

PHARMACOLOGY

TEACHER'S GUIDE SENIOR 6 ASSOCIATE NURSING PROGRAM

First Edition

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FOREWORD

Dear Teacher,

Rwanda Basic Education Board is honoured to present teacher's guide for associate nursing program which assists the teacher as guidance to the competence-based teaching and learning to ensure consistence in the learning of pharmacology subject.

The Rwandan educational philosophy is to ensure that student-associate nurses achieve full potential at every level of education which will prepare them to be able to respond to the community health needs and exploit employment opportunities.

In line with efforts to improve the quality of education, the government of Rwanda emphasizes the importance of aligning teaching and learning materials with the syllabus to facilitate their learning process. Many factors influence what they learn, how well they learn and the competences they acquire. Those factors include the relevance of the specific content, the quality of teacher's pedagogical approaches, the assessment strategies and the instructional materials available.

We paid special attention to the activities that facilitate the learning process in which student-associate nurse can develop ideas and make new discoveries during concrete activities carried out individually or with peers. With the help of the teacher, student-associate nurse will gain appropriate skills and be able to apply what they have learnt in real life situations.

Hence, they will be able to develop certain values and attitudes allowing them to make a difference not only to their own life but also to the nation. This is in contrast to traditional learning theories which view learning mainly as a process of acquiring knowledge from the more knowledgeable who is mostly the teacher.

In competence-based curriculum, learning is considered as a process of active building and developing of knowledge and understanding, skills and values and attitude by the student-associate nurses where concepts are mainly introduced by an activity, situation or scenario that helps the student-associate nurses to construct knowledge, develop skills and acquire positive attitudes and values.

In addition, such active learning engages student- associate nurses in doing things and thinking about the things they are doing and they are encouraged to bring their own real experiences and knowledge into the learning processes.

In view of this, your role is to:

- **Plan your lessons and prepare appropriate teaching and learning materials.**
- **Organize group discussions for student-associate nurse considering the importance of social constructivism suggesting that learning occurs more effectively when the student-associate nurses works collaboratively with more knowledgeable and experienced people.**
- **Engage student-associate nurses through active learning methods such as inquiry methods, group discussions, research, investigative activities, group and individual work activities.**
- **Provide supervised opportunities for student-associate nurses to develop different competences by giving tasks which enhance critical thinking, problem solving, research, creativity innovation, communication and cooperation.**
- **Support and facilitate the learning process by valuing student-associate nurses' contributions in the class activities.**
- **Guide student-associate nurses towards the harmonization of their findings.**
- **Encourage individual, peer and group evaluation of the work done in the classroom and use appropriate competence-based assessment approaches and methods.**

To facilitate you in your teaching activities, the content of this teacher's guide is self-explanatory so that you can easily use it. It is divided in 3 parts:

The part 1: Explains the structure of this teacher's guide and gives you the methodological guidance;

The part 2: Gives the sample lesson plans as reference for your lesson planning process;

The part 3: Provides the teaching guidance for each concept given in the student book.

Even though this teacher's guide contains the Answers to all activities given in the Student book, you are requested to work through each question and activity before judging the student's findings. I wish to sincerely extend my appreciation to the people who contributed towards the development of this Teacher's Guide, the Ministry of Health, Human Resource for Health Secretariat (HRHS), University of Rwanda, School of Nursing and Midwifery, Higher Learning Institutions and

Rwanda Basic Education Board.

Special gratitude goes to University faculty, Nurses, Midwives, Teachers, illustrators, designers. HRH Secretariat Staff and REB Staff who diligently worked to successful completion of this book.

Dr. MBARUSHIMANA Nelson

Director General of Rwanda Basic Education Board

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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 i mpairment among others.			
Topic area				Pharmacology			
Sub-topic area				Applied pharmacology			
Unit Title				Medications for fever, pain and inflammation			
Key unity Competence				Provide appropriate medication for pain, fever, seizures, and inflammation			
Title of the Lesson				Medication for inflammation			
Plan for this class(location: in / outside)				In the Class No.005			
Instructional Objectives				By the end of the lesson, the learners of S6 should be able to correctly use anti-inflammatory Drugs.			
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	<ul style="list-style-type: none"> - Ask students to form five groups. - Provide anti-inflammation drugs and instructions to students. 	<ul style="list-style-type: none"> - Form five groups and randomly share responsibility. - choose group representative - Taking list anti-inflammatory drugs needed for this activity 	<ul style="list-style-type: none"> - Competences: - Team working - critical thinking - Communication - Collaboration - Problem solving

