myocardial infarction), Long-standing hypothyroidism and diabetes insipidus
  - In patients with diabetes mellitus the dose of antidiabetic drugs including insulin may need to be increased
  - In pregnancy maternal serum-thyrotropin concentration should be monitored because levothyroxine may cross the placenta and excessive maternal concentration can be detrimental to fetus
- Interaction
  - Absorption of levothyroxine is reduced by antacids, calcium salts, oral iron, lanthanum, polystyrene sulfonate resins, colestipol, cholestyramine, cimetidine and sucralfate
  - Metabolism of levothyroxine is increases by rifampicin, carbamazepine, phenobarbital, phenytoin, propranolol
  - Amiodarone may increase thyroxine level
  - Anticoagulant effect of coumarins is enhanced by thyroid hormones
  - Thyroid hormones enhance effects of tricyclics (enhance effects of amitriptyline and imipramine)
  - Requirements for thyroid hormones in hypothyroidism may be increased by oestrogens
- Carbimazole
  - Precaution
    - Higher doses should be prescribed under specialist supervision only
    - Treatment in children should be undertaken by a specialist
    - All patients should be advised to report any sore throat immediately because of the rare complication of agranulocytosis
    - Use with caution in mild to moderate hepatic impairment; avoid in severe impairment
    - Danger of neonatal goitre and hypothyroidism in pregnancy
    - May affect neonatal thyroid function during breastfeeding therefore lowest effective dose should be used

## **STEP 7: Key Points (10 minutes)**

- Carbimazole
  - Indicated for hyperthyroidism.
  - Contraindicated in Severe blood disorders
  - Caution for its use during pregnancy as may cause neonatal goitre and hypothyroidism and during breastfeeding as may affect neonatal thyroid function.
- Iodine (Lugol's solution) Solution
  - Indicated for hyperthyroidism (thyrotoxicosis)
  - Contraindicated in patients with hypersensitivity to iodine and should be avoided in patients with hyperthyroidism, hyperkalemia, acute bronchitis, pregnancy and lactation

- Caution in pregnancy as it may cause neonatal goitre and hypothyroidism in pregnancy and in breastfeeding as it appears to be concentrated in milk due to danger of neonatal hypothyroidism or goiter
- Interacts with lithium and can increase the risk of hypothyroidism if taken concurrently
- Risk of hyperkalaemia when given with potassium-sparing diuretics, potassium supplements, and ACE inhibitors
- Levothyroxine
  - Indicated for hypothyroidism
  - Contraindicated in thyrotoxicosis

### **STEP 8: Evaluation (10 minutes)**

- What are the indications of thyroid hormone and antithyroid drugs?
- What are the contraindications of thyroid hormone and antithyroid drugs?
- What is the dose, dosage and course of thyroid hormone and antithyroid drugs?
- What are side effects and adverse effects of thyroid hormones and antithyroid drugs?
- What are interactions and precautions of thyroid hormones and antithyroid drugs?

## References

- Ministry of Health and Social Welfare. ( 2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.
- Robert L. T., Gary C. Y., Gary R. M., Barbara G. W., & Michael, L. (2014). *Pharmacotherapy: A pathophysiologic approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
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# Session 34: Description of Insulin and Anti Diabetic Agents

**Total Session Time:** 120 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- Outline indications of Insulin and Anti diabetics agents
- List Contraindication of Insulin and Anti diabetics agents
- Describe dose, dosage and course of Insulin and Anti diabetics agents
- List side effects and adverse effects of Insulin and Anti diabetics agents
- Describe interaction and precaution of Insulin and Anti diabetics agents

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Computer
- LCD

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning tasks
2	20 minutes	Presentation/ Buzzing	Indications of Insulin and Anti Diabetics Agents
3	20 minutes	Presentation/ brainstorming	Contraindication of Insulin and Anti Diabetics Agents
4	30 minutes	Presentation	Dose, Dosage of Insulin and Anti Diabetics Agents
5	20 minutes	Presentation/ brainstorming	Side Effects and Adverse Effects of Insulin and Anti Diabetics Agents
6	15minutes	Presentation	Interaction and Precaution of Insulin and Anti Diabetics Agents
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning Tasks (5 minutes)**

**READ or ASK** students to read the learning tasks and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Insulin and Anti Diabetes Agents (20 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What are the types of insulin and anti diabetic agents?
- What are the indications of Insulin and Anti diabetes' agents?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY** and **SUMMARIZE** by using the content below

- There are various types of insulin which are given to patients depending on the conditions of a patient. They include Short-acting insulins, Rapid-acting insulin and Intermediate action Insulin
- Anti diabetic agents include, Chlorpropamide, Glibenclamide, Gliclazide and metformin
- Indications of Insulin
  - Treatment with insulin injection is indicated in Type I Diabetes Mellitus or in uncontrolled Type II Diabetes Mellitus, Hyperglycemic emergencies, Pancreatitis, Pregnancy and trauma or Surgery
  - Insulin preparations are divided into 3 types:
    - Short-acting insulins those of short duration which have a relatively rapid onset of action, namely soluble insulin. Soluble insulin is the most appropriate form of insulin for use in diabetic emergencies e.g. diabetic ketoacidosis and at the time of surgery
    - Rapid-acting insulin analogues, insulin aspart, insulin glulisine, and insulin lispro
    - Intermediate action Insulin, e.g. isophane insulin
- Anti-diabetics Agents
  - Chlorpropamide: Is used in the treatment of type 2 diabetes mellitus in patients who cannot control blood sugar levels by diet and exercise alone. It is used along with diet and exercise. It may be used alone or with other ant diabetic medicines

- Glibenclalmide: Is used in the treatment of type 2 diabetes mellitus
- Gliclazide: It is indicated in Non-insulin dependent diabetes mellitus, maturity onset diabetes and in insulin resistant diabetes
- Tolbutamide : It is indicated in type 2 diabetes mellitus
- Metformin: Is used in the treatment of diabetes mellitus.
  - Metformin is used for the symptomatic management of polycystic ovary syndrome [unlicensed indication];
  - It improves insulin sensitivity, may aid weight reduction, helps to normalize menstrual cycle (increasing the rate of spontaneous ovulation), and may improve hirsutism

### **STEP 3: Contraindication of Insulin and Anti Diabetics Agents**

**(20 minutes)**

***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the Contraindication of Insulin and Anti Diabetics agents?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Contraindication of Insulin and Anti diabetics agents:
  - Insulin: Is contraindicated in persons who have Hypersensitivity to any ingredient of the product and during episodes of hypoglycemia
  - Chlorpropamide : Is contraindicated in pregnancy, heart disease, liver problems, recent operation, body temperature more than 101 °F, severe nausea and vomiting that has lasted a long time, weakened patient, injury, low blood sugar, pituitary hormone deficiency, Addison's disease, hepatic porphyria, G6PD Anemia, Hemolytic Anemia
  - Glibenclalmide: Is contraindicated in diabetic emergencies (ketoacidosis, hyperosmolar coma), advanced hepatic or renal insufficiencies, pregnancy and nursing period
  - Gliclazide: Is contraindicated in following conditions, pregnancy, lactation, hypersensitivity, renal impairment, juvenile onset diabetes, unstable or brittle diabetes, diabetic ketoacidosis

- Tolbutamide: Is contraindicated in patients with known hypersensitivity or allergy to the drug, diabetic ketoacidosis, with or without coma, Metformin Is contraindicated in patients with any condition that could increase the risk of lactic acidosis, including kidney disorders , lung disease and liver disease

#### **STEP 4: Dose, Dosage of Insulin and Anti Diabetics Agents (30minutes)**

- The following are the dose and Dosage of Insulin and Anti diabetics agents
  - Insulin -Children and Adults - Subcutaneous 0.5 to 1 units/kg/day. Adjust doses to achieve pre-meal and bedtime blood glucose levels of 80 to 140 mg/dL (children younger than 5 yr of age, 100 to 200 mg/dL). Severe Ketoacidosis or Diabetic Coma Subcutaneous 0.8 to 1.2 units/kg/day. Regular insulin is given IV or IM.
  - Chlorpropamide Initially 250 mg daily with breakfast (elderly 100– 125 mg), adjusted according to response; max. 500 mg daily
  - Gliclazide for Noninsulin dependent diabetes, oral dose: The drug is increased in stepwise fashion. It is started as 40-80 mg/day in divided doses given 1/2 hr before breakfast and evening meal. It can gradually be increased to 320 mg/day which is also given in division
  - Tolbutamide- 0.5–1.5 g (max. 2 g) daily in divided doses with or immediately after meals or as a single dose with or immediately after breakfast
  - Glibenclamide ---- Initially 5 mg daily with or immediately after breakfast, dose adjusted according to response max. 15 mg daily
  - Metformin - Dose Diabetes mellitus, ADULT and CHILD over 10 years initially 500 mg with breakfast for at least 1 week then 500 mg with breakfast and evening meal for at least 1 week then 500 mg with breakfast, lunch and evening meal; usual max. 2 g daily in divided doses. Polycystic ovary syndrome [unlicensed], initially 500 mg with breakfast for 1 week, then 500 mg with breakfast and evening meal for 1 week, then 1.5–1.7 g daily in 2–3 divided doses

#### **STEP 5: Side Effects and Adverse Effects of Insulin and Anti Diabetics Agents (20 Minutes)**

##### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the side effects and adverse effects of Insulin and Anti diabetics agents

**ALLOW** few students to respond?

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

- The Side effects and adverse effects of Insulin and Anti diabetics agents
  - Insulin: Hypoglycemia, Headache, Allergic reactions, Flu like symptoms, Weight gain, Hypokalemia, Lipoatrophy, Itching, Rash , Injection site reaction
  - Chlorpropamide: Has appreciably more side effects, mainly because of its very prolonged duration of action and the consequent hazard of hypoglycaemia and it should no longer be used. It may also cause facial flushing after drinking alcohol; this effect does not normally occur with other drugs
  - Glibenclamide: Common side effects include stomach upset and low blood sugar (hypoglycaemia), weight gain, constipation
  - Gliclazide: Hypoglycemia (low blood sugar) hyperglycemia (high blood sugar) oat, cough back, muscle and joint pain headache high blood pressure angina (chest pain) leg swelling diarrhea, constipation, abdominal pain, nausea dizziness skin rash/itching depression
  - Tolbutamide: Hypoglycemia, weight gain, hypersensitivity: cross allergicity with sulfonamides
  - Metformin: Anorexia, nausea, vomiting, diarrhea (usually transient), abdominal pain, taste disturbance, lactic acidosis, decreased vitamin B12 absorption, erythema, pruritus and urticaria. Hepatitis also reported

**STEP 6: Interaction and Precaution of Insulin and Anti Diabetics Agents (20minutes)**

- Insulin
  - Precaution
    - A regular self-monitoring of the blood sugar is necessary during an intensified insulin therapy. Urgent hospital treatment with intravenous injection is indicated when there is a ketoacidosis or hyperosmolar breakdown
    - During pregnancy and breast-feeding, insulin requirements may alter and doses should be assessed frequently by an experienced diabetes physician. The dose of insulin generally needs to be increased in the second and third trimesters of pregnancy
  - Interactions
    - The following drugs May increase hypoglycemic effects of insulin: ACE inhibitors, anabolic steroids, clofibrate, disopyramide, fibrates, fluoxetine, guanethidine, MAOIs, oral antidiabetics, propoxyphene, salicylates, sulfinpyrazone, sulfonamide antibiotics, tetracyclines
    - Atypical antipsychotics, corticosteroids, danazol, diazoxide, diltiazem, glucagon, isoniazid, oral contraceptives, phenothiazines, protease inhibitors, somatropin, sympathomimetics, thyroid hormone May decrease hypoglycemic effects of insulin.

- Chlorpropamide
  - Precaution
    - Before taking chlorpropamide, tell your doctor or pharmacist if you are allergic to it; or if you have any other allergies
    - This product may contain inactive ingredients, which can cause allergic reactions or other problems
    - Talk to your pharmacist for more details.
- Glidezide
  - Interaction
    - The hypoglycaemic effect of gliclazide is potentiated by Phenylbutazone, aspirin, clofibrate, sulphonamides, oral anticoagulants and MAO inhibitors
    - Rifampicin, barbiturates, alcohol, diuretics, diazoxide, glucocorticoids, estrogens and sympathomimetic drugs antagonise the hypoglycaemic action of gliclazide.
- Glibenclamide
  - Precaution
    - Glibenclamide should be used with caution in the elderly as it may increase the risk of hypoglycaemia (low blood sugar levels)
    - Glibenclamide is not safe to take if you are, or are planning to become, pregnant
  - Interaction
    - Glibenclamide shows interaction with most drug used to treat high blood pressure like ACE inhibitors e.g. captopril Beta blockers e.g. propranolol (including eye drops) Bosentan Diazoxide
- Tolbutamide
  - Precaution
    - Tolbutamide should be used with caution in the elderly as it may increase the risk of hypoglycaemia (low blood sugar levels)
    - Tolbutamide is not safe to take if you are, or are planning to become, pregnant. it may produce birth defects
  - Interaction
    - Increased hypoglycemia with cimetidine, insulin, salicylates, and sulfonamides
    - Salicylates displace tolbutamide from its binding site on plasma binding proteins which lead to increase in free tolbutamide concentration, thus hypoglycemic shock
- Metformin
  - Precaution: Metformin should be used cautiously in renal impairment because of the increased risk of lactic acidosis
  - Interaction: The H<sub>2</sub>-receptor antagonist cimetidine causes an increase in the plasma concentration of metformin, by reducing clearance of metformin by the kidneys

## **STEP 7: Key points (5 minutes)**

- Insulin is common used in management of different type of Diabetes Mellitus
- Anti Diabetic agents such as Chlorpropamide, Glibenclalmide, Gliclazide, Tolbutamide Metformin are common used in management of type 2 diabetes mellitus
- The dose and dosage of anti-diabetic agents are given depend on the state of patient and should be monitored regularly to balance the blood sugar
- The dosage also depends on food, therefore caution should be taken before and after meal
- it very important to ask the patient if is using other medication which are not ant diabetic agent because may cause drug-drug interaction
- The most common side effect of most anti-diabetic agent is hypoglycaemia
- It's important to make sure you know how to recognise the symptoms of low blood sugar. These include feeling shaky or anxious, sweating, looking pale, feeling hungry, having a feeling that your heart is pounding (palpitations), and feeling dizzy

## **STEP 7: Evaluation (5 minutes)**

- What are the indication of insulin and anti-diabetic agent?
- What is the common side effect of Anti-Diabetic Agents?
- What is the most serious potential side effect of metformin?

