PHARMACOLOGY

TEACHER'S GUIDE SENIOR 6
ASSOCIATE NURSING PROGRAM

First Edition

Foreword

Dear Teacher,

The Rwanda Basic Education Board is pleased to present this Teacher's Guide for the Associate Nursing Program. This guide is designed to support competence-based teaching and ensure consistency in delivering the Fundamentals of Nursing subject.The Rwandan educational philosophy aims to help student-associate nurses achieve their full potential, preparing them to address community health needs and pursue career opportunities.

To enhance education quality, the government of Rwanda emphasizes the alignment of teaching materials with the syllabus. Effective teaching relies on the relevance of content, pedagogical approaches, assessment strategies, and instructional materials. The guide focuses on activities that promote learning, allowing students to develop ideas and make discoveries.

In a competence-based curriculum, learning involves actively building knowledge and skills through activities, scenarios, and real-life applications. Your role as a teacher includes:

- Planning lessons and preparing teaching materials.
- Organizing group discussions and collaborative learning.
- Engaging students through active learning methods such as inquiry, research, and group work.
- Supporting and facilitating the learning process by valuing student contributions and guiding them towards integrating their findings.

This guide is divided into three parts:

1. Explains the book's structure and provides methodological guidance.
2. Offers sample lesson plans for reference.
3. Provides detailed teaching guidance for each concept in the student book.

Although the guide includes answers to student book activities, please review each question and activity before assessing student responses.

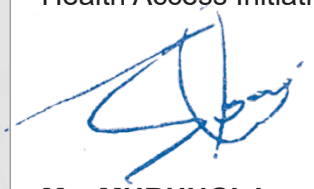
I extend my gratitude to everyone involved in developing this guide, including the Ministry of Health, University of Rwanda, and other institutions. Special thanks go to faculty members, nurses, midwives, teachers, illustrators, designers, Health Workforce development staff/MoH, and REB staff for their dedicated work.

Dr. MBARUSHIMANA Nelson

Director General, REB

Acknowledgements

I would like to express my deep gratitude to everyone who contributed to the development of this teacher's guide. The project would not have succeeded without the support of numerous stakeholders. I extend special thanks to the Ministry of Health for leading the development process. My appreciation also goes to the Health Workforce development staff/MoH, REB staff, University of Rwanda, College of Medicine and Health Sciences, Staff from Health Private training institutions, Teaching hospitals, Level Two Teaching hospitals, district hospitals, National Council of Nurses and Midwives (NCNM), Rwanda Nurses and Midwives Union (RNMU) and Secondary schools having Associate Nursing program. Additional thanks are due to the Ministry of Health, the Ministry of Education, and the Clinton Health Access Initiative (CHAI) for their financial support.



Ms. MURUNGI Joan

Head of Curriculum, Teaching, and Learning Resources Department / REB

Table of Contents

PART I. GENERAL INTRODUCTION

Rwanda is striving to build a knowledge-based economy, with particular emphasis on science and technology as engine for socio-economic development. One of the national priorities in the education system is to ensure that the quality of education continues to improve through closer integration of curriculum development, quality assurance and assessment, improved supply of learning materials, particularly text books, and improved teaching and learning strategies.

The Nation has reviewed its curricula and teaching methods in order to equip the critical mass of young people and population as whole with knowledge, skills and attitudes to be highly competitive in the region and global market. Therefore, since 2015 a competence-based curriculum has been put in place to drive the nation to the economic development it desires as it was stipulated in vision 2020.

This pharmacology Teaching Guide was collaboratively developed and reviewed by educators from public and private schools, colleges, and universities. Teaching Guide was studied and reviewed by education curriculum developers and pedagogy experts, and was improved with appropriate methodologies and strategies. Rwanda Education Board believes that teachers are the most important partners in improving education quality and key factor in determining learners' success. Incorporated in this Teaching Guide is a framework that will guide them in creating lessons and assessment tools, support them in facilitating activities and questions, and assist them towards deeper content areas and competencies to be achieved by the learners

Through, with this Teaching Guide, teachers will be able to facilitate an understanding of the value of the lessons for each learner to fully engage in the content on both the cognitive, psychomotor and affective levels of learning

Teachers should also aim for deep understanding of the subject matter where they lead learners to analyze and synthesize knowledge. When teachers empower learners to take ownership of their learning, they develop independence and self-direction, learning about both the subject matter and themselves.

This Teaching Guide is mapped and aligned to the National Curriculum, designed to be highly usable for teachers. It contains classroom activities and pedagogical notes, and is integrated with innovative pedagogies. All of these features are presented in the different parts of this guide which provides also a hands-on/ laboratory activity, connecting to a real-life problem and show step-by-step solutions to sample problems in each unit.

PART II : SIMPLE OF LESSON PLAN

Term	Date	Subject	Class	Unit N°	Lesson N°	Duration	Class size
1	To be specified	Pharmacology	S6	1	9 of 12	80mins	30 students

Type of Special Educational Needs and number of learners	The teacher will assess whether there are students with special considerations and take necessary measures.These may include mild hearing impairment and visual impairment among others.
Topic area	Pharmacology Applied pharmacology Medications for fever, pain and inflammation Provide appropriate medication for pain, fever, seizures, and inflammation Medication for inflammation In the Class No.005 By the end of the lesson, the learners of S6 should be able to correctly use anti-inflammatory Drugs.
Sub-topic area	
Unit Title	
Key unity Competence	
Title of the Lesson	
Plan for this class(location: in / outside)	
Instructional Objectives	
Learning Materials	Pharmacology textbooks, case studies, a sample of anti-inflammatory drugs.
References	

Timing for each step	Description of teaching and learning activity		Competences and crosscutting issues to be addressed.
	The teacher will display the chart of inflammation. Students guided will observe, reflect and construct the ideas shown by charts.		
	Teacher's activities	**Learner's activities**	
1. Introduction 5 min	**Asking questions relating to anti inflammation drugs:** Explain the physiology of inflammation? Define the inflammation drugs What are medications used to manage the inflammation?	**Give answers.** Anti-inflammatory agents are drugs that block the effects of the inflammation The acts by blocking prostaglandin synthesis. Listen attentively how the teacher defines the key concepts.	**Competence:** Critical Thinking Communication
2.Development of the lesson: in 45 minutes			
2.1. Discovering activity	– Ask students to form five groups. – Provide anti-inflammation drugs and instructions to students.	– Form five groups and randomly share responsibility. – choose group representative – Taking list anti-inflammatory drugs needed for this activity	– Competences: – Team working – Critical thinking – Communication – Collaboration – Problem solving

	Monitor how the students are progressing towards the knowledge, skills and attitudes to be learned and boost those who are still behind. Teacher moves around to help those who are having difficulties to understand the lesson topic on Mechanism, therapeutic action, adverse effects of anti-inflammation	From the available list – Students work in a participative manner on the assignment. – Both boys and girls – Participate actively.	**Crosscutting issues:** – Gender equality – Lifelong learning – Peace – Financial education – Interprofes-sional collabo-ration
2.2.Presentation of findings	– Invite representatives of groups to presents their views.	Representatives present group work – Other students follow the presentation attentively	– Communication – Critical thinking
1.3Exploitation of students' findings	– Ask the students to criticize the presentations one by one. – Ask students to identify correct, incomplete or false information.		

	– Review the ideas of students' products, correct those which are false, complete those which are incomplete, and confirm those which are correct	Provide the comments to the presentations – Capture the corrections of the teacher	– Communication – Critical thinking
3.Conclusion and assessment : 30 minutes	– The teacher ask students to Summarize the knowledge learned – teacher ask student to Give more clarifications on the content – Provide the harmonized content – Engage each student to work on self-assessment questions indicated in student's textbook.	– Listen the clarification given by the teacher – Take summary – Do the exercises required in student's textbook	– Listening skills – Writing skills – -synthetizing – Competences: – Creativity through summarizing the content – Lifelong learning through the student work on self-assessment – Problem solving while engaging listening the clarification given by the teacher – Critical thinking getting the harmonized content from the teacher
Teacher self-evaluation			

UNIT 1 ANTIFUNGAL DRUGS

1.1. Key Unit Competence

Manage different health conditions at the primary healthcare settings by utilizing antifungal drugs appropriately.

1.2 Prerequisite (knowledge, skills, attitudes and values)

Students should have been introduced to course of human biology, ways of drug administration, fungal multiplication and effects of fungi to the host, infectious fungal diseases, medical pathology, surgical pathology, principles of drug administration, and principles of pharmacokinetics as well as pharmacodynamics. This previously learnt courses will help the students to acquire knowledge and skills related to antifungals, and be able to manage patients with fungal conditions using antifungals.

The tutor needs to ensure that this content has been covered in order to be able to use antifungals appropriately, especially in the management of fungal infectious diseases treated with antifungals from different classes.

1.3. Cross-cutting issues to be addressed

a) Inclusive education

This unit involves the need to acquire knowledge and skills to apply the principles of pharmacology and administer drugs according to the standards and special considerations of patient's conditions. To administer the correct prescribed drugs and analysis of each patient's specific condition requires critical thinking, and proper use of the brain. Critical thinking may be challenging for students with mental disabilities, and this requires the teacher to assess the degree of mental disability to the concerned students. Analysis of the teacher will help to assess if the students may be grouped with others who may critically think.

During teaching, ensure that students with special needs are included throughout the course delivery. There may be for example students with visual impairment, hearing impairment or even physical disabilities. For the students with visual impairment, the teacher must ensure that they occupy the front seats in class, and they may be encouraged to report when they can't see well what is written or being presented. In case of class activities, these students may be grouped together with others who have healthy vision, and if there printed activities, ensure to use bigger font sizes. For students with hearing impairment, there is a need to for the teacher to speak loudly, help the students occupy the front seats. The written points help

students with visual impairment and speaking aloud helps students with hearing impairment Remember to repeat the main points of the lessons. Finally, for the students with physical disability, the teacher needs to help them occupy the seats that make them comfortable.

b) Gender

Emphasize to students that anybody irrespective of their gender can present and report during group activities. Give examples of famous people who are successful in real life irrespective of their gender differences. Make sure that during different class activities, both boys and girls share and participate equally in all activities. Bear in mind that they all have equal role in the smooth running of the class, and that the leaders of the class or group activities may be of either female or male gender.

c) Environment and sustainability

Students get basic knowledge from the natural sciences, so introduction to biodiversity is essential, and the students should be encouraged to maintain the biodiversity in order to keep the world safe. They also get skills and attitudes that will enable them in their everyday life to address the environment and climate change issues and to have a sustainable livelihood. Help the students to know maximum skills and attitudes on the environmental sustainability and to be responsible in caring for students' environment.

1.4 Guidance on the introductory activity 1.0

This introductory activity is intended to:

- Motivate the students to learn about different classes of antifungal agents
- Stimulate the students to search more information on the criteria to choose and use antifungal agents
- To rise the curiosity on the content to cover as it relates to pharmacokinetics and pharmacodynamics of antifungals.
- Build on previous knowledge, skills, values and attitudes to help the teacher to assess the students' prior knowledge and help to link with the new content that is related to antifungals.

The progress in the learning is gradual. At this point, there are no right or wrong answers as students will gradually get more appropriate answers progressively as they go through the unit.

Teacher's activities:

- The tutors are encouraged to promote learning in small groups of students and provide students with Unit 4 introductory activity, give clear instructions to the activity.

- Ask any three to four students to present their findings after reading, while others are following, the teacher will be providing the guidance as needed.
- During grouping or pairing, there is a need to ensure that students with different levels of knowledge and understanding are mixed.
- The teacher also has a responsibility to help students with different problems.

– **Possible answers for the Introductory Activity 1.0: Refer to the student's book**

1. Students may have different ideas. Some may say they saw similar patients while others may say they have not seen such kinds of patients. The essential information needed from the students is to recognize that patients have fungal infections that are more likely treated by antifungals.
2. The students do not have to necessarily provide the right answers. They may think of different drugs that they have seen being used. The intent of the teacher is to check if some students heard of, or saw these medical conditions and how they were managed (more likely with antifungals).
3. The students may provide the ideas if they saw the drugs in the past. If it is the case, they may be in a position to recognize some of these drugs, and they recognize that these are the similar drugs (antifungal agents) they saw.

Note: you may need to look at the views and ideas of the students in order to know how they will be facilitated in the unit, and throughout the entire course. They may even be asked to say what they think will be learnt in the unit.

Get all the answers from some students, and congratulate them for the ideas provided. You then help them to get oriented on the main content to cover in the unit.

1.5. List of lessons/sub-headings including assessments

No of lessons	Lesson title	Learning objectives (from the syllabus including knowledge, skills and attitudes)	Number of Periods
1	Definition and classification of antifungal drugs	Define the antifungalmedications Classify antifungalmedications	1
2	Systemic antifungals: azole and echinocandin antifungals	Compare and contrast the pharmacotherapyof superficial and systemic fungal infections. Explain the mechanism(s)of drug action, primary indications, contraindications, significant drug interactions, pregnancy category, and importantadverse effects of medications available at the primary healthcare settings according to the National Essential list of drugs Outline the nursing considerations for patientsreceiving a systemic or topical antifungal Choose specific antifungal medications to be used for localand systemic infections Respect the national treatment guidelines toadminister antifungal medication	2
3	Systemic antifungals: other antifungal agents	Compare and contrast the pharmacotherapyof superficial and systemic fungal infections. Explain the mechanism(s)of drug action, primary indications, contraindications, significant drug interactions, pregnancy category, and importantadverse effects of medications available at the primary healthcare settings according to the National Essential list of drugs Outline the nursing considerations for patientsreceiving a systemic or topical antifungal Choose specific antifungal medications to be used for localand systemic infections Respect the national treatment guidelines toadminister antifungal medication	2

4	Topical antifungal agents	Compare and contrast the pharmacotherapyof superficial and systemic fungal infections. Explain the mechanism(s) of drug action, primary indications, contraindications, significant drug interactions, pregnancy category, and important adverse effects of medications available at the primary healthcare settings according to the National Essential list of drugs Outline the nursing considerations for patientsreceiving a systemic or topical antifungal Choose specific antifungal medications to be used for localand systemic infections Respect the national treatment guidelines toadminister antifungal medication	2
5	**End Unit Assessment**		1

Lesson 1: Definition and classification of antifungal drugs

a) Learning objectives:

By the end of the session, the students should be able to explain correctly antifungal drugs, and classify them

b) Prerequisites/Revision/Introduction:

Read the Key unit competence in the syllabus to determine what students will learn and be able to do by the end of the unit. Look at the action verb, concept and context of each learning objective. This will help you see the skills, knowledge and attitudes embedded in the learning objective. Remember the learning objectives are linked to the key unit competence.

Use K-W-L (What students already know-What they want to know-What they have learnt) after the introductory activity to assess how much students already know and what they would be interested in learning about definition and classification of antifungal drugs. Remind the students that this session is linked to other subjects, and the components related to this session include ways of drug administration; fungal multiplication and effects of fungi to the host; factors influencing fungal infections; infectious fungal diseases; medical pathology; surgical pathology; principles of drug administration; and principles of pharmacokinetics as well as pharmacodynamics.

c) Teaching resources

Basic materials for a class/ lesson to be conducted include: Students' books, internet connectivity, case studies, projector, markers, chalks, different antifungal drug forms and any other trustworthy and reliable resources to enhance learning.

d) Possible methods:

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet are the key teaching methods to use.

e) Learning activities 1.1. Definition and classification of antifungal drugs

Teacher's activities:

- Ask students to form small groups of 6 students each and do the activity 1.1 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In making small groups, ensure that the gender considerations are taken into account, and none is excluded based on gender.
- Guide the students, including those who are weak, without giving them the answers immediately.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to follow carefully the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the students' ideas.
- Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Student's role:

- Work in small groups on the activity 1.1 as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.
- Attempt all the questions ensuring that participation of each member is obvious.

- Assist one another as they may have different levels of understanding.
- Selected members present the findings of the activity to the rest of students.
- Other students follow carefully the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks.

Answers for learning activity 1.1

a. Antifungal drug can simply be defined as a drug used to treat fungal infections.

An antifungal agent is a drug that selectively eliminates fungal pathogens from a host with minimal toxicity to the host.

b. Systemic antifungals, and topical antifungals

Answers for self-assessment 1.1

1. Classes of antifungal drugs are: azoles, polyene antifungals, allylamines, and echinocandin antifungals.
2. (B) **The composition of the fungal cell wall is highly rigid and protective.**

Lesson 2: Systemic antifungals: azole and echinocandin antifungals

a) Learning objectives

By the end of this session, the students should be able to:

- Describe adequately the systemic antifungals in the class of azoles and echinocandin antifungals

b) Prerequisites/Revision/Introduction

In order to understand well this lesson, the students must have been introduced to basic principles of infectious fungal diseases; medical pathology; surgical pathology; principles of drug administration; and principles of pharmacokinetics as well as pharmacodynamics.

Use K-W-L (What students already know-What they want to know-What they have learnt) to assess how much students already know and what they would be interested in learning about systemic antifungals. Remind the students that the current session needs to be linked to the first session on definition and classification of antifungals.

c) Teaching resources

Students' books, internet connectivity, books or magazines, projector, markers, chalks, and any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Think-pair-share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet are the main teaching methods that may be used.

Before the lesson, review the learning objective to determine what students will know and be able to do by the end of the lesson. This will help you to see the skills, knowledge, and attitudes embedded in the learning objective and prepare for your lesson appropriately. Remember the learning objectives link to the key unit competence. Ensure a conducive learning environment and lead a review of the previous lesson on definition and classification of antifungal drugs, handle any homework or assignments. Help students link the previous lesson to the current lesson using an appropriate discovery activity.

e) Learning activities 1.2.1: Systemic antifungals: azole and echinocandin antifungals

Teacher's activities:

- Ask students to do individually activity 1.2.1 in their student books.
- Provide the to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems.
- Guide the students, including those who are weak, without giving them the answers immediately.
- Invite randomly two students to present their findings to the rest of students.
- Ask other students to follow carefully the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the students' ideas.
- Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not still clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their books referring to students' book.
- Harmonize and conclude on the learned knowledge.

Student's role:

- Work individually on the activity 1.2.1 as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.
- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members present the findings of the activity to the rest of students.
- Other students follow carefully the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks.

Answers for learning activity 1.2.1 Systemic antifungals: azole and echinocandin antifungals

A. Examples of systemic antifungals:

- Azoles: The azoles include fluconazole, itraconazole, ketoconazole, posaconazole, and voriconazole.
- Echinocandin antifungals: anidulafungin, caspofungin, and micafungin.

B. Indications of azoles are: aspergillosis, leishmaniasis, cryptococcosis, blastomycosis, moniliasis, coccidioidomycosis, histoplasmosis, and mucormycosis, among others.

Answers for self-assessment 1.2.1

1. **FALSE** (The drugs used to treat systemic fungal infections can be toxic to the host and are not to be used indiscriminately).
2. **FALSE** (Ketoconazole is an azole antifungal)
3. **TRUE**

Lesson 3: Systemic antifungals: other antifungal agents

a) Learning objectives

By the end of this session, the students should be able to:

- Describe adequately the systemic antifungals that fall in different classes, other than azoles and echinocandin antifungals

b) Prerequisites/Revision/Introduction

In order to understand well this lesson, the students must have been introduced to basic principles of infectious fungal diseases; medical pathology; surgical pathology; principles of drug administration; and principles of pharmacokinetics as well as pharmacodynamics.

Use K-W-L (What students already know-What they want to know-What they have learnt) to assess how much students already know and what they would be interested in learning about systemic antifungals, other than azoles and echinocandin antifungals. Remind the students that the current session needs to be linked to the previous session of antifungals.

c) Teaching resources

Students' books, internet connectivity, books or magazines, projector, markers, chalks, and any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Think-pair-share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet are the main teaching methods that may be used.