	<p>Monitor how the students are progressing towards the knowledge, skills and attitudes to be learned and boost those who are still behind.</p> <p>Teacher moves around to help those who are having difficulties to understand the lesson topic on Mechanism ,therapeutic action ,adverse effects of anti-inflammation</p>	<p>from the available list</p> <ul style="list-style-type: none"> - -Students work in a participative manner on the assignment. - Both boys and girls - Participate actively. 	<p>Crosscutting issues:</p> <ul style="list-style-type: none"> - Gender equality - Lifelong learning - Peace - Financial education - -nterprofes-sional collabo-ration
2.2.Presentation of findings	<ul style="list-style-type: none"> - Invite representatives of groups to presents their views. 	<p>Representatives present group work</p> <ul style="list-style-type: none"> - Other students follow the presentation attentively 	<ul style="list-style-type: none"> - Communication - Critical thinking
1.3Exploitation of students' findings	<ul style="list-style-type: none"> - Ask the students to criticize the presentations one by one. - Ask students to identify correct, incomplete or false information. 		

	<ul style="list-style-type: none"> – 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 <ul style="list-style-type: none"> – Capture the corrections of the teacher 	<ul style="list-style-type: none"> – Communication – Critical thinking
3. Conclusion and assessment :30 minutes	<ul style="list-style-type: none"> – 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. 	<ul style="list-style-type: none"> – Listen the clarification given by the teacher – Take summary – Do the exercises required in student's textbook 	<ul style="list-style-type: none"> – 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			

Part III. UNIT DEVELOPMENT**1.1.Key Unit Competence:**

Provide appropriate medication for pain, fever, seizures, and inflammation

1.2.Prerequisite (knowledge, skills, attitudes and values)

The learners should be introduced to the normal functions of human body and different body structures in the course of biology in the previous years, basic nursing skills in fundamentals of nursing; Surgical and medical pathologies including various ways of drug administration in senior four and five as well nurses' responsibilities and consideration for drug administration. Learnt in previously courses will help the students to acquire knowledge and skills related to inflammation, pain, fever, and seizures in senior six.

The tutor needs to ensure that this content has been covered

1.3.Cross-cutting issues to be addressed**a) Inclusive education**

This unit involves the need to acquire knowledge to prescribe and administer anti-inflammation, pain, fever, and seizures drugs according to the standards and special considerations of patients' conditions. Prescription of drugs and analysis of each patient's specific condition requires critical thinking, and proper use of the brain. Critical thinking may be challenging for learners with mental disabilities, and this requires the teacher to assess the degree of mental disability to the concerned learners. Analysis of the teacher will help to see if the learners may be grouped with others who may critically think.

During teaching, ensure that learners with special needs are included throughout the course delivery. There may be for example learners with visual impairment, hearing impairment or even physical disabilities. For the learners 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 learners 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 learners occupy the front seats, and assess the degree of

hearing impairment so that some may be guided to the healthcare settings to get medical care. 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 learners with physical disability, the teacher needs to assess the degree of impairment, and check if it will be compatible with the professional requirements in later life or throughout the studies. In order to include such category of learners, the teacher must orient the learners on the requirements of the profession, and encourage them to come to class ahead of time to meet the time the course starts.

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

b) Gender education:

Emphasis throughout this unit has to be put on how both male and females have the same opportunities when it comes to generating pharmacology ideas and opportunities, there are no ideas/opportunities specifically reserved or meant for a particular gender but they can all choose whatever ideas they feel capable of.

Give examples of famous people who are successful in real life without considering their gender. Make sure that during different class activities, both boys and girls shares 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. In addition to all having equal opportunities to generate ideas and opportunities to manage Pain ,Fever and Inflammation conditions , emphasis has to be put on how we all regardless of our background, economic or social setup have right to produce ideas that do not discriminate as our needs are the same. Learners need to understand that effective pharmacology ideas should not discriminate but promote inclusiveness of all patients' wellbeing etc.

c) Environment and sustainability:

Learners get basic knowledge from the natural sciences, so introduction to biodiversity is essential, the greatest source of pharmacology ideas and opportunities is the health environment and surrounding situations of what happens in daily living situation and the learners 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 learners to know maximum skills and attitudes on the environmental sustainability and to be responsible in caring for students' environment.

Peace and Values: You need to emphasize to students the need to live in

peace and harmony with others. Learners need to appreciate the application of pharmacology ideas and opportunities that promote peace and are not against the values of the community they want to serve. Learners also need to appreciate the importance of promoting positive health care values especially towards society, clients, stakeholders, settings, and government. Refer to other cross cutting issues as identified in the curriculum framework

1.4.Guidance on the introductory activity

This introductory activity helps you to engage learners in the introduction of medication for pain, fever, seizures, and inflammation and invite the learners to follow the next lessons. The teacher will orient the students on the introductory activity; guide them as they go through the pictures in the student book and ask to form groups of students with a determined number. Inform them that there will be representatives from the groups to present as the rest of the class will be listening attentively and complement their colleagues their observations.