## References

- Robert, L. T., Gary ,C.Y., Gary,R.M, Barbara,G.W., & Michael, L. (2014). *Pharmacotherapy: A pathophysiologic approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
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# Session 35: Description of Hormonal Contraceptives Methods

**Total Session Time:** 60 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of hormonal contraceptives
- List contraindication of hormonal contraceptives
- Describe dose, dosage and course of hormonal contraceptives
- List side effects and adverse effects of hormonal contraceptives
- Describe interaction and precaution of hormonal contraceptives

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Overhead projector and computer

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Tasks
2	05 minutes	Presentation/ Buzzing	Indications of Hormonal Contraceptives
3	10 minutes	Presentation/ Brainstorming	Contraindications of Hormonal Contraceptives
4	20 minutes	Presentation	Dose, Dosage and Course of Hormonal Contraceptives
5	05 minutes	Presentation/ Brainstorming	Side Effects and Adverse Effects of Hormonal Contraceptives
6	05 minutes	Presentation	Interactions and Precaution of Hormonal Contraceptives
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## **STEP 1: Presentation of Session Title and Learning Tasks (5 minutes)**

**READ or ASK** students to read the learning tasks and clarify

**ASK** students if they have any questions before continuing.

## **STEP 2: Indications of Hormonal Contraceptives (5 minutes)**

### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What hormonal contraceptives are used in clinical practice?
- What are indications for hormonal contraceptives?
- **ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY and SUMMARIZE** by using the content below

- Hormonal contraceptives are either given orally or by injection
- Oral contraceptive fall into two major categories:
  - Combined oral contraceptives (COCs)
  - Progestogen Only Pills (POPs)
- Hormonal contraceptives are indicated in:
  - Alleviating menopausal symptoms
  - In women with early natural or surgical menopause
  - Primarily for prevention of conception
  - Treatment of dysfunctional uterine bleeding,
  - Treatment of dysmenorrheal
  - Treatment of endometriosis.
  - In management of Menorrhagia
  - Treatment of premenstrual symptoms
  - Post Coital Contraception ("morning-after pill")

## **STEP 3: Contraindications of Hormonal Contraceptives (10 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are contraindications of hormonal contraceptives?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Hormonal contraceptives are contraindicated in patients with:
  - Thrombophlebitis
  - Thromboembolic phenomena
  - Cardiovascular and
  - Cerebrovascular disorders or a past history of these conditions
  - Treat vaginal bleeding when the cause is unknown
- They should be avoided in patients with known or suspected tumors of the breast or estrogen-dependent neoplasm
- They are contraindicated in patient with the following conditions:
  - Liver disease
  - Pregnancy
  - Severe headaches especially associated with visual disturbances
  - Numbness or paresis of extremities
  - Unexplained chest pain or shortness of breath
  - Severe leg pains

## **STEP 4: Dose, Dosage and Course of Hormonal Contraceptives**

### **(30 minutes)**

- Hormonal contraceptives can be administered orally, intramuscular or through intradermal
  - Combined Oral Contraceptive (COP)
    - The use of COP in contraception
    - In pack of 28 pills, first 21 have hormone and the last 7 have no hormone
    - Take one pill each day until the pack is empty
  - Menopausal symptoms with uterus
    - Give one tablet of combined oral contraceptive daily
  - Menopausal symptom and osteoporosis prophylaxis (with progesterone for 12-14 days per cycle in women with intact uterus)

- 10-50 micrograms daily for 21 days repeated after 7 days tablet free period.
- Female hypogonadism
  - 10-50micrograms daily
- Post Coital Contraception (“morning-after pill”)
  - The method is applicable mostly after rape and unprotected sexual intercourse where pregnancy is not desired
  - Within 3 days (72 hours) of unprotected sexual intercourse, give
  - Combined oral Contraceptive 100 microgram ethinylestradiol and 500 micrograms levonorgestrel (2 high dose COC tablets)
- Or**
- When this preparation is not available, use 3 tablets each containing 30-35 micrograms ethynodiol diacetate and 150-250 microgram levonorgestrel (3 low dose COC tablets)
- Management of the dysfunctional uterine bleeding
  - Norethisterone (Primolut N) 5mg 12hourly for 10 -14 days
  - COC (E+P) Combined oral contraception 2-3 cycles
- Progesterone only pills (POP)
  - This type is suitable for lactating mothers or women with mild or moderate hypertension. Start 6 week after birth
  - Use of POP in contraception
  - Take one tablet every daily at the same time
  - Use of POP in management of dysmenorrhea. Give POP 5mg three times daily by mouth from day 5 to 24 for 3-4 cycles
  - Use of POP in management premenstrual syndrome. Give POP 5mg 2-3 times
- Progesterone injection
  - This type is suitable for lactating mothers or women with mild or moderate hypertension
- Use of progesterone in contraception
  - Depo Provera 150m intramuscular after every three month
- Use of progesterone injection in management of dysfunctional uterine bleeding
  - Deep intramuscular into buttock of 5-10mg daily for 5-10 days until 2days before onset of menstruation
- Injectable Contraceptive:
  - Medroxy progesterone acetate IM 150 mg every three months
- Implant Contraceptive:
  - Levonorgestrel in six plastic capsules is implanted in the left upper arm made under local anesthesia
  - Levonorgestrel is effective for five years and is recommended for women who have completed their family or not ready for sterilization or those not able to take estrogen containing contraceptives

## **STEP 5: Side Effects and Adverse Effects of Hormonal Contraceptives** **(20 Minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are side effects and adverse effects of hormonal contraceptives?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Side effects of estrogen hormone
  - Nausea and vomiting, abdominal cramps and bloating, weight changes
  - Breast enlargement and tenderness
  - Premenstrual-like syndrome
  - Changes in libido, depression, mood changes, headache, migraine, dizziness,
  - Leg cramps (rule out venous thrombosis)
  - Headache has been reported
- Side effects and adverse effects of progestogen
  - Premenstrual like syndrome which includes; bloating, fluid retention, breast tenderness
  - Weight change, nausea, headache, dizziness, insomnia
  - Drowsiness, depression, change in libido
  - Skin reactions including urticaria, pruritus, rash, and acne)
  - Hirsutism and alopecia
  - Jaundice and anaphylactic reactions
  - Menstrual disturbances

## **STEP 6: Interactions and Precautions of Hormonal Contraceptives** **(5 minutes)**

- The following drugs reduces the effects of the oral contraceptive so advise to use other contraceptive methods:
  - Hypnotic/sedatives anti-migraine medication, barbiturates, chloral hydrate, diazepam
  - Antacid: Aluminium hydroxide, magnesium hydroxide, magnesium trisilicate
  - Anti TB as rifampicin
  - Antiretroviral as Nevirapine and Ritonavir

- Certain antibiotics as Ampicillin and other Penicillins and Tetracyclines
- The following groups of drugs are made less by oral contraceptives; prescribers might consider increasing the doses of the following drugs, known with careful monitoring:
  - Anticonvulsant
  - Ant diabetic agents
  - Anticoagulants
  - Antihypertensive agents (methyldopa)
  - Corticosteroid
  - Hypnotics, sedatives or other CNS depressants

### **Step 7: Key Points (5minutes)**

- Hormonal contraception are primarily indicated for contraception
- Hormonal contraception are contraindicated in pregnancy, thromboembolism and in liver problems
- Hormonal contraception are administered orally, parenteral or through intradermal implants
- Common side effects of hormonal contraceptives are nausea and vomiting, abdominal cramps and bloating, weight changes
- Hormonal contraception effects are reduced by hypnotic, antacids, antiTB and antiretroviral
- Hormonal contraceptive reduces the effects of other drugs like antidiabetics, corticosteroids, anticonvulsants and anticoagulants

### **STEP 8: Evaluation (5minutes)**

- Mention indications of hormonal contraceptives?
- Mention the Contraindication of hormonal contraceptives?
- What are the dose, dosage and course of hormonal contraceptives?
- What are side effects and adverse effects of hormonal contraceptives??
- Describe interaction and precaution of hormonal contraceptives?

## References

- Robert L. T., Gary C. Y., Gary R. M., Barbara G. W., & Michael, L.. (2014). *Pharmacotherapy: A Pathophysiologic Approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
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# Session 36: Description of Cough and Cold Preparations

**Total Session Time:** 120 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- Define and list the symptoms of common cold and cough
- List indications of Cough and Cold Preparations
- Describe dose, dosage and course of Cough and Cold Preparations
- List Contraindications, side effects, adverse effects, interactions and precautions of Cough and Cold Preparations

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Overhead projector (OHP) and computer.

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Objectives
2	10 minutes	Presentation Brainstorming	Definition and Symptoms of Common Cold and Cough
3	20 minutes	Presentation Buzzing	Indications of Cough and Cold Preparations
4	20 minutes	Presentation	Dose, Dosage and Course of Cough and Cold Preparations
5	55 minutes	Presentation Small Group Discussion	Side Effects, Adverse Effects, Contraindications, Interactions and Precautions of Cough and Cold Preparations.
6	05 minutes	Presentation	Key Points
7	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning Objectives (05 minutes)**

**READ or ASK** students to read the learning objectives and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Definition and Symptoms of Common Cold and Cough (10 minutes)**

#### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following questions:

- What causes common cold?
- What are the symptoms of common cold?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

- Common cold, also known simply as a cold, is a [viral](#) infectious disease of the upper respiratory tract that primarily affects the nose
- The common cold is a self-limiting condition and must be distinguished from respiratory infections
- The episodes of the common cold are mostly due to viruses
- The symptoms attribute to the common cold include:
  - Cough
  - Runny nose
  - Blocked nose
  - Sore throat
  - Fever
  - Malaise
  - Headache and
  - Loss of appetite
- Cough is the expulsion of air from the lungs with a sudden sharp sound.

### **STEP 3: Indications of Cough and Cold Preparations (20 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What are the indications for cough and cold preparations?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY** and **SUMMARIZE** by using the content below

Cough and cold preparations are indicated for: Preparations which contains Codeine, dextromethorphan (and some other opioids), antihistamines and soothing remedies like cough syrups are used for cough relief

- Expectorants like guaphensin and mucolytic agents like carbocisteine are used to clean the thick sputum by reducing the viscosity
- Sympathomimetic preparations like pseudoephedrine, antihistamines like brompheniramine, saline nose drops and hot fluids are used for nose congestion
- Soothing remedies like syrups and lozenges and topical anaesthetic agents like benzocaine are used for sore throat relieves

### **STEP 4: Dose, Dosage and Course of Cough and Cold Preparations (20 minutes)**

- The dose of cough and cold preparations depends on the type of the agent used in a preparation
- It is important for a health worker to give right information to patients about the dose, dosage and course of the preparations
- Read the leaflet inserted in a preparation in order to identify the ingredients used, their doses and dosages
- Most of ingredients in cough and cold preparations are used in 8 hourly, 6 hourly or 4 hourly bases
- Example 60mg of pseudoephedrine is used 3-4 times daily for adults and 30mg 3-4 daily for children above five years
- The preparations should be used up to two weeks and if there is no improvement see your doctor for further check-up

## **STEP 5: Side Effects, Contraindications, Interactions and Precautions of Cough and Cold Preparations (55 minutes)**

### ***Activity: Small Group Discussion ( 30 minutes)***

**DIVIDE** students into small manageable groups

**ASK** students to discuss on the following question

- What are Side/adverse effects, contraindications, interactions and precautions of cough and cold preparations?

**ALLOW** students to discuss for 15 minutes

**ALLOW** few groups to present and the rest to add points not mentioned

**CLARIFY** and **SUMMARIZE** by using the contents below

- Side effects and adverse effects
  - Codeine and dextromethorphan cause nausea, vomiting, constipation, dizziness and dependence
  - Antihistamines cause gastrointestinal disturbances plus central nervous system disturbances like nausea
  - High concentration of alcohol in cough syrups causes sedation by suppressing the cough reflex. Also high concentration of sugar may cause osmotic diarrhoea
  - Expectorants cause gastric mucosa irritation, nausea and vomiting
  - Mucolytic agents cause bronchospasm, fever and gastrointestinal disturbances
  - Ephedrine and pseudoephedrine cause constriction of nasal blood vessels hence reducing mucosal swelling
  - Infants may choke due to aspiration if large volume of normal saline nasal drop is used
  - Lozenges cause aspiration in children
- Contraindications
  - Most of mucolytic agents are contraindicated to peptic ulceration, and some in pregnancy and breast feeding
  - Codeine and dextromethorphan should be avoided in patients with acute respiratory depression
  - In intracranial pressure and head injury
- Interactions and Precautions
  - Most drug combinations in cough and cold preparations have no rational basis as may contain ineffective or effective opposing ingredients such as expectorants with cough suppressants. Such combination should be avoided
  - Anaesthetic agents, mucolytic, oral nasal decongestants and antihistamines should be avoided in young children
  - Avoid using more than one preparation at a time

- Avoid the use of codeine cough suppressants in children below 6 years
- Mucolytic agents should be used with caution with peptic ulceration as may disrupt gastric mucosa

## **STEP 6: Key Points (5 minutes)**

- The symptoms attribute to the common cold include cough, runny nose, blocked nose, sore throat, fever, malaise, headache and loss of appetite
- It is important to identify the ingredients in cough and cold preparations in order to give right indication of them
- The dose of cough and cold preparations depends on the type of the agent used in a preparation

## **STEP 7: Evaluation (05 minutes)**

- What is cough?
- What are the indications of cough and cold preparation?
- What are the contraindications of codeine?
- Why most of mucolytic agents should be avoided in peptic ulceration?

## References

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# Session 37: Anti-asthmatic Drugs

**Total Session Time:** 120 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of anti-asthmatic drugs
- Describe dose, dosage and course of anti-asthmatic drugs
- List common side effects and adverse effects of anti-asthmatic drugs
- List contraindications of anti-asthmatic drugs
- Describe interactions, warnings and precautions of anti-asthmatic drugs

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Computer and projector

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Objectives
2	10 minutes	Presentation Brainstorming	Introduction to Essential Anti-asthmatic Drugs
3	15 minutes	Presentation/ Buzzing	Indications of Essential Anti-asthmatic Drugs
4	30 minutes	Presentation	Dose, Dosage and Course of Treatment of Essential Anti-asthmatic Drugs
5	20 minutes	Presentation/ Buzzing	Side Effects and Adverse Effects of Essential Anti-asthmatic Drugs
6	10 minutes	Presentation/ Brainstorming	Contraindications of Essential Anti-asthmatic Drugs
7	20 minutes	Presentation	Interactions, Warning and Precautions of Essential Anti-asthmatic Drugs
8	05 minutes	Presentation	Key Points
9	05 minutes	Presentation	Evaluation

## **STEP 1: Presentation of Session Title and Learning tasks (5 minutes)**

**READ or ASK** students to read the learning objectives and clarify

**ASK** students if they have any questions before continuing.

## **STEP 2: Introduction to Essential Anti-asthmatic Drugs (10 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What is asthma?
- What are the essential anti-asthmatic drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

### **Asthma**

- Asthma is an inflammatory condition in which there is recurrent reversible airway obstruction in response to irritant stimuli that are too weak to affect non-asthmatic subjects, characterized by attacks of wheezing, shortness of breath and often nocturnal cough.
- Severe attacks are life-threatening
- Essential features
  - Airway inflammation, which causes bronchial hyper-responsiveness, which in turn results in recurrent reversible airway obstruction

### **Essential Anti-Asthmatic Drugs**

- Anti-asthmatic drugs are mainly categorized into two major groups
  - Bronchodilators
  - Anti-inflammatory agents
- Most drugs acting on respiratory tract are adrenoceptor agonists, or sympathomimetic agents (bronchodilators) and corticosteroids (used as ‘controllers’ or anti-inflammatory)
- The two categories (above) are not mutually exclusive, that is some drugs classified as bronchodilators also have some anti-inflammatory effect
- According to Tanzania standard guideline, essential anti-asthmatic drugs include aminophylline, beclomethasone inhalation, cromoglycate nasal spray, salbutamol, ipratropium aerosol and adrenaline

### **STEP 3: Indications of Essential Anti-asthmatic Drugs (15 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What are the clinical indications of essential anti-asthmatic drugs?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY** and **SUMMARIZE** by using the content below

- Aminophylline
  - Is used for treating active symptoms and blockage of airway due to asthma or other lung diseases such as emphysema or bronchitis.
  - It improves contraction of the diaphragm (the major breathing muscle).
  - It is used in combination with other medicines.
- Beclomethasone Inhalation
  - It can be used to treat asthma and other allergic conditions
- Sodium Cromoglycate nasal spray
  - It is used to treat asthma and other allergic conditions
  - It is considered a breakthrough drug in management of asthma, as the patients can be freed from steroids in many cases; however, it is mainly effective as a prophylaxis for allergic and exercise induced asthma, not as a treatment for acute attacks
- Salbutamol
  - Salbutamol is typically used to treat bronchospasm (due to any cause, allergen asthma or exercise-induced), as well as chronic obstructive pulmonary disease.
  - It is used to relieve bronchospasm in bronchial asthma, chronic bronchitis, emphysema and other airway resistance diseases
- Ipratropium Inhalation aerosol
  - Is indicated as a bronchodilator for maintenance treatment of bronchospasm associated with chronic obstructive pulmonary disease (COPD), including chronic bronchitis and emphysema.
- Adrenaline
  - Adrenaline is the drug of choice for allergic emergencies
  - In general this drug is used to treat life-threatening emergencies such as severe allergic reactions (anaphylaxis) such as acute asthmatic attack, cardiac arrest and cardiopulmonary resuscitation (when the heart stops beating and/or the patient stops breathing).