Before the lesson, review the learning objective to determine what students will know and be able to do by the end of the lesson. This will help you to see the skills, knowledge, and attitudes embedded in the learning objective and prepare for your lesson appropriately. Remember the learning objectives link to the key unit competence. Ensure a conducive learning environment and lead a review of the previous lesson on definition and classification of antifungal drugs, handle any homework or assignments. Help students link the previous lesson to the current lesson using an appropriate discovery activity.

e) Learning activities 1.2.2: Systemic antifungals: other antifungal agents

Teacher's activities:

- Ask students to do in small groups activity 1.2.2 in their student books.
- Provide the to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems.
- Guide the students, including those who are weak, without giving them the answers immediately.
- Invite randomly two students to present their findings to the rest of students.
- Ask other students to follow carefully the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.

- Note on chalk board / Manila paper or flip chart the students' ideas.
- Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not still clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their books referring to students' book.
- Harmonize and conclude on the learned knowledge.

Student's role:

- Work in small groups on the activity 1.2.2 as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.
- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members present the findings of the activity to the rest of students.
- Other students follow carefully the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks.

Answers for learning activity 1.2.2

a. Indications for nystatin: the treatment of candidiasis (oral form); treatment of local candidiasis, vaginal candidiasis, and cutaneous and mucocutaneous infections caused by Candida species.

b. The usual dosage of nystatin is 500,000–1,000,000 units t.i.d. PO; continue for 48 h after resolution to prevent relapse; also used topically.

Answers for self-assessment 1.2.2

A) Other indications of amphotericin B are: aspergillosis, leishmaniasis, blastomycosis, moniliasis, coccidioidomycosis, histoplasmosis and mucormycosis; use is reserved for progressive, potential fatal infections due to many associated adverse effects.

B) Adverse effects of amphotericin B include: severe renal impairment, bone marrow suppression, GI irritation with nausea, vomiting, and potentially severe diarrhea, anorexia and weight loss, and pain at the injection site with the possibility of phlebitis or thrombophlebitis.

Lesson 4: Topical antifungals

a) Learning objectives

By the end of this session, the students should be able to:

- Explain correctly and confidently the topical antifungals

b) Prerequisites/Revision/Introduction

In order to understand well this lesson, the students must have been introduced to basic principles of infectious fungal diseases; medical pathology; surgical pathology; principles of drug administration; and principles of pharmacokinetics as well as pharmacodynamics.

Use K-W-L (What students already know-What they want to know-What they have learnt) to assess how much students already know and what they would be interested in learning about topical antifungals. Remind the students that the current session needs to be linked to the previous sessions on definition and classification of antifungals as well as systemic antifungals.

c) Teaching resources

Students' books, internet connectivity, books or magazines, projector, markers, chalks, and any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Think-pair-share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet are the main teaching methods that may be used.

Before the lesson, review the learning objective to determine what students will know and be able to do by the end of the lesson. This will help you to see the skills, knowledge, and attitudes embedded in the learning objective and prepare for your lesson appropriately. Remember the learning objectives link to the key unit competence. Ensure a conducive learning environment and lead a review of the previous lesson on definition and classification of antifungal drugs, handle any homework or assignments. Help students link the previous lesson to the current lesson using an appropriate discovery activity.

e) Learning activities 1.2.3: Topical antifungals

Teacher's activities:

- Ask students to do individually activity 1.2.3 in their student books.
- Provide the to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems.

- Guide the students, including those who are weak, without giving them the answers immediately.
- Invite randomly two students to present their findings to the rest of students.
- Ask other students to follow carefully the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the students' ideas.
- Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not still clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their books referring to students' book.
- Harmonize and conclude on the learned knowledge.

Student's role:

- Work individually on the activity 1.2.3 as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.
- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members present the findings of the activity to the rest of students.
- Other students follow carefully the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks.

Answers for learning activity 1.2.3

a. Examples of azole-type antifungals: butoconazole, clotrimazole, econazole, ketoconazole, miconazole, oxiconazole, sertaconazole nitrate, sulconazole, terconazole, and tioconazole.

b. Nursing considerations to takre into account while prescribing topical antifungals:

- Assess for known allergy to any topical antifungal agent to prevent hypersensitivity reactions.
- Perform a physical assessment to establish baseline data for evaluation of the effectiveness of the drug and the occurrence of any adverse effects associated with drug therapy.

- Perform culture and sensitivity testing of the affected area to determine the causative fungus and appropriate medication.
- Inspect the area of application for color, temperature, and evidence of lesions to establish a baseline to monitor the effectiveness of the drug and to monitor for local adverse effects of the drug.

Answers for self-assessment 1.2.3

After going through the session of topical antifungals, answer the following questions:

1. Adverse effects of topical antifungals used as suppositories include
   - nausea,
   - vomiting, and
   - hepatic dysfunction (related to absorption of some of the drug by the GI tract) or urinary frequency,
   - burning, and
   - change in sexual activity (related to local absorption in the vagina).
2. Give the indications of topical clotrimazole are:.
   - treatment of oral and vaginal Candida infections;
   - tinea infections.

1.6 Summary of the unit

A fungus is one of the infectious agents, and it is a cellular organism with a hard cell wall that contains chitin and polysaccharides and a cell membrane that contains ergosterols.

Infections caused by fungi are mycoses (mycosis in singular form), and they usually occur in many circumstances.

With the rise of immunocompromising infections such AIDS, many systemic fungal infections are increasing as well, and they usually require special measures in the use of systemic antifungals during their treatment.

There are different types of antifungal agents according to their mechanism of action or chemical structure, and according to where they exert their effects.

Systemic antifungals work by altering the cell permeability, leading to leakage of cellular components. This ends up in prevention of cell replication and ultimately, cell death.

Because systemic antifungals can be very toxic compared to topical antifungals, and therefore, patients on systemic antifungals should be monitored closely while receiving them. Adverse effects may include hepatic and renal failure.

There is a wide range of local fungal infections such as vaginal and oral yeast infections (Candida) and a variety of tinea infections, including athlete's foot and jock itch.

Topical antifungals are agents that are too toxic to be used systemically but are effective in the treatment of local fungal infections.

Proper administration of topical antifungals improves their effectiveness. They should not be used near open wounds or lesions.

Topical antifungals can cause serious local irritation, burning, and pain. The drug should be stopped if these conditions occur.

1.7 Additional information for Teachers

The associate nurse ought to know the following key components that relate to antifungal drug therapy:

- Culture the affected area before beginning therapy to identify the causative fungus.
- Ensure that the patient takes the complete course of the drug regimen to achieve maximal results.
- Instruct the patient in the correct method of administration, depending on the route, to improve effectiveness and decrease the risk of adverse effects:
  - Troches should be dissolved slowly in the mouth.
  - Vaginal suppositories, creams, and tablets should be inserted high into the vagina with the patient remaining recumbent for at least 10 to 15 minutes after insertion.
  - Topical creams and lotions should be gently rubbed into the affected area after it has been cleansed with soap and water and patted dry. Occlusive bandages should be avoided.
- Advise the patient to stop the drug if a severe rash occurs, especially if it is accompanied by blisters or if local irritation and pain are very severe. This development may indicate a sensitivity to the drug or worsening of the condition being treated.
- Provide patient instruction to enhance patient knowledge about drug therapy and to promote compliance.

- Provide the following patient teaching:
  - The correct method of drug administration; demonstrate proper application.
  - The length of time necessary to treat the infection adequately.
  - Use of clean, dry socks when treating athlete's foot, to help eradicate the infection.
  - The need to keep the infected area clean, washing with mild soap and water and patting dry; keep area dry.
  - The need to avoid scratching the infected area; use of cool compresses to decrease itching can be advised.
  - The need to avoid occlusive dressings because of the risk of increasing systemic absorption.
  - The importance of not placing drugs near open wounds or active lesions because these agents are not intended to be absorbed systemically.
  - The need to report severe local irritation, burning, or worsening of the infection to a health care provider.

Answers for end unit assessment

1. The nurse will give 5 mL per dose
2. (D) Fungal infection of toenails or fingernails. Actually, terbinafine is used in the treatment of tinea infections
3. The adverse effects of topical antifungal agents: When these drugs are applied locally as a cream, lotion, or spray, local effects include irritation, burning, rash, and swelling. When they are taken as a suppository or troche, adverse effects include nausea, vomiting, and hepatic dysfunction (related to absorption of some of the drug by the GI tract) or urinary frequency, burning, and change in sexual activity (related to local absorption in the vagina).
4. FALSE. (Terbinafine cream is applied twice daily. It is used in the short-term (1–4 wk) treatment of topical mycosis; treatment of tinea infections).
5. FALSE. (Antifungal drugs in topical forms are used to treat a variety of mycoses of the skin and mucous membranes).

1.8. Additional activities

1.8.1. Remedial Activities

1. Because of their cellular makeup, bacteria are sensitive to the majority of antifungal drugs. **TRUE or FALSE**
2. Give 3 examples of polyene antifungal drugs include amphotericin, nystatin, and pimaricin.
3. The azoles are a group of antifungals used to treat systemic fungal infections only. **TRUE or FALSE**
4. Topical antifungal should not preferably be used on open lesion. **TRUE or FALSE**
5. Which of the following antifungals may be classified in allylamines?
   A. Terbinafine
   B. Amphotericin B
   C. Fluconazole
   D. Ketoconazole

Answers for remedial activities

1. **FALSE.** (Because of their cellular makeup, bacteria are resistant) to antifungal drugs.
2. Three examples of polyene antifungal drugs are: amphotericin, nystatin, and pimaricin.
3. **FALSE.** (The azoles are a large group of antifungals used to treat systemic and topical infections).
4. **TRUE**
5. (A) Terbinafine

1.8.2. Consolidation activities

1. While using systemic antifungals, it is important to get a culture of the fungus causing the infection to ensure that the right drug is being used. **TRUE or FALSE**
2. Ketoconazole is not the drug of choice for patients with endocrine or fertility problems. **TRUE or FALSE**
3. Itraconazole is the drug of choice to use patients with hepatic failure. **TRUE or FALSE**

Answers for consolidation activities

1. TRUE
2. TRUE
3. FALSE. (Itraconazole has been associated with hepatic failure, should not be used in patients with hepatic failure).

1.8.3 Extended activities

1. What is the mechanism of action of polyene antifungal drugs?
2. The studies have shown that all azoles are safe for use in pregnant women and lactating mothers. TRUE or FALSE
3. Which drugs may interact with itraconazole and cause serious cardiovascular effects if associated with it?
4. What is the usual dosage of anidulafungin?
5. What are the common uses of flucytosine?

Answers for extended activities

1. Polyene antifungal drugs interact with sterols in the cell membrane (ergosterol in fungi, cholesterol in humans) to form channels through which small molecules leak from the inside of the fungal cell to the outside.
2. FALSE. (Many of the azoles are associated with liver toxicity and can cause severe effects on a fetus or a nursing baby).
3. Itraconazole has a black box warning regarding the potential for serious cardiovascular effects if it is given with lovastatin, simvastatin, triazolam, midazolam, pimozide, or dofetilide.
4. The usual dosage of anidulafungin is 100–200 mg IV on day 1, then 50–100 mg/d IV for 14 d; with the dose varying with infection being treated.
5. The uses of flucytosine are limited to the treatment of systemic infections caused by Candida or Cryptococcus

UNIT 2 DRUGS ACTING ON GASTROINTESTESTINAL TRACT

2.1 Key unit competence

A t the end of this unit, the student will be able to provide appropriate medications for common gastrointestinal medical conditions management

2.2 Prerequisites

To succeed well this unit, and complete it confidently, the students need to have been introduced to basic pharmacological concepts. They should have been introduced to the key principles of pharmacology including drug names, the meaning of pharmacology, factors influencing drug prescription, drug dosage forms, and ways of drug administration. Pharmacokinetics and pharmacodynamics are the core prerequisites, and students need to have basic information on common gastrointestinal disorders. The students also need to have been introduced to human biology, and basic chemical reactions.

You then assess how much students already know and what they would be interested in learning about drugs acting on the gastrointestinal tract.

2.3. Cross cutting issues to be addressed

a) Inclusive education

This unit involves the need to use drugs appropriately, and expect the potential results of these drugs on the client. This requires critical thinking for the students in order to administer drugs bearing in mind they need to exert effects while causing no or less harm to the patient.

During teaching, ensure that students with special needs are included throughout the course delivery. There may be for example students with visual impairment, hearing impairment or even physical disabilities. For the students with visual impairment, the teacher must ensure that they occupy the front seats in class, and they may be encouraged to report when they can't see well what is written or being presented. In case of class activities, these students may be grouped together with others who have healthy vision, and if there are printed activities, ensure to use bigger font sizes. For students with hearing impairment, these students must be included in the learning process. In this context, there is a need to for the teacher to speak loudly, help the students occupy the front seats.

The written points help students with visual impairment and speaking aloud helps students with hearing impairment. Remember to repeat the main points of the lessons.

It is the responsibility of the teacher and teaching team to ensure that all students with a diversity of disabilities are included in the learning process, and special considerations will be considered for each category of students with special needs.

b) Gender

Emphasize to students that anybody irrespective of their gender can present and report during group activities. Give examples of famous people who are successful in real life irrespective of their gender differences. Make sure that during different class activities, both boys and girls share and participate equally in all activities. Bear in mind that they all have equal role in the smooth running of the class, and that the leaders of the class or group activities may be of either female or male gender.

c) Environment and sustainability

Students get basic knowledge from the natural sciences, so introduction to biodiversity is essential, and the students should be encouraged to maintain the biodiversity in order to keep the world safe. They also get skills and attitudes that will enable them in their everyday life to address the environment and climate change issues and to have a sustainable livelihood. Help the students to know maximum skills and attitudes on the environmental sustainability and to be responsible in caring for students' environment.

2.4.Guidance on introductory activity 2.0

This introductory activity intends to:

- Motivate the students to learn about key aspects related to medications to manage gastrointestinal conditions.
- Stimulate the students to search more information pertaining to use of medications acting on the gastrointestinal tract.
- To rise the curiosity on the content to cover as it relates to medications acting on the gastrointestinal tract.
- Build on previous knowledge, skills, values and attitudes to help the teacher to assess the student's prior knowledge and help to link with the new content to cover.

Students learn progressively. Therefore, at this stage, there are no right or wrong answers as students will gradually get more appropriate answers as they go through the unit. You may even ask the students to guess what will be covered in the unit getting introduced.

Teacher's activities:

- The teachers are encouraged to promote learning in small groups of students and provide students with Unit 2 introductory activity, give clear instructions to the activity.
- Ask a determined number of students to present their findings after reading, while others are following, and the teacher will be providing the guidance as needed.
- During grouping or pairing, to ensure that students with different levels of knowledge and understanding are mixed.
- The teacher also has a responsibility to help students with different problems.

Possible answers for the Introductory Activity 2.0: refer to the student's book

Image A shows different medications acting on gastrointestinal tract.

Image B shows medication which relief of the symptoms of nausea and vomiting.

Image C shows home-made oral rehydration salt.

Image D shows oral rehydration salt pack

2.5 List of lessons/sub-headings including assessments

SN	Lesson title	Learning objectives (from the syllabus including knowledge, skills and attitudes)	Number of Periods
1	Definition and classification of drugs acting on gastrointestinal tract	Define key terms related to drugs acting on the gastrointestinal tract	2
		Choose the appropriate drugs to treat common gastrointestinal conditions	
		Identify the classification of drugs used to treat gastro enteral medical conditions	
2	Introduction to drugs for gastritis and peptic ulcer disease	Describe the mechanism of action of drugs for gastritis and peptic ulcer disease	2
3	Proton pump inhibitors and H2-receptor antagonists	Describe the mechanism of action of drugs for gastritis and peptic ulcer disease (proton pump inhibitors and H2 receptor antagonists)	2
		Effectively manage gastritis and peptic ulcer disease	

		Provide appropriate health education about proper use of proton pump inhibitors and H2 receptor antagonists to manage gastritis and peptic ulcer disease	
4	Antacid drugs	Describe the mechanism of action of drugs for gastritis and peptic ulcer disease (antacids)	2
		Effectively manage gastritis and peptic ulcer disease	
		Provide appropriate health education about proper use of antacids to manage gastritis and peptic ulcer disease	
5	Other drugs used to manage gastritis and peptic ulcer disease (Miscellaneous drugs and antibiotics)	Describe the mechanism of action of drugs for gastritis and peptic ulcer disease (Miscellaneous drugs and antibiotics)	2
		Provide appropriate health education about proper use of Miscellaneous drugs and antibiotics to manage gastritis and peptic ulcer disease	
		Effectively manage gastritis and peptic ulcer disease using miscellaneous drugs and antibiotics	
6	Antiemetic drugs	Describe the mechanism of action of anti-emetic drugs	2
		Appreciate the importance of timely management of vomiting	
7	Laxative drugs	Describe the mechanism of action of laxative drugs	2
		Effectively manage constipation, gastritis, nausea and vomiting	
		Choose the appropriate drugs to treat common gastrointestinal conditions	
8	Oral Rehydration Salts (ORS) and homemade rehydration solution	Discuss oral rehydration salts to manage fluids and electrolytes imbalances	2
		Describe the elements of oral rehydration salts	
		Prepare homemade solution to manage diarrhea	

9	Anti-spasmodic drugs	Explain abdominal spasm	2
		Recognize the appropriate medications for abdominal spasm	
		Identify drugs used to manage abdominal spasms	
		Monitor the therapeutic and side effects of antispasmodic medications	
10	End unit assessment		2

Lesson 1: Definition and classification of drugs acting on gastrointestinal tract

a) Learning objectives

By the end of the session, the students should be able to classify confidently the drugs acting on gastrointestinal tract.

b) Prerequisites/Revision/Introduction

To understand well this lesson, and complete it successfully, the students need to have been introduced to basic pharmacological concepts, specially pharmacokinetics and pharmacodynamics. They should have been introduced to the key principles of pharmacology including drug names, the meaning of pharmacology, factors influencing drug prescription, drug dosage forms, and ways of drug administration. The students also need to have been introduced to human biology, and basic chemical reactions.

You then assess how much students already know and what they would be interested in learning about the definition and classification of drugs acting on gastrointestinal tract.

c) Teaching resources

They include: Students' books, internet connectivity, printed copies of case studies, projector, markers, chalks, any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet.

e) Learning activity 2.1: Definition and classification of drugs acting on gastrointestinal tract

Teachers' activities:

- Ask students to do individually the activity 2.1 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.

- Move around in silence to monitor if they are having some problems. In case of small groups, ensure that the gender considerations are taken into account, and none is excluded based on gender.
- Remember to assist those who are weak but without giving them the responses.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to follow carefully the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the student's ideas.
- Tick the correct findings and correct the ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Answers for learning activity 2.1

1. The categories of drugs acting on the gastrointestinal tract are:
   - Drugs for gastritis and peptic ulcer diseases
   - Antiemetic drugs
   - Oral rehydration salts (ORS)
   - Antispasmodic drugs
   - Laxative drugs
2. Definition of an antiemetic drug: Antiemetic drugs are the medications used for management of nausea and vomiting.
3. Main reasons to use drugs acting on the gastrointestinal tract: Some gastrointestinal drugs increase peristalsis, suppress it, or reduce its undesirable by-products. Other GI drugs decrease the flow of saliva, control vomiting and diarrhea, loosen stool, cause vomiting, protect the GI tract, decrease acid production, or re-establish GI normal flora.

Answers for self-assessment 2.1

1. (A): Antispasmodics
2. (D): Antiemetics and Antispasmodics
3. Laxatives are used to stimulate or facilitate evacuation of the bowels, for example in a case of constipation. Therefore, one should check well whether there is a clear indication for this patient.

Lesson 2: Introduction to drugs for gastritis and peptic ulcer disease

a) Learning objectives

By the end of the session, the students should be able to describe adequately the mechanism of action of drugs for gastritis and peptic ulcer disease.

b) Prerequisites/Revision/Introduction

To understand well this lesson, and complete it successfully, the students need to have been introduced to basic pharmacological concepts, specially pharmacokinetics and pharmacodynamics. They should have been introduced to the key principles of pharmacology including drug names, the meaning of pharmacology, factors influencing drug prescription, drug dosage forms, and ways of drug administration. The students also need to have been introduced to human biology, and basic chemical reactions. Finally, ensure that the students understood the previous session on definition and classification of drugs acting on gastrointestinal tract disorders.