This introductory activity is intended to:

- Motivate the students to learn about medications for pain, fever, seizures, and inflammation
- Offer curiosity and inspiration to the learners about drugs used to manage pain, fever, inflammation and seizures and opportunities to care for case management.
- Emphasis is made on learner’s attention to various health conditions that requires pharmacological treatment of pain, fever, seizures, and inflammation.
- Its purpose is to guide the learners about what they will learn from this unit.
- It can build on previous knowledge, skills, values and attitudes to help the teacher to assess the learner’s prior knowledge and help to link with the new content, or the new content can help to arouse learner’s interest about what to expect in the new content. That can be answered in one lesson, or many

Gradually, over a period of time as the unit progresses. At this point, there is no right or wrong answers as learners 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 or pairs of learners and provide learners with Unit 1 introductory activity, give clear instructions to the activity.

- Ask a determined number of students to brainstorm on introductory activity
- During grouping or pairing, there is a need to ensure that learners with different levels of knowledge and understanding are mixed.
- The teacher also has a responsibility to help learners with different problems.
- Possible answers for the Introduction Activity (1.0): Refer learner's book

The images on introductory activity show patients with fever, pain, inflammation and seizure.

- A is an image of a patient with fever the nurse is taking body temperature for the patient.
- B is an image of a man who is experiencing headache.
- C image showing a man who follow down and who have seizure.
- D image show a wound and someone who is administrating medication to relieve the pain
- E image show different medications used to manage pain, inflammation and seizure

1.5.List of lessons/sub-headings including assessments

Nº of lessons	Lesson title	Learning objectives (From the syllabus including knowledge skills, attitudes)	Periods
1	Overview on pathophysiology of fever	– Describe pathophysiology of fever	2
2	Medications for fever	– Choose an appropriate drug for managing fever – Appreciate the effective management of fever based on national guidelines	2

3	Overview on pathophysiology of pain	<ul style="list-style-type: none"> – Describe the pathophysiology of pain – Utilize different tools for pain assessment and scoring. 	2
4	Medications for pain	<p>Diagnose pain of the patient</p> <p>Choose an appropriate drug for managing pain</p> <p>Manage appropriately acute and chronic pain</p> <p>Appreciate the effective management of pain,</p>	2
5	Pain management Using the WHO Ladder	Demonstrate the appropriate use of WHO pain ladder in management of pain	2
6	Anesthetic drugs	<p>Explain the mechanism of action of local anesthesia</p> <p>Identify types of local anesthesia</p> <p>Identify possible complications related to local anesthesia</p>	2
7	Introduction to anti-inflammatory drugs	<p>Describe physiology of anti-inflammatory drugs</p> <p>Explain characteristics and mode of action of non-steroid anti-inflammatory medications</p>	2
8	Anti-Inflammatory Drugs	<p>Choose an appropriate drug for managing of inflammation</p> <p>Describe the therapeutic and adverse effects of non-steroidal anti-inflammatory medications</p>	2

9	Medications for common cold and rhinitis	Provide appropriate medications for rhinitis and common cold Manage effectively patients with rhinitis and common cold	1
10	Introduction to seizures associated with fever	Describe the management of seizures	1
11	Medication for seizures	Effectively manage seizures related to fever	2
12	End of Unit Assessment		2

Lesson 1: Overview on pathophysiology of fever

a) Learning objectives:

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

To provide appropriate medication for fever

Choose an appropriate drug for managing fever

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 get the skills, knowledge and attitudes embedded in the learning objective. Remember the learning objectives are linked to the key unit competence. This is the first lesson of the first unit medication for pain, fever, seizures, and inflammation. In this lesson you will be dealing with medication for fever. The first thing to do before starting teaching is to remind students that they have learnt about anatomy and physiology and divide them into working groups, and let them discuss on the pictures in students book (Figure.....,). After the introductory activity to assess how much students already know and what they would be interested in learning medications for fever.

c) Teaching aids

Basic materials for a class/ lesson to be conducted include: Desks, Learners books, computer, internet if needed, flipchart, projectors, case studies, sample of different forms of antipyretic drugs and any other trustworthy and reliable resources to enhance learning.

Possible methods:

Pairs, small group discussion, brainstorming, on field observation

d) Learning Activity 1.1 . Introduction to medications for fever

Learners analyze the given images, which relates to the medication of fever. In groups of 3 to 6 students, or in pairs and come with ideas that may help them understand the physiology of fever, diagnose fever to patient and medications for fever that will result in effective management of pain. Refer students to the textbook of pharmacology in library, indicate pages they will read, then instruct them that after 20 period the will bring their findings or answers to be presented in classroom. Harmonize their findings; help them to draw conclusion on physiology of fever and medication for fever.