## **STEP 4: Dose, Dosage and Course of Treatment of Essential Anti-Asthmatic Drugs (30 minutes)**

### **Aminophylline**

- Acute severe asthma adults orally 100-300mg 3- 4 times daily after food or by slow intravenous injection over at least 20 minutes (with close monitoring), 250–500 mg (5 mg/kg), child 5 mg/kg

### **Beclomethasone Inhalation**

- Adult Dose for Asthma – Maintenance
  - 40 mcg/inh and 80 mcg/inh inhalation aerosols:
    - 2 inhalations (40 mcg each) twice a day
    - Alternatively, 2 inhalations (80 mcg each) twice daily has been effective in some patients who previously received inhaled steroids
    - Do not exceed 640 mcg a day
- Pediatric Dose for Asthma - Maintenance
  - Children over 12 years of age:
  - 40 mcg/inh and 80 mcg/inh inhalation aerosols:
    - 1 or 2 inhalations (40 mcg each) twice a day. Or 1 inhalation (80 mcg) twice a day
    - Alternatively, 2 inhalations (80 mcg each) twice daily has been effective in some patients who previously received inhaled steroids

### **Cromoglycate Nasal spray**

- The usual dose is to apply one spray into each nostril, four to six times each day

### **Salbutamol**

- Salbutamol may be given as following dosage:
  - For chronic asthma 4mg tablet 3-4 times a day by mouth. Or aerosol inhalation 200micrograms (two puffs) 3-4 times a day
  - For acute asthma give by inhalation of nebulized solution 2.5 mg q.i.d (four ) times a day increased to 5mg if necessary
  - For children with mild to moderate asthma give salbutamol orally, 1-5years 1mg t.i.d (three) times day, over five years 2mg t.i.d times a day
  - For children with acute severe asthma give nebulized salbutamol 0.1mg every 4 hours
  - Prophylaxis in exercise-induced bronchospasm, 200 micrograms (2 puffs), child 100 micrograms (1 puff), increased to 200 micrograms (2 puffs) if necessary.

### **Ipratropium Bromide Aerosol**

- For chronic Bronchitis use
  - Ipratropium bromide aerosol 20 – 80mg, 6 – 8 hourly

## **STEP 5: Common Side Effects and Adverse Effects of Essential Anti-Asthmatic Drugs (20 minutes)**

### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What are the Common side effects and adverse effects of essential anti-asthmatic drugs?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY** and **SUMMARIZE** by using the content below

#### **Side effects of Aminophylline**

- Common side effects of aminophylline includes cracks in the skin, loss of heat from the body red, swollen skin, scaly skin, skin rash, chest pain or discomfort, dizziness, fainting, fast, slow, or irregular heartbeat, increase in urine volume, lightheadedness, persistent vomiting, pounding or rapid pulse, seizures, shakiness

#### **Side effects of Beclomethasone**

- Common side effects of beclomethasone includes, body aches or pain, congestion, cough, difficulty with breathing, dryness or soreness of the throat, fever, hoarseness, runny nose, tender, swollen glands in the neck
- Other side effects include trouble swallowing, voice changes, blindness, blurred vision, changes in behavior, chills, darkening of the skin, decreased vision, diarrhea, dizziness, eye pain, fainting, headache, loss of appetite, lower back or side pain mental depression, nausea or vomiting, painful or difficult urination, skin rash, sore mouth or tongue, tearing, thoughts of killing oneself

#### **Side effects of Sodium Cromoglycate Nasal spray**

- Rashes, itching/swelling (especially of the face/tongue/throat), dizziness, trouble breathing, fine tremor, anxiety, headache, muscle cramps, dry mouth, and palpitation.
- Other symptoms may include tachycardia, arrhythmia, flushing, myocardial ischemia (rare), and disturbances of sleep and behavior
- Rarely occurring, but of importance, are allergic reactions of paradoxical bronchospasm, urticaria, angioedema, hypotension, and collapse
- High doses or prolonged use may cause hypokalaemia, which is of concern especially in patients with renal failure and those on certain diuretics and xanthine derivatives

### **Side effects of Ipratropium Bromide Aerosol**

- It is an anticholinergic and its use may increase intraocular pressure. This may result in precipitation or worsening of narrow-angle glaucoma. Therefore should be used with caution in patients with narrow-angle glaucoma
- It may cause urinary retention and therefore caution is advised when administering it to patients with prostatic hyperplasia, or bladder-neck obstruction
- It may also cause dizziness, accommodation disorder, mydriasis, and blurred vision and therefore patients should be cautioned about engaging in activities requiring balance and visual acuity such as driving a car or operating appliances or machinery

### **Adverse effects of Adrenaline**

- Palpitations, tachycardia, hypertension, sweating, nausea, vomiting, breathing difficulties, paleness, dizziness, weakness, tremor, headache, anxiety and restlessness, irregular heartbeat rhythm (arrhythmias), chest pain, hypoglycaemia, cold extremities, pulmonary oedema, bleeding in the brain (cerebral haemorrhage)

## **STEP 6: Contraindications of Essential Anti-asthmatic Drugs (10 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the contraindications of essential anti-asthmatic drugs?

**ALLOW** few students to respond?

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Aminophylline
  - Is contraindicated to person who is allergic to any ingredient in aminophylline (including ethylenediamine), similar medicines (eg, theophylline), or xanthines (eg, caffeine, chocolate)
- Beclomethasone Inhalation
  - Contraindications include hypersensitivity
- Salbutamol
  - Is contraindicated in persons with a history of hypersensitivity reaction (urticaria, angioedema, rash) to salbutamol, or any of its components.
  - Salbutamol is also contraindicated in patients with pre-existing cardiac tachyarrhythmias (too fast heart beat, may be regular or irregular)
- Ipratropium Bromide Aerosol
  - Is contraindicated to persons with history of hypersensitivity to ipratropium bromide or its components and atropine or any of its derivative

## **STEP 7: Interactions and Precaution of Essential Anti-asthmatic Drugs** **(20 minutes)**

- Aminophylline
  - Can interact with aminoglutethimide, barbiturates (eg, phenobarbital), beta-blockers (eg, propranolol), carbamazepine, hydantoins (eg, phenytoin), isoproterenol, moricizine, propafenone, rifampin, or sulfipyrazone because the effectiveness of aminophylline may be decreased
  - Also can interact with allopurinol, cimetidine, disulfiram, enoxacin, estrogen, fluvoxamine, interferon alpha, macrolide antibiotics (eg, clarithromycin, erythromycin), methotrexate, mexiletine, oral contraceptives (birth control pills), pentoxifylline, quinolone antibiotics (eg, ciprofloxacin), tacrine, thiabendazole, ticlopidine, troleandomycin, verapamil, viloxazine, or zileuton because the risk of side effects of aminophylline may be increased
- Cromoglycate Nasal spray
  - Sodium cromoglicate should be used with caution in pregnant and breastfeeding women
  - People on steroids or who have recently stopped taking a steroid and their asthma is getting worse (inhaler)
  - People suffering from, stress, trauma, infection or other illness (inhaler)
  - It should not be used in people with an allergy to sodium cromoglicate, or any of the ingredients in the medicine
- Salbutamol
  - Should be used with caution in patients with cardiac arrhythmia, hypertension, hyperthyroidism, convulsive disorders and diabetes mellitus
  - It should be taken with extreme caution in persons taking tricyclic antidepressants, monoamine oxidase inhibitors, loop diuretics or thiazide diuretics
  - Beta-receptor blocking drugs should be avoided during salbutamol therapy because these drugs block the bronchodilator effect of salbutamol
- Ipratropium Bromide Aerosol
  - Hypersensitivity reactions including urticaria, angioedema, rash, bronchospasm, anaphylaxis, and oropharyngeal edema may occur after the administration of
  - It can produce paradoxical bronchospasm that can be life threatening
  - There is potential for an additive interaction with concomitantly used anticholinergic medications
- Adrenaline
  - Should be administered with caution in patients who have heart disease, including patients with cardiac arrhythmias, coronary artery or organic heart disease, cerebrovascular disease, or hypertension
    - In such patients, or in patients who are on drugs that may sensitize the heart to arrhythmias, epinephrine may precipitate or aggravate angina pectoris as well as produce ventricular arrhythmias

- Epinephrine should be administered with caution to patients with hyperthyroidism, Parkinson's disease, diabetes mellitus, pheochromocytoma, elderly individuals, and pregnant women
  - Patients with Parkinson's disease may experience psychomotor agitation or notice a temporary worsening of symptoms. Diabetic patients may experience transient increases in blood sugar
- Adrenalin® contains sodium bisulfite which may cause mild to severe allergic reactions including anaphylaxis or asthmatic episodes in susceptible individuals
- Epinephrine should be administered cautiously to patients taking other sympathomimetic agents because of the possibility of additive effects
- Administer epinephrine cautiously to patients receiving halogenated hydrocarbon general anesthetics, such as halothane, as coadministration may result in arrhythmias

### **STEP 8: Key points (5 minutes)**

- Essential anti-asthmatic drugs include aminophylline, beclomethasone inhalation, cromoglycate nasal spray, salbutamol, ipratropium aerosol and adrenaline
- Aminophylline used for treating active symptoms and blockage of airway due to asthma or other lung diseases such as emphysema or bronchitis
- Ipratropium Bromide Aerosol is an anticholinergic and its use may increase intraocular pressure. This may result in precipitation or worsening of narrow-angle glaucoma
- Salbutamol should be used with caution in patients with cardiac arrhythmia, hypertension, hyperthyroidism, convulsive disorders and diabetes mellitus

### **STEP 9: Evaluation (5 minutes)**

- What are the indication of salbutamol and aminophylline?
- What is the dose of Ipratropium Bromide Aerosol for bronchitis?
- What is the common adverse effects of adrenaline and Cromoglycate Nasal spray?
- What are the contraindications of salbutamol and adrenaline?

## References

- Katzung, Bertram G, Masters, Susan B, Trevor & Anthony J. (2006). *Basic & clinical Pharmacology* (10<sup>th</sup> Ed).
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- Sally, S.R, Jeanne C.S. (2000). *Introductory Clinical Pharmacology* (6th ed) New York,
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# Session 38: Description of Anti-epileptics and Anticonvulsant Drugs

**Total Session Time:** 120 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of anti-epileptics and anticonvulsant Drugs
- List contraindications of anti-epileptics and anticonvulsant Drugs
- Describe dose, dosage and course of anti-epileptics and anticonvulsant Drugs
- List side effects and adverse effects of anti-epileptics and anticonvulsant Drugs
- Describe interactions and precautions of anti-epileptics and anticonvulsant Drugs

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Computer and LCD Projector

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Tasks
2	10 minutes	Presentation Brainstorming	Indications of Anti-Epileptics and Anticonvulsant Drugs
3	20 minutes	Presentation Buzzing	Contraindications of Anti-epileptics and Anticonvulsant Drugs
4	30 minutes	Presentation	Dose, Dosage and Course of Anti-epileptics and Anticonvulsant Drugs
5	25 minutes	Presentation Brainstorming	Side effects and Adverse Effects of Anti-epileptics and Anticonvulsant Drugs
6	20 minutes	Presentation	Interactions and Precautions of Anti-epileptics and Anticonvulsant Drugs
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning Tasks (5 minutes)**

**READ or ASK** students to read the learning tasks and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Anti-epileptics and Anticonvulsant Drugs (10 minutes)**

#### ***Activity: Brainstorming (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- Mention Anti-epileptics and Anticonvulsant Drugs
- What are the indications of Anti-epileptics and Anticonvulsant Drugs?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY and SUMMARIZE** by using the content below

- Anti-epileptics include Phenobarbitone, Phenytoin, Carbamazepine and Sodium Valproate
- Anti-epileptic drugs are used in management of Epilepsy
- Anticonvulsants include Diazepam and Clonazepam
- Anti convulsant drugs are used in management of Status epilepticus

### **STEP 3: Contraindications of Anti-epileptics and Anticonvulsant Drugs (20 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the contraindications of Anti-epileptics and Anticonvulsant Drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

- **Anti-epileptics**

Following are contraindications of phenobarbitone

- Acute intermittent porphyria
- Pulmonary diseases with decreased respiratory reserve (due to respiratory depressant effect)
- Pregnant and nursing mothers
- Hypersensitivity

Following are contraindications of carbamazepine

- Previous bone marrow depression
- Atrioventricular conduction abnormalities
- Should not be given to patients taking MAO inhibitors or within 14 days of stopping such treatment
- Pregnant and nursing mothers

Following are contraindications of phenytoin

- Pregnancy- it is teratogenic drug causing “foetal hydantoin syndrome” craniofacial anomalies, mental retardation and limb defect
- Hypersensitivity to the drug
- Heart blocks, sinus bradycardia

- **Anticonvulsants**

In treatment of status epilepticus, drug of 1<sup>st</sup> choice is Diazepam or Clonazepam; 2<sup>nd</sup> choice treatment is Phenobarbitone; 3<sup>rd</sup> choice is Phenytoin.