You then assess how much students already know and what they would be interested in learning about the introduction to drugs for gastritis and peptic ulcer disease.

c) Teaching resources

They include: Students' books, internet connectivity, printed copies of case studies, projector, markers, chalks, any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet.

e) Learning activity 2.2: Introduction to drugs for gastritis and peptic ulcer disease

Teachers' activities:

- Ask students to do in small groups the activity 2.2 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In case of small groups, ensure that the gender considerations are taken into account, and none is excluded based on gender.
- Remember to assist those who are weak but without giving them the responses.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to follow carefully the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the student's ideas.
- Tick the correct findings and correct the ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Answers for learning activity 2.2

1. Risk factors for peptic ulcer diseases: close family history of PUD, blood group (persons with blood group O were found at higher risk), smoking tobacco because it leads to an increase of gastric acid secretion, consuming the beverages and food that contain caffeine and or other irritant like spices. Consuming some drugs expose to peptic ulcer diseases. Those drugs are corticosteroids, nonsteroidal anti-inflammatory drugs ibuprofen for example that causes direct cellular damage to GI mucosal cells and a reduced secretion of protective mucus and bicarbonate ion, platelet inhibitors such as aspirin also increase risk to PUD. In addition to that, excessive psychological stress, as well as infection with Helicobacter pylori is the risk factors to peptic ulcer diseases.
2. Classes of antiulcer drugs with a short description of mechanism of action for each:

- Proton pump inhibitors: They bind to the enzyme H+, K+ -ATPase and prevent acid from being secreted.

- H2-receptor antagonists: They occupy the histamine receptors and prevent acid secretion.
- Antacids: They chemically combine with acids to lower stomach Ph.
- Miscellaneous drugs.
- Antibiotics: They eradicate the H. pylori, the primary cause of peptic ulcers.

Answers for self-assessment 2.2

1. (C) NSAIDs such as diclofenac
2. (B) Antibiotic medications
3. FALSE (H. pylori is eradicated by the use of antibiotics).

Lesson 3: Proton pump inhibitors and H2-receptor antagonists

a) Learning objectives

By the end of the session, the students should be able to describe confidently the mechanism of action of proton pump inhibitors and H2 receptor antagonists, and prescribe them as required.

b) Prerequisites/Revision/Introduction

To understand well this lesson, and complete it successfully, the students need to have been introduced to basic pharmacological concepts, specially pharmacokinetics and pharmacodynamics. They should have been introduced to the key principles of pharmacology including drug names, the meaning of pharmacology, factors influencing drug prescription, drug dosage forms, and ways of drug administration. The students also need to have been introduced to human biology, and basic chemical reactions. Finally, ensure that the students understood the previous session on introduction to drugs for gastritis and peptic ulcer disease.

You then assess how much students already know and what they would be interested in learning about the proton pump inhibitors and H2-receptor antagonists.

c) Teaching resources

They include: Students' books, internet connectivity, printed copies of case studies, projector, markers, chalks, any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet.

e) Learning activity 2.3: Proton pump inhibitors and H2-receptor antagonists

Teachers' activities

- Ask students to do in pairs the activity 2.3 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In case of small groups, ensure that the gender considerations are taken into account, and none is excluded based on gender.
- Remember to assist those who are weak but without giving them the responses.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to follow carefully the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the student's ideas.
- Tick the correct findings and correct the ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Answers for learning activity 2.3

1. Cimetidine belongs to the class of H2-receptor antagonists
2. Omeprazole belongs to the class of proton pump inhibitors
3. The indications of cimetidine are: treatment and prevention of recurrence of duodenal ulcer, the treatment of active and benign gastric ulcer. It is also used to manage gastroesophageal reflux disease, to treat pathological hypersecretory conditions, such as Zollinger-Ellison syndrome and to prevent stress-related upper GI bleeding during hospitalization
4. The side effects of omeprazole are: headache, nausea, diarrhea, rash, and abdominal pain. Although rare, blood disorders may occur, causing unusual fatigue and weakness. Therapy is generally limited to 2 months. Atrophic gastritis and hypomagnesaemia have been reported rarely with prolonged treatment with PPIs.

Answers for self-assessment 2.3

1. TRUE
2. FALSE
3. (B) Four to eight weeks
4. Side effects of cimetidine if taken at high doses: Patients who are taking high doses, or those with renal or hepatic disease, may experience confusion, restlessness, hallucinations, or depression.

Lesson 4: Antacid drugs

a) Learning objectives

By the end of the session, the students should be able to describe appropriately the mechanism of action of antacid drugs, and prescribe them as required.

b) Prerequisites/Revision/Introduction:

To understand well this lesson, and complete it successfully, the students need to have been introduced to basic pharmacological concepts, specially pharmacokinetics and pharmacodynamics. They should have been introduced to the key principles of pharmacology including drug names, the meaning of pharmacology, factors influencing drug prescription, drug dosage forms, and ways of drug administration. The students also need to have been introduced to human biology, and basic chemical reactions. Finally, ensure that the students understood the previous session on proton pump inhibitors and H2-receptor antagonists.

You then assess how much students already know and what they would be interested in learning about the antacid drugs.

c) Teaching resources:

They include: Students' books, internet connectivity, printed copies of case studies, projector, markers, chalks, any other trustworthy and reliable resources to enhance learning.

d) Possible methods:

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet.

e) Learning activity 2.4. Antacid drugs

Teachers' activities

- Ask students to do individually the activity 2.4 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.

- Move around in silence to monitor if they are having some problems. In case of small groups, ensure that the gender considerations are taken into account, and none is excluded based on gender.
- Remember to assist those who are weak but without giving them the responses.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to follow carefully the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the student's ideas.
- Tick the correct findings and correct the ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Answers for learning activity 2.4

1. The rationale for this interval in taking other drugs with antacid is because the absorption of other drugs could be affected.
2. TRUE
3. TRUE

Answers for self-assessment 2.4

1. FALSE
2. (D)
3. (A) To neutralize stomach acid by raising the pH of the stomach contents

Lesson 5: Other drugs used to manage gastritis and peptic ulcer disease (Miscellaneous drugs and antibiotics):

a) Learning objectives

By the end of the session, the students should be able to describe confidently the mechanism of action of miscellaneous drugs and antibiotics in PUD and gastritis management, and prescribe them as required.

b) Prerequisites/Revision/Introduction

To understand well this lesson, and complete it successfully, the students need to have been introduced to basic pharmacological concepts, specially pharmacokinetics and pharmacodynamics. They should have been introduced to the key principles of pharmacology including drug names, the meaning of pharmacology, factors influencing drug prescription, drug dosage forms, and ways of drug administration. The students also need to have been introduced to human biology, and basic chemical reactions. Finally, ensure that the students understood the previous session on antacid drugs.

You then assess how much students already know and what they would be interested in learning about other drugs used to manage gastritis and peptic ulcer disease (Miscellaneous drugs and antibiotics).

c) Teaching resources

They include: Students' books, internet connectivity, printed copies of case studies, projector, markers, chalks, any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet.

e) Learning activity 2.5: Other drugs used to manage gastritis and peptic ulcer disease (Miscellaneous drugs and antibiotics):

Teachers' activities

- Ask students to do in small groups the activity 2.5 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In case of small groups, ensure that the gender considerations are taken into account, and none is excluded based on gender.
- Remember to assist those who are weak but without giving them the responses.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to follow carefully the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the student's ideas.
- Tick the correct findings and correct the ones which are incorrect and try again to complete those which are incomplete.

- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Answers for learning activity 2.5

1. The mechanism of action of misoprostol in the treatment of peptic ulcer diseases: It inhibits gastric acid secretion, causes vasodilatation in the submucosa and stimulates the production of protective mucus.
2. Examples of antibiotic used in the management of peptic ulcer disease: Amoxicillin, clarithromycin, and metronidazole (which is also an antiprotozoal).
3. Bismuth exerts an antibacterial effect on H. pylori via various mechanisms such as inhibition of cell wall, protein, and ATP synthesis; inhibition of cell membrane function; and inhibition of H. pylori binding to host cell surface

Answers for self-assessment 2.5

1. (C)Amoxicillin
2. (A) Neurotoxicity
3. (B) Inhibits gastric acid secretion
4. Four drugs used in the quadritherapy for Helicobacter pylori eradication are: Clarithromycin, Metronidazole, Amoxicillin, Tinidazole, Misoprostol, Bismuth, Proton pump inhibitor, H2 receptor blocker. Four drugs are combined as required. Tetracycline may be used instead of amoxicillin for patients allergic to penicilins.

Lesson 6: Antiemetic drugs

a) Learning objectives

By the end of the session, the students should be able to describe confidently the mechanism of action of antiemetic drugs, and prescribe them as required.

b) Prerequisites/Revision/Introduction:

To understand well this lesson, and complete it successfully, the students need to have been introduced to basic pharmacological concepts, specially pharmacokinetics and pharmacodynamics. They should have been introduced to the key principles of pharmacology including drug names, the meaning of pharmacology, factors influencing drug prescription, drug dosage forms, and ways of drug administration. The students also need to have been introduced to human biology, and basic chemical reactions. Finally, ensure that the students understood

the previous session on miscellaneous drugs and antibiotics used in PUD (Peptic ulcer disease) and gastritis management.

You then assess how much students already know and what they would be interested in learning about antiemetic drugs.

c) Teaching resources

They include: Students' books, internet connectivity, printed copies of case studies, projector, markers, chalks, any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet.

e) Learning activity 2.6: Antiemetic drugs

Teachers' activities

- Ask students to do in pairs the activity 2.6 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In case of small groups, ensure that the gender considerations are taken into account, and none is excluded based on gender.
- Remember to assist those who are weak but without giving them the responses.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to follow carefully the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the student's ideas.
- Tick the correct findings and correct the ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Answers for learning activity 2.6

1. Definition of an antiemetic drug: Antiemetic drugs are the drugs for treating or preventing nausea and vomiting.
2. Two drugs that should be given to the patient to reduce or stop vomiting: They are many, and examples include Metoclopramide, Domperidone, Prochlorperazine, Chlorpromazine, Butyrophenones, Droperidol, Ondansetron and Promethazine among others.
3. Classes of antiemetic drugs: Dopamine antagonists, Serotonin Antagonists, Antihistamines

Answers for self-assessment 2.6

1. (A) Promethazine
2. (C)Ondansetron
3. Contraindications of chlorpromazine: Comatose states; hypersensitivity to chlorpromazine, phenothiazines, or their components

Lesson 7: Laxative drugs

a) Learning objectives

By the end of the session, the students should be able to describe confidently the mechanism of action of laxative drugs, and prescribe them as required.

b) Prerequisites/Revision/Introduction

To understand well this lesson, and complete it successfully, the students need to have been introduced to basic pharmacological concepts, specially pharmacokinetics and pharmacodynamics. They should have been introduced to the key principles of pharmacology including drug names, the meaning of pharmacology, factors influencing drug prescription, drug dosage forms, and ways of drug administration. The students also need to have been introduced to human biology, and basic chemical reactions. Finally, ensure that the students understood the previous session on antiemetic drugs.

You then assess how much students already know and what they would be interested in learning about laxative drugs.

c) Teaching resources

They include: Students' books, internet connectivity, printed copies of case studies, projector, markers, chalks, any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet.

e) Learning activity 2.7: Laxative drugs

Teachers' activities

- Ask students to do in pairs the activity 2.7 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In case of small groups, ensure that the gender considerations are taken into account, and none is excluded based on gender.
- Remember to assist those who are weak but without giving them the responses.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to follow carefully the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the student's ideas.
- Tick the correct findings and correct the ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Answers for learning activity 2.7

1. A broad class of medications that increase bowel movements such as in case of constipation is called laxatives.
2. Categories of drugs used to treat constipation (laxatives) with one example for reach category:
   - Chemical stimulants, example: Bisacodyl
   - Bulk stimulants, example: Magnesium sulfate
   - Lubricants, example: Glycerin

Answers for self-assessment 2.7

1. (B) Glycerin
2. (C)Mineral oil
3. (D) To treat mild to moderate diarrhea
4. Bulk stimulant laxatives increase the bulk by osmotic pull of fluid into the feces. That increase the increased bulk stretches the gastro-intestinal wall, leading to the stimulation and increased GI movement.
5. Mechanism of action of chemical stimulant laxatives: These medications stimulate the normal gastrointestinal reflexes by chemically irritating the lining of the gastrointestinal wall, leading to increasing of its activity.

Lesson 8: ORS and homemade rehydration solution

a) Learning objectives

By the end of the session, the students should be able to:

- Define ORS
- Identify when should ORS be used
- Discuss how the ORS drink is prepared

b) Prerequisites/Revision/Introduction

To understand well this lesson, and complete it successfully, the students need to have been introduced to basic pharmacological concepts, especially Fluid component, pharmacokinetics and pharmacodynamics. They should have been introduced to the key principles of pharmacology including drug names, the meaning of pharmacology, factors influencing drug prescription, drug dosage forms, and ways of drug administration. The students also need to have been introduced to human biology, and basic chemical reactions. Finally, ensure that the students understood the previous session on intravenous fluids and calculation of drop rate.

You then assess how much students already know and what they would be interested in learning about the Oral Rehydration Salts (ORS) and homemade rehydration.

Use K-W-L (What students already Know-What they want to Know-What they have learnt) after the introductory activity to assess how much students already know and what they would be interested in Intravenous fluids and calculation of drop rate.

c) Teaching resources

They included: Pharmacology books, S6 pharmacology book guide for students, internet connectivity, projector, markers, chalks, and any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet.

e) Learning activities 2.8. ORS and homemade rehydration

Teachers' activities

- Ask students to do in small groups the activity 2.8 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In case of small groups, ensure that the gender considerations are considered, and none is excluded based on gender.
- Remember to assist those who are weak but without giving them the knowledge.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to carefully follow the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the student's ideas.
- Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Student's role:

- Work in small groups on the activity 2.10 as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.
- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members to present the findings of the activity to the rest of students.
- Other students must follow carefully to the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks

Answers for learning activity 2.8

1. Composition of oral rehydration salts

The oral rehydration solution (ORS) is an oral powder that contains mixture of glucose sodium chloride, potassium chloride, and sodium citrate. It is dissolvable in water and after being dissolved in the requisite volume of water they are intended for the prevention and treatment of dehydration due to diarrhea.

It is always combined with zinc as recommended by the WHO and UNICEF to be used collectively to ensure the effective treatment of diarrhea.

2. Indications of oral rehydration salts

ORS is indicated for the treatment of fluid losses especially in case of diarrhea in infants, children and adults with mild to moderate dehydration.

3. The following are the components to use and their amount

Purified water: 1L+ Salt (2.5ml=1.2 teaspoon) + Sugar (30ml=6teaspoons)

Answers for Self-assessment 2.8

Respond by True or false

1. F
2. T
3. T
4. F

Chose the correct answer

1. B: Magnesium
2. A: 2,200–4,000 mL
3. D: B and C
4. C: Sugar, salt and water
5. B: Start IV fluids

Lesson 9: Antispasmodic Drugs

a) Learning objectives

By the end of the session, the students should be able to:

- Define antispasmodic drugs
- Identify the role of antispasmodic drugs
- Use confidently antispasmodic drugs

b) Prerequisites/Revision/Introduction

To understand well this lesson, and complete it successfully, the students need to have been introduced to basic pharmacological concepts, especially pharmacokinetics and pharmacodynamics. They should have been introduced to the key principles of pharmacology including drug names, the meaning of pharmacology, factors influencing drug prescription, drug dosage forms, and ways of drug administration. The students also need to have been introduced to human biology, and basic chemical reactions. Finally, ensure that the students understood the previous session Oral Rehydration salts and homemade rehydration solution.

You then assess how much students already know and what they would be interested in learning about antispasmodic drugs.

c) Teaching resources

They included: Pharmacology books, S6 pharmacology book guide for students, internet connectivity, projector, markers, chalks, and any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet.

e) Learning activities 2.9: Antispasmodic drugs

Teachers' activities

- Ask students to do in small groups, pairs activity 2.9 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In case of small groups, ensure that the gender considerations are considered, and none is excluded based on gender.
- Remember to assist those who are weak but without giving them the knowledge.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to carefully follow the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the student's ideas.
- Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.

- Harmonize and conclude on the learned knowledge.

Student's role:

- Work in small groups on the activity 2.9 as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.
- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members present the findings of the activity to the rest of students.
- Other students must follow
- carefully to the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks

Answers for learning activity 2.9

1. Antispasmodics are medications used to treat spasms of the gastrointestinal tract muscles, which can occur in different diseases.
2. Indications of antispasmodic drugs include the following conditions:

- Diverticular disease.
- Prevention of nausea, vomiting, and dizziness associated with motion sickness.
- Adjunctive therapy for treatment of GI ulcers
- Decrease secretions before anesthesia or intubation
- Maintenance treatment of bronchospasm associated with COPD.
- Treatment of irritable or hyperactive bowel in adults.

Self-assessment 2.9

1. (B) To block the parasympathetic system
2. True
3. (A) Atropine

2.6.Summary of the unit

Drugs acting on gastrointestinal tract may exert a diversity of effects according to the intent of their use. The drugs that have an impact on gastrointestinal tract disorders in one way or another fall in any of the following categories:

- Drugs for gastritis and peptic ulcer diseases
- Antiemetic drugs
- Laxative drugs
- Intravenous fluids
- Oral rehydration salts (ORS)
- Antispasmodic drugs

Drugs that are used for gastritis and peptic ulcer disease management generally fall in the classes of **proton pump inhibitors, H2 receptor antagonists, antacids,** and others such **antibiotics or miscellaneous drugs.** Their mechanism of action depends on the specific class of drugs.

Antiemetic drugs are used to treat or prevent nausea and vomiting. They act by inhibiting dopamine or serotonin receptors in the brain. The main classes of antiemetic drugs are **Dopamine antagonists, Serotonin Antagonists, and Antihistamines**.

Laxatives are a group of drugs that are used to promote the evacuation of the bowel, or defecation, and are widely used to prevent and treat constipation. The main classes of laxative drugs are **chemical stimulants, bulk stimulants and lubricants.**

Fluids are administered to refill total body water, restore blood volume and pressure and/or Shift water from one fluid compartment to another, restore and maintain electrolyte and acid–base balance.

According to their tonicity, the intravenous fluids are classified as isotonic, **hypertonic and hypotonic.** According to their viscosity, there are colloids and crystalloids. Nurses are in good position for the intravenous fluid administration and monitoring. Healthcare providers need to accurately calculate the drop rate and ensure that all necessary measures are taken to prevent fluid overload for patients.

The oral rehydration solution (ORS) is an oral powder that contains mixture of glucose, sodium chloride, potassium chloride, and sodium citrate. It is dissolvable in water and after being dissolved in the requisite volume of water they are intended for the prevention and treatment of dehydration due to diarrhea. People may prepare a homemade oral rehydration solution by mixing the salt and sugar in appropriate proportions.

Anti-spasmodic medications are used to treat spasms of the gastrointestinal tract muscles, which can occur in different medical conditions such as irritable bowel syndrome, biliary colic, and pancreatitis among others. The most common antispasmodics contain anticholinergic properties, which is helpful in relieving symptoms, such as abdominal pain. They are classified into two main types: smooth muscle relaxants such as alveline and mebeverine, and anticholinergics such as hyoscine.

2.7.Additional information for Teachers

Other laxatives

Apart from the three common classes of laxatives, there is another drug that does not fit into the categories usually used for laxatives that has been approved for the treatment of a specific form of constipation. **Methylnaltrexone (Relistor)** was approved in 2008 for the treatment of opioid-induced constipation in patients with advanced disease who are receiving palliative care and are no longer responsive to traditional laxatives. Opioids bind to various receptors in the body, including the mu-receptors, which leads to decreased GI motility and constipation. Patients on long-term opioid treatment frequently have a very difficult time with constipation.

Methylnaltrexone is a selective antagonist to opioid binding at the mu-receptor. It does not cross the blood–brain barrier and therefore acts specifically at peripheral opioid receptor sites, like the GI tract, but does not affect the analgesic effects of opioids in the central nervous system. This drug is given by daily subcutaneous injections. It reaches peak levels in 1/2 hour and is eliminated primarily unchanged in the urine. The half-life of the drug is about 8 hours. Patients may experience abdominal pain, flatulence, nausea, dizziness, and diarrhea. Severe or continued diarrhea should be reported. Use of this drug for beyond 4 months has not been studied.