Harmonize and conclude on the learned knowledge and still engage students in making that conclusion

Teacher' activities

- **Splits learners into groups**
- **Provide the necessary guidance for library searching materials.**
- **Move around in silence to monitor if they are having some problems**
- **Remember to assist those who are weak but without giving them the knowledge.**
- **Invites any three students to present their findings to the rest of students.**
- **Ask other students to follow carefully the presentations**
- **Note on chalk board / Manila paper the student's ideas.**
- **Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.**
- **Harmonize and conclude on the learned knowledge and still engage students in making that conclusion**

Learner's Role

- **learners form groups as instructed**
- **Go to Library to search information as the teacher guided them materials.**
- **Ask questions where it seems not clear**
- **Request assistant if necessary.**
- **Being ready to present their findings to the other students.**
- **To follow carefully the presentations and ask questions if any.**
- **Note on chalk board / Manila paper the student's ideas.**
- **Follow the teacher when ticking the correct findings and correcting those ones which are incorrect**

Learning activities

- Learners analyze the given questions, which relates to the type of fever that is famous in the community, either in groups or in pairs and come with ideas that may result in opportunities to get introduced physiology of fever, signs and assessment of fever, and their intent.
- This activity may be given as a research question or homework. Depending on the purpose of the assessment activity, choose an appropriate method to assess learners' findings, answers or responses.
- Depending on the performance or results, you may decide to give remedial or extension activities.

Answers for learning activity 1.1

Fever is caused by substances called pyrogens. Exogenous pyrogens are usually microbes or their products. Fever is the result of exogenous pyrogens that induce release of endogenous pyrogens, such as interleukin-1 (IL-1), tumor necrosis factor-alpha (TNF-alpha), and IL-6 and other cytokines, which then trigger cytokine receptors, or of exogenous pyrogens that directly trigger Toll-like receptors. Fever results when something raises the hypothalamic set point, triggering vasoconstriction and shunting of blood from the periphery to decrease heat loss; sometimes shivering, which increases heat production is induced.

These processes continue until the temperature of the blood bathing the hypothalamus reaches the new set point.

Answers for self-assessment 1.1

Complete the following sentences

1. Triggering heat production and heat conservation
2. Heat loss mechanisms

Lesson 2: Medications for fever

a) Learning objectives:

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

- Choose an appropriate drug for managing fever
- Appreciate the effective management of fever based on national guidelines

b) Prerequisites/Revision/Introduction:

Read the syllabus to determine what students will learn and be able to do by the end of the lesson. 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. This is the second lesson of the second unit of medication for pain, fever, seizures, and inflammation. In this lesson you will be dealing with medication for fever. The first thing to do before starting teaching is to remind students that they have learnt about anatomy and physiology, medical and surgical pathologies and divide them into working groups, and let them discuss on the content from the student's book and library text book, after the introductory activity to assess how much students already know and what they would be interested in learning about medications of fever.

c) Teaching aids

Basic materials for a class/ lesson to be conducted include: Desks, Learners books, computer, internet, flipchart, projectors, case studies, sample of each form of antipyretic drugs and any other trustworthy and reliable resources to enhance learning.

d) Possible methods:

Pairs, small group discussion, brainstorming

e) Learning activities

Learners analyze the given images, which relates to the medication of fever. In groups of 3 to 6 students, or in pairs and come with ideas that may help them understand the physiology of fever, diagnose fever to patient and medications for fever that will result in effective management of pain. Refer students to the textbook of pharmacology in library, indicate pages they will read, then instruct them that after 20 period they will bring their findings or answers to be presented in classroom. Harmonize their findings; help them to draw conclusion on physiology of fever and medication for fever.

Teacher' activities

- **Splits learners into groups**
- **Provide the necessary guidance for library searching materials.**
- **Move around in silence to monitor if they are having some problems**
- **Remember to assist those who are weak but without giving them the knowledge.**
- **Invites any three students to present their findings to the rest of students.**
- **Ask other students to follow carefully the presentations**
- **Note on chalk board / Manila paper the student's ideas.**
- **Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.**
- **Harmonize and conclude on the learned knowledge and still engage**

students in making that conclusion

Learner's Role

- learners form groups as instructed
- Go to Library to search information as the teacher guided them materials.
- Ask questions where it seems not clear
- Request assistant if necessary.
- Being ready to present their findings to the other students.
- To follow carefully the presentations and ask questions if any.
- Note on chalk board / Manila paper the student's ideas.
- Follow the teacher when ticking the correct findings and correcting those ones which are incorrect

Answers for learning activity 1.2

1. Antipyretic are medications used to treat fever.
2. Paracetamol reduce fever by direct action at the level of the hypothalamus and dilation of peripheral blood vessels, which enables sweating and dissipation of heat.
3. Paracetamol is available in many forms. Acetaminophen is available as tablets, caplets, solutions, suppositories and injectable

Answers for self-assessment 1.2

1. Paracetamol, ibuprofen, aspirin
2. D
3. A, B, D, F

LESSON 3. Overview on pathophysiology of pain

a) Learning objectives:

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

- Describe physiology of pain
- Utilize different tools for pain assessment and scoring

b) Prerequisites/Revision/Introduction:

Read the syllabus to determine what students will learn and be able to do by the end of the lesson. 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. This is the third lesson of the first unit medication for pain, fever, seizures, and inflammation. In this lesson you will be dealing with physiology, assessment and diagnosis of pain. The first thing to do before starting teaching is to remind students that they have learnt about anatomy and physiology, medical and surgical pathologies and divide them into working groups, and let them discuss on the content from the student's book and library text book, after the learning activity to assess how much students already know and what they would be interested in learning about pathophysiology of pain.

c) Teaching aids

Basic materials for a class/ lesson to be conducted include: Desks, Learners books, computer, internet (if needed), flipchart, projectors, case studies, sample of each form of antipyretic drugs and any other trustworthy and reliable resources to enhance learning.

d) Possible methods:

Pairs, small group discussion, brainstorming

e) Learning activities

Teacher' activities

- **Splits learners into groups**
- **Mention the part of the lesson in student book**
- **Provide the necessary guidance for library searching materials.**
- **Move around in silence to monitor if they are having some problems**
- **Remember to assist those who are weak but without giving them the knowledge.**
- **Invites students to present their findings to the rest of students.**
- **Ask other students to follow carefully the presentations**
- **Note on chalk board / Manila paper the student's ideas.**
- **Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.**
- **Harmonize and conclude on the learned knowledge and still engage students in making that conclusion**

Learner's Role

- **Learners form groups as instructed**
- **Go to Library to search information as the teacher guided them and use the different materials to search for informations.**
- **Ask questions where it seems not clear**
- **Request assistant from the teacher where it is needed.**

- **Present their findings to the other students.**
- **Following carefully to the presentations and ask questions if any.**
- **Note on chalk board / Manila paper the student's ideas.**
- **Follow the teacher when ticking the correct findings and correcting those ones which are incorrect.**

Possible answers for learning activity 1.3

1. Pain is a displeasing sensory and emotional experience related to real or potential tissue impairment
2. The pain is assessed using verbal rating scales, numeric scales, and analogues scales. The most commonly used is a numeric scale.

Answer for Self-assessment 1.3

- 1.Types of pain are neuropathic pain, nociceptive pain and sympathetic pain.
- 2.The patient has moderate pain3.
 - a. False
 - Not only diseases lead to pain even damage, injuries, procedures may cause someone's pain
 - b. True
 - The perception of pain is subjective
 - c. False
 - Not all pain medication for pain lead to sedation

LESSON 4. MEDICATIONS FOR PAIN

a) Learning objectives:

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

- Diagnose pain of the patient
- Choose an appropriate drug for managing pain
- Manage acute and chronic pain appropriately

b) Prerequisites/Revision/Introduction:

Read the syllabus to determine what students will learn and be able to do by the end of the lesson. 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. This is the Fourth lesson of the first unit medication for pain, fever, seizures, and inflammation. In this lesson you will be dealing with medication for

pain. The first thing to do before starting teaching is to remind students that they have learnt about anatomy and physiology, medical and surgical pathologies. Divide them into working groups, and let them discuss on the content from the student's book and library text book, after the introductory activity to assess how much students already know and what they would be interested in learning about medications for pain.

c) Teaching aids

Basic materials for a class/ lesson to be conducted include: Desks, Learners books, computer, internet, flipchart, projectors, case studies, sample of each form of antipyretic drugs and any other trustworthy and reliable resources to enhance learning.

d) Possible methods:

Working Pairs, small group discussion, brainstorming

e) Learning activities

Teacher' activities

Ask learners to form groups and read in student's books about different medications used to manage pain, indications forms with posology and different special considerations, indicates them the page, move around in silence to monitor if they are having some problems, remember to assist those who are weak but without giving them the knowledge, invites any students to present their findings to the rest of students. Ask other students to follow carefully the presentations. Note on chalk board / Manila paper the student's ideas. Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.

Harmonize and conclude on the learned knowledge and still engage students in making that conclusion

Learner's Role

- **learners form groups as instructed**
- **Go to Library to search information as the teacher guided them and use different materials to search for information.**
- **Ask questions where it seems not clear**
- **Request assistant if necessary.**
- **Present their findings to the other students.**
- **Following carefully to the presentations and ask questions if any.**
- **Note on chalk board / Manila paper the student's ideas.**
- **Follow the teacher when ticking the correct findings and correcting those ones which are incorrect**

Answer for learning activity 1.4

1. Analgesics are classified as Opioid analgesics (morphine), non-opioid analgesics that include salicylates (aspirin), non-steroidal ant inflammatory drugs (ibuprofen).
2. Morphine is indicated for relief of moderate and severe pain.
3. Tramadol is contra indicated for alcohol intoxication; excessive use of central- acting analgesics, hypnotics, opioids, or other psychotropic drugs; hypersensitivity to tramadol or its components.