- **Diazepam/ Clonazepam**

- It is contraindicated to people with allergy to benzodiazepines
- Contraindicated to people with the following conditions:
  - Alcohol Intoxication, Depression, Myasthenia Gravis, Wide-Angle Glaucoma, Closed Angle Glaucoma, CYP2C19 Poor Metabolizer, Severe Chronic Obstructed Lung Disease, Significant Decrease in Lung Function, Lung Disease, Liver Problems, Severe Liver Disease, Serious Kidney Problems, Temporarily Stops Breathing While Sleeping, Pregnancy, A Mother who is Producing Milk and Breastfeeding, Low Amount of Albumin Proteins in the Blood

## **STEP 4: Dose, dosage and course of Anti-epileptics and Anticonvulsant Drugs (30minutes)**

- **Epilepsy**

- Phenobarbitone (O) once daily at night
  - Children: 3mg/kg/24 hours
  - Adult: 60 to 90 mg
- Phenytoin (O) once daily at night or twice daily when required
  - Children: 5mg/kg/24 hours
  - Adult: 200 mg
- Carbamazepine (O) as two divided doses

- Children: 10mg/kg/24 hours
- Adult: 300 mg 12 hourly
- Sodium valproate (O)
  - Children: 20mg/kg in divided doses
  - Adult: 600 mg in divided doses
- Status epilepticus

First choice:

- Diazepam (IV) 10 - 20 mg at a rate of 5mg per minute. Repeat in 30 -60 minutes if necessary to a maximum of 200 mg in 24 hours; monitor respiration  
OR
- Clonazepam (O) 0.5mg to 2mg. Once the status epilepticus has been controlled the patient should be maintained on other anti-epileptics

Second choice:

- Phenobarbitone 200mg (IV) slowly. Repeat after 10 minutes, thereafter it may be repeated every 30 minutes to a maximum of 15mg/kg/24 hours

Third choice:

- Phenytoin (IV) 150-250 mg at a rate not exceeding 50 mg/minute. Continue with 100 mg every 6 hours, but do not exceed 15mg/kg/24 hours

## **STEP 5: Side Effects and Adverse Effects of Anti-Epileptics and Anticonvulsant Drugs (25 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the side and adverse effects of Anti-epileptics and Anticonvulsant Drugs?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Side and adverse effects of Anti-epileptic Drugs are
  - Phenobarbitone: Hepatitis, hypotension, respiratory depression, behavioural disturbances, irritability, drowsiness, depression, hallucinations, impaired memory and cognition, hyperactivity particularly in the elderly and in children, megaloblastic anaemia (may be treated with folic acid), suicidal ideation
  - Phenytoin: Nausea, vomiting, constipation, drowsiness, insomnia, transient nervousness, tremor, dizziness, headache, anorexia, rash, acne, blood disorders

(including megaloblastic anaemia, leucopenia, thrombocytopenia, and aplastic anaemia)

- Carbamazepine: Dry mouth, nausea, vomiting, oedema, ataxia, dizziness, drowsiness, fatigue, headache, blood disorders, dermatitis, constipation, involuntary movements, visual disturbances, hypertension, hypotension, aggression, confusion, depression, hallucinations
  - Sodium Valproate: Nausea, gastric irritation, diarrhoea; weight gain, transient hair loss (regrowth may be curly); less frequently increased alertness, aggression, hyperactivity, behavioural disturbances, tremor, drowsiness, confusion, hallucinations, blood disorders, hearing loss and rash, also reported menstrual disturbances and male infertility
- Side and adverse effects of Anticonvulsant Drugs are:
    - Diazepam: Drowsiness and light headedness the next day; confusion, amnesia; dependence; muscle weakness; occasionally: headache, vertigo, dizziness, slurred speech, hypotension, salivation changes, gastrointestinal disturbances, visual disturbances, changes in libido, incontinence, urinary retention, respiratory depression, blood disorders, jaundice, skin reactions
    - Clonazepam: Drowsiness, fatigue, dizziness, co-ordination disturbances; also poor concentration, restlessness, confusion, amnesia, dependence, and withdrawal; salivary or bronchial hypersecretion in infants and small children; rarely gastro-intestinal symptoms, respiratory depression, headache, aggression and anxiety, sexual dysfunction, urinary incontinence, pruritus, reversible hair loss, skin pigmentation changes and visual disturbances on long-term treatment; blood disorders reported; suicidal ideation

## **STEP 6: Interaction and precaution of Anti-epileptics and Anticonvulsant Drugs (20 minutes)**

- If possible combination of anti-epileptics should be avoided as interactions between anti-epileptics are complex and may increase toxicity without a corresponding increase in antiepileptic effect
- These interactions are highly variable and unpredictable
- Phenytoin has a lot of side effects therefore prefer Carbamazepine
- Anticonvulsants when given together may cause serious respiratory depression
- In case of withdrawal, Antiepileptic drugs should be withdrawn under specialist supervision
- Avoid abrupt withdrawal, particularly of barbiturates and benzodiazepines, because this can precipitate severe rebound seizures
- Reduction in dosage should be gradual and, in the case of barbiturates, withdrawal of the drug may take months. In patients receiving several antiepileptic drugs, only one drug should be withdrawn at a time

- Those affected by drowsiness should not drive or operate machinery
- Women of child-bearing potential who take antiepileptic drugs should be given contraceptive advice
- Some antiepileptic drugs can reduce the efficacy of hormonal contraceptives, and the efficacy of some anti-epileptics may be affected by hormonal contraceptives
- There is an increased risk of teratogenicity associated with the use of antiepileptic drugs (especially if used during the first trimester and particularly if the patient takes two or more antiepileptic drugs)
- Valproate is associated with the highest risk of major and minor congenital malformations, and with developmental delay

### **STEP 7: Key Points (5 minutes)**

- Anti-epileptics are indicated for disorders of the central nervous system (CNS) which are characterized by chronic spontaneous recurring seizures whereas anticonvulsants are indicated for status epilepticus
- Most of anti-epileptics should be used with caution when with other drugs metabolized by the liver, especially Warfarin, ARVs and Oral contraceptives
- When anti-convulsants are given together may cause serious respiratory depression
- Interactions of Anti-epileptics are highly variable and unpredictable
- Precautions should be taken when using anti-epileptics especially in withdrawal, when used by women of child-bearing age, when used in combinations and in case of drowsiness

### **STEP 7: Evaluation (5 minutes)**

- What are the indications of anti-epileptics and anticonvulsant drugs?
- What are contraindications of anti-epileptics and anticonvulsant drugs?
- What is the dose, dosage and course of one anti-epileptic and one anticonvulsant drug?
- List side effects and adverse effects of one anti-epileptic and one anticonvulsant drug?

## References

- Ministry Of Health and Social Welfare. (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4th ed.). Dar es salaam, Tanzania government printers.
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# Session 39: Description of Antipsychotic Drugs

**Total Session Time:** 120 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of antipsychotic drugs
- List contraindication of antipsychotic drugs
- Describe dose, dosage and course of antipsychotic drugs
- List side effects and adverse effects of antipsychotic drugs
- Describe interactions and precautions of antipsychotic drugs

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Computer and projector

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Tasks
2	20 minutes	Presentation Brainstorming	Indications of antipsychotic drugs
3	20 minutes	Presentation	Contraindication of antipsychotic drugs
4	30 minutes	Presentation	Dose, dosage and course of antipsychotic drugs
5	20 minutes	Presentation Buzzing	Side effects and adverse effects of antipsychotic drugs
6	15 minutes	Presentation	Interaction and precaution of antipsychotic drugs
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning Tasks (5 minutes)**

**READ or ASK** students to read the learning objectives and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Antipsychotic Drugs (20 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- Mention anti antipsychotic drugs
- What are the indications of antipsychotic drugs?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY and SUMMARIZE** by using the content below

- They are divided into two groups:
  - First-generation antipsychotics, also known as typical antipsychotics
  - Examples are:
    - Chlorpromazine
    - Haloperidol
    - Thioridazine
    - Fluphenazine
  - Second-generation drugs, known as atypical antipsychotics
  - Examples are:
    - Clozapine
    - Olanzapine
    - Risperidone
- Antipsychotics (also known as neuroleptics or major tranquilizers) are drugs that are used to treat psychotic disorders

### **STEP 3: Contraindications of Antipsychotic Drugs (20 minutes)**

- They are contraindicated in clients with
  - Hypersensitivity
  - Liver damage
  - Coronary artery disease
  - Cerebrovascular disease
  - Parkinsonism

- Bone marrow depression
- Severe hypotension or hypertension
- Coma
- Severely depressed states

#### **STEP 4: Dose, Dosage and Course of Antipsychotic Drugs (30 minutes)**

- Treatment of acute attacks (schizophrenia):
  - Haloperidol 5 mg every 30 minutes for 2 hours
- For maintenance:
  - Chlorpromazine 100 – 600 mg (O) daily in divided doses OR
  - Haloperidol 3-4.5 mg (O) 12hourly OR
  - Olanzapine 5-10mg 12 hourly. Maximum dose 25mg/day OR
  - Risperidone 1mg bid then increase by 1mg every 2-3 days to 2 – 3mg twelve hourly. Maximum dose 16mg/day
- For patients who have poor compliance
  - Fluphenazine decanoate 12.5–50 mg IM every 4 weeks.

#### **STEP 5: Side Effects and Adverse Effects of Antipsychotic Drugs (20 minutes)**

##### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What are common adverse effects of Antipsychotics?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY and SUMMARIZE** by using the content below

Common side effects of antipsychotics include:

- Sedation (particularly common in patients on clozapine, olanzapine, quetiapine and chlorpromazine)
- Headaches
- Dizziness
- Diarrhea
- Anxiety
- Extrapyramidal side effects (particularly common in patients on first-generation antipsychotics), which includes:
  - Akathisia — an often distressing sense of inner restlessness.

- Dystonia
  - Parkinsonism
  - Tremor
- Hyperprolactinaemia (rare for those on clozapine, quetiapine and aripiprazole) which can cause:
  - Galactorrhoea unusual secretion of breast milk.
  - Gynaecomastia
  - Sexual dysfunction (in both sexes)
  - Osteoporosis
- Orthostatic hypotension
- Weight gain (particularly prominent in patients on clozapine, olanzapine and quetiapine)
- Anticholinergic side-effects (common for olanzapine, clozapine) such as:
  - Blurred vision
  - Constipation
  - Dry mouth (although hypersalivation may also occur)
  - Reduced perspiration
- Tardive dyskinesia appears to be more with haloperidol and is characterised by;
  - Slow (hence the tardive) repetitive, involuntary and purposeless movements, most often of the face, lips, legs, or torso

## **STEP 6: Interactions and precautions of antipsychotic drugs (15 minutes)**

Antipsychotics should be used cautiously in people with:

- Seizure disorders
- Diabetes mellitus
- Glaucoma
- Prostatic hypertrophy
- Peptic ulcer disease
- Chronic respiratory disorders

## **STEP 7: Key Points (5 minutes)**

- Antipsychotics are drugs that are used to treat psychotic disorders
- Antipsychotics are contraindicated in various medical conditions including patients who are hypersensitive to these drugs
- Different doses of antipsychotics are used during acute and maintenance treatment of schizophrenia

## **STEP 8: Evaluation (5 minutes)**

- What is the indication of antipsychotics?

- What are the contraindications of antipsychotics?
- What are the dose and dosage of antipsychotics?
- What are the precautions of antipsychotics?

## References

- MoHSW (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam: Tanzania Government Printers.
- Sally, S.R. Jeanne, C.S. (2000). *Introductory Clinical Pharmacology* (6<sup>th</sup>ed) New York, Lippincott Williams and Wilkins.
- School of Pharmaceutical Sciences (2011).*Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam: ARDHI University Press.
- Talbert, R. L. Yee, G. C. Matzke, G. R. Wells, B. G. & Michael, L. (2014)  
*Pharmacotherapy: a pathophysiologic approach* (9<sup>th</sup> ed.). New York: McGraw-Hill Education.
- The Royal Pharmaceutical Society of Great Britain (2007). *Martindale, the Extra Pharmacopoeia* (5<sup>th</sup> ed). London: Pharmaceutical Press.
- The Royal Pharmaceutical Society of Great Britain (2009). *British National Formulary* (59<sup>th</sup> ed). London: BMJ Group and RPS Publishing.

# Session 40: Description of General and Local Anaesthetics

**Total Session Time:** 120 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of general and local anaesthetics
- List Contraindication of general and local anaesthetics
- Describe dose, dosage and course of general and local anaesthetics
- List side effects and adverse effects of general and local anaesthetics
- Describe interaction and precaution of general and local anaesthetics

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Computer and overhead projector

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Tasks
2	20 minutes	Presentation/ Buzzing	Indications of General and Local Anaesthetics
3	20 minutes	Presentation/ brainstorming	Contraindication of General and Local Anaesthetics
4	30 minutes	Presentation	Dose, Dosage and Course of General and Local Anaesthetics
5	20 minutes	Presentation/ brainstorming	Side Effects and Adverse Effects of General and Local Anaesthetics
6	15minutes	Presentation	Interaction and Precaution of General and Local Anaesthetics
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning Tasks (5 minutes)**

**READ or ASK** students to read the learning objectives and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of General and Local Anaesthetics (20 Minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What are the general and local anaesthetics?
- What are the indications of general and local anaesthesia?