Antidiarrheals

Antidiarrheals block stimulation of the GI tract for symptomatic relief from diarrhea. Available agents include bismuth subsalicylate (Pepto-Bismol), loperamide (Imodium), and opium derivatives (paregoric). Several antidiarrheal products are available in combination. There is also a drug approved strictly for use in treating traveler's diarrhea (Rifaximin [Xifaxan]).

Antidiarrheal agents slow the motility of the GI tract through direct action on the lining of the GI tract to inhibit local reflexes (bismuth subsalicylate), through direct action on the muscles of the GI tract to slow activity (loperamide), or through action on CNS centers that cause GI spasm and slowing (opium derivatives). These drugs are indicated for the relief of symptoms of acute and chronic diarrhea, reduction of volume of discharge from ileostomies, and prevention and treatment of traveler's

diarrhea. Bismuth subsalicylate has been found to be very helpful in treating traveler's diarrhea (and in preventing cramping and distention associated with dietary excess and some viral infections.

Answers for end unit assessment 2

1. (C) Skin color
2. (D) Antacids.
3. (A) The occupy the histamine receptors and prevent acid secretion
4. (B) Drowsiness
5. (C) Glycerin
6. (D) Gastrointestinal obstruction
7. (B) Obtain baseline weight and vital signs
8. Drop rate= 500Mlx20/180min=55 drops/min

2.8. Additional activities

2.8.1. Remedial Activities

1. By their mechanism of action, the isotonic intravenous fluids expand plasma volume True or False
2. By their mechanism of action, hypotonic solutions cause a decrease in plasma volume True or False
3. By their mechanism of action, hypertonic intravenous solutions lead to normal plasma volume True or False
4. Colloids IV fluids frequently cause allergies compared to crystalloids. True or False
5. It is optional to take history before intravenous fluid administration True or False
6. The following are examples of crystalloids isotonic IV fluids, EXCEPT

   A.Ringer lactate

   B.Normal saline

   C.Dextran

   D.Dextrose 5%

Answers for Remedial activities

1. F
2. T
3. F
4. T
5. F
6. (C) Dextran

2.8.2. Consolidation activities

1. One of the following is a colloid that is mostly indicated in treatment of shock
   a. Normal saline
   b. Albumin 5%
   c. Dextran
   d. Dextrose 5%
2. Which of the following statement is the nursing consideration after intravenous fluid administration?
   a. Complete history taking
   b. Obtain baseline weight and vital signs
   c. Double check the prescription
   d. Monitor for signs of fluid volume excess
3. Which of the following drugs has been approved to specifically treat traveler's diarrhea?
   a. Rifaximin
   b. Metoclopramide
   c. Promethazine
   d. Hyoscine
4. Which of the following drugs is an antidiarrheal?
   a. Metoclopramide
   b. Loperamide
   c. Omeprazole
   d. Cimetidine

Answers for Consolidation activities

1. (B) Albumin 5%
2. (D) Monitor for signs of fluid volume excess
3. (A) Rifaximin
4. (B) Loperamide

2.8.3. Extended activities

1. The extracellular fluid counts for 20% of total body weight. True or False
2. The intracellular fluid volume counts 40% of total body weight. True or False
3. ORS is appropriate for the treatment of severe dehydration. True or False
4. Which of the following drugs is an antiemetic?
   a. Ondansetron
   b. Loperamide
   c. Cimetidine
   d. D.Metronidazole
5. You receive an 80-year-old female with history of nausea and vomiting. When you take vital signs, you realize that this client has mild hypotension. The prescription for this patient is 1l of normal saline in 2hrs. Considering the available infusion set, the drop factor is 10drops/min. Calculate the drop rate.

Answers for Extended activities

1. True
2. True
3. False
4. (A) Ondansetron
5. Drop rate: 1000Mlx10/120=83 drops/min

UNIT 3 MEDICATIONS USED FOR NON-COMMUNICABLE DISEASES

3.1. Key unit competence

At the end of this unit, the learner will be able to provide appropriate medications for hypertension, diabetes mellitus and asthma

3.2. Prerequisites

To succeed well this unit, and complete it confidently, the students need to have been introduced to basic pharmacological concepts. They should have been introduced to the key principles of pharmacology including drug names, the meaning of pharmacology, factors influencing drug prescription, drug dosage forms, and ways of drug administration. Pharmacokinetics and pharmacodynamics are the core prerequisites, and students need to have basic information on hypertension, diabetes and asthma diseases learned in medical pathology. The students also need to have been introduced to human biology, and basic chemical reactions.

You then assess how much students already know and what they would be interested in learning about drugs used to manage non-communicable diseases.

3.3.Cross cutting issues to be addressed

a) Inclusive education

This unit involves the need to use drugs appropriately, and expect the potential results of these drugs on the client. This requires critical thinking for the students in order to administer drugs bearing in mind they need to exert effects while causing no or less harm to the patient.

During teaching, ensure that students with special needs are included throughout the course delivery. There may be for example students with visual impairment, hearing impairment or even physical disabilities. For the students with visual impairment, the teacher must ensure that they occupy the front seats in class, and they may be encouraged to report when they can't see well what is written or being presented. In case of class activities, these students may be grouped together with others who have healthy vision, and if there are printed activities, ensure to use bigger font sizes. For students with hearing impairment, these students must be included in the learning process. In this context, there is a need to for the teacher to speak loudly, help the students occupy the front seats.

The written points help students with visual impairment and speaking aloud helps students with hearing impairment. Remember to repeat the main points of the lessons.

It is the responsibility of the teacher and teaching team to ensure that all students with a diversity of disabilities are included in the learning process, and special considerations will be considered for each category of students with special needs.

b) Gender

Emphasize to students that anybody irrespective of their gender can present and report during group activities. Give examples of famous people who are successful in real life irrespective of their gender differences. Make sure that during different class activities, both boys and girls share and participate equally in all activities. Bear in mind that they all have equal role in the smooth running of the class, and that the leaders of the class or group activities may be of either female or male gender.

c) Environment and sustainability

Students get basic knowledge from the natural sciences, so introduction to biodiversity is essential, and the students should be encouraged to maintain the biodiversity in order to keep the world safe. They also get skills and attitudes that will enable them in their everyday life to address the environment and climate change issues and to have a sustainable livelihood. Help the students to know maximum skills and attitudes on the environmental sustainability and to be responsible in caring for students' environment.

3.4. Guidance on introductory activity 3.0

This introductory activity intends to:

- Motivate the students to learn about key aspects related to medications to manage noncommunicable diseases (NCDs).
- Stimulate the students to search more information pertaining to use of medications to manage NCDs.
- To raise the curiosity on the content to cover as it relates to medications to manage noncommunicable diseases.
- Build on previous knowledge, skills, values and attitudes to help the teacher to assess the student's prior knowledge and help to link with the new content to cover.

Students learn progressively. Therefore, at this stage, there are no right or wrong answers as students will gradually get more appropriate answers as they go through

the unit. You may even ask the students to guess what will be covered in the unit getting introduced.

Teacher's activities:

- The teachers are encouraged to promote learning in small groups of students and provide students with Unit 3 introductory activity, give clear instructions to the activity.
- Ask a determined number of students to present their findings after reading, while others are following, and the teacher will be providing the guidance as needed.
- During grouping or pairing, to ensure that students with different levels of knowledge and understanding are mixed.
- The teacher also has a responsibility to help students with different problems.

Possible answers for the Introductory Activity 3.0: refer to the student's book

There may be a diversity in answers from the respondents.

1) Students may have different ideas. Some may say they saw similar patients while others may say they have not seen such kinds of patients. The essential information needed from the students is to recognize which patients with high blood pressure with some drugs, which patient with blood glucose measurement and self-injection of a drug for treatment. Finally, the student may recognize the patients with respiratory problem like asthma and are taking the drugs by inhalation.
2) The students do not have to necessarily provide the right answers. They may think of different problems that they have seen. The intent of the teacher is to check if some students heard of, or saw these medical conditions and how they were managed (Hypertension, diabetes and asthma).
3) The students may provide the ideas if they saw the drugs in the past. If it is the case, they may be in a position to recognize some of these drugs, and they recognize that these are the similar drugs (antihypertensive, antidiabetic, and anti-asthmatic drugs) they saw.

Note: you may need to look at the views and ideas of the students in order to know how they will be facilitated in the unit, and throughout the entire course. They may even be asked to say what they think will be learnt in the unit.

Get all the answers from some students, and congratulate them for the ideas provided. You then help them to get oriented on the main content to cover in the unit.

3.5. List of lessons/sub-headings including assessments

No of lessons	Lesson title	Learning objectives (from the syllabus including knowledge, skills and attitudes)	Number of Periods
1	Introduction to antihypertensive drugs	Explain hypertension Classify antihypertensive medications	1
2	Diuretics	Classify diuretic drugs Describe general principles guiding the pharmacotherapy of hypertension using diuretics	2
3	Calcium channel blockers	Describe general principles guiding the pharmacotherapy of hypertension using calcium channel blockers	2
4	Angiotensine converting enzyme (ACE) and angiotensine receptor blockers(ARBs)	Describe general principles guiding the pharmacotherapy of hypertension using ACE and ARBs	2
5	Vasodilators and sympatholytic drugs	Classify vasodilators and sympatholytic drugs drugs Describe general principles guiding the pharmacotherapy of hypertension using vasodilators and sympatholytic drugs drugs	2
6	National treatment guidelines for hypertension	Utilize national treatment guidelines for NCDs in clinical management Respect the national treatment guidelines to manage patients at the primary healthcare settings Describe general principles guiding the pharmacotherapy of hypertension.	1

7	Oral antidiabetic medications	Discuss on Type, I and Type 2 Diabetes, the differences between the two types, and how to recognize diabetes mellitus based on signs and symptoms	2
		Identify the classical symptoms of diabetes	
		Describe Values for the diagnosis of categories of hyperglycemia, measured in mmol/l	
		Classify diabetes based on etiology	
		Classify oral antidiabetic medications	
8	Parenteral antidiabetic medications	Classify antidiabetic medications	2
9	Nursing considerations during diabetes mellitus drug therapy	Appreciate the medical prescription for non-communicable diseases	1
10	National treatment guidelines for Diabetes mellitus drugs	Utilize national treatment guidelines for NCDs in clinical management	2
11	Antiinflammatory drugs in astma management	Demonstrate understanding of importance of	2
		non-communicable diseases	
12	Bronchodilators in asthma management	Classify medications used to manage asthma	2
13	Nursing considerations during asthma drug therapy	Appreciate the medical prescription for non-communicable diseases	
14	National treatment guidelines of asthma management	Utilize national treatment guidelines for NCDs in clinical management	1
	End unit assessment		2

Lesson 1. Introduction to antihypertensive drugs

a) Learning objectives

By the end of the session, the students should be able to hypertension and classify antihypertensive drugs.

b) Prerequisites/Revision/Introduction:

Read the Key unit competence in the syllabus to determine what students will learn and be able to do by the end of the unit. Look at the action verb, concept and context of each learning objective. This will help you see the skills, knowledge and attitudes embedded in the learning objective. Remember the learning objectives are linked to the key unit competence.

Use K-W-L (What students already know-What they want to know-What they have learnt) after the introductory activity to assess how much students already know and what they would be interested in learning about hypertension and classification antihypertensive drugs. Remind the students that this session is linked to other subjects, and the components related to this session include ways of drug administration; cardiovascular system and blood circulation, renal system, sympathetic nervous system, endocrine system, respiratory system, factors influencing high blood pressure; medical pathology; surgical pathology; principles of drug administration; and principles of pharmacokinetics as well as pharmacodynamics.

c) Teaching resources

Basic materials for a class/ lesson to be conducted include: Students' books, internet connectivity, case studies, projector, markers, chalks, different drug forms and any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet are the key teaching methods to use.

e) Learning activity 3.1: Introduction to antihypertensive drugs

Teacher's activities:

- Ask students to form small groups of 6 students each and do the activity 3.1 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems.
- In making small groups, ensure that the gender considerations are taken into account, and none is excluded based on gender.

- Guide the students, including those who are weak, without giving them the answers immediately.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to follow carefully the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the students' ideas.
- Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Student's role:

- Work in small groups on the activity 3.1 as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.
- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members present the findings of the activity to the rest of students.
- Other students follow carefully the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks.

Answers for learning activity 3.1

a. Hypertension is a high blood pressure above normal ranges.
b. Mild, moderate and severe
c. Diuretics, calcium channel blockers, angiotensin converting enzyme inhibitors, angiotensin II receptor antagonists/blocakers, sympatholytics, peripheral vasodilators

Answers for self-assessment 3.1

1. Moderate Hypertension
2. A. Diuretics

Lesson 2. Diuretic drugs

a) Learning objectives

By the end of the session, the students should be able to classify diuretics and describe general principles guiding the pharmacotherapy of hypertension using diuretic drugs.

b) Prerequisites/Revision/Introduction

Read the Key unit competence in the syllabus to determine what students will learn and be able to do by the end of the unit. Look at the action verb, concept and context of each learning objective. This will help you see the skills, knowledge and attitudes embedded in the learning objective. Remember the learning objectives are linked to the key unit competence.

Use K-W-L (What students already know-What they want to know-What they have learnt) to assess how much students already know and what they would be interested in learning about diuretic drugs. Remind the students that this session is linked to other subjects, and the components related to this session include ways of drug administration; cardiovascular system and blood circulation, renal system, sympathetic nervous system, endocrine system, respiratory system, factors influencing high blood pressure; medical pathology; surgical pathology; principles of drug administration; and principles of pharmacokinetics as well as pharmacodynamics.

c) Teaching resources

Basic materials for a class/ lesson to be conducted include: Students' books, internet connectivity, case studies, projector, markers, chalks, and any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet are the key teaching methods to use.

e) Learning activities 3.2. Diuretics

Teacher's activities:

- Ask students to work in pairs and do the activity 3.2 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In making small groups, ensure that the gender considerations are taken into account, and none is excluded based on gender.

- Guide the students, including those who are weak, without giving them the answers immediately.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to follow carefully the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the students' ideas.
- Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Student's role:

- Work in pairs on the activity 3.2 as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.
- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members present the findings of the activity to the rest of students.
- Other students follow carefully the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks.

Answers for learning activity 3.2

1. Diuretics are drugs that increase sodium excretion and lower blood volume.
2. Thiazides: E.g: Hydrochlorothiazide7, Loop diuretics: E.g: Lasix, Potassium sparing diuretics: E.g: Spironolactone, Osmotic diuretics: E.g: Mannitol)

Answers for self assessment 3.2

1. TRUE
2. C. Aldactone
3. D. Erectile dysfunction
4. Dehydrated patients, Anuria and Hypersensitivity

Lesson 3: Calcium channel blockers drugs

a) Learning objectives

By the end of the session, the students should be able to describe confidently general principles guiding the pharmacotherapy of hypertension using calcium channel blockers drugs.

b) Prerequisites/Revision/Introduction

Read the Key unit competence in the syllabus to determine what students will learn and be able to do by the end of the unit. Look at the action verb, concept and context of each learning objective. This will help you see the skills, knowledge and attitudes embedded in the learning objective. Remember the learning objectives are linked to the key unit competence.

Use K-W-L (What students already know-What they want to know-What they have learnt) to assess how much students already know and what they would be interested in learning about calcium channel blockers drugs. Remind the students that this session is linked to other subjects, and the components related to this session include ways of drug administration; cardiovascular system and blood circulation, renal system, factors influencing high blood pressure; medical pathology; surgical pathology; principles of drug administration; and principles of pharmacokinetics as well as pharmacodynamics.

c) Teaching resources

Basic materials for a class/ lesson to be conducted include: Students' books, internet connectivity, case studies, projector, markers, chalks, different calcium channel blockers drug forms and any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet are the key teaching methods to use.

e) Learning activities 3.3. Calcium channel blockers drugs

Teacher's activities:

- Ask students to form small groups of 6 students each and do the activity 3.3 in their student books.

- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In making small groups, ensure that the gender considerations are taken into account, and none is excluded based on gender.
- Guide the students, including those who are weak, without giving them the answers immediately.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to follow carefully the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the students' ideas.
- Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Student's role:

- Work in small groups on the activity 3.3 as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.
- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members to present the findings of the activity to the rest of students.
- Other students follow carefully the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks.

Answers for learning activity 3.3

1. Calcium channel blockers
2. Other examples of calcium channel blockers: Amlodipine, verapamil, diltiazem
3. They block the entry of calcium into smooth muscle cells as well as myocytes. They produce arterial vasodilation and thereby reduce arterial blood pressure.

Answers for self-assessment 3.3

1. C. Adalat
2. Elements to monitor for a patient on verapamil:

- Monitor vital signs and auscultate lungs to evaluate changes in cardiac output.
- Monitor laboratory test results
- Monitor patient response to the drug
- Monitor for adverse effects
- Monitor the effectiveness of comfort measures and compliance with the regimen

3. Side effects of amlodipine are: Headache, swelling of hands, feet, ankles or lower legs, stomach upset, nausea, dizziness, drowsiness, excessive tiredness.

Lesson 4: Angiotensin converting enzyme inhibitors and angiotensin II receptor blockers

a) Learning objectives

By the end of the session, the students should be able to describe general principles guiding the pharmacotherapy of hypertension using angiotensin converting enzyme inhibitors and angiotensin II receptor blockers drugs.

b) Prerequisites/Revision/Introduction

Read the Key unit competence in the syllabus to determine what students will learn and be able to do by the end of the unit. Look at the action verb, concept and context of each learning objective. This will help you see the skills, knowledge and attitudes embedded in the learning objective. Remember the learning objectives are linked to the key unit competence.

Use K-W-L (What students already know-What they want to know-What they have learnt) to assess how much students already know and what they would be interested in learning about angiotensin converting enzyme inhibitors and angiotensin II receptor blockers drugs. Remind the students that this session is linked to other subjects, and the components related to this session include ways of drug administration; cardiovascular system and blood circulation, renal system, factors influencing high blood pressure; medical pathology; surgical pathology; principles of drug administration; and principles of pharmacokinetics as well as pharmacodynamics.

c) Teaching resources

Basic materials for a class/ lesson to be conducted include: Students' books, internet connectivity, case studies, projector, markers, chalks, different angiotensin converting enzyme inhibitors and angiotensin II receptor blockers drug forms and any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet are the key teaching methods to use.

e) Learning activities 3.4: Angiotensin converting enzyme inhibitors and angiotensin II receptor blockers drugs.

Teacher's activities:

- Ask students to form small groups of 6 students each and do the activity 3.4 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In making small groups, ensure that the gender considerations are taken into account, and none is excluded based on gender.
- Guide the students, including those who are weak, without giving them the answers immediately.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to follow carefully the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the students' ideas.
- Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Student's role:

- Work in small groups on the activity 3.4 as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.
- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members to present the findings of the activity to the rest of students.
- Other students must follow carefully the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks.

Answers for learning activity 3.4

a) Two categories of drugs that interfere with the activity of angiotensin"

- **Angiotensin enzyme inhibitors**
- **Angiotensin receptor blockers**

b) Examples for each category:

- **Angiotensin enzyme inhibitors: Captopril and Enalapril**
- **Angiotensin receptor blockers: Losartan, valsartan**

Answers for Self- assessment 3.4

1. A. Captopril
2. C. Cozaar
3. Contraindications of ARBs: Allergies, impaired kidney or liver functions, pregnancy and lactation
4. The side effects of ACE inhibitors are dizziness, angioedema, loss of taste, photosensitivity, severe hypotension, dry cough, hyperkalemia, blood dyscrasias, and renal impairment.

Lesson 5. Vasodilators and Sympathetic Nervous System Blockers

a) Learning objectives

By the end of the session, the students should be able to describe general principles guiding the pharmacotherapy of hypertension using vasodilators and sympathetic nervous system Blockers drugs.

b) Prerequisites/Revision/Introduction

Read the Key unit competence in the syllabus to determine what students will learn and be able to do by the end of the unit. Look at the action verb, concept and context of each learning objective. This will help you see the skills, knowledge and attitudes embedded in the learning objective. Remember the learning objectives are linked to the key unit competence.