Self-assessment 1. 4

1. C (Medications used to treat pain include morphine, ibuprofen and diclofenac)
2. D (Contraindication of morphine is asthma and respiratory depression)
3. B (Tramadol is a weak opioid)

LESSON 5. WORLD HEALTH ORGANIZATION (WHO) PAIN MANAGEMENT LADDER

a) Learning objectives:

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

Demonstrate the appropriate use of WHO pain management ladder .

b) Prerequisites/Revision/Introduction:

Look at the action verb, concept and context of the 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. This is the **Fifth lesson** of the first unit medication for pain, fever, seizures, and inflammation. In this lesson you will be dealing with WHO pain ladder in management of pain with pain myths. The first thing to do before starting teaching is to remind students that they have learnt about pain physiology and its management discuss on the content from the student's book and library text book, after the introduction and assess how much students already know and what they would be interested in learning about WHO Pain Ladder. Also, the teacher needs to ask students what they know about myths some myths about pain

c) Teaching aids

Basic materials for a class/ lesson to be conducted include: Desks, Learners books, computer, internet, flipchart, projectors, case studies, sample of each form of antipyretic drugs and any other trustworthy and reliable resources to enhance learning.

d) Possible methods:

Pairs, small group discussion, brainstorming

e) Learning activities

Teacher' activities

Ask learners to form groups and read in student's books about and search on internet (Teacher will indicate the website updated) Move around in silence to monitor if they are having some problems, remember to assist those who are weak but without giving them the knowledge, invites any students to present their findings to the rest of students. Ask other students to follow carefully the presentations. Note on chalk board / Manila paper the student's ideas. Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.

Harmonize and conclude on the learned knowledge and still engage students in making that conclusion

Learner's Role

- **learners form groups as instructed**
- **Go to Library to search information as the teacher guided them.**
- **Ask questions where it seems not clear**
- **Request assistant if necessary.**
- **Present their findings to the other students.**
- **To follow carefully the presentations and ask questions if any.**
- **Note on chalk board / Manila paper the student's ideas.**
- **Follow the teacher when ticking the correct findings and correcting those ones which are incorrect.**

Possible answers for learning activity 1.5.

1. According to WHO pain management ladder, the levels of pain are Mild pain, moderate pain and severe pain.
2. Management of pain
Mild pain: non-opioid analgesics only or plus adjuvant analgesics
Moderate pain: Weak opioid only or plus non-opioid analgesics or plus adjuvant analgesics.
Severe pain: Strong opioid only or plus non-opioid analgesic or plus adjuvant analgesics.

Possible answers for self-assessment 1.5

1. B (Tramadol)
2. B (Tramadol+ Buscopan)
 - a. Adjuvant drugs are used to enhance the effects of pain medications
 - b. To treat concurrent symptoms
 - c. To provide analgesia for other types of pain

LESSON 6. ANESTHETICS

a) Learning objectives:

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

- Explain the mechanism of action of local anesthesia
- Identify types of local anesthesia
- Identify possible complications related to local anesthesia

b) Prerequisites/Revision/Introduction:

Look at the action verb, concept and context of the 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. This is the **sixth lesson** of the first unit medication for pain, fever, seizures, and inflammation. In this lesson you will be dealing with WHO pain ladder in management of pain with pain myths. The first thing to do before starting teaching is to remind students that they have learnt about medical pathology and surgical pathology discuss on the content from the student's book and library text book on local anesthetics, after the introduction and assess how much students already know and what they would be interested in learning anesthetics.

c) Teaching aids

Basic materials for a class/ lesson to be conducted include: Desks, Learners books, computer, internet, flipchart, projectors, case studies, sample of each form of anesthetic drugs and any other trustworthy and reliable resources to enhance learning.

d) Possible methods:

Pairs, small group discussion, brainstorming

e) Learning activities

Teacher' activities

- Ask learners to form groups and read in student's books about

anesthetics.

- **Move around in silence to monitor if they are having some problems, remember to assist those who are weak but without giving them the knowledge.**
- **Invites any students to present their findings to the rest of students.**
- **Ask other students to follow carefully the presentations**
- **Note on chalk board / Manila paper the student's ideas.**
- **Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.**
- **Harmonize and conclude on the learned knowledge and still engage students in making that conclusion**

Learner's Role

- **Learners form groups as instructed**
- **Go to Library to search information as the teacher guided them**
- **Ask questions where it seems not clear**
- **Request assistant if necessary.**
- **Present their findings to the other students.**
- **Following carefully to the presentations and ask questions if any.**
- **Note on chalk board / Manila paper the student's ideas.**
- **Follow the teacher when ticking the correct findings and correcting those ones which are incorrect**