**ALLOW** few pairs to respond and let other pairs add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY and SUMMARIZE** by using the content below

- General anaesthetics include; halothane, ketamine, isoflurane and thiopental while local anaesthetic include lignocaine and bupivavaine
- Indication of General anaesthetics include:
  - Halothane is occasionally used for inhalation induction of anaesthesia with careful monitoring for cardiorespiratory depression and arrhythmias
  - Ketamine is useful in induction and maintenance of anaesthesia it is used during surgery and intubation
  - Isoflurane is a volatile liquid anaesthetic, it is used in induction and maintenance of anaesthesia, it is useful during surgery and intubation
  - Thiopental is used in induction of general anaesthesia, anaesthesia of short duration reduction during surgery and intubation
- Indication of Local anaesthetics include:
  - Bupivacaine labour, surgery and local infiltration
  - Lignocaine is used as infiltration anaesthesia, intravenous regional and nerve block, surface anaesthesia and nerve block

## **STEP 3: Contraindications of General and Local Anaesthetics (20 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the Contraindications of general and local anaesthetics?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Contra indication of General anaesthetics;
  - Halothane is contraindicated if the anaesthetist is not confident of being able to maintain the airway (e.g. in the presence of a tumour in the pharynx or larynx) Extreme care is required in surgery of the mouth, pharynx, or larynx and in patients with acute circulatory failure
  - Ketamine is contraindicated if the anaesthetist is not confident of being able to maintain the airway (e.g. in the presence of a tumor in the pharynx or larynx). Extreme care is required in surgery of the mouth, pharynx, or larynx and in patients with acute circulatory failure. Also in hypertension, pre-eclampsia or eclampsia, severe cardiac disease, raised intracranial pressure, head trauma, acute and porphyria.
  - Isoflurane is contraindicated to women who are breast feeding
  - Thiopental is contraindicated if the anaesthetist is not confident of being able to maintain the airway (e.g. in the presence of a tumor in the pharynx or larynx). Extreme care is required in surgery of the mouth, pharynx, or larynx and in patients with acute circulatory failure. Also in acute porphyria, myotonic dystrophy and breast-feeding
- Contra indication of Local anaesthetics;
  - Bupivacaine is contraindicated in hypovolemia, complete heart blockade should not be used in solutions containing adrenaline for anaesthesia in appendages
  - Lignocaine like bupivacaine, it is contraindicated in hypovolaemia, complete heart blockade should not be used in solutions containing adrenaline for anaesthesia in appendages

## **STEP 4: Dose, Dosage and Course of General and Local Anaesthetics (30minutes)**

- Dose, dosage, and course of General Anaesthetics are as follows.
  - Halothane:
    - Induction of anaesthesia: adult and child over 1 month are initially given 0.5% then increased gradually according to response to 2–4%
    - Using specifically calibrated vaporiser, in oxygen or nitrous oxide–oxygen
    - Maintenance of anaesthesia: adult and child over 1 month, 0.5–2% using specifically calibrated vaporiser, in oxygen or nitrous oxide–oxygen
  - Ketamine:
    - By intramuscular injection; For short procedures, initially 6.5–13 mg/kg, adjusted according to response
    - By intravenous injection; For short procedures, initially 1–4.5 mg/kg, adjusted according to response
    - By intravenous infusion; A solution containing 1 mg/mL is used in longer procedures for induction, a total dose of 0.5–2 mg/kg may be given. The maintenance dose of 10–45 micrograms/ kg/minute is required and the rate may be adjusted according to response
  - Isoflurane:
    - Induction of anaesthesia, the dose is increased gradually from 0.5% to 3% using specifically calibrated vaporiser, in oxygen or nitrous oxide–oxygen
    - Maintenance of anaesthesia; is given at 1–2.5% in nitrous oxide–oxygen using specifically calibrated vaporizer. Additional 0.5–1% may be required when given with oxygen alone
  - Thiopental:
    - The dose for induction of general anaesthesia is usually 100–150 mg over 10–15 seconds as (25 mg/mL) solution by slow intravenous injection, for adult over 18 years. Children 1 month–18 years, initially up to 4 mg/kg, then 1 mg/kg repeated as necessary (max. total dose 7 mg/kg)
- Indication of Local anaesthetics include
  - Bupivacaine:
    - The doses should be adjusted according to patient's physical status and nature of procedure
    - Local infiltration, max. 60 mL, using a 2.5 mg/mL solution
    - Peripheral nerve block, max. 60 mL, using a 2.5 mg/ mL solution; max. 30 mL, using a 5 mg/mL (0.5%) solution
    - Epidural block Surgery and lumbar, max. 20 mL, using a 5 mg/mL Solution.
  - Lignocaine:
    - Infiltration anaesthesia, the drug is by injection according to patient's weight and nature of procedure, max. 200 mg (or 500 mg if given in solutions containing adrenaline)
    - The usual strength for surface anaesthesia, is 2–4%,

## **STEP 5: Side Effects and Adverse Effects of General and Local Anaesthetics (20 Minute)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the side effects and adverse effects of general and local anaesthetics?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Side effects and adverse effects of general anaesthesia
  - Halothane: Side effects include severe hepatotoxic which can be fatal in repeated uses
  - Ketamine: Side effects include incidence of hallucinations, nightmares, and other transient psychotic effects. Other side effects are tachycardia, hypertension, arrhythmias, hypotension, bradycardia increased salivation, laryngospasm, anxiety, insomnia, diplopia, nystagmus, raised intra-ocular pressure and rashes at injection-site
  - Isoflurane: Side effects include irritation of mucous membranes causing cough, breath-holding and laryngospasm
  - Thiopental: Side effects include hypotension, arrhythmias, myocardial depression, laryngeal spasm, cough, sneezing, hypersensitivity reactions, rash, injection-site reactions. Excessive dose is associated with hypothermia and profound cerebral impairment
- Side effects and adverse effects of local anaesthesia
  - Bupivacaine Side effects include initially a feeling of inebriation and lightheadedness followed by sedation, circumoral paraesthesia and twitching. convulsions can occur in severe reactions. Also CNS effects which include confusion, respiratory depression and convulsions hypotension and bradycardia (may lead to cardiac arrest)
  - Lignocaine: same to those of bupivacaine

## **STEP 6: Interaction and precaution of general and local anaesthesia (20minutes)**

- Interaction
  - General anaesthetics which include Halothane, Ketamine, Isoflurane and Thiopental have the following interaction:
    - Their hypotensive effect is enhanced when given with adrenergic blocker, angiotensin ii receptor antagonists, monoamine oxidase inhibitors, tricyclic antidepressants, beta blocker, and calcium channel blockers

- There is an increased chances of convulsion when they are given with theophyllin especially Ketamine
- There is an increased chance of arrhythmias when given together with oxytocin and theophyllin
- Local anaesthetics
  - Bupivacaine has increased myocardial depression when given with antiarrhythmic drugs, also bupivacaine toxicity is increased when given with beta blocker like propranolol
  - Lignocaine has no interaction or special pre caution

### **STEP 7: Key points (5 minutes)**

- General anaesthetics are usually used in major surgical operations
- Local anaesthetics are usually used in minor surgical operations
- Ketamine should not be administered with aminophylline
- Bupivacaine and lignocaine dose should be adjusted according to length of procedure and status of the patient

### **STEP 7: Evaluation (5 minutes)**

- What are indications of halothane?
- Which drugs are used in general anaesthesia?
- Which drugs are used in local anaesthesia?
- What are the effects using calcium channel blocker with isoflurane?

## References

- Ministry Of Health and Social Welfare. (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.
- Robert L. Talbert, Gary C. Yee, Gary R. Matzke, Barbara G. Wells, L. Michael. (2014). *Pharmacotherapy: A Pathophysiologic Approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Sally S.R, Jeanne C.S. (2000). *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins.
- School of Pharmaceutical sciences. (2011). *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.
- The Royal Pharmaceutical Society of Great Britain. (2007). *Martindale, the Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.
- The Royal Pharmaceutical Society of Great Britain. (2009). *British National Formulary* (59<sup>th</sup> ed). London, BMJ Group and RPS Publishing.

# Session 41: Description of Muscle Relaxants and Cholinesterase Inhibitors

**Total Session Time:** 120 minutes

## Prerequisite module

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of muscle relaxants and cholinesterase inhibitors
- List Contraindication of muscle relaxants and cholinesterase inhibitors
- Describe dose, dosage and course of muscle relaxants and cholinesterase inhibitors
- List side effects and adverse effects of muscle relaxants and cholinesterase inhibitors
- Describe interaction and precaution of muscle relaxants and cholinesterase inhibitors

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Computer and overhead projector

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning tasks
2	20 minutes	Presentation/ Buzzing	Listing Indications of Muscle Relaxants and Cholinesterase Inhibitors
3	20 minutes	Presentation/ brainstorming	Listing Contraindication of Muscle Relaxants and Cholinesterase Inhibitors
4	30 minutes	Presentation	Description of Dose, Dosage and Course of Muscle Relaxants and Cholinesterase Inhibitors
5	20 minutes	Presentation/ brainstorming	Listing Side Effects and Adverse Effects of Muscle Relaxants and Cholinesterase Inhibitors
6	15 minutes	Presentation	Description of Interaction and Precaution of Muscle Relaxants and Cholinesterase Inhibitors
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning tasks (5 minutes)**

**READ or ASK** students to read the learning objectives and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Muscle Relaxants and Cholinesterase Inhibitors (20 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What are muscle relaxants and cholinesterase inhibitors?
- What are the indications of muscle relaxants and cholinesterase inhibitors?

**ALLOW** few pairs to respond and let other pairs add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY and SUMMARIZE** by using the content below

- Muscle relaxants are also known as neuromuscular blocking drugs. They include: Gallamine, Suxamethonium Chloride, Vecuronium Bromide, and Pancuronium Bromide. Anti-cholinesterase includes Edrophonium and Neostigmine
- They are used in anaesthesia
  - They enable light anaesthesia to be used with adequate relaxation of the muscle
  - Gallamine is used to produce relaxation of skeletal muscle during surgery
  - Suxamethonium Chloride is used for short to intermediate duration neuromuscular blockade for surgery or during intensive care
  - Vecuronium Bromide is used for intermediate duration neuromuscular blockade for surgery or during intensive care
  - Pancuronium Bromide is used for long duration neuromuscular blockade for surgery or during intensive care
- Anticholinesterases reverse the effects of the non-depolarising (competitive) neuromuscular blocking drugs such as pancuronium but they prolong the action of depolarizing neuromuscular blocking drugs
  - Edrophonium has a transient action and may be used in the diagnosis of suspected dual block due to suxamethonium
  - Neostigmine has a longer duration of action than edrophonium and is used specifically for reversal of nondepolarising (competitive) blockade

## **STEP 3: Contraindication of Muscle Relaxants and Cholinesterase Inhibitors (20 Minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the Contraindication of muscle relaxants and cholinesterase inhibitors?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Most muscle relaxants are not contraindicated to any specific individuals except Suxamethonium and galamine chloride which is contraindicated to those with:
  - Family history of malignant
  - Hyperthermia
  - Hyperkalaemia
  - Major trauma
  - Severe burns
  - Neurological disease involving acute wasting of major muscle
  - Prolonged immobilisation
  - Hyperkalaemia
  - Low plasma-cholinesterase activity (including severe liver disease)
- Cholinesterase inhibitors are contraindicated in
  - Intestinal obstruction
  - Urinary obstruction

## **STEP 4: Dose, Dosage and Course of Muscle Relaxants and Cholinesterase Inhibitors (30 minutes)**

- Dose dosage and course of muscle relaxants
  - Atracurium Besilate:
    - Surgery or intubation, adult and child over 1 month, by intravenous injection, initially 300–600 micrograms/kg, then 100–200 micrograms/kg as required
    - Intensive care, ADULT and CHILD over 1 month, by intravenous injection, initially 300–600 micrograms/kg then by intravenous infusion 4.5–29.5 micrograms/kg/minute

- Suxamethonium Chloride
  - By intravenous injection, initially 1 mg/kg; maintenance, usually 0.5–1 mg/kg at 5–10 minute intervals; max. 500 mg/hour; CHILD under 1 year, 2 mg/kg; CHILD over 1 year, 1 mg/kg
  - By intravenous infusion of a solution containing 1–2 mg/mL (0.10.2%), 2.5–4 mg/minute; max. 500 mg/hour; CHILD reduce infusion rate according to body-weight
  - By intramuscular injection, CHILD under 1 year, up to 4–5 mg/kg; CHILD over 1 year, up to 4 mg/kg; max
- Gallamine
  - Adults: 1-1.5 mg/kg i.v. initially, then 0.5-1 mg/kg as required at about 40-minute intervals
  - Children: 1.5 mg/kg initially, then 0.5 mg/kg as required
  - Infants of less than 1 month: 250-750 micrograms/kg initially, then 100-500 micrograms/kg
- Mivacurium
  - Intravenous injection, 70–250 micrograms/kg; maintenance 100 micrograms/kg every 15 minutes
  - CHILD 2–6 months initially 150 micrograms/kg, 7 months–12 years initially 200 micrograms/kg
- Vecuronium Bromide
  - By intravenous injection, intubation, adult and child, initially 80–100 micrograms/kg; maintenance 20–30 micrograms/kg adjusted according to response; neonate
    - By intravenous infusion, 0.8–1.4 micrograms/kg/minute (after initial intravenous injection of 40–100 micrograms/kg)
- Pancuronium Bromide
  - Intubation, by intravenous injection, initially 50–100 micrograms/kg then 10–20 micrograms/kg as required: Intensive care, by intravenous injection, 60 micrograms/kg every 60–90 minutes
- Dose dosage and course of cholinesterase inhibitors
  - Edrophonium
 

Is given by intravenous injection over several minutes, 500–700 micrograms/kg (after or with atropine)
  - Neostigmine
 

Is given by intravenous injection over 1 minute, 50–70 micrograms/kg (max. 5 mg) after or with atropine

## **STEP 5: Side Effects and Adverse Effects of Muscle Relaxants and Cholinesterase Inhibitors (20 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the side effects and adverse effects of muscle relaxants and cholinesterase?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Side and adverse effects of muscle relaxants
  - Atracurium, has Cardiovascular effects are associated with significant histamine release
  - Gallamine may produce vagolytic tachycardia. Anaphylactoid reactions rarely occur
  - Pancuronium causes tachycardia and hypertension
  - Rocuronium high doses produce mild vagolytic activity
  - Vecuronium, it does not generally produce histamine release and lacks cardiovascular effects
- Side effects of cholinesterase inhibitor in normal dose include:
  - Nausea
  - Vomiting
  - Increased salivation
  - Diarrhoea
  - Abdominal cramps
- In overdosage
  - Bronchoconstriction
  - Increased bronchial secretions
  - Lacrimation
  - Excessive sweating
  - Involuntary defaecation and
  - Micturition
  - Miosis
  - Nystagmus
  - Bradycardia, heart block, arrhythmias, hypotension, agitation
  - Excessive dreaming

## **STEP 6: Interaction and Precaution of Muscle Relaxants and Cholinesterase Inhibitors (20 minutes)**

- Interaction and precaution of muscle relaxants
- Suxamethonium
  - Interaction
    - Action of Suxamethonium is enhanced by donepezil
  - Pre Caution is advised in:
    - Hypersensitivity to these drugs
    - Myasthenia gravis
    - Hypothermia
    - Neuromuscular disorders
    - Electrolyte disturbances
- Gallamine
  - Precautions; Gallamine should be used, whenever possible, by an experienced specialist anaesthetist. Facilities for endotracheal intubation and mechanically assisted ventilation should be immediately to hand and ready for use
- Interaction and precaution cholinesterase inhibitors
  - Interactions:
    - Action of neostigmine is antagonized by lithium and propranolol
  - Caution is advised in:
    - Asthma (extreme caution)
    - bradycardia
    - Arrhythmias
    - Recent myocardial infarction
    - Epilepsy, hypotension, parkinsonism, vagotonia, peptic ulceration
    - Hyperthyroidis
    - Neostigmine is antagonized by lithium and propranolol

## **STEP 7: Key points (5 minutes)**

- Muscle relaxants are used together with anesthesia in surgery or intubation
- Anticholinesterases drugs are used to reverse the effects of the non-depolarising neuromuscular blocking drugs such as but they prolong the action of depolarizing neuromuscular blocking drugs
- Action of Suxamethonium is enhanced by donepezil
- Neostigmine is antagonized by lithium and propranolol

## **STEP 7: Evaluation (5 minutes)**

- What are the indications of muscle relaxants?
- What are the indications of cholinesterase inhibitors?
- Which drug enhances the action of suxamethonium?
- What will happen in anticholinesterase overdose?

- What is the precaution on the use of gallamine?