Use K-W-L (What students already know-What they want to know-What they have learnt) after the introductory activity to assess how much students already know and what they would be interested in learning about vasodilators and sympathetic nervous system blockers drugs. Remind the students that this session is linked to other subjects, and the components related to this session include ways of drug administration; cardiovascular system and blood circulation, renal system, nervous system as well factors influencing high blood pressure; medical pathology; surgical pathology; principles of drug administration; and principles of pharmacokinetics as well as pharmacodynamics.

c) Teaching resources

Basic materials for a class/ lesson to be conducted include: Students' books, internet connectivity, case studies, projector, markers, chalks, different and any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet are the key teaching methods to use.

e) Learning activities 3.5: Using vasodilators and sympathetic nervous system Blockers drugs.

Teacher's activities:

- Ask students to work in pair and do the activity 3.5 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In making small groups, ensure that the gender considerations are taken into account, and none is excluded based on gender.
- Guide the students, including those who are weak, without giving them the answers immediately.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to follow carefully the presentations.

- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the students' ideas.
- Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Student's role:

- Work in pair the activity 3.5 as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.
- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members present the findings of the activity to the rest of students.
- Other students follow carefully the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks.

Answers for for learning activity 3.5

1. **Vasodilators** are used to relax or dilate vessels throughout the body. They block the movement of calcium into the smooth muscle of the blood vessels to cause relaxation of the smooth muscle, and dilation of the resistance vessels

   Examples Hydralazine and d nitroprusside

2. **Sympathetic nervous system blockers example**: Beta-blockers, alpha blockers, alpha and beta blockers and alpha adrenergic blockers

Answers for selfassessment 3.5

1. D
2. B

Lesson 6. Treatment guidelines of hypertension

a) Learning objectives

By the end of the session, the students should be able to manage a patient with hypertension according to the national guideline for hypertension management.

b) Prerequisites/Revision/Introduction

Read the Key unit competence in the syllabus to determine what students will learn and be able to do by the end of the unit. Look at the action verb, concept and context of each learning objective. This will help you see the skills, knowledge and attitudes embedded in the learning objective. Remember the learning objectives are linked to the key unit competence.

Use K-W-L (What students already know-What they want to know-What they have learnt) after the learning activity to assess how much students already know and what they would be interested in learning about national guideline for hypertension treatment. Remind the students that this session is linked to other subjects, and the components related to this session include ways of drug administration; cardiovascular system and blood circulation, renal system, sympathetic nervous system factors influencing high blood pressure; medical pathology; surgical pathology; principles of drug administration; and principles of pharmacokinetics as well as pharmacodynamics and antihypertensive drugs.

c) Teaching resources

Basic materials for a class/ lesson to be conducted include: Students' books, internet connectivity, case studies, projector, markers, chalks and any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet are the key teaching methods to use.

e) Learning activities 3.6. Treatment guidelines of hypertension

Teacher's activities

- Ask students to form small groups of 3 students each and do the activity 3.6 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In making small groups, ensure that the gender considerations are taken into account, and none is excluded based on gender.

- Guide the students, including those who are weak, without giving them the answers immediately.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to follow carefully the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the students' ideas.
- Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Student's role:

- Work in small groups on the activity 3.6 as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.
- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members to present the findings of the activity to the rest of students.
- Other students must follow carefully to the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks.

Answers for learning activity 3.6

1. ACE-Inhibitors are first line antihypertensive medications for a patient with hypertension and diabetes
2. HIV test, electrolytes, creatinine and a pregnancy test

Answers for self-assessment 3.6

1. I. (D) Administer hydralazine

   II. (C) Administer hydralazine IV if available
2. (A). Captopril

Lesson 7. Oral antidiabetic medications

a) Learning objectives

By the end of the session, the learners should be able:

- **To understand how to recognize and Classify diabetic based on etiology.**
- **Classify oral antidiabetic medications**

b) Prerequisites/Revision/Introduction

To understand well this lesson, and complete it successfully, the students need to have been introduced to basic pharmacological concepts, especially pharmacokinetics and pharmacodynamics. They should have been introduced to the key principles of pharmacology including drug names, the meaning of pharmacology, factors influencing drug prescription, drug dosage forms, and ways of drug administration. The students also need to have been introduced to human biology, and basic chemical reactions, medical pathology. Finally, ensure that the students understood the previous session, then assess how much students already know and what they would be interested in learning about oral antidiabetic medications.

c) Teaching resources

Basic materials for a class/lesson to be conducted: student's books, internet connectivity, books or magazines, projector, markers, flipchart, chalks, and any other trustworthy and reliable resources to enhance learning. Put a Face on the Disease: Possibly the best way to learn about diabetes is by inviting a person with the disease to talk to students. Ask them to describe what it is like to live with and to demonstrate how they manage it. Students may also be interested in learning about famous people in history, sports, and entertainment who have diabetes.

d) Possible methods

Think-pair-share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet.

Before the lesson, review the learning objective to determine what students will know and be able to do by the end of the lesson. This will help you to see the skills, knowledge, and attitudes embedded in the learning objective and prepare for your lesson appropriately. Remember the learning objectives link to the key unit competence.

Ensure a conducive learning environment and lead a review of the previous lesson on pharmacology history, handle any homework or assignments. Help students link the previous lesson to the current lesson using an appropriate discovery activity.

e) Learning activities: Oral antidiabetic drugs

Teacher's activities:

- Ask students to do individually activity 3.7 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In case of small groups, ensure that the gender considerations are considered, and none is excluded based on gender.
- Remember to assist those who are weak but without giving them the knowledge.
- Invite randomly four students to present their findings to the rest of students.
- Ask other students to carefully follow the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the student's ideas.
- Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not still clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their books referring to students' book.
- Harmonize and conclude on the learned knowledge.

Student's role:

- Work in pairs on the activity 3.7 as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.
- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members present the findings of the activity to the rest of students.
- Other students follow carefully the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks.

Answers for learning activity 3.7

1. Oral hypoglycemic agents are indicated for the treatment of uncomplicated type II diabetes in patients whose diabetes cannot be controlled by diet or exercise only.
2. Hypersensitivity, chronic heart failure, metabolic acidosis with or without coma, diabetic ketoacidosis (DKA), severe renal disease, abnormal creatinine clearance resulting from shock, septicemia, or myocardial infarction and lactation.

Answers for Self-assessment 3.7

1. C. Daonil
2. B. Nightmares
3. B. Glucophage

Lesson 8. Parenteral antidiabetic drugs

a) Learning objectives

By the end of the session, the students will be able to describe and administer parenteral antidiabetic medications to patients.

b) Prerequisites/Revision/Introduction

To understand well this lesson, and complete it successfully, the students need to have been introduced to basic pharmacological concepts, especially pharmacokinetics and pharmacodynamics. They should have been introduced to the key principles of pharmacology including drug names, the meaning of pharmacology, factors influencing drug prescription, drug dosage forms, and ways of drug administration. The students also need to have been introduced to human biology, and basic chemical reactions. Finally, ensure that the students understood the previous session on oral antidiabetic medications you then assess how much students already know and what they would be interested in learning about parenteral antidiabetic drugs.

c) Teaching resources

They include: Students' books, internet connectivity, printed copies of case studies, projector, markers, chalks, any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet.

e) Learning activity 3.8: Parenteral antidiabetic drugs

Teachers' activities:

- Ask students to do in pairs the activity 3.8 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In case of small groups, ensure that the gender considerations are taken into account, and none is excluded based on gender.
- Remember to assist those who are weak but without giving them the responses.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to follow carefully the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the student's ideas.
- Tick the correct findings and correct the ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Student's role:

- Work in pairs on the activity as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.
- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members to present the findings of the activity to the rest of students.
- Other students must follow carefully to the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks.

Answers for learning activity 3.8

1. An antidiabetic drug that is administered parentally is insulin
2. Insulin is indicated to control hyperglycemia in the diabetic patient, and for the emergency treatment of acute ketoacidosis.
3. The types of insulin are: Rapid acting insulin, short-acting, intermediate-acting, and long-acting and mixed.

Answers for self-assessment 3.8

1. (B)Patient with diabetes ketoacidosis
2. (C) Subcutaneous
3. (A) On the abdomen subcutaneously

Lesson 9. Nursing considerations during diabetes mellitus drug therapy

a) Learning objectives

By the end of the session, the students will be able to explain confidently the nursing considerations during diabetes mellitus drug therapy.

b) Prerequisites/Revision/Introduction

To understand well this lesson, and complete it successfully, the students need to have been introduced to basic pharmacological concepts, especially pharmacokinetics and pharmacodynamics. They should have been introduced to the key principles of pharmacology including drug names, the meaning of pharmacology, factors influencing drug prescription, drug dosage forms, and ways of drug administration. The students also need to have been introduced to human biology, and basic chemical reactions. Finally, ensure that the students understood the previous session on parenteral antidiabetic medications, you then assess how much students already know and what they would be interested in learning about nursing considerations during diabetes mellitus drug therapy

c) Teaching resources

They include: Students' books, internet connectivity, printed copies of case studies, projector, markers, chalks, any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet.

e) Learning activity 3.9. Parenteral antidiabetic drugs

Teachers' activities:

- Ask students to do individually the activity 3.9 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In case of small groups, ensure that the gender considerations are taken into account, and none is excluded based on gender.
- Remember to assist those who are weak but without giving them the responses.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to follow carefully the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the student's ideas.
- Tick the correct findings and correct the ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Student's role:

- Work individually 3.9 the activity as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.
- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members to present the findings of the activity to the rest of students.
- Other students must follow carefully to the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks.

Answers for learning activity 3.9

1. B. Monitor the patient's food intake and ensure that the patient eats when using insulin to ensure therapeutic effect and avoid hypoglycemia.
2. A. Self-inject insulin at home by the subcutaneous route only, and rotate injection sites regularly

Answers for Self-assessment 3.9

1. A. Assess for contraindications or cautions
2. C. Evaluate contraindications

Lesson 10. National treatment guideline for diabetes mellitus

a) Learning objectives

By the end of the session, the students will be able to manage diabetes using the national treatment guidelines.

b) Prerequisites/Revision/Introduction

To understand well this lesson, and complete it successfully, the students need to have been introduced to basic pharmacological concepts, especially pharmacokinetics and pharmacodynamics. They should have been introduced to the key principles of pharmacology including drug names, the meaning of pharmacology, factors influencing drug prescription, drug dosage forms, and ways of drug administration. The students also need to have been introduced to human biology, and basic chemical reactions. Finally, ensure that the students understood the previous session on nursing considerations during diabetes mellitus drug therapy, you then assess how much students already know and what they would be interested in learning about national treatment guideline for diabetes mellitus.

c) Teaching resources

They include: Students' books, internet connectivity, printed copies of case studies, projector, markers, chalks, any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet.

e) Learning activity 3.10. Treatment guidelines for diabetes mellitus

Teachers' activities

- Ask students to do individually the activity 3.10 in their student books.

- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In case of small groups, ensure that the gender considerations are taken into account, and none is excluded based on gender.
- Remember to assist those who are weak but without giving them the responses.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to follow carefully the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the student's ideas.
- Tick the correct findings and correct the ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Student's role:

- Work individually the activity 3.10 as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.
- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members present the findings of the activity to the rest of students.
- Other students follow carefully the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks.

Answers for learning activity 3.10

1 – Metformin + Basal (long acting) Insulin and prandial (short acting) with time if required.

– Educate about lifestyle measures, adherence to medication and dose optimization.

Answers for Self-assessment 3.10

1. A. Glibenclamide
2. B. Vildagliptin + Metformin

Lesson 11. Anti-inflammatory drugs in asthma management

a) Learning objectives

By the end of the session, the students will be able to manage asthma using anti-inflammatory drugs.

b) Prerequisites/Revision/Introduction

To understand well this lesson, and complete it successfully, the students need to have been introduced to basic pharmacological concepts, especially pharmacokinetics and pharmacodynamics. They should have been introduced to the key principles of pharmacology including drug names, the meaning of pharmacology, factors influencing drug prescription, drug dosage forms, and ways of drug administration. The students also need to have been introduced to human biology, and basic chemical reactions. Finally, ensure that the students understood the previous session on introduction to anti-asthmatic drugs, you then assess how much students already know and what they would be interested in learning about anti-inflammatory drugs in asthma management.

c) Teaching resources

They include: Students' books, internet connectivity, printed copies of case studies, projector, markers, chalks, any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet.

e) Learning activity 3.11. Anti-inflammatory drugs in asthma management

Teachers' activities:

- Ask students to do individually the activity 3.11 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In case of small groups, ensure that the gender considerations are taken into account, and none is excluded based on gender.
- Remember to assist those who are weak but without giving them the responses.
- Invite randomly some students to present their findings to the rest of students.

- Ask other students to follow carefully the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the student's ideas.
- Tick the correct findings and correct the ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Student's role:

- Work individually the activity 3.11 as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.
- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members present the findings of the activity to the rest of students.
- Other students follow carefully the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks.

Answers for learning activity 3.11

1. Anti-inflammatory agents and bronchodilators
2. Four types of inhalation devices use when administering anti-asthmatic drug by inhalation metered-dose inhalers, Respimats, dry-powder inhalers, and nebulizers.
3. 2 drugs found in class of anti-inflammatory drugs used to treat asthma are Beclomethasone, Cromolyn

Answers for Self-assessment 3.11

1. Three advantages of administering anti-asthmatic drugs by inhalation.

– Therapeutic effects are enhanced by delivering drugs directly to their site of action,

– Systemic effects are minimized, and

– Relief of acute attacks is rapid.

2. Anti-inflammatory drugs used in treatment of asthma are inhaled steroids, the leukotriene receptors, and a mast cell stabilizer

3. Nursing evaluation during the use of this anti-inflammatory drugs are

– Monitor patient response to the drug (improved breathing).

– Monitor for adverse effects (drowsiness, headache, abdominal pain, myalgia).

– Evaluate the effectiveness of the teaching plan (patient can name drug, dosage, adverse effects to watch for, specific measures to avoid them, and measures to take to increase the effectiveness of the drug).

– Monitor the effectiveness of other measures to ease breathing

Lesson 12. Bronchodilators

a) Learning objectives

By the end of the session, the students will be able to manage asthma using bronchodilators.

b) Prerequisites/Revision/Introduction

To understand well this lesson, and complete it successfully, the students need to have been introduced to basic pharmacological concepts, especially pharmacokinetics and pharmacodynamics. They should have been introduced to the key principles of pharmacology including drug names, the meaning of pharmacology, factors influencing drug prescription, drug dosage forms, and ways of drug administration. The students also need to have been introduced to human biology, and basic chemical reactions. Finally, ensure that the students understood the previous session on anti-inflammatory drugs

you then assess how much students already know and what they would be interested in learning about bronchodilators in asthma management

c) Teaching resources

They include: Students' books, internet connectivity, printed copies of case studies, projector, markers, chalks, any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet.

e) Learning activity 3.12: Bronchodilators

Teachers' activities:

- Ask students to do in small groups the activity 3.12 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In case of small groups, ensure that the gender considerations are taken into account, and none is excluded based on gender.
- Remember to assist those who are weak but without giving them the responses.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to follow carefully the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the student's ideas.
- Tick the correct findings and correct the ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Student's role:

- Work in small groups the activity 3.12 as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.
- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members present the findings of the activity to the rest of students.
- Other students follow carefully the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks.

Answers for learning activity 3.12

1. Bronchodilator anti-asthmatics facilitate respirations by dilating the airways
2. Bronchodilators include xanthines, sympathomimetics, and anticholinergics.

Answers for self-assessment 3.12

1. (C)Aminophylline
2. (D)Epinephrine
3. The reason of choosing IV route instead of oral route:

The xanthines are rapidly absorbed from the gastrointestinal (GI) tract when given orally, reaching peak levels within 2 hours. They are also given IV, reaching peak effects within minutes. The nurse wanted the rapid action of aminophylline.

Lesson 13. Treatment guidelines for asthma

a) Learning objectives

By the end of the session, the students will be able to manage asthma using bronchodilators.

b) Prerequisites/Revision/Introduction

To understand well this lesson, and complete it successfully, the students need to have been introduced to basic pharmacological concepts, especially pharmacokinetics and pharmacodynamics. They should have been introduced to the key principles of pharmacology including drug names, the meaning of pharmacology, factors influencing drug prescription, drug dosage forms, and ways of drug administration. The students also need to have been introduced to human biology, and basic chemical reactions. Finally, ensure that the students understood the previous session on bronchodilators, you then assess how much students already know and what they would be interested in learning about national treatment guidelines for asthma.

c) Teaching resources

They include: Students' books, internet connectivity, printed copies of case studies, projector, markers, chalks, any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet.

e) Learning activity 3.13. National treatment guidelines for asthma

Teachers' activities:

- Ask students to do in small groups the activity 3.13 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In case of small groups, ensure that the gender considerations are taken into account, and none is excluded based on gender.
- Remember to assist those who are weak but without giving them the responses.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to follow carefully the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the student's ideas.
- Tick the correct findings and correct the ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Student's role:

- Work in small groups the activity 3.13 as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.
- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members present the findings of the activity to the rest of students.
- Other students follow carefully the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks.

Answers for learning activity 3.13

1. (A) Use an inhaled short-acting beta2 agonist (SABA) for quick relief.
2. (C)Salbutamol and beclamethasone

Answers for self-assessment 3.13

1. Asthma classification according to national guidelines of asthma management:

– Intermittent
– Persistent – Mild
– Persistent – Moderate
– Persistent – Severe
– Asthma attack

2. Management options and examples of drugs to use for each class/ category of asthma:

STEP 1: Intermittent

Salbutamol Inh 2 puffs every 6 hrs PRN

STEP 2: Persistent – Mild

1. Salbutamol Inh 2 puffs every 6 hrs PRN
2. Beclamethasone 500mcg 1puff BD

STEP 3: Persistent – Moderate

1. Salbutamol Inh 2 puffs every 6 hrs
2. Beclamethasone 1000mcg 1puff BD

STEP 4: Persistent – Severe

1. Salbutamol Inh 2 puffs every 4 hr PRN
2. Beclamethasone 1500mcg 2 puff BD
3. Aminophylline 100mg PO 3x/day

STEP 5: ASTHMA ATTACK 1. Revert to Respiratory emergency

3.6.Unit summary

Hypertension is a high blood pressure ≥140 mmHg and/or the diastolic blood pressure ≥90 mmHg.

The treatment of hypertension require both pharmacological and non-pharmacological measures.

Medications for hypertension treatment include diuretics, calcium channel blockers, angiotensin converting enzyme inhibitors, angiotensin receptor blockers/agonists, vasodilators and sympatholytics.

Diuretics are drugs that increase sodium excretion and lower blood volume. Example: furosemide, hydrochlorothiazide, spironolactone.

Calcium channel blockers They block the entry of calcium into smooth muscle cells as well as myocytes. They produce arterial vasodilation and thereby reduce arterial blood pressure. Examples are nifedipine, Amlodipine, verapamil, diltiazem.

Angiotensin-converting enzyme (ACE) inhibitors slow the formation of angiotensin II, which reduces vascular resistance, blood volume, and blood pressure examples: Captopril and Enalapril.

Angiotensin II receptor blockers/ antagonist drugs work by blocking the binding of angiotensin II to the angiotensin I receptors. By blocking the receptor site, these agents inhibit the vasoconstrictor effects of angiotensin II as well as preventing the release of aldosterone due to angiotensin II from the adrenal glands. Examples: Losartan, valsartan

Vasodilators block the movement of calcium into the smooth muscle of the blood vessels to cause relaxation of the smooth muscle, and dilation of the resistance vessels. Examples are hydralazine and Nitroprusside.

Symptholytics block the effects of the sympathetic nervous system are useful in blocking many of the compensatory effects of the sympathetic nervous system. They include beta-blockers, Alpha blockers, alpha and beta blockers and alpha adrenergic blockers.

Beta-blockers are commonly used. Examples are atenolol and propranolol

Hypertension is treated according to its grade and emergency according to the national treatment guideline.

Diabetes is chronic disease in which there is low/no insulin production or the produced secreted is not working properly. Diabetes is treat both pharmacological and non-pharmacologically.