Possible answers for learning activity 1.6

1. **An anesthetic is a drug used to cause complete or partial loss of sensation**
2. **The wound is painful, before suturing there is a need to provide an anaesthetic drug as it blocks nerve preventing depolarization of nerve membranes, blocking the transmission of pain stimuli and causes the loss of reflexes to allow surgical procedure performance without feeling the pain.**
3. **There are two categories of anesthetics: Local anesthetics and general anesthetics**

Answer for self-assessment 1.6

1. Advantages of using local anesthetics are simple, economical, and no expensive, equipment needed is minimal, postoperative recovery is brief, undesirable effects of general anesthesia are avoided. It is ideal for short and superficial surgical procedures
2. Complications of local anesthetics are discomfort at injection site, tingling sensation, minor bruising, bleeding or soreness where the injection was given, dizziness, headaches, blurred vision, twitching muscles, continuing numbness, weakness or pins, seizures or a cardiac arrest.
3. A. Tablet

LESSON 7. Overview on physiology of inflammation

a) Learning objectives:

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

Describe physiology of anti-inflammatory drugs.

Explain characteristics and mode of action of non-steroid anti-inflammatory medication.

Explain the therapeutic action of non-steroid anti-inflammatory medication.

b) Prerequisites/Revision/Introduction:

Read the syllabus to determine what students will learn and be able to do by the end of the lesson. 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. This is the **seventh lesson** of the first unit medication for pain, fever, seizures, and inflammation. In this lesson you will be dealing with introduction to inflammation. Starting teaching by reminding students that they have learnt about anatomy and physiology, medical and surgical pathologies and divide them into working groups or at individual task, and let them discuss on the content from the students book and library text book, after careful observing the image of introductory activity to assess how much students already know and what they would be interested in learning about inflammation.

c) Teaching aids

Basic materials for a class/ lesson to be conducted include: Desks, Learners books, computer, internet, flipchart, projectors, case studies, sample of inflammation image and any other trustworthy and reliable resources to enhance learning.

d) Possible methods:

Pairs, small group discussion, brainstorming

e) Learning activities

Teacher' activities

- **Ask learners to form groups and read in student's books about inflammation.**
- **Indicates them the page**
- **Move around in silence to monitor if they are having some problems**
- **Remember to assist those who are weak but without giving them the knowledge.**
- **Invites any students to present their findings to the rest of students.**
- **Ask other students to follow carefully the presentations**
- **Note on chalk board / Manila paper the student's ideas.**
- **Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.**
- **Harmonize and conclude on the learned knowledge and still engage students in making that conclusion.**

The teacher refers students in their respective groups to textbooks of Biology, pathophysiology and pharmacology and instruct to read about physiology of inflammation and mode of action of anti-inflammatory drugs, then tell them when to come back for presentation.

Learner's Role

- **Learners form groups as instructed**
- **Go to Library to search information as the teacher guided them.**
- **Ask questions where it seems not clear**
- **Request assistant if necessary.**
- **Present their findings to the other students.**
- **Following carefully to the presentations and ask questions if any.**
- **Note on chalk board / Manila paper the student's ideas.**
- **Follow the teacher when ticking the correct findings and correcting those ones which are incorrect.**

Possible answers for learning activity 1.7

1. These images show person with swelling and redness. On image A, the person may be having a contusion, on image B, the person may have had a burn, on image C, the person may be having an insect bite (redness on the affected area).
2. The causes of inflammation are: physical injury, exposure to toxic chemicals, extreme heat and invading microorganism or cell death.
3. Inflammation is defense mechanism which happen in case the body is exposed to various stimuli like physical injury, exposure to toxic chemicals, extreme heat, invading microorganism or cell death. The damaged tissue releases a number of chemical mediators (histamine, leukotrienes, bradykinin, complement, and prostaglandins) that act as an alarms to notify the surrounding area of the injury to destroy or neutralizing the foreigh body. it is characterized by pain, swelling, fever and change in skin color(redness).

Answers for Self-assessment 1.7

1. The inflammation becomes chronic
2. Chemical mediators of inflammation include histamine, leukotrienes, bradykinin, complement, and prostaglandins

LESSON 8. ANTI-INFLAMMATORY DRUGS

a) Learning objectives:

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

Choose an appropriate drug for managing inflammation

Describe the therapeutic and adverse effects of non- steroidal anti- inflammatory medications

b) Prerequisites/Revision/Introduction:

Read the syllabus to determine what students will learn and be able to do by the end of the lesson. 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. This is the eighth lesson of the first unit of medications for pain, fever, seizures, and inflammation. In this lesson you will be dealing with non-steroid anti-inflammation drugs. starting teaching by reminding students that they have learnt about anti-inflammation drugs and divide them into working groups or at individual task, and let them discuss on the content from the student's book and library text book assess how much students already know and what they would be interested in learning about inflammation.

c) Teaching aids

Basic materials for a class/ lesson to be conducted include: Desks, Learners books, computer, internet, flipchart, projectors, case studies, sample of inflammation image and any other trustworthy and reliable resources to enhance learning.

d) Possible methods:

Pairs, small group discussion, brainstorming

e) Learning activities

Teacher's activities

Ask learners to form groups and read in student's books about inflammation. Indicates them the page. Move around in silence to monitor if they are having some problems. Remember to assist those who are weak but without giving them the knowledge. Invites any students to present their findings to the rest of students. Ask other students to follow carefully the presentations. Note on chalk board / Manila paper the student's ideas. Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.