## References

- Ministry of Health and Social Welfare. (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.
- Robert L. Talbert, Gary C. Yee, Gary R. Matzke, Barbara G. Wells, L. Michael. 2014. *Pharmacotherapy: A Pathophysiologic approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Sally S.R, Jeanne C.S. (2000). *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins.
- School of Pharmaceutical sciences. (2011). *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.
- The Royal Pharmaceutical Society of Great Britain. 2007. Martindale, *The Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.
- The Royal Pharmaceutical Society of Great Britain. 2009. *British National Formulary* (59<sup>th</sup> ed). London, BMJ Group and RPS Publishing.

# Session 42: Description of Eye, Ear and Nose Preparations

**Total Session Time:** 120 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List preparations of the eye, ear and nose and their indications
- List Contraindication of eye, ear and nose preparations
- Describe dose, dosage and course of eye, ear and nose preparations
- List side effects and adverse effects of eye, ear and nose preparations
- Describe interactions and precautions of eye, ear and nose preparations

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Overhead projector (OHP) and Computer

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Objectives
2	40 minutes	Presentation small Group Discussion	A List of the Eye, Ear And Nose Preparations and their indications
3	20 minutes	Presentation	Dose, Dosage and Course of the Eye, Ear and Nose Preparations
4	20 minutes	Presentation Buzzing	Side Effects and Adverse Effects of the Eye, Ear and Nose Preparations
5	10 minutes	Presentation Brainstorming	Contraindications of the Eye, Ear and Nose Preparations
6	15 minutes	Presentation Brainstorming	Interactions and Precautions of the Eye, Ear and Nose Preparations
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning Objectives (5 minutes)**

**READ or ASK** students to read the learning objectives and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: List of the Eye, Ear and Nose Preparations and their indications (40 minutes)**

**Activity:** *Small Group Discussion ( 30 minutes)*

**DIVIDE** students into small manageable groups

**ASK** students to discuss on the following question

- What are the eye,ear and nose preparations that are used in clinical settings?
- What are the indications of the eye, ear and nose preparations?

**ALLOW** students to discuss for 15 minutes

**ALLOW** few groups to present and the rest to add points not mentioned

**CLARIFY** and **SUMMARIZE** by using the contents below

#### **List of preparations**

- Nasal preparations
  - Beclomethasone spray
  - Ephedrine nasal drops
- Ear preparations
  - Chroramphenicol ear drops
  - Neomycin + Dexamethasone ear drops
  - Ciprofloxacin ear drops
  - Aluminium diacetate ear drops
- Eye preparations
  - Anti-effective agents
    - Acyclovir ointment
    - Chloramphenicol drops
    - Chloramphenicol ointment
    - Gentamycin drops
    - Povidone iodine
    - Oxytetracycline ointment
    - Ciprofloxacin

- Dexamethasone + Chloramphenicol
- Dexamethasone + Gentamycin
- Natamycin
- Econazole
- Steroidal anti-inflammatory agents
  - Dexamethasone
  - Prednisolone
  - Methylprednisolone
  - Triamcinolone cream and injection
- Ant infective and ant inflammatory agents
  - Cyclopentolate
  - Atropine
  - Timolol
  - Hydroxypropylmethylcellulose
  - Iodoxamine tromethazine
  - Sodium cromoglycate
  - Pilocarpine
  - Zinc sulphate
  - Latanoprost
  - Acetazolamide

### **Indications**

- The eye preparations can be indicated in either of the following:
  - Bacteria, fungal and viral infections
  - Inflammations like conjunctivitis
  - Mydriasis and cycloplegia
  - Anaesthesia induction
  - Glaucoma
  - Lubrication
  - Diagnosis
- The ear preparations are usually indicated in microbial infections, inflammations like otitis media and lubrication in removal of ear wax
- The nose preparations are indicated in microbial infections of the nose, diagnosis of nose disorders, inflammations of the nose and shrinking of the nasal polyps by corticosteroids

### **STEP 3: Dose, Dosage and Course of Eye, Ear and Nose Preparations**

**(20 minutes)**

- The dose of respective antimicrobial agent should be given to an individual depending on the diagnosis, weight and vital body organs functions
- The dosage of respective antimicrobial agent depends on the severity of diagnosis, half life of an agent and vital organ functions

- One to two drops of eye formulations are given 2-4 times a day depending on their half lives
- 2-3 drops of ear formulations is given 3-4 times a day and reducing the frequency as the day dose
- The course of antibacterial treatment can be up to 14 days, antifungal up to three months and antiviral up to six weeks
- Lubricants can be used until there is a promising outcome
- The duration of treatment with steroid ant inflammatory agents should be short especially in corticosteroids because are immunosuppressants

#### **STEP 4: Side effects of Eye, Ear and Nose Preparations (20 minutes)**

***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question

- What are the side effects of the eye, ear and nose preparations listed above?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY** and **SUMMARIZE** by using the content below

- Aplastic anaemia and transient stinging caused by preparations containing chloramphenicol
- Local burning and itching; lid margin crusting; hyperaemia; taste disturbances; corneal staining, keratitis, lid oedema, lacrimation, photophobia, corneal infiltrates; nausea and visual disturbances reported in preparations containing ciprofloxacin and other quinolones
- Local irritation and inflammation, superficial and punctate keratopathy in products containing acyclovir
- Aggravation of red eye, steroid cataract and glaucoma and thinning of cornea and sclera for eye corticosteroids
- Local sensitivity reactions may occur in ear preparations
- Dryness, irritation of nose and throat, and epistaxis in nose corticoid preparations.

## **STEP 5: Contraindications of Eye, Ear and Nose Preparations (10 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the contraindications of the eye, ear and nose preparations?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

- Corticosteroid ear and eye preparations should be avoided in the presence of an untreated ear infection
- If infection is present, the corticosteroid should be used in combination with a suitable antibiotic
- Avoid prolonged use of chloramphenicol and aminoglycosides like gentamycin

## **STEP 6: Interactions and Precautions of Eye, Ear and Nose Preparations (15 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the interactions and precautions of the ear, eye and nose preparations?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

- Ciprofloxacin and other quinolone containing preparations should be avoided in children less than one year and pregnancy
- Gentamycin and other aminoglycoside preparations are not recommended in pregnancy
- Prolonged use of topical corticosteroid ear, eye and nose preparations should be avoided
- Long use of chloramphenicol and aminoglycoside preparations should be avoided
- Corticosteroid nasal preparations should be avoided in the presence of untreated nasal infections, and also after nasal surgery until healing has occurred

## **STEP 7: Key Points (5 minutes)**

- Most of eye, nose and ear preparations are ant infective and ant inflammatory agents
- The use of antimicrobial eye, ear and nose preparations should be given special attention to pregnant women and children less than one year
- In order to avoid their possible side effects steroids should be used for as short time as possible

## **STEP 8: Evaluation (5 minutes)**

- What are the possible side effects of eye preparations containing corticosteroids?
- What measures will you take as Pharmaceutical personnel when a patient has been prescribed with corticosteroid spray after nasal surgery?
- Why steroids should not be used for a long time?

## References

- School of Pharmaceutical sciences. (2011). *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, Tanzania: ARDHI University press.
- Ministry of Health and Social Welfare. (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania: Government printers.
- The Royal Pharmaceutical Society of Great Britain. (2007). *Martindale, the Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, UK: Pharmaceutical press.
- The Royal Pharmaceutical Society of Great Britain. (2009). *British National Formulary* (59<sup>th</sup> ed). London, UK: BMJ Group and RPS Publishing.
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# Session 43: Description of Oxytocics, Tocolytics and Related Medicines

**Total Session Time:** 120 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of essential oxytocics, tocolytics and related preparations
- List contraindication of essential oxytocics, tocolytics and related preparations
- Describe dose, dosage and course of essential oxytocics, tocolytics and related preparations
- List common side effects and adverse effects of essential oxytocics, tocolytics and related preparations
- Describe interactions and precautions of essential oxytocics, tocolytics and related preparations

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Computer and projector

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning tasks
2	20 minutes	Presentation/ Buzzing	Clinical Indications of Oxytocics, Tocolytics and Related Preparation
3	20 minutes	Presentation/ brainstorming	Contraindications of Oxytocics, Tocolytics and Related Preparation
4	30 minutes	Presentation	Dose, Dosage and Course of Oxytocics, Tocolytics and Related Preparation
5	20 minutes	Presentation/ brainstorming	Common Side Effects and Adverse Effects of Oxytocics, Tocolytics and Related Preparation
6	15 minutes	Presentation	Interaction and Precaution of Oxytocics, Tocolytics and Related Preparation

7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning tasks (5 minutes)**

**READ or ASK** students to read the learning objectives and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Clinical Indications of Essential Oxytocics, Tocolytics and Related Preparations (20 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What are the clinical indications of essential oxytocics, tocolytics and related preparations?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

#### **CLARIFY and SUMMARIZE by using the content below**

- According to Tanzania Standard treatment guideline, essential oxytocics, tocolytics and related preparations include salbutamol, ergometrine, oxytocin, misoprostol and magnesium sulphate

#### **Salbutamol**

- Salbutamol is used for myometrial relaxation
- It is used in selected cases in attempt to inhibit premature labor once it has begun.

#### **Ergometrine**

- Its main action is the production of intense contractions
- It is used in the active management of the third stage of labor, and to prevent or treat postpartum or postabortal haemorrhage caused by uterine atony
- Ergometrine maleate or methylergometrine maleate have been used in a provocation test for the diagnosis of Prinzmetal's angina

#### **Oxytocin**

- Synthetic oxytocin is the most widely used drug for stimulating uterine contractions following the rupture of membranes during labor
- It is also used to augment abnormal labor that is protracted or displays arrest disorder.
- Oxytocics used in the immediate postpartum period, including the control of uterine hemorrhage after vaginal or cesarean delivery (Postpartum Haemorrhage - PPH)

### **Misoprostol**

- It is commonly used for [labor induction](#)
- It causes [uterine contractions](#) and the ripening ([effacement](#) or thinning) of the [cervix](#)
- It is also used to prevent and treat [stomach ulcers](#), and treat [postpartum bleeding](#) due to insufficient contraction of the [uterus](#)

### **Magnesium Sulphate**

- Used as a tocolytics to stop preterm labor and for severe pre-eclampsia

## **STEP 3: Contraindication of Essential Oxytocics, Tocolytics and Related Preparation (20 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the contraindications of essential oxytocics, tocolytics and related preparation?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

### **Salbutamol**

- Salbutamol is contraindicated in the suppression of labor in women with heart disease, eclampsia or severe pre- eclampsia, antepartum haemorrhage or placenta previa
- It should be used with caution in women with diabetes, hypertension or hyperthyroidism

### **Oxytocin**

- Oxytocin is contraindicated in women, for whom vaginal delivery is contraindicated because of conditions such as unfavorable foetal position (e.g. transverse lie) or placenta previa - a condition in which the placenta grows over the cervix, blocking the baby's exit

### **Ergometrine**

- Ergometrine maleate is contra-indicated for the induction of labor or for use during the first stage of labor
- Ergometrine maleate has been associated with acute attacks of porphyria and is considered unsafe in porphyric patients

### **Misoprostol**

- Misoprostol is contraindicated in Pregnancy when used to reduce risk of NSAID-induced ulcers and to individuals with hypersensitivity to misoprostol, prostaglandins, or prostaglandin analogues

### **Magnesium sulphate**

- Magnesium sulphate is contraindicated in the patients with the following conditions:-
  - Hypersensitivity, myocardial damage, diabetic coma, heart block, hypermagnesemia, hypercalcemia
- Administration during 2 hours preceding delivery for mothers with toxemia of pregnancy

## **STEP 4: Dose, Dosage and Course of Essential Oxytocics, Tocolytics and Related Preparation (30 minutes)**

### **Salbutamol**

- 10 micrograms per minute of Salbutamol is given and gradually increasing to 45 micrograms per minute until contraction has ceased and then reduce gradually
- Alternatively, give by IM injection 100 -250 micrograms and repeat according to the patient response and subsequently, give orally 4mg every 6 to 8 hours as maintenance dose
- Salbutamol is administered by IV infusion using dextrose 5% until 12 to 48 hour after contractions have ceased, followed by oral maintenance therapy

### **Oxytocin**

- For induction of labor use: Oxytocin IV the dose will depend on parity
  - Primigravida:
    - Oxytocin IV 5 IU in 500mls of fluid titrate at 15, 30, 60 drops per minute until desired uterine contractions are attained
  - Multiparous:
    - Oxytocin IV Starts with low dose eg 1.25 IU in 500mls of fluid titrate as above. Regulate the dose according to response
    - If no progress of labor is achieved give; Oxytocin (IV) Initially 1 unit then 4 units in 1 litre Normal Saline at 15, 30, 60 drops per minute until regular contractions lasting for more than 40 secondly are maintained
- When 4 units are not enough to cause maintained contractions, and it is first pregnancy, the dose can be increased to 16, 32 then 64 units in litre of Normal Saline each time increasing the delivery rate through 15, 30 and 60 drop per minute

### **Ergometrine**

- Ergometrine maleate alone is used for prevention or treatment of postpartum or postabortal haemorrhage in a usual intramuscular dose of 200 micrograms
- A dose of ergometrine maleate 500 micrograms and oxytocin 5 units is injected intramuscularly after delivery of the anterior shoulder, or, at the latest, immediately after delivery of the infant; contractions are reported to occur within 2 to 7 minutes.
- Single doses of 250 to 500 micrograms have also been used
- In the treatment of mild secondary postpartum haemorrhage, ergometrine maleate has been given by mouth in a dose of 500 micrograms three times daily for 2 to 7 days

### **Misoprostol**

- For induction of labor
  - 25 mcg (1/4 of 100-mcg oral tablet) intravaginally initially, then repeat at intervals not to exceed q3-6hr
  - Not to be used in patients with previous cesarean delivery or major uterine surgery
- Postpartum Hemorrhage (Off-label)
  - Prophylaxis: 600 mcg PO within 1 minute of delivery
  - Treatment: 800 mcg PO once; use caution if prophylactic dose already given and adverse effects present or observed
  - Use only in settings where oxytocin not available

### **Magnesium Sulphate**

- For management of Severe pre-eclampsia
  - Magnesium sulphate is used together with normal saline, nifedipine 10-20 mg 12 hrly and Hydralazine 10 mg (I.V) slowly in the following dose
  - Magnesium sulphate 4gm (IV) in 20 mls of normal saline for 10-15 min followed by 5gm of 50% MgSO<sub>4</sub> in each buttock; Followed by 4gm of MgSO<sub>4</sub> in 250 mls of normal Saline to run over 4hrs. Maintenance dose: 4gm of MgSO<sub>4</sub> (IM alternative buttock) 4hourly for 24hrs
  - MgSO<sub>4</sub> regimen should continue until 24 hrs after the last fit

## **STEP 5: Common Side Effects and Adverse Effects of Essential Oxytocics, Tocolytics and Related Preparation (20 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the side effects and adverse effects of essential oxytocics, tocolytics and related preparation?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

### **Adverse effects of salbutamol**

- Salbutamol may cause possible adverse effect in the mother, this includes tachycardia, tremor, palpitations, nausea and vomiting, thirsty, restlessness, hypertension, flushing and hyperglycaemia
- It can cause oedema though rarely and this is usually due to fluid overload and can be avoided by giving Salbutamol in small volumes of fluid only