Insulin alone and/or Oral antidiabetic medications are used to treat diabetes

The commonly used oral antidiabetic agents are metformin(glucophage), Glibenclamide(Daonil) and Vildagliptin.

Insulin is available in various types and it is administered either subcutaneously or IV depending on the type and desirable effects.

Asthma is a common chronic immune-mediated airway inflammatory

Anti-asthmatics medications include inhaled anti-inflammatories and bronchodilators

The national guideline is available to guide in the treatment of NCDs including hypertension, diabetes and asthma.

3.7. Additional information for Teachers

The teacher will need to review renin-angiotensin-aldosterone system. Osmotic diuretics are not in the treatment of hypertension.

Calcium channel blockers

Nursing considerations

Provide comfort measures to help the patient tolerate drug effects. These include small, frequent meals to alleviate gastrointestinal (GI) upset; environmental controls, such as limiting light, maintaining temperature, and avoiding excessive noise and interruptions, which could aggravate stress and increase myocardial demand; and taking safety precautions, such as providing periodic rests and assisting with ambulation if dizziness occurs, to prevent injury.

Provide thorough patient teaching, including the name of the drug and dosage prescribed; measures to avoid adverse effects and prevent angina attacks; actions to take when an attack occurs; warning signs of problems, and signs and symptoms to report immediately; and the need for periodic monitoring and evaluation to enhance patient knowledge about drug therapy and to promote compliance.

ACE Inhibitors

Renin is an enzyme that is released by the kidneys in response to reduced renal blood circulation or hyponatremia. This enzyme acts in the plasma angiotensinogen to produce angiotensin I. Then, angiotensin I is converted to angiotensin II, mostly in the lungs. Angiotensin II is a vasoconstricting agent.

It causes sodium retention via the release of aldosterone. In the adrenal gland, angiotensin II is converted to angiotensin III. Both angiotensin II and III stimulate the release of aldosterone. Angiotensin I is inactive in the cardiovascular system. Angiotensin II has several cardiovascular-renal actions. The most important site of

the angiotensin-converting enzyme (ACE) is in the lungs, but ACE also is found in the kidneys, central nervous system, and elsewhere.

Nursing considerations

Assess for the contraindications and cautions before administration. These include allergies, impaired kidney or liver functions, pregnancy and lactation to avert potential fetal abnormalities and fetal death, which have been associated with these drugs. Find an alternative method of feeding the baby if the patient is nursing to prevent the potentially dangerous blockade of the renin–angiotensin–aldosterone system in the neonate)

Life style modification for a patient with hypertension

1. Salt Reduction
2. Weight Loss (if BMII >25)+Physical exercise
3. Smoking Cessation
4. Alcohol Cessation

Hypertension in pregnancy

Chronic Hypertension: Less than 20 weeks' gestation

1. Treat according to 'essential hypertension' guidelines. Calcium-
2. Channel Blockers, Hydralazine, Carvedilol, and Methyldopa are options.

Preeclampsia:

140/90 to 150/99 mmHg & greater than 20 weeks gestation. Refer to ophthalmologist if worsening vision or abnormal fundoscopic exam.

Severe Preeclampsia:

> 160/100 mmHg & greater than 20 weeks gestation. Call physician immediately and admit to hospital. Give hydralazine 10 IV while waiting on transfer.

Eclampsi : Patient having seizures. Call physician to help with immediate delivery of the baby. Give magnesium 2g IV if physician not available.

Children treatment Hypertension Guidelines

Definition Hypertension is defined as systolic and/or diastolic blood pressure the 95th percentile for gender, age and height percentile on at least three consecutive occasions.

A sustained blood pressure of > 115/80 is abnormal in children between 6 weeks and 6 years of age.

Stage 1 hypertension: SBP or DBP from 95th to 99th percentile + 5 mm Hg In adolescents if BP>140/90 mmHg, even < 95th percentile

Stage 2 hypertension: SBP or DBP greater than 99th percentile + 5 mm Hg Hypertensive urgency is defined as a significant elevation of blood pressure without accompanying end organ damage. Signs of complications are: Encephalopathy, convulsions, retinal haemorrhage or blindness causes Generally, severe hypertension suggests renal disease Accurate measurement of BP: o Use the widest cuff that can be applied to the upper arm o The cuff bladder must encircle at least 80% of the upper arm and should cover at least 75% of the distance between the elbow and the shoulder joints o It is better to use a cuff that is slightly too large than one that is too small.

Possible Management:

a) Non-pharmacological treatment

- Admit patient to pediatric high dependency unit
- Monitor BP every 60 minutes for 24 hours
- Insert peripheral line for drugs
- Bed rest - Control fluid intake and output (restriction)
- Restrict dietary sodium
- Manage end organ effects

b) Pharmacological treatment:

- Do not combine drugs of the same class
- Fusemide, IV, 1–2 mg/kg as a bolus slowly over 5 minutes
- If oliguria, maximum dose: 5 mg/kg/dose

Nifedipine 0.25-0.5mg/kg (max: 10mg) sublingual.

May be repeated 6 hours later, thereafter every 12 hours OR amlodipine, oral, 0.2 mg/kg/dose daily. OR

- Hydralazin0.2-0.6mg/kg/dose. The dose can be repeated every 4 hours.

Refer the patient to a specialist

Overview on diabetes

When we consume food, insulin moves glucose from blood to muscle, liver, and fat cells as insulin level increases. The functions of insulin include the transport and metabolism of glucose for energy, stimulation of storage of glucose in the liver and muscle, serves as the signal of the liver to stop releasing glucose, enhancement of the storage of dietary fat in adipose tissue, and acceleration of the transport of amino acid into cells.

Insulin and glucagon maintain a constant level of glucose in the blood by stimulating the release of glucose from the liver.

The exact cause of diabetes mellitus is actually unknown, yet there are factors that contribute to the development of the disease.

Type 1 diabetes mellitus is characterized by destruction of the pancreatic beta cells which lead to stop producing insulin.

A common underlying factor in the development of type 1 diabetes is a genetic susceptibility. Destruction of beta cells leads to a decrease in insulin production, unchecked glucose production by the liver and fasting hyperglycemia.

Type 1 diabetes often occurs in children and people under 30 years of age, but it can occur at any age. This condition is not caused by lifestyle factors. Its exact cause is not known but research shows that something in the environment can trigger it in a person that has a genetic risk. Most people diagnosed with type 1 diabetes do not have family members with this condition.

Type 2 diabetes develops when the pancreas does not make enough insulin and the insulin that is made does not work as well as it should, which lead to major problems of insulin resistance and impaired insulin secretion. (Also known as insulin resistance). As a result, the glucose begins to rise above normal levels in the blood. Half the people with type 2 diabetes do not know they have the condition because they have no symptoms.

People who develop type 2 diabetes are very likely to also have someone in their family with the condition. It is considered a lifestyle condition because being overweight and not doing enough physical activity increases the risk of developing type 2 diabetes.Uncontrolled type 2 diabetes could lead to hyperglycemic, hyperosmolar nonketotic syndrome.

Gestational diabetes occurs in about 5 to 10% of pregnant women, and usually goes away after the birth of the baby. Women who have had gestational diabetes have an increased risk of developing type 2 diabetes later on. With gestational diabetes mellitus (GDM), the pregnant woman experiences any degree of glucose intolerance with the onset of pregnancy. The secretion of placental hormones causes insulin resistance, leading to hyperglycemia. After delivery, blood glucose levels in women with GDM usually return to normal or later on develop type 2 diabetes.

It also reverts to metabolic and clinical normality post-partum, though relative risks of later Type 2 diabetes are between 7- 13 times high in women with gestational diabetes compared to normo-glycemic ones.

Diagnosing Tests include, Glycated hemoglobin (A1C) test: An A1C level of 6.5 percent.

Random blood sugar test:A random blood sugar level of 200 mg/dL (11.1 mmol/L) or higher suggests diabetes, especially when coupled with any of the signs and symptoms of diabetes, such as frequent urination and extreme thirst. The presence of symptoms of hyperglycaemia, such as polyuria, polydypsia, pruritus vulvae, lethargy, loss of weight and a random capillary whole blood glucose equal or above 11.1 mmol/L

Fasting blood sugar test. A blood sample will be taken after an overnight fast. A fasting blood sugar level less than 100 mg/dL (5.6 mmol/L) is normal. A fasting blood sugar level from 100 to 125 mg/dL (5.6 to 6.9 mmol/L) is considered prediabetes. If it›s 126 mg/dL (7 mmol/L) or higher on two separate tests, you have diabetes.

Non-pharmacological management of diabetes

The successful establishment of the diabetes health-care team and infrastructure to support it is critical for the achievement of these goals. This includes provision of education for health-care professionals and for people living with diabetes.

Diabetes Education

Diabetes education is the provision of knowledge and skill to people with diabetes that will empower them to render self-care in the management of their diabetes and associated disorders. This is one of the cornerstones of management together with diet, physical activity and pharmacotherapy, and is critical in improving the outcome.

People with diabetes and their families need to know:

- Their metabolic and blood pressure targets
- How to look after their feet, and thus prevent ulcers and amputations
- How to avoid other long-term complications
- That regular medical check-ups are essential
- When to seek medical help, e.g., how to identify hypoglycemic and hyperglycemic emergencies and symptoms, as well as signs of chronic complications
- That good glucose control is required before and during pregnancy,
- How to make informed choices about their use of traditional medicine and alternative medicine

1) Self-management (Monitoring)

Self-management is the cornerstone of overall diabetes care. Optimal outcomes can only be achieved if the person with diabetes is willing to, and capable of, self-regulating their condition on a daily basis for life. People with diabetes have a responsibility to manage their diabetes on a day-to-day basis, communicate with

their healthcare professionals periodically throughout the year, and seek advice, when necessary. Self-management is important in improving and extending one's quality of life.

2) Nutrition therapy

Effective nutrition therapy in diabetes has major benefits for both short and long-term diabetes outcomes. Both hypo- and hyperglycemia have devastating effects on the individual with diabetes and changes in eating habits can be difficult, especially in some cultural settings. Nutrition management should be based upon individual nutritional assessment, optimal glycemic control and reduction of cardiovascular risk. Nutrition education needs not only to include satisfactory methods to achieve optimum glycemic control, but also provide guidance on recommended daily intake for protein, carbohydrate, fat. Dietary modification is one of the cornerstones of diabetes management, and is based on the principle of healthy eating in context of social, cultural and psychological influences of food choices. Dietary modification and increasing level of physical activity should be the first steps in the management of newly diagnosed people with Type 2 diabetes, and have to be maintained.

Principles of dietary management of Type 2 diabetes mellitus

- All members of the diabetes-care team must have knowledge about nutrition to be able to educate people with diabetes about dietary measures.
- Dietary counselling is best given by a dietitian or nutritionist with an interest in diabetes mellitus.
- To achieve ideal weight loss, an appropriate diet should be prescribed together with an exercise regimen.
- Caloric restrictions should be moderate yet provide a balanced nutrition.
- At least three meals a day should be eaten, and binge eating should be avoided.
- The diet should be individualized, based on traditional eating patterns, be palatable and affordable.
- Animal fat, salt, and so-called diabetic foods should be avoided.
- Pure (simple) sugars in foods and drinks should be avoided.
- Eating plans should be higher in complex carbohydrates (starches) and fibre content, vegetables and limited numbers of fruits should be encouraged.
- Simple explained and written dietary instructions should be provided.
- Food quantities should be measured in volumes using available household items, such as cups, or be countable, such as number of fruits or slices of yam or bread.
- Alcohol should be avoided.
- Sweeteners are not essential and should be avoided as much as possible.

3) Physical activity and exercise

Physical activity or exercise is one of the essentials in the prevention and management of Type 2 diabetes mellitus. Regular physical activity improves metabolic control, increases insulin sensitivity, improves cardiovascular health, and helps weight loss and its maintenance, as well as giving a sense of well-being.

There are two main types of physical activity:

- Aerobic or endurance exercise (e.g., walking or running) and
- Anaerobic or resistance exercise (e.g., lifting weights). Both types of activity maybe prescribed to persons with Type 2 diabetes mellitus, but the aerobic form is usually preferred. patients should be encouraged to integrate increased physical activity into their daily routine.

General principles and recommendations for physical activity in Type 2 diabetes mellitus

- A detailed physical evaluation of cardiovascular, renal, eye and foot status (including neurological) should be performed before starting an exercise programme.
- The presence of chronic complications may preclude certain forms of exercises
- Prescribed physical activity programmes should be appropriate for the patient's age, socio-economic status, state of physical fitness,
- lifestyle, and level of glycaemic control.
- While exercise generally improves metabolic control, it can also precipitate acute complications like hypoglycaemia and hyperglycaemia.
- The physical activity should be regular (-3 days/week), last at least 20- 30 min. per session, and be of at least moderate activity. Activities like walking, climbing steps (instead of taking lifts) should be encouraged. For sedentary persons with diabetes, a gradual introduction using a low-intensity activity like walking is mandatory.
- Avoid strenuous exercise if ambient glycaemia is > 250 mg/dl (14 mmol/L), the patient has ketonuria or blood glucose is less than 80mg/dl (4.5 mmol/L),

To avoid exercise-induced hypoglycaemic, dosages of insulin secretagogues or insulin may need to be reduced and/or peri-exercise carbohydrate intake increased.

- Glycaemia should be monitored (using strips and meters) before and after planned strenuous physical activity as delayed hypoglycaemia may occur.
- Proper footwear must always be worn.

4) Psychosocial support

Diabetes mellitus is a chronic condition that greatly affects the lives of people with diabetes and their families. In children and adolescents, diabetes can complicate family functioning, and interfere with normal psychological and social development. People with diabetes are faced with the challenge to self-manage their diabetes in addition to carrying out the activities of day-to-day living. Acute and chronic diabetes complications can negatively affect the person's well-being and role functioning. People differ in their ability to cope effectively with the demands of diabetes self-management. Some people with diabetes are psychologically more vulnerable and require special attention. Diabetes in a child or adolescent may be associated with acute distress and in some cases prolonged distress for both the individual and the family. Pre-existing psychological, social, personal, family or environmental problems are likely to be exacerbated.

Answers for end unit assessment

1. (C)Mild hypertension
2. (A) Administer oral form early in the day so that increased urination will not interfere with sleep.
3. (D) They relax and open up narrowed blood vessels
4. (C)Hypertension
5. (B) Hydralazine
6. (A) Regulating blood glucose levels.
7. (B) Start one antihypertensive
8. (C)Metformin

3.8. Additional activities

3.8.1. Remedial activities

1. How insulin is stored?
2. In the treatment of asthma, which device is used to deliver micronized powder directly to the lungs
   a. Metered-dose inhalers
   b. Respimats
   c. Dry-powder inhalers
   d. Nebulizers.

3. A 25-year-old patient was admitted at emergency with the following, severe shortness of breath, difficulty speaking, rapid breathing where your chest or ribs visibly have retractions, straining your chest muscles and working hard to breathe and nasal flaring. After assessing and taking history of the patient, persistent asthma was confirmed. Referring to the national asthma treatment guideline, how will you initiate the treatment of that patient?

4. Which statement is true about rapid insulin?

   a. Takes longer to start working than the rapid-acting insulins.

   b. Insulins are often termed background or basal insulins

   c. Is slow, steady release of insulin with no apparent peak action. One injection can last up to 24 hours

   d. Starts working somewhere between 2.5 to 20 minutes after injection

Answers for remedial activities

1. Storage of insulin

- Store unopened insulin on its side in a fridge.
- Keep the fridge temperature between 2 and 8 °C.
- Make sure that insulin does not freeze.
- Once opened, keep it at room temperature (less than 25 °C) for not more than one month and then dispose of it safely.
- Avoid keeping insulin in direct sunlight.

2. (C) Dry-powder inhalers

3. Treatment of the patient with persistent asthma

- Salbutamol Inh2 puffs every 4 hr PRN
- Beclamethasone 1500mcg 2 puff BD
- Aminophylline 100mg PO 3x/day

4. (D) Starts working somewhere between 2.5 to 20 minutes after injection.

3.8.2.Consolidation activities

1. Which drug regimen will you give a patient with B.P of 172/102 mmHg and type II diabetes mellitus if life style modification alone did not work to keep the client stable?
2. Enumerate classes of drugs for the management of asthma
3. Aminophylline (theophylline) is prescribed for a client asthma attack. A nurse administers the medication, knowing that the primary action of this medication is to:

a. Promote expectoration by increasing secretions

b. Relax smooth muscles of the bronchial airway

c. Suppress the cough by working on lungs directly

d. To decrease expectoration by bronchoconstriction

Answers for consolidation activities

1. Regimen for a patient with B.P of 172/102 mmHg and asthma

- Start two hypertensive medications
- Encourage lifestyle modifications
- Follow-up in 1 month
- Lifestyle Modifications+ Angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blockers (ARBs) for patients with diabetes.

2. Classes of drugs for the management of asthma are:

   Anti-inflammatory anti-asthmatic drugs and bronchodilators.

3. (B) Relax smooth muscles of the bronchial airway

3.8.3.Extended activities

1. Insulin is administered parenterally only. Why can't it be administered orally?
2. Why is it important to rotate insulin injection sites?
3. When should aspirin be used for diabetic patients?

Answers for extended activities

1. Insulin can't be given orally because it is a polypeptide and can therefore be digested if taken orally.
2. Reason of rotate insulin injection sites is to avoid damage to muscles and to prevent subcutaneous atrophy
3. Aspirin junior or regular aspirin daily should be used to diabetics when there is an increased risk for a cardiovascular event (but if there is no the potential risk of bleeding).

UNIT 4 ANTIVIRAL DRUGS

4.1. Key unit competence

At the end of this unit, the students will be able to utilize antiretroviral medications to limit HIV/AIDS transmission.

4.2. Prerequisites

To succeed well this unit, and complete it confidently, the students need to have been introduced to basic pharmacological concepts. They should have been introduced to the key principles of pharmacology including drug names, the meaning of pharmacology, factors influencing drug prescription, drug dosage forms, and ways of drug administration. The students also need to have been introduced to human biology, basic chemical reactions, fundamentals of nursing, medical pathology, and surgical pathology. This previously learnt courses will help the students to acquire knowledge and skills related to antiviral drugs, and be able to manage patients with parasitic conditions. The tutor should recall the students the key topics of prerequisites courses that would be helpful to well understand antiviral unit.

4.3. Cross cutting issues to be addressed

a) Inclusive education

This unit involves the need to use antiprotozoal drugs appropriately, and expect the potential results of these drugs on the client. This requires critical thinking for the students in order to administer drugs bearing in mind they need to exert effects while causing no or less harm to the patient.

During teaching, ensure that students with special needs are included throughout the course delivery. There may be for example students with visual impairment, hearing impairment or even physical disabilities. For the students with visual impairment, the teacher must ensure that they occupy the front seats in class, and they may be encouraged to report when they can't see well what is written or being presented. In case of class activities, these students may be grouped together with others who have healthy vision, and if there are printed activities, ensure to use bigger font sizes. For students with hearing impairment, these students must be included in the learning process. In this context, there is a need to for the teacher to speak loudly, help the students occupy the front seats.

The written points help students with visual impairment and speaking aloud helps students with hearing impairment. Remember to repeat the main points of the lessons.

It is the responsibility of the teacher and teaching team to ensure that all students with a diversity of disabilities are included in the learning process, and special considerations will be considered for each category of students with special needs.

b) Gender

Emphasize to students that anybody irrespective of their gender can present and report during group activities. Give examples of famous people who are successful in real life irrespective of their gender differences. Make sure that during different class activities, both boys and girls share and participate equally in all activities. Bear in mind that they all have equal role in the smooth running of the class, and that the leaders of the class or group activities may be of either female or male gender.

c) Environment and sustainability

Students get basic knowledge from the natural sciences, so introduction to biodiversity is essential, and the students should be encouraged to maintain the biodiversity in order to keep the world safe. They also get skills and attitudes that will enable them in their everyday life to address the environment and climate change issues and to have a sustainable livelihood. Help the students to know maximum skills and attitudes on the environmental sustainability and to be responsible in caring for students' environment.