- Myocardial ischaemia is also rare but serious complications

#### **Adverse Effects of oxytocin**

- Includes hypertension, arrhythmia and pulmonary oedema
- Hyperstimulation of the uterus is the main complication of oxytocin infusion
- This may lead to uterine rapture, amniotic fluid embolism or foetal distress
- If signs of hyperstimulation are noticed, oxytocin administration should be stopped immediately

#### **Adverse Effects of ergometrine**

- Nausea and vomiting, abdominal pain, diarrhoea, headache, dizziness, tinnitus, chest pain, palpitations, bradycardia and other cardiac arrhythmias, myocardial infarction, dyspnoea, and pulmonary oedema have been reported after use of ergometrine
- Bronchospasm has been reported after use of ergometrine
- Hypertension may occur, particularly after rapid intravenous dosage; hypotension has also been reported. Hypersensitivity reactions, including shock, have occurred
- Ergometrine shows fewer tendencies to produce gangrene than ergotamine, but ergotism has been reported and symptoms of acute poisoning are similar

#### **Adverse effects of misoprostol**

- The most commonly reported adverse effect of taking a misoprostol orally is diarrhea, abdominal pain, nausea, flatulence, headache, dyspepsia, vomiting, and constipation

#### **Common Side Effects of Intravenous Magnesium sulphate**

- Common side effects of intravenous magnesium sulphate includes respiratory paralysis, hypothermia, pulmonary edema, depressed reflexes, hypotension, flushing, drowsiness, depressed cardiac function, diaphoresis, hypocalcemia, hypophosphatemia, hyperkalemia, visual changes

### **STEP 6: Description of Interaction and Precaution of Essential Oxytocics, Tocolytics and Related Preparation (20 Minutes)**

#### **Oxytocin**

- Precautions
  - If uterine hyperactivity occurs, discontinue immediately
  - Intravenous preparations should be administered by trained personnel
  - Risk of severe water intoxication on prolonged administration due to its antidiuretic effects
  - Restricting fluid intake may be warranted
  - Uterine hypertonicity, spasm, rupture of the uterus, and tetanic contractions may occur from high doses
  - IM not recommended for labor induction/augmentation

#### **Misoprostol**

- Warning
  - Patients must seek medical attention if excessive bleeding occurs

- Administration to pregnant women can cause abortion, premature birth, or birth defects
- Uterine rupture has been reported when drug is administered to pregnant women to induce labor or induce abortion beyond 8th week of gestation
- Do not use for reducing risk of NSAID-induced ulcers in women of childbearing potential unless patient is at high risk for complication from gastric ulcers; may be prescribed in the following situations:

### **Magnesium sulphate**

- Warnings
  - Magnesium sulfate (magnesium sulfate (magnesium sulfate injection) injection) should be given very cautiously in the presence of serious impairment of renal function since it is excreted almost entirely by the kidneys
- Precautions
  - When barbiturates, narcotics, or other hypnotics (or systemic anesthetics) are to be given in conjunction with magnesium, their dosage should be adjusted with caution because of the additive central depressive effects of magnesium
  - Hypomagnesemia is usually associated with hypokalemia (potassium levels must be normalized)

### **STEP 7: Key points (5 minutes)**

- According to Tanzania standard treatment guideline, essential oxytocics, tocolytics and related preparations include salbutamol, ergometrine, oxytocin, misoprostol and magnesium sulphate
- Synthetic oxytocin is the most widely used drug for stimulating uterine contractions following the rupture of membranes during labor
- Common side effects of intravenous magnesium sulphate includes respiratory paralysis, hypothermia, pulmonary edema, depressed reflexes, hypotension, flushing, drowsiness, depressed cardiac function, diaphoresis, hypocalcemia, hypophosphatemia, hyperkalemia, visual changes

### **STEP 7: Evaluation (5 minutes)**

- What are the clinical indications of Oxytocin and Magnesium sulphate?
- What are the common adverse effects of salbutamol, misoprostol and ergometrine?
- What are the contraindications of oxytocin and misoprostol?

## References

- Ministry Of Health and Social Welfare. (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.
- Robert L. Talbert, Gary C. Yee, Gary R. Matzke, Barbara G. Wells & L. Michael. (2014). *Pharmacotherapy: a pathophysiologic approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Sally S.R & Jeanne C.S. 2000. *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins.
- School of Pharmaceutical sciences.( 2011).*Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar Es Salaam, ARDHI University press.
- The Royal Pharmaceutical Society of Great Britain. (2007). *Martindale, the Extra Pharmacopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.

# Session 44: Description of Vitamins and Minerals

**Total Session Time:** 120 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of vitamins and minerals
- List Contraindications of vitamins and minerals
- Describe dose, dosage and course of vitamins and minerals
- List side effects and adverse effects of vitamins and minerals
- Describe interactions and precautions of vitamins and minerals

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Computer and projector

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Tasks
2	20 minutes	Presentation/ Buzzing	Indications of Vitamins and Minerals
3	20 minutes	Presentation/ brainstorming	Contraindications of Vitamins and Minerals
4	30 minutes	Presentation	Dose, Dosage and Course of Vitamins and Minerals
5	20 minutes	Presentation/ brainstorming	Side Effects and Adverse Effects of Vitamins and Minerals
6	15 minutes	Presentation	Interactions and Precautions of Vitamins and Minerals
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning Tasks (5 minutes)**

**READ or ASK** students to read the learning objectives and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Vitamins and Minerals (20 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- What are the vitamins and minerals listed in national essential medicine list
- What are the indications of Vitamins and Minerals?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY and SUMMARIZE** by using the content below

- Vitamins are organic compounds and a vital nutrients that organisms require in limited amounts
- Vitamins and minerals listed in national essential medicine list include: vitamin A, vitamin B complex, vitamin C, vitamin D, vitamin E, vitamin K, calcium and selenium
- Indications of Vitamins and Minerals:
  - Vitamin A, is used for prevention and treatment of ocular defects known as xerophthalmia it is also used as a supplement where diet is known to be inadequate.
  - Vitamin B complex, is composed of nicotinamide, thiamine and riboflavin. It is used in management of vitamin B complex deficiencies, isoniazid induced neuropathy and penicillin induced neuropathy
  - Vitamin C is used in prevention and treatment of scurvy
  - Vitamin D, the term Vitamin D is used for a range of compounds which possess the property of preventing or treating rickets
  - Vitamin E is indicated for some neuromuscular abnormalities
  - Vitamin K is used for prevention and treatment of vitamin K deficiency bleeding
  - Calcium gluconate used in the management of hyperphosphataemia
  - Selenium is used in management of selenium deficiency

## **STEP 3: Contraindications of Vitamins and Minerals (20 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the Contraindications of Vitamins and Minerals?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Contraindication of vitamin and mineral
  - Vitamin A, is not contra indicated to any specific group of individual
  - Vitamin B complex, is not contra indicated to any specific group of individual but should be given with caution because it may cause anaphylactic shock when given by injection
  - Vitamin C is not contra indicated to any specific group of individual
  - Vitamin D is contraindicated to people with hypercalcaemia, metastatic calcification
  - Vitamin E is not contra indicated to any specific group of individual neonate weighing less than 1.5 kg
  - Vitamin K neonates, infants and women in their late pregnancy.
  - Calcium is contraindicated to people with all conditions associated with hypercalcaemia and hypercalcuria
  - Selenium is not contra indicated to any specific group of individual

## **STEP 4: Dose, Dosage and Course of Vitamins and Minerals (30minutes)**

- Vitamin A, in prevention of vitamin deficiency, child 1 month–5 years, 5 drops daily (5 drops contain vitamin A approx. 700 units, vitamin D approx. 300 units, ascorbic acid approx. 20 mg) until the condition subside
- Vitamin B complex, is usually formulated as a tablet contains combination of nicotinamide 15 mg, riboflavin 1 mg, thiamine hydrochloride 1 mg. The dose is usually 1–2 tablets daily
- Vitamin C is given prophylactically at the dose 25–75 mg daily; therapeutic, not less than 250 mg daily in divided doses
- Vitamin D, is given as oral supplement of only 10 micrograms (400 units) of Ergocalciferol, calciferol, vitamin D2 or colecalciferol daily
- Vitamin E it is given as a supplement at the dose of 3 to 5mg daily until the condition subsides

- Vitamin K 10–40 mg daily, adjusted as necessary; child 1–12 years, 5–10 mg daily, adjusted as necessary, 12–18 years, 10–20 mg daily, adjusted as necessary
- Calcium is presented as given orange flavored tablet of calcium carbonate at the dose of 2.5 g daily until the condition is corrected
- Selenium is given by mouth or by intramuscular injection or by intravenous injection, 100–500 micrograms daily until the condition is corrected

## **STEP 5: Side Effects and Adverse Effects of Vitamins and Minerals**

**(20 Minute)**

***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the side effects and adverse effects of Vitamins and Minerals
- ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Vitamin A, side effects occurs when vitamin is given in excess rough skin, dry hair, an enlarged liver, and a raised erythrocyte sedimentation rate
- Vitamin B complex, the common side effects is sensory neuropathy when given at high doses given for extended periods
- Vitamin C no side effects have been reported.
- Vitamin D, Symptoms of overdosage include anorexia
  - Lassitude, nausea and vomiting, diarrhea, constipation, weight loss, polyuria, sweating, headache, thirst, vertigo, and raised concentrations of calcium and phosphate in plasma and urine
- Vitamin E High doses can also cause nausea, diarrhea, stomach cramps, fatigue, weakness, headache, blurred vision, rash, and bruising and bleeding.
- Vitamin K, no side effects have been reported
- Calcium the most common side effects is hypercalcaemia
- Selenium excessive intake of selenium lead to the following signs and symptoms of selenosis include a garlic odor on the breath, gastrointestinal disorders, hair loss, sloughing of nails, fatigue, irritability, and neurological damage. Extreme cases of selenosis can result in cirrhosis of the liver, pulmonary edema, and death

## **STEP 6: Interaction and Precaution of Vitamins and Minerals (20minutes)**

- Vitamin A, absorption of vitamin A is reduced by antibacterial Neomycin
- Vitamin B complex, reduces the effects of levodopa
- Vitamin C reduces absorption of selenium
- Vitamin D, increase the risk of hypercalcemia when given with thiazide diuretics
- Vitamin E Taking large amounts of vitamin E along with cyclosporine increases the amount of cyclosporine absorbed by the body therefore increasing the effects of cyclosporine. There is also an increased bleeding tendency when is given with antiviral tipranavir.
- Vitamin K antagonizes the effects of coumarin
- Calcium reduces absorption of ciprofloxacin
- Selenium absorption is reduced by vitamin C

## **STEP 7: Key points (5 minutes)**

- Vitamin A is used for prevention and treatment of xerophthalmia
- Vitamin D is used for treatment of rickets
- Vitamin B complex is a combination of nicotinamide, thiamine and riboflavin
- Vitamin D should not be given with thiazide diuretics

## **STEP 7: Evaluation (5 minutes)**

- What are the contraindications of vitamin D?
- What is the dose of vitamin B complex?
- What are the side effects of selenium?
- Which antibiotics interact with selenium?

## References

Ministry Of Health and Social Welfare. ( 2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.

Robert L. Talbert, Gary C. Yee, Gary R. Matzke, Barbara G. Wells &, L. Michael. (2014). *Pharmacotherapy: a pathophysiologic approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.

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The Royal Pharmaceutical Society of Great Britain. (2007). *Martindale, the Extra acopoeia* (5<sup>TH</sup> ed). London, pharmaceutical press.

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# Session 45: Description of Sera and Immunoglobulin

**Total Session Time:** 120 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of Sera and Immunoglobulin
- List Contraindication of Sera and Immunoglobulin
- Describe dose, dosage and course of Sera and Immunoglobulin
- List side effects and adverse effects of Sera and Immunoglobulin
- Describe interaction and precaution of Sera and Immunoglobulin

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Computer and projector
- **Handout 32.1:** Management of rabies for exposed individuals

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning Tasks
2	20 minutes	Presentation/ Buzzing	Indications of Sera and Immunoglobulin
3	10 minutes	Presentation/ brainstorming	Contraindication of Sera and Immunoglobulin
4	40 minutes	Presentation	Dose, Dosage and Course of Sera and Immunoglobulin
5	20 minutes	Presentation/ brainstorming	Side Effects and Adverse Effects of Sera and Immunoglobulin
6	05minutes	Presentation	Interaction and Precaution of Sera and Immunoglobulin
7	10 minutes	Presentation	Key Points
8	10 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning Tasks (5 minutes)**

**READ or ASK** students to read the learning tasks and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Sera and Immunoglobulin (20 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following questions for 2 minutes

- What are Sera and Immunoglobulins?
- What are the indication of sera and immunoglobulins?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY and SUMMARIZE** by using the content below

#### **Definition**

- Antisera
  - Refers to purified and concentrated preparations of serum of horses actively immunized against a specific antigen
  - Example are Tetanus antitoxin (ATS), Gas gangrene antitoxin (AGS), Diphtheria antitoxin (ADS), Antirabies serum (ARS) and Antisnake venom polyvalent
- Immunoglobulins (IGs)
  - Refers to a separated human gamma globulins which carry the antibodies
  - They are more efficacious than the corresponding antisera
  - Example are normal human gamma globulin, Anti-D immunoglobulin, Tetanus immunoglobulin, Rabies immunoglobulin and Hepatitis-B immunoglobulin

#### **Indications**

- Gamma - Globulins Injection
  - Indications for its use are viral hepatitis A and B (prophylaxis), measles, mumps, poliomyelitis and chickenpox (prophylaxis and modification of course of illness), and has some beneficial action in burns
    - It is especially valuable in agammaglobulinemia, premature infants and in patients of leukemia or those undergoing immunosuppression

- Anti-D(Rho) Immunoglobulin Injection
  - Prevention of Rho(D) sensitisation to rhesus negative woman
- Anti-rabies Immunoglobulin Injection
  - Post-exposure prophylaxis against rabies infection
- Activated Prothrombin
  - Treatment of bleeding episodes
- Factor VII
  - Treatment of bleeding episodes
- Snake venom polyvalent Antiserum injection
  - Snake bite/Poisoning
- Tetanus Immunoglobulin
  - Post-exposure prophylaxis and treatment of tetanus infection
    - Indicated for prophylaxis in non-immunized persons receiving a contaminated wound who are at high risk of developing tetanus

### **STEP 3: Contraindications of Sera and Immunoglobulin (10 minutes)**

***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the contraindications of sera and immunoglobulin?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

- The immunoglobulins
  - Patients with a history of allergic reactions after administration of human immunoglobulin preparations
  - Individuals with isolated immunoglobulin A (IgA) deficiency (individuals could have an anaphylactic reaction to subsequent administration of blood products that contain IgA)
- The antisera
  - Patients with hypersensitivity to horse serum or any other component of the serum