4.4. Guidance on introductory activity 4.0

This introductory activity is intended to:

- Motivate the students to learn about antiviral drugs.
- Stimulate the students to search more information pertaining to of pharmacokinetics and pharmacodynamics.
- To rise the curiosity on the content to cover as it relates to pharmacokinetics and pharmacodynamics of antiprotozoal drugs.
- Build on previous knowledge, skills, values and attitudes to help the teacher to assess the student's prior knowledge and help to link with the new content that is related to antiprotozoal.

The progress in the learning is gradual. At this point, there are no right or wrong answers as students will gradually get more appropriate answers progressively as they go through the unit. You may even ask the students to guess what will be covered in the unit.

Teacher's activities:

- The teachers are encouraged to promote learning in small groups of students and provide students with Unit 5 introductory activity, give clear instructions to the activity.

- Ask a determined number of students to present their findings after reading, while others are following, the teacher will be providing the guidance as needed.
- During grouping or pairing, there is a need to ensure that students with different levels of knowledge and understanding are mixed.

The teacher also has a responsibility to help students with different problems.

Possible answers for the Introductory Activity 4.0: refer to the student's book

- Students may have different ideas.

  The image A shows different stages of the HIV lifecycle, and these are the stages that antiretroviral drugs target. These antiretroviral drugs may even be classified according to their targets in the HIV lifecycle.

  The image B shows different tablets/capsules of antiretroviral drugs. They come in different dosage forms, and they are usually used in combinations to strengthen their efficacy. Finally, the image C shows an image of person holding the bottles that contain the antiretroviral medications. It is the responsibility of the nurses and other healthcare providers to teach well the patients on how to use the antiretroviral drugs.
- The students do not have to necessarily provide the right answers, given that the intent is to recognize that antiretroviral drugs are the focus of the unit.

4.5. List of lessons/ sub-headings including assessments

Content/lesson	Learning objectives	Numbers of periods
Introduction to antiretroviral drugs	At the end of the lesson will be able to define antiretroviral drugs and other key terms	2
Classification of antiretroviral drugs.	At the end of the lesson will be able to Compare and contrast the classes of antiretroviral medications	2
Antiretroviral treatment in adolescents and adults	Apply National treatment guidelines for adult HIV/AIDS in clinical practice	2
Antiretroviral Treatment in Children	Apply National treatment guidelines for children HIV/AIDS in clinical practice	2

ARV Treatment in Pregnant Women	Describe the antiretroviral protocol used for reducing the risk of perinatal transmission and for treating pediatric patients with HIV AIDS.	2
Prophylaxis in Newborns with Perinatal HIV Exposure or HIV Infection	Apply the protocol and rational for prophylaxis in newborns with perinatal HIV exposure or HIV Infection	1
HIV Prevention Among Discordant Couples	Describe HIV prevention among discordant couples	1
1. ART for Post-Exposure Prophylaxis (PEP)	Explain the protocol and rationale for post exposure prophylaxis following occupational exposure to HIV infected fluids.	1
End unit assessment		2

Lesson 1: Introduction to antiretroviral drugs

a) Learning objectives:

By the end of the session, the students should be able to:

- Differentiate antiviral from antiretroviral

b) Prerequisites/Revision/Introduction

This is the first lesson of the fifth unit on antiviral drugs. In this lesson you will be dealing with definitions of virus, antiviral, retrovirus and antiretrovial drug. The first thing to do before starting teaching is to remind students what they have learnt about general pharmacology (principles of pharmacology), fundamentals of nursing, medical pathology, human biology (protozoal lesson) and surgical pathology, and let them discuss the meaning of antiretroviral drugs.

Use K-W-L (What students already know-What they want to know-What they have learnt) after the introductory activity to assess how much students already know and what they would be interested in learning about introduction to antiretroviral drugs.

c) Teaching resources

They included: Pharmacology books, S6 pharmacology book guide for students, internet connectivity, projector, markers, chalks, and any other trustworthy and reliable resources to enhance learning.

d) Possible methods:

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet.

e) Learning activities 4.1 Antiretroviral and antiviral drugs

- Ask students to do in small groups activity 5.1 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In case of small groups, ensure that the gender considerations are considered, and none is excluded based on gender.
- Remember to note any areas where students have problems and ensure that these are emphasized in the subsequent learning lessons.
- Discuss in detail the various issues raised but to assure the students that they will be discussed in the subsequent learning lessons.
- Remember to assist those who are weak but without giving them the knowledge.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to carefully follow the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the student's ideas.
- Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Student's role:

- Work in small groups on the activity 4.1 as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.
- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members present the findings of the activity to the rest of students.
- Other students follow carefully the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks.

Answers for Learning Activity 4.1

1. Antiretroviral drugs are the drugs that are used to fight retrovirus infections which mainly include HIV. Different classes of antiretroviral drugs act on different stages of the HIV life cycle.
2. Protease inhibitors are drugs that block the activity of the enzyme protease in HIV. Protease is essential for the maturation of infectious virus, and its absence leads to the formation of an immature and noninfective HIV particle.

Expected Answers for Self-Assessment Activity 4.1

1. (A) Antivirals are a class of drugs which are used to treat retroviral infections
2. (B) Antiviral drugs are effective drugs for helps simplex
3. Antivirals are a class of drugs which are used to treat viral infection. The antiviral drugs target diverse group of viruses such as helps, herpes, hepatitis, and influenza virus whereas antiretroviral drugs are the drugs that are used to fight retrovirus infections which mainly include HIV. Different classes of antiretroviral drugs act on different stages of the HIV life cycle

Lesson 2: Classification of antiretroviral drugs

a) Learning objectives

By the end of the session, the students should be able to compare and contrast the classes of antiretroviral medication

b) Prerequisites/Revision/Introduction

This is the second lesson of the fifth unit on antivirals. In this lesson. you will be explaining the classification of antiretroviral drugs. The first thing to do before starting teaching is to remind students that they have learnt about medical pathology, human biology (protozoal lesson) and surgical pathology, and let them discuss the meaning of antivirus and antiretroviral drugs so that they can prepare themselves for this lesson of classification of antiretroviral drugs.

Use K-W-L (What students already know-What they want to know-What they have learnt) after the introductory activity to assess how much students already know and what they would be interested in learning about **classification of antiretroviral drugs**

They included: Pharmacology books, S5 pharmacology book guide for students, internet connectivity, projector, markers, chalks, and any other trustworthy, illustrations and reliable resources to enhance learning.

c) Teaching resources

They included: Pharmacology books, S6 pharmacology book guide for students, internet connectivity, projector, markers, chalks, and any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet.

e) Learning activities 4.2 Classification of antiretroviral drugs

Teachers' activities:

- Ask students to do in pairs activity 4.2 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In case of small groups, ensure that the gender considerations are considered, and none is excluded based on gender.
- Remember to note any areas where students have problems and ensure that these are emphasized in the subsequent learning lessons.
- discuss in detail the various issues raised but to assure the students that they will be discussed in the subsequent learning lessons.
- Remember to assist those who are weak but without giving them the knowledge.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to carefully follow the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the student's ideas.
- Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Student's role:

- Work in pairs on the activity 4.2 as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.

- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members present the findings of the activity to the rest of students.
- Other students carefully follow the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks.

Answers for Learning Activity 4.2

1. **Classes of antiretroviral drugs that can be used in HIV/AIDS management are:** nucleoside/nucleotide reverse transcriptase inhibitors (NRTIs), non-nucleoside reverse transcriptase inhibitors (NNRTIs), integrase strand transfer inhibitors (INSTIs), and protease inhibitors (PIs), HIV fusion inhibitors and CCR5 antagonists.
2. **The five basic goals of ART are:**
   - Maximal and long-lasting suppression of viral load,
   - Restoration and preservation of immune function,
   - Improved quality of life,
   - Reduction of HIV-related morbidity and mortality and
   - Prevention of HIV transmission

Expected answers for Self-Assessment Activity 4.2

1. A combination of several different antiviral drugs is used to attack the virus at various points in its life cycle to achieve maximum effectiveness with the least amount of toxicity
2. (C)Atazanavir
3. The mechanism of action of enfuvirtide: It prevents the HIV envelope from fusing with the cell membrane of CD4 cells, and thereby blocks viral entry and replication. Fusion inhibition results from binding of enfuvirtide to gp41, a subunit of the glycoproteins embedded in the HIV envelope (see Fig. 94.1). As a result of enfuvirtide binding, the glycoprotein becomes rigid, and hence cannot undergo the configurational change needed to permit fusion of HIV with the cell membrane.

Lesson 3 Antiretroviral treatment in adolescents and adults

a) Learning objectives:

By the end of the session, the students should be able to apply the national treatment guidelines for adolescents and adults with HIV/AIDS in clinical practice.

b) Prerequisites/Revision/Introduction

This is the third lesson of the fifth unit. In this lesson you will be explaining the describe antiretroviral treatment in adults. The first thing to do before starting teaching is to remind students what they have learnt about therapeutic action of different classes of antiretroviral drugs.

Use K-W-L (What students already know-What they want to know-What they have learnt) after the introductory activity to assess how much students already know and what they would be interested in learning about antiretroviral drug.

c) Teaching resources

They included: Pharmacology books, S6 pharmacology book guide for students, internet connectivity, projector, markers, chalks, and any other trustworthy, illustrations and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet.

e) Learning activity 4.3

Teachers' activities

- Ask students to do in small groups activity 4.3 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In case of small groups, ensure that the gender considerations are considered, and none is excluded based on gender.
- Remember to note any areas where students have problems and ensure that these are emphasized in the subsequent learning lessons.
- Discuss in detail the various issues raised but to assure the students that they will be discussed in the subsequent learning lessons.
- Remember to assist those who are weak but without giving them the knowledge.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to carefully follow the presentations.

- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the student's ideas.
- Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Student's role:

- Work in small groups on the activity 4.3 as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.
- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members present the findings of the activity to the rest of students.
- Other students carefully follow the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks.

Answers for learning activity 4.3 Antiretroviral treatment in adolescents and adults

1. The required combinations of antiretroviral drugs: ART regimens typically contain at least three drugs. Regimens that contain only two drugs are not generally recommended, and monotherapy should always be avoided, except possibly during pregnancy. Additionally, all ART regimens contain drugs from at least two different classes. By using drugs from different classes, we can attack HIV in two different ways (e.g., inhibition of reverse transcriptase and inhibition of protease) and can thereby enhance antiviral effects.
2. Antiretroviral therapy (ART) is recommended for all persons with HIV to reduce morbidity and mortality and to prevent the transmission of HIV to others. The Panel on Antiretroviral Guidelines for Adults and Adolescents recommends initiating ART immediately (or as soon as possible) after HIV diagnosis in order to increase the uptake of ART and linkage to care, decrease the time to viral suppression for individual patients, and improve the rate of virologic suppression among persons with HIV.

Expected Answers for Self-Assessment Activity 4.3

1. Preferred 1st line regimen for adolescent and adults is TDF/3TC/DTG
2. TDF/3TC/EFV600mg is the alternative first-line regimen for adults and adolescents who cannot take TLD
3. If a patient experiences toxicity typical of a particular drug in the regimen, that drug should be withdrawn and replaced with a drug that is (1) from the same class and (2) of equal efficacy. For example, if a patient taking zidovudine were to develop anemia and neutropenia, zidovudine should be discontinued and replaced with another NRTI (e.g., stavudine). Note that when toxicity is the reason for altering the regimen, changing just one drug is proper, whereas when resistance or suboptimal treatment is the reason, at least two of the drugs should be changed.

Lesson 4: Antiretroviral Treatment in Children

a) Learning objectives:

By the end of the session, the students should be able to explain Apply National treatment guidelines for children HIV/AIDS in clinical practice

b) Prerequisites/Revision/Introduction:

This is the fourth lesson of the fifth unit on antivirals. In this lesson you will be dealing with antiretroviral treatment in children.

The first thing to do before starting teaching is to remind students that they have learnt about pharmacology (principles of pharmacology senior 4 and), fundamentals of nursing, medical pathology, classification of antiretroviral drugs and let them discuss so that they can prepare themselves for this **antiretroviral treatment in children** lesson.

Use K-W-L (What students already know-What they want to know-What they have learnt) after the introductory activity to assess how much students already know and what they would be interested in learning about antiretroviral treatment in children.

c) Teaching resources

They included: Pharmacology books, S6 pharmacology book guide for students, internet connectivity, projector, markers, chalks, and any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet.

e) Learning activities 4.4 Antiretroviral treatment in children

Teachers' activities:

- Ask students to do in small groups the activity 4.4 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In case of small groups, ensure that the gender considerations are considered, and none is excluded based on gender.
- Remember to note any areas where students have problems and ensure that these are emphasized in the subsequent learning lessons.
- discuss in detail the various issues raised but to assure the students that they will be discussed in the subsequent learning lessons.
- Remember to assist those who are weak but without giving them the knowledge.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to carefully follow the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the student's ideas.
- Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Student's role:

- Work in small groups on the activity 5.4 as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.
- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members present the findings of the activity to the rest of students.
- Other students carefully follow the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks.

Expected Answers for Learning Activity 4.4

1. Children weighing less than 20 kilos should be started with ABC sp+3TC sp+LPV/r (40mg/10mg)pt Or ABC+3TC+LPV/r (Syrups). Alternate regimen is ABC+3TC+NVPsp/EFV
2. FALSE. In young children, the course of HIV infection is accelerated. Whereas adults generally remain symptom free for a decade or more, many children develop symptoms by their first birthday. Death often ensues by age 5 even with ART.
3. FALSE. The preferred 1st line option for children of 30kgs and above without renal failure is TDF/3TC/DTG

Expected Answers for Self-Assessment Activity 4.4

1. TB screening is mandatory for all children at enrolment and at each clinical visit. TPT (Tuberculosis preventive therapy) should be integrated in HIV management.
2. The preferred 1st line option for children of 30kgs and above without renal failure is TDF/3TC/DTG.
3. (B) Anti-TB should be initiated immediately and ART within 2 to 8 weeks.

Lesson 5: ARV Treatment in Pregnant Women

a) Learning objectives

By the end of the session, the students should be able to describe the antiretroviral protocol used for reducing the risk of perinatal transmission and for treating pregnant women with HIV AIDS.

b) Prerequisites/Revision/Introduction

This is the fifth lesson of the fifth unit of antiviral drugs. In this lesson, you will be dealing with national treatment guidelines for ARV Treatment in Pregnant Women. The first thing to do before starting teaching is to remind students that they have learnt about general pharmacology (principles of pharmacology), medical pathology, human biology and surgical pathology, normal obstetric so that they can prepare themselves for this lesson on ARV Treatment in Pregnant Women.

Use K-W-L (What students already know-What they want to know-What they have learnt) after the introductory activity to assess how much students already know and what they would be interested in learning about ARV Treatment in Pregnant Women.

c) Teaching resources

They included: Pharmacology books, S5 pharmacology book guide for students, internet connectivity, projector, markers, chalks, and any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet.

e) Learning activities 4.5: ARV Treatment in Pregnant Women

Teachers' activities:

- Ask students to do in small groups activity 5.5 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In case of small groups, ensure that the gender considerations are considered, and none is excluded based on gender.
- Remember to note any areas where students have problems and ensure that these are emphasized in the subsequent learning lessons.
- Discuss in detail the various issues raised but to assure the students that they will be discussed in the subsequent learning lessons.
- Remember to assist those who are weak but without giving them the knowledge.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to carefully follow the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the student's ideas.
- Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Student's role:

- Work in small groups on the activity 4.5 as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.

- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members present the findings of the activity to the rest of students.
- Other students carefully follow the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks.

Answers for Learning Activity 4.5

1. Women tested HIV positive during ANC or at the time of labor, should start anti-retroviral therapy immediately. In case of delay, ART initiation should not go beyond 7 days.
2. Every pregnant or breastfeeding woman newly tested positive for HIV should start with ART regimen Tenofovir + Lamivudine + Dolutegravir.

Answers for self-Assessment Activity 4.5

1. FALSE: Every pregnant woman whose HIV status is unknown during ANC should be tested for HIV at the time of delivery.
2. FALSE. Doses are the same as in non-pregnant adults' HIV treatment.
3. (B) Tenofovir + Lamivudine + Dolutegravir.

Lesson 6: Prophylaxis in Newborns with Perinatal HIV Exposure or HIV Infection

a) Learning objectives

By the end of the session, the students should be able to explain the protocol and rationale for prophylaxis in Newborns with Perinatal HIV Exposure or HIV Infection.

b) Prerequisites/Revision/Introduction:

This is the sixth lesson of the fifth unit antiviral drugs. In this lesson you will be dealing with Prophylaxis in Newborns with Perinatal HIV Exposure or HIV Infection.

The first thing to do before starting teaching is to remind students that they have learnt about general pharmacology (principles of pharmacology), fundamentals of nursing, medical pathology, human biology (protozoal lesson) antiretroviral drugs and surgical pathology, so that they can prepare themselves for this lesson on Prophylaxis in Newborns with Perinatal HIV Exposure or HIV Infection.

Use K-W-L (What students already know-What they want to know-What they have learnt) after the introductory activity to assess how much students already know and what they would be interested in learning about Prophylaxis in Newborns with Perinatal HIV Exposure or HIV Infection

c) Teaching resources

They include: Pharmacology books, S6 pharmacology book guide for students, internet connectivity, projector, markers, chalks, and any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet.

e) Learning activities 4.6. Prophylaxis in Newborns with Perinatal HIV Exposure or HIV Infection

Teachers' activities

- Ask students to do in small groups activity 5.6 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In case of small groups, ensure that the gender considerations are considered, and none is excluded based on gender.
- Remember to note any areas where students have problems and ensure that these are emphasized in the subsequent learning lessons.
- Discuss in detail the various issues raised but to assure the students that they will be discussed in the subsequent learning lessons.
- Remember to assist those who are weak but without giving them the knowledge.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to carefully follow the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the student's ideas.
- Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Student's role:

- Work in small groups on the activity 4.6 as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.
- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members present the findings of the activity to the rest of students.
- Other students carefully follow the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks.

Answers for Learning Activity 4.6

All children born to a known HIV positive mother (before or during labour) will receive zidovudine and Nevirapine (AZT+ NVP) as soon as possible within 72 hours after birth up to six weeks of life.

Answers for Self-Assessment 4.6

1. If the mother is identified to be HIV-positive at the time of breastfeeding, she should be put on ART. The child will start a combined AZT and NVP as soon as possible for six weeks. At the end of 6 weeks ART prophylaxis; the child will also start cotrimoxazole prophylaxis until the final confirmation of HIV negative status at 24 months of life. And All Breastfed infants who are at high risk of acquiring HIV, including those first identified as exposed to HIV during the postpartum period, should continue infant prophylaxis for an additional 6 weeks (total of 12 weeks of infant prophylaxis) using NVP and AZT.

Lesson 7: HIV Prevention Among Discordant Couples

a) Learning objectives:

By the end of the session, the students should be able to Describe HIV prevention among discordant couples.

b) Prerequisites/Revision/Introduction:

This is the seventh lesson of the fifth unit of antiviral drugs. In this lesson, you will be dealing with HIV Prevention Among Discordant Couples. The first thing to do before starting teaching is to remind students that they have learnt about general pharmacology (principles of pharmacology), fundamentals of nursing,

medical pathology, human biology and surgical pathology, so that they can prepare themselves for this lesson on HIV Prevention Among Discordant Couples.

Use K-W-L (What students already know-What they want to know-What they have learnt) after the introductory activity to assess how much students already know and what they would be interested in learning about HIV Prevention Among Discordant Couples.

c) Teaching resources

They include: Pharmacology books, S6 pharmacology book guide for students, internet connectivity, projector, markers, chalks, and any other trustworthy and reliable resources to enhance learning.

d) Possible methods

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet.

e) Learning activities 4.7: HIV Prevention Among Discordant Couples

Teachers' activities

- Ask students to do in pairs activity 4.7 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.
- Move around in silence to monitor if they are having some problems. In case of small groups, ensure that the gender considerations are considered, and none is excluded based on gender.
- Remember to note any areas where students have problems and ensure that these are emphasized in the subsequent learning lessons.
- Discuss in detail the various issues raised but to assure the students that they will be discussed in the subsequent learning lessons.
- Remember to assist those who are weak but without giving them the knowledge.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to carefully follow the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the student's ideas.
- Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.