## **STEP 4: Dose, Dosage and Course of Sera and Immunoglobulin**

### **(40 minutes)**

- Gamma - Globulins Injection
  - Available as Gamma - Globulins Injection I.V 500mg, 2.5g and 5g
  - Hereditary haemolytic anaemia
    - Immunoglobulin IgG 400mg/kg (IV) daily for 5 days
  - Idiopathic thrombocytopenic Purpura (ITP) for the emergence of acute bleeding caused by severe thrombocytopenia
    - IV immunoglobulin may be given as a single dose infusion of 0.4-1.0g/kg followed immediately platelets transfusion Splenectomy
- Anti-D(Rho) Immunoglobulin Injection
  - Available as Anti-D(Rho) Immunoglobulin Injection 0.25 mg/ml in set of 5ml
  - Dose by deep intramuscular injection, to rhesus-negative woman for prevention of Rho(D) sensitisation;
    - Following birth of rhesus-positive infant: 500 units immediately or within 72 hours
    - For transplacental bleed of over 4mL fetal red cells: Extra 100–125units per mL fetal red cells
    - Following any potentially sensitising episode (e.g. stillbirth, abortion, amniocentesis) up to 20 weeks' gestation . 250 units per episode (after 20 weeks, 500units) immediately or within 72 hours
    - Antenatal prophylaxis 500 units given at weeks 28 and 34 of pregnancy; if infant rhesus-positive, a further dose is still needed immediately or within 72 hours of delivery
    - Following Rho(D) incompatible blood transfusion 100–125 units per mL transfused rhesus-positive red cells
- Anti-rabies Immunoglobulin Injection
  - Available as Anti-rabies Immunoglobulin Injection 1000 IU/5ml ampoule
  - Passive immunization of rabies
    - Anti-rabies human immunoglobulin 20 IU/kg half the dose given parenterally and the other half injected into and around the wound
  - Active immunization of rabies
    - Rabies immunoglobulin with the first dose (day 0) Tetanus toxoid vaccine



Refer students to **Handout 31.1: Management of rabies for exposed individuals** for further reading

- Activated Prothrombin
  - Treatment of bleeding episodes
  - Activated Prothrombin Complex Concentrate (APCC) 50-100IU/kg every12-24hrs

- Factor VII
  - Available as Powder for reconstitution 2mg
  - Treatment of bleeding episodes
  - Recombinant factor VIIa 90 microgram per kg every 2-3 hrs or by continuous infusion (at 20 $\mu$ g/kg/hr)
  
  
  
  
  
- Snake venom polyvalent Antiserum injection
  - Available as Snake venom polyvalent Antiserum injection
  - Dose: 20ml i.v. (1 ml/min injection) repeated at 1 to 6 hourly intervals till symptoms of envenomation disappear: up to 300 ml may be required in viper bites, while still larger amounts (up to 900 ml) have been used in cobra bites
- Tetanus Immunoglobulin and tetanus antitoxin (antitetanic serum, ATS)
  - Available as Tetanus Immunoglobulin (human) - ATS Injection 1,500 IU in vial; Tetanus Immunoglobulin Tetanus Immunoglobulin (human) - ATS Injection 10,000 I.U in vial; Tetanus Immunoglobulin Tetanus Immunoglobulin (human) - ATS Injection 100,000 I.U in vial and Tetanus Immunoglobulin Tetanus Immunoglobulin (human) - ATS Injection 500,000 I.U in vial
  - For prevention of further absorption of toxin from wound
    - Human tetanus immunoglobulin: Adults & children 100 – 300 IU/kg IM stat
  - Wound care
    - Tetanus prophylaxis
    - 0.5 mL Tetanus toxoid and 1 mL Tetanus immunoglobulin (Depending on the immunization protocol, see table 39.1)

Table 39.1: Protocol in Provision of Tetanus Prophylaxis

Patient Category	Non-tetanus Prone	Tetanus Prone
Immunized and booster within 5 years	Nil	Nil
Immunized and 5 to 10 years since booster	Nil	TT
Immunized and >10 years	TT	TT
Incomplete immunization or unknown	TT and TIG	TT and TIG

*TT = T. toxoid; TIG = Tetanus Immunoglobulin*

## **STEP 5: Side Effects and Adverse Effects of Sera and Immunoglobulin (20 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the side effects of sera and immunoglobulin?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY and SUMMARISE** by using the content below

- Antisera
  - Immediate type of allergic reactions (urticaria, angioedema, respiratory distress and anaphylaxis) can occur with any antiserum
  - Serum sickness with fever, rash, joint pain, lymphadenopathy appearing 7-12 days later is more frequent after large doses and repeated administration
  - Local pain, erythema and arthus type reaction without constitutional symptoms may also occur 7-70 days after i.m. injection
- Rabies immunoglobulin
  - Side-effects
    - Injection site swelling and pain; very rarely anaphylaxis; buccal ulceration, glossitis, chest tightness, dyspnoea, tremor, dizziness, arthralgia, and facial oedema
- Tetanus immunoglobulin
  - Side effects
    - Injection site swelling and pain; rarely anaphylaxis
- Anti-D(Rho) Immunoglobulin Injection
  - Side-effects
    - Nausea, vomiting, diarrhoea, abdominal pain; hypotension, hypertension, headache, fever, malaise, asthenia, drowsiness, dizziness, back pain, arthralgia, myalgia; pruritus, rash, sweating, injection site pain; rarely tachycardia, anaphylaxis, dyspnoea, hypotension, and urticarial
- Snake venom polyvalent Antiserum injection
  - Allergic reactions includes anaphylactic shock, to the serum are possible

## **STEP 6: Interaction and Precaution of Sera and Immunoglobulin** **(5 minutes)**

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- Precaution
  - The immune globulins and antisera are administered cautiously during pregnancy (Pregnancy Category C) and lactation and in children
- Interaction
  - Antibodies in the immune globulin preparations may interfere with the immune response to live virus vaccines

## **STEP 7: Key Points (10 minutes)**

- Antisera
  - Refers to purified and concentrated preparations of serum of horses actively immunized against a specific antigen
- Immunoglobulins (IGs)
  - Refers to a separated human gamma globulins which carry the antibodies
  - They are more efficacious than the corresponding antisera
- The immune globulins and antisera are administered cautiously during pregnancy (Pregnancy Category C) and lactation and in children
- The immune globulins and antisera may interfere with the immune response to live virus vaccines

## **STEP 8: Evaluation (10 minutes)**

- What are the indications of Sera and Immunoglobulin?
- What are the contraindication of Sera and Immunoglobulin?
- What is the dose, dosage and course of Sera and Immunoglobulin?
- What are the side effects and adverse effects of Sera and Immunoglobulin?
- What is the interaction and precaution of Sera and Immunoglobulin?

## References

- Ministry of Health and Social Welfare. 2013(2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.
- Robert, L. T., Albert, Gary C. Y, Gary R. Matzke, Barbara G. Wells, & L. Michael. (2014.) *Pharmacotherapy: A Pathophysiologic Approach* (9<sup>th</sup> ed.). New York, McGraw-Hill Education.
- Sally S.R., & Jeanne C.S. (2000). *Introductory Clinical Pharmacology* (6<sup>th</sup> ed) New York, Lippincott Williams and Wilkins.
- School of Pharmaceutical sciences. (2011). *Tanzania Pharmaceutical Handbook* (2<sup>nd</sup> ed.). Dar es Salaam, ARDHI University press.
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## **Handout 32.1: Management of rabies for exposed individuals**

Category	Management
CATEGORY I Touching or feeding animals, licks on the skin	No treatment
CATEGORY II Nibbling of uncovered skin, minor scratches or abrasions without bleeding, licks on broken skin	After washing the wound with running water and soap for 15 minutes, administer antirabies vaccines 0.2ml (ID) in divided doses of 0.1 ml on deltoid on one hand and another 0.1ml on the deltoid of the second hand on days 0, 3, 14 and 28 <b>OR</b> 1 ml (IM) on deltoid muscle for days 0, 3,7,14, and 28 Note: Children are given the same doses but vaccine is administered on the lateral part of the thigh.
CATEGORY III Single or multiple transdermal bites or scratches with bleeding, contamination of mucous membrane with saliva from licks; exposure to bat bites or scratches	After washing the wound with running water and soap for 15 minutes, administer Rabies Immunoglobulin (RIG) on day 0 40 IU/kg body weight for Equine (ERIG) 20 IU/kg body weight for Human (HRIG) Administer antirabies vaccines - 0.2ml (ID) in divided doses of 0.1 ml on deltoid on one hand and another 0.1ml on the deltoid of the second hand on days 0, 3, 14 and 28 <b>OR</b> 1 ml (IM) on deltoid muscle for days 0, 3,7,14, and 28 Note 1: Children are given the same doses but vaccine should be administered on the lateral part of the thigh. Note 2: The World Health Organization recommends ID route of vaccination administration because it is cost effective.

# Session 46: Description of Vaccines for Immunization

**Total Session Time:** 120 minutes

## Prerequisites

- None

## Learning Tasks

By the end of this session students are expected to be able to:

- List indications of Vaccines
- List Contraindications of Vaccines
- Describe dose, dosage and course of Vaccines
- List side effects and adverse effects of Vaccines
- Describe interactions and precautions of Vaccines

## Resources Needed:

- Flip charts, marker pens, and masking tape
- Black/white board and chalk/whiteboard markers
- Overhead projector (OHP) and computer

## SESSION OVERVIEW

Step	Time	Activity/ Method	Content
1	05 minutes	Presentation	Introduction, Learning tasks
2	20 minutes	Presentation Buzzing	Indications of Vaccines
3	10 minutes	Presentation Brainstorming	Contraindication of Vaccines
4	50 minutes	Presentation Small Group Discussion	Dose, Dosage and Course of Vaccines
5	15 minutes	Presentation Brainstorming	Side Effects and Adverse Effects of Vaccines
6	10 minutes	Presentation	Interaction and Precaution of Vaccines
7	05 minutes	Presentation	Key Points
8	05 minutes	Presentation	Evaluation

## SESSION CONTENTS

### **STEP 1: Presentation of Session Title and Learning tasks (5 minutes)**

**READ or ASK** students to read the learning objectives and clarify

**ASK** students if they have any questions before continuing.

### **STEP 2: Indications of Vaccines (20 minutes)**

#### ***Activity: Buzzing (5 minutes)***

**ASK** students to pair up and buzz on the following question for 2 minutes

- Mention vaccines listed in essential medicine list
- What are the indications of tetanus and , Measles Mumps and Rubella (MMR) vaccines?

**ALLOW** few pairs to respond and let other pairs to add on points not mentioned

**WRITE** their response on the flip chart/board

**CLARIFY and SUMMARIZE** by using the content below

- Vaccines in essential medicine list include BCG vaccine, DPT vaccine, Hepatitis vaccine, Measles Vaccine, Poliomyelitis Vaccine and Tetanus (toxoid) Vaccine
- Vaccines which are used for immunization include:
  - Bacillus Calmette Guerin (BCG vaccine) which has derived from *Mycobacterium bovis*
    - Immunization against tuberculosis
    - It is recommended to all neonates and infants, children and adults who are at high risk of tuberculosis
  - Diphtheria-Pertussis-Tetanus (DPT vaccine)
    - Used in suspected cases of diphtheria without waiting for bacteriological confirmation (*Corynebacterium diphtheriae* infections)
  - Diphtheria-Pertussis-Tetanus + Hepatitis vaccine injection (DPT vaccine)
    - Used in cases of diphtheria and hepatitis infection possibilities
  - Measles Vaccine
    - It has been replaced by a combined live measles, mumps and rubella vaccine (MMR vaccine)
    - Used in the control of outbreaks of measles and elimination of mumps and rubella.
  - Poliomyelitis Vaccine
    - Immunization against poliomyelitis
  - Tetanus (toxoid) Vaccine
    - Gives protection against tetanus especially in childhood.



## **STEP 3: Contraindications of Vaccines (10 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the contraindications of vaccines?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Vaccines are contra-indicated in those who have a confirmed anaphylactic reaction to a preceding dose of a vaccine containing the same antigens or vaccine component.
- They are also contraindicated temporarily to individuals who are:
  - Immunosuppressed
  - Pregnant unless there is significant high risk of exposure like yellow fever.

## **STEP 4: Dose, Dosage and Course of Vaccines (50 minutes)**

### ***Activity: Small Group Discussion ( 30 minutes)***

**DIVIDE** students into small manageable groups

**ASK** students to discuss on the following question

- What are the dose, dosage and courses of vaccines?

**ALLOW** students to discuss for 15 minutes

**ALLOW** few groups to present and the rest to add points not mentioned

**CLARIFY** and **SUMMARIZE** by using the contents below

- BCG vaccine
  - Adults and children over 1 year are usually take 0.1ml while neonates and children under 1 year take 0.05ml
- Diphtheria-Pertussis-Tetanus (DPT vaccine)
  - Children between 2 months - 10 years should take 3 doses in one month interval
  - The booster dose should be given three years after the primary course
  - The second booster dose should be given ten years after the first booster dose
  - If someone contact diphtheria should receive a booster dose if he/she has been fully immunized with five doses
- MMR vaccine

- The first dose of MMR vaccine is given to children aged 13 months.
  - A second dose is given before starting school at 3–5 years
  - Adults and children over 9 months receives 2 doses of 0.5ml
- Poliomyelitis vaccine
  - A course of primary immunization consists of 3 doses of a combined preparation containing inactivated poliomyelitis vaccine, starting at 2 months of age with intervals of 1 month between.
  - A course of 3 doses should also be given to all unimmunized adults.
- Tetanus vaccine
  - Primary immunization for children less than 10 years consists of 3 doses of a combined preparation containing adsorbed tetanus with an interval of 1 month between doses
  - First booster dose should be at school entry and the second when leaving the primary school

## **STEP 5: Side Effects and Adverse Effects of Vaccines (15 minutes)**

### ***Activity: Brainstorming (5 minutes)***

**Ask** students to brainstorm on the following question:

- What are the side effects and adverse effects of vaccines?

**ALLOW** few students to respond

**WRITE** their responses on the flip chart/ board

**CLARIFY** and **SUMMARISE** by using the content below

- Injection of a vaccine may be followed by local reactions such as:
  - Pain
  - Inflammation
  - Redness
  - Lymphangitis
  - Sterile abscess development at the injection site
  - Gastro-intestinal disturbances especially oral vaccines
  - Fever
  - Headache
  - Irritability
  - Loss of appetite
  - Fatigue
  - Myalgia
  - Malaise

## **STEP 6: Interactions and Precautions of Vaccines (10 minutes)**

- Vaccination may be postponed if the individual is suffering from an acute illness
- However, it is not necessary to postpone immunization in patients with minor illnesses without fever or systemic upset

## **STEP 7: Key points (5 minutes)**

- Immunization is very important especially in childhood
- The dose of vaccine depends on the age of the individuals
- Vaccines are contraindicated to immunosuppressed and pregnant individuals
- There is a need to postpone the vaccine if an individual is suffered from acute illness

## **STEP 8: Evaluation (5 minutes)**

- What is the indication of MMR vaccine?
- What is the dosage interval of tetanus vaccine?
- What are the effects of vaccines?

## References

- Ministry of Health and Social Welfare. (2013). *Standard Treatment Guidelines & National Essential Medicines List Tanzania Mainland* (4<sup>th</sup> ed.). Dar es salaam, Tanzania government printers.
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