- Harmonize and conclude on the learned knowledge.

Student's role:

- Work in pairs the activity 4.7 as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.
- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members present the findings of the activity to the rest of students.
- Other students carefully follow the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks.

Answers for Learning Activity 4.7

1. The overall package of interventions is:

- Risk reduction counselling and condom provision
- Initiation of pre-exposure prophylaxis for those whose HIV positive partner is not yet on ARV or are not virally suppressed
- Family planning counselling and service provision
- Repeat HIV testing for the uninfected partner every 12 months
- Care and treatment for the HIV-positive partner
- STI screening and treatment

2. The objectives of these interventions are

- To protect the negative partners from acquiring HIV infection
- To provide care and treatment to HIV positive partners, allowing them access to early treatment that improves clinical outcomes
- To protect future children from HIV infections
- To offer the appropriate HIV prevention package for children and other family members of the HIV positive individuals
- To support the prevention of unwanted pregnancies in discordant couples

Expected Answers for Self-Assessment 4.7

1. TRUE
2. TRUE

Lesson 8. ART for Post-Exposure Prophylaxis (PEP)

a) Learning objectives

By the end of the session, the students should be able to explain the protocol and rationale for post exposure prophylaxis following occupational exposure to HIV infected fluids.

b) Prerequisites/Revision/Introduction

This is the eight lesson of the fifth unit antiviral drugs. In this lesson you will be dealing with ART Post Exposure Prophylaxis/ Accidental Exposure to Blood (AEB) or to Other Biological fluids .

The first thing to do before starting teaching is to remind students that they have learnt about general pharmacology (principles of pharmacology), fundamentals of nursing, medical pathology, human biology and surgical pathology, so that they can prepare themselves for this lesson on explain the protocol and rationale for post exposure prophylaxis following occupational exposure to HIV infected fluids.

Use K-W-L (What students already know-What they want to know-What they have learnt) after the introductory activity to assess how much students already know and what they would be interested in learning about Explain the protocol and rationale for post exposure prophylaxis following occupational exposure to HIV infected fluids.

c) Teaching resources

They include: Pharmacology books, S6 pharmacology book guide for students, internet connectivity, projector, markers, chalks, and any other trustworthy and reliable resources to enhance learning.

d) Possible methods:

Pair share, small group discussion, brainstorming, short class presentation, research in the library textbooks or on the internet.

e) Learning activities 4.8: ART for Post-Exposure Prophylaxis (PEP)

Teachers' activities

- Ask students to do in small groups activity 4.8 in their student books.
- Provide to the students the necessary materials or guide them where they can get the materials.

- Move around in silence to monitor if they are having some problems. In case of small groups, ensure that the gender considerations are considered, and none is excluded based on gender.
- Assist the students to identify key issues regarding the ART for Post-Exposure Prophylaxis (PEP)
- Remember to note any areas where students have problems and ensure that these are emphasized in the subsequent learning lessons.
- Discuss in detail the various issues raised but to assure the students that they will be discussed in the subsequent learning lessons.
- Remember to assist those who are weak but without giving them the knowledge.
- Invite randomly some students to present their findings to the rest of students.
- Ask other students to carefully follow the presentations.
- Those who are not acting may have to listen attentively without disturbing and should applaud the actors after.
- Note on chalk board / Manila paper or flip chart the student's ideas.
- Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.
- Students may still have few things that are not clear. Answer or address any questions or challenges about the activity. Guide them to make notes in their notebooks referring to students' book.
- Harmonize and conclude on the learned knowledge.

Student's role

- Work in small groups on the activity 4.8 as it appears in the student books.
- Use the materials and resources provided by the teacher to give answers to the activity.
- Attempt all the questions ensuring that participation of each member is obvious.
- Assist one another as they may have different levels of understanding.
- Selected members present the findings of the activity to the rest of students.
- Other students carefully follow the presentation of the findings.
- Those who are not presenting have to listen attentively without disturbing and should applaud their colleagues after presentation.
- Ask for more clarifications from the teacher and take notes in their notebooks.

Answers for Learning Activity 4.8

1. **The drugs that may be administered to this patient are:**
   - 1.TDF+ 3TC / FTC +ATV/r
   - 2. AZT + 3TC/ FTC + ATV/r(If no TDF or a contraindication)
2. **FALSE:** An HIV serology test should be performed for the exposed caregiver as soon as possible (ideally within 48 hours).

Expected Answers for Self-Assessment 4.8

1. HIV post-exposure prophylaxis for survivors of sexual assault is considered within 72 hours
2. The severity of the exposure, which is directly linked to the depth of the wound and the type of needle that was responsible for the injury (venipuncture needle, needle for injection, non-sharp instrument). For external contact of secretions with the skin or mucosa (splash), the risk is higher with blood than with any other body secretions (amniotic fluid, serous fluid). The person assumed to be the source should be assessed on his or her HIV status, clinical and immunological status and history of ART.

4.6. Summary of the Unit

Antivirals are a class of drugs which are used to treat viral infections. The antiviral drugs target diverse group of viruses such as herpes, hepatitis, and influenza viruses. Antiretroviral drugs fall in the broad category of antivirals, and these are the drugs that are used to fight retrovirus infections which mainly include HIV. Different classes of antiretroviral drugs act on different stages of the HIV life cycle.

Six classes are currently being used in attempt to control the HIV as follows:

- Nucleoside/nucleotide reverse transcriptase inhibitors (NRTIs)
- Non-nucleoside reverse transcriptase inhibitors (NNRTIs)
- Integrase strand transfer inhibitors (INSTIs),
- Protease inhibitors (PIs) inhibit HIV enzymes.
- HIV fusion inhibitors and
- CCR5 antagonists

They have different mechanisms of action according to where they exert their effects, and their chemical structure. These highly effective regimens can reduce plasma HIV to undetectable levels, causing CD4 T-cell counts to return toward

normal, thereby restoring some immune function. However, despite these advances, treatment cannot cure HIV. The HIV mutates over time, presenting a slightly different configuration with each new generation.

These medications are combined to exert their effects, and the monotherapy should always be avoided. Three medications are generally combined to potentiate the actions of one another, and prevent the risk of treatment failure.

Women should be assessed for a possibility of a pregnancy, and if they are pregnant, the antiretroviral therapy should be initiated immediately or as soon as possible. They should benefit from the doses as the guidelines of treatment for adults, and ensure that the right medications are used in order to avoid possible interference with the pregnancy.

Children born to HIV positive women should also benefit from prophylaxis medications that include ARVs and cotrimoxazole. Discordant couples should also benefit from antiretroviral medications according to the guidelines.

4.7. Additional information for taechers

Antiviral Agents: Drugs for Non-HIV Viral Infections

1. **Drugs for Herpes Simplex Virus Infection:** Acyclovir Ganciclovir

Acyclovir

Indications: Treatment of herpes simplex virus (HSV) 1 and 2 infections; treatment of severe genital HSV infections; treatment of HSV encephalitis; acute treatment of shingles and chickenpox; ointment for the treatment of genital herpes infections; cream for the treatment of cold sores (herpes labialis).

Contraindications: It is contraindicated for patient with hypersensitive to acyclovir. In high doses, polyuric renal failure has occurred therefore adequate hydration should be maintained to prevent dehydration.

Mechanism of actions: Inhibits viral DNA replication.

Pharmacokinetics: Half-life: 2.5 to 5 hours; excreted unchanged in the urine.

Adverse Effects: Headache, vertigo, tremors, nausea, vomiting, rash.

2. **Drugs for Hepatitis**

A) Antihepatitis C drugs: are relatively new. They are protease inhibitors specific to the hepatitis C virus. They must be combined with ribavirin and peginterferon. Some antivirals are available only for the local treatment of viral infections, including warts and eye infections. Topical antivirals should not be applied to open wounds; local reactions can occur with administration. Peginterferon alfa-2b, Lamivudine (nucleoside analog), Peginterferon alfa-2a, Ribavirin (oral nucleoside analog), Simprevir (protease inhibitor), Declatasvir (NS5A inhibitor), and Sofosbuvir (NS5B inhibitor).

Simeprevir

Indications: Treatment of chronic hepatitis C in adults with compensated liver dysfunction in combination with peginterferon alfa and ribavirin.

Contraindications: hypersensitivity to Simeprevir or any component of the formulation

Mechanism of actions: Inhibits hepatitis C protease formation preventing viral replication.

Pharmacokinetics: T1/2: 10 to 12 hours; excreted in the feces.

Adverse Effects: Fatigue, nausea, diarrhea, rash.

B) Antihepatitis B drugs

Adefovir

Indications: Treatment of chronic hepatitis B in adults with evidence of active viral replication and either evidence of persistent elevations in alanine aminotransferase and aspartate aminotransferase or histologically active disease.

Contraindications: contraindicated in patients with previously demonstrated hypersensitivity to any of the components of the product.

Mechanism of actions: Inhibits hepatitis B virus reverse transcriptase, causes DNA chain termination, and blocks viral replication.

Pharmacokinetics: T1/2: 7.5 hours; excreted in the urine.

Adverse Effects: Headache, asthenia, nausea, severe to fatal hepatomegaly with steatosis, nephrotoxicity, lactic acidosis, exacerbation of hepatitis B when discontinued.

3) Drugs for Influenza: Influenza vaccine Oseltamivir

Rimantadine

Indications: Prophylaxis and treatment of illness caused by influenza A virus in adults; prophylaxis against influenza A virus in children.

Contraindications: Rimantadine is contraindicated in patients with a known **rimantadine hypersensitivity, amantadine hypersensitivity, or hypersensitivity to any agent in the adamantane class.** Rimantadine should be used cautiously in patients with a history of seizure disorder

Mechanism of actions: Inhibits viral replication, possibly by preventing the uncoating of the virus.

Pharmacokinetics: T1/2: 25.4 hours; excreted unchanged in the urine.

Adverse Effects: Light-headedness, dizziness, insomnia, nausea, dyspnea, orthostatic hypotension, depression.

Special considerations on Antivirals

Children

Children are very sensitive to the effects of most antiviral drugs, and more severe reactions can be expected when these drugs are used in children. Many of these drugs do not have proven safety and efficacy in children, and extreme caution should be used. Most of the drugs for prevention and treatment of influenza virus infections can be used, in smaller doses, for children. Acyclovir is the drug of choice for children with herpes virus or CMV infections. The drugs used in the treatment of AIDS are frequently used in children, many now have recommended pediatric dosing but others may be used without the evidence of safety because of the seriousness of the disease. Dose should be lowered according to body weight, and children must be monitored very closely for adverse effects on kidneys, bone marrow, and liver.

Adults

Adults need to know that these drugs are specific for the treatment of viral infections. The use of antibiotics to treat such infections can lead to the development of resistant strains and superinfections that can cause more problems. Patients with HIV infection who are taking antiviral medications need to be taught that these drugs do not cure the disease, that opportunistic infections can still occur, and that precautions to prevent transmission of the disease need to be taken. Pregnant women, for the most part, should not use these drugs unless the benefit clearly outweighs the potential risk to the fetus or neonate. Women of childbearing age should be advised to use barrier contraceptives if they take any of these drugs. Zidovudine has been safely used in pregnant women. The Centers for Disease Control and Prevention advises that women with HIV infection should not breastfeed to protect the neonate from the virus.

Older Adults

Older patients may be more susceptible to the adverse effects associated with these drugs; they should be monitored closely. Patients with hepatic dysfunction are at increased risk for worsening hepatic problems and toxic effects of those drugs that are metabolized in the liver. Drugs that are excreted unchanged in the urine can be especially toxic to patients who have renal dysfunction. If hepatic or renal dysfunction is expected (extreme age, alcohol abuse, use of other hepatotoxic or nephrotoxic drugs), the dose may need to be lowered and the patient should be monitored more frequently.

Table: Treatment of Herpes Simplex Virus and Varicella-Zoster Virus Infections

Infection	Drug	Route	Dosage	Duration
HERPES SIMPLEX VIRUS INFECTIONS				
Encephalitis	Acyclovir	IV	10–15 mg/kg every 8 hr	14–21 days
Mucocutaneous in Immunocompromised host (ICH)	Acyclovir	IV	5 mg/kg every 8 hr	7–10 days
	Acyclovir	PO	400 mg 5 times/day	7–14 days
	Valacyclovir	PO	Initial episode: 1 gm twice daily for 10 days Recurrent episode: 500 mg twice daily for 3 days Reduction of transmission: 500 mg once daily Suppressive therapy: Immunocompetent patients: 1 gm once daily (500 mg once daily in patients with < 9 recurrences per year) HIV-infected patients (CD4 ≥ 100 cells/mm3): 500 mg twice daily	
	Famciclovir	PO	500 mg 2 times/day	7–10 days
	Foscarneta	IV	400 mg 2–3 times/day	7–21 days
Neonatal	Acyclovir	IV	5–10 mg/kg every 8 hr	7 days
Orolabial	Acyclovir	Topical	5% cream 5 times/day	4 days
	Penciclovir	Topical	1% cream every 2 hr	4 days
	Docosanol	Topical	10% cream 5 times/day	4 days or until lesions have healed
Genital infections	See Chapter 95			
VARICELLA-ZOSTER VIRUS INFECTIONS				
Varicella	Acyclovir	PO	800 mg 4 times/day	5 days
Varicella in Immunocompromised host (ICH)	Acyclovir	IV	10 mg/kg every 8 hr	7 days

Herpes zoster	Acyclovir	PO	800 mg 5 times/day	7–10 days
	Valacyclovir	PO	1 gm 3 times/day	7 days
	Famciclovir	PO	500 mg 3 times/day	7 days
Herpes zoster in Immunocompromised host ICH	Acyclovir	IV	10 mg/kg every 8 hr	7 days
Acyclovir-resistant zoster	Foscarnet	IV	40 mg/kg every 8–12 hr	10 days

Interferon Alfa Preparations: Dosages for Chronic Hepatitis B and Hepatitis C

Generic Name	Brand Name	Chronic Hepatitis B	Chronic Hepatitis C
CONVENTIONAL INTERFERON ALFA PREPARATIONS			
Interferon alfa-2b	**Intron A**	5 million IU subQ daily or 10 million IU subQ 3 times/week	3 million IU subQ or IM 3 times/week
Interferon alfacon-1	**Infergen**	(Not used)	Monotherapy: 9 mcg subQ 3 times/week With ribavirin: 15 mcg subQ daily
LONG-ACTING INTERFERON ALFA PREPARATIONS			
Peginterferon alfa-2a	**Pegasys**	180 mcg subQ once/week	180 mcg subQ once/week
Peginterferon alfa-2b	**PegIntron, Unitron PEG**		Monotherapy: 1 mcg/kg subQ once/week With ribavirin: 1.5 mcg/kg subQ once/week

Answers for End Unit Assessment

i. Completing the empty spaces with appropriate terms:

1. Antiviral
2. Retrovirus
3. antiretroviral drugs

ii. Responding by true or false

1. T
2. F
3. F
4. T
5. T
6. F

4.8. Additional Activities

4.8.1. Remedial Activities

Answer by TRUE or FALSE

1. Antiretroviral therapy (ART) is recommended for all persons with HIV to reduce morbidity and mortality and to prevent the transmission of HIV to others
2. The goal of antiretroviral therapy is to decrease the number of CD4 cells so as to improve the immune reconstitution.
3. One of the goals of antiretroviral therapy is to reduce the transmission of HIV

Answers for remedial activities

1. TRUE
2. FALSE
3. TRUE

4.8.2. Consolidation activities

1. Clinical and laboratory evaluations are the cornerstones of care and treatment of HIV positive children of ≤10 years old.
2. In general, the management of HIV infection in pregnant women should follow the same guidelines for managing HIV infection in nonpregnant adults.
3. Which of the following antiretroviral treatment regimens should preferably be initiated to the childern younger than 10 years of age, weighing <20 kg?

   A. ABC+3TC+NVP

   B. ABC sp+3TC sp+EFV

   C. ABC sp+3TC sp+LPV

   D. ABC+3TC+DTG

Answers for consolidation activities

1. TRUE
2. TRUE
3. C

4.8.3. Extended Activities

1. Which of the following antiretroviral treatment regimens should prerably be initiated to the childern younger than 10 years of age, weighing 20 -30kg?

   A. ABC+3TC+NVP

   B. ABC sp+3TC sp+EFV

   C. ABC sp+3TC sp+LPV

   D. ABC+3TC+DTG

5. According to the Rwanda national guidelines of HIV management, what are the three drugs that should be used for every pregnant or breastfeeding woman newly tested positive for HIV?

6. According to the Rwanda national guidelines of HIV management, what are the three drugs that should be used for every pregnant or breastfeeding woman newly tested positive for HIV with impaired renal function or any contraindication to TDF?

7. Which of the following combinations should a pregnant HIV-negative partner of the discordant couple be given as a single dose at labor?

   A. TDF+3TC+DTG

   B. ABC+3TC+DTG

   C. ABC+3TC+NVP

   D. EFV+3TC+NVP

Answers for Extended Activities

1. D
2. Tenofovir + Lamivudine + Dolutegravir.
3. ABC + 3TC+DTG
4. A

REFERENCES

1. Amy M. Karch. (2013). Focus on Nursing Pharmacology. Sixth edition: Wolters Kluwer Health | Lippincott Williams &6 Wilkins.
2. Center for Diseases Control and Prevention. (2015). Staying on Track with Tuberculosis Medicine.
3. Karch (2013). Focus on Nursing Pharmacology, 6th edition. Wolters Kluwer Health | Lippincott Williams & Wilkins
4. Michael Patrick Adams, Leland Norman Holland, Jr, and Carol Quam Urban (2014). Pharmacology for Nurses: A Pathophysiologic Approach. 4th edition. Pearson Education, Inc.
5. David E. Golan, Ehrin J. Armstrong, and April W. Armstrong (2017). PRINCIPLES of PHARMACOLOGY THE PATHOPHYSIOLOGIC BASIS OF DRUG THERPY.4th edition. Wolters Kluwer
6. Bertram G.K, Susan B.M., and Anthony.J.Trevor (2012). Basic and Clinical Pharmacology, 12th Ed.Mc Graw Hill LANGE.
7. Sharkey KA, MacNaughton WK. Pharmacotherapy for gastric acidity, peptic ulcers, and gastroesophageal reflux disease. In, Brunton LL, Hilal-Dandan R, Knollman BC, eds. Goodman & Gilman's the pharmacological basis of therapeutics. 13th ed. New York: McGraw-Hill, 2018, pp. 909-20, pp. 921-44, 945-54
8. Dicyclomine Capsule/Tablet (A-S Medication Solutions). DailyMed. Source: U.S. National Library of Medicine. https://dailymed.nlm.nih.gov/dailymed/. Accessed 04/10/2019.
9. Dicyclomine Solution for Injection (Leucadia Pharmaceuticals, Inc.). DailyMed. Source: U.S. National Library of Medicine. https://dailymed.nlm.nih.gov/dailymed/. Accessed 04/10/2019.
10. https://www.pharmacologyeducation.org/clinical-pharmacology/clinical-pharmacokinetics
11. https://www.nestle-watersna.com/sites/g/files/pydnoa606/files/asset-library/documents/pdfs/fluid_requirements.pdf
12. https://www.nutritioninnovationlab.org/node/437
13. https://www.ebmconsult.com/app/medical-calculators/maintenance-fluid-calculator
14. https://www.google.com/search?q=NORMAL+SALINE&rlz=1C1GCEU_en-GBRW877RW877&sxsrf=AOaemvLqWlPhzLJXFwYQOG5PvTJsKx8k5Q:1639575757401&source=lnms&tbm=isch&sa=X&ved=2ahUKEwjftuLU9-X0AhURZMAKH

15. .https://www.google.com/search?q=5%25+Dextrose+&tbm=isch&ved=2ahUKEwikqNya-eX0AhXBw4UKHd71CxYQ2-cCegQIABAA&oq=5%25+Dextrose+&gs_lcp=CgNpbWcQAzIHCCMQ7wMQJzIFCAAQgAQyBQgAEIAEMgUIA

16. Infusion Nurses Society (INS). (2016). Infusion therapy standards of practice. Standard 34: Needleless connectors.Journal of Infusion Nursing, 39(Suppl. 1), S68-S70. (Level D)