Harmonize and conclude on the learned knowledge and still engage students in making that conclusion

Learner's Role

- **Learners form groups as instructed**
- **Go to Library to search information as the teacher guided them.**
- **Ask questions where it seems not clear**
- **Request assistant if necessary.**
- **Present their findings to the other students.**
- **Following carefully to the presentations and ask questions if any.**
- **Note on chalk board / Manila paper the student's ideas.**
- **Follow the teacher when ticking the correct findings and correcting those ones which are incorrect.**

Answers for learning activity 1.8

1. Ibuprofen, aspirin, diclofenac, indomethacin
2. Antinflammatory drugs act by blocking prostaglandin synthesis
3. The side effects of Nonsteroidal anti-inflammatory drugs are bleeding, gastric upset and reduced kidney function (the list is exhaustive).

Possible Answers for Self-assessment 1.8

1. Mr. H has an inflammation and pain; diclofenac and ibuprofen are drugs that act both on pain and inflammation).
2. a. Miss N has moderate pain, diclofenac suppository or 75mg in IM will be administered (acute pain needed to be managed as soon as possible that's why parenteral route is preferred for quick action, and for the continuation she has to take drugs per os), then diclofenac 50mg t.i.ds, prn or ibuprofen 400mg t.i.ds.
3. b. Aspirin is contraindicated because she has active bleeding this may lead to more bleeding as aspirin interferes with platelets aggregation.

LESSON 9. MEDICATIONS FOR COMMON COLD AND RHINITIS

a) Learning objectives:

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

Provide appropriate medications for common cold and rhinitis

Manage effectively patients with rhinitis and common cold

b) Prerequisites/Revision/Introduction:

Read the syllabus to determine what students will learn and be able to do by the end of the lesson. 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. This is the ninth lesson of the first unit medication for pain, fever, seizures, and inflammation. In this lesson you will be dealing with medications for rhinitis and common cold. starting teaching by reminding students that they have learnt about non-steroidal anti-inflammatory medication and divide them into working groups or at individual task, and let them discuss on the content from the student's book and library text book assess how much students already know and what they would be interested in learning about medications for common cold and rhinitis.

c) Teaching aids

Basic materials for a class/ lesson to be conducted include: Desks, Learners books, computer, internet, flipchart, projectors, case studies, sample of medications for rhinitis and common cold and any other trustworthy and reliable resources to enhance learning.

a) Possible methods:

Pairs, small group discussion, brainstorming

b) Learning activities

Teacher' activities

Ask learners to form groups and send them to library, indicate books to read and instruct them when to come back in class for presentation. Invites any students to present their findings to the rest of students. Ask other students to follow carefully the presentations. Note on chalk board / Manila paper the student's ideas. Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.

Harmonize and conclude on the learned knowledge and still engage students in making that conclusion.

Learner's Role

- **Learners form groups as instructed**
- **Go to Library to search information as the teacher guided them.**
- **Ask questions where it seems not clear**
- **Request assistant if necessary.**
- **Present their findings to the other students.**
- **Following carefully to the presentations and ask questions if any.**
- **Note on chalk board / Manila paper the student's ideas.**
- **Follow the teacher when ticking the correct findings and correcting those ones which are incorrect**

Possible answers for learning activity 1.9

1. Medications for common cold are grouped into three groups.

A. Antihistamines Example Chlorpheniramine, promethazine, desloratidine, loratidine

B. Antinflammatory drugs: corticosteroids

C. Decongestants example: Beclomethasone

4. 2. Antihistamines medications act by blocking the release or action of histamine, a chemical released during inflammation that increases secretions and narrows airways.

Possible answers for self assessment 1.9.

1. C

2. B

3. D

LESSON 10. Overview on pathophysiology of seizures

a) Learning objectives:

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

Explain the mechanism of seizures related to fever

b) Prerequisites/Revision/ guidance to introductory activity:

Read the syllabus to determine what students will learn and be able to do by the end of the lesson. 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. This is the tenth lesson of the first unit of medication for seizures. In this lesson you will be dealing with introductory to anti-seizure medications. Starting teaching by reminding students that they have learnt about non-medical pathology and neurological at individual task, and bring them to discuss on the content from the students book and library text book assess how much students already know and what they would be interested in learning about the pathophysiology seizures.

c) Teaching aids

Basic materials for a class/ lesson to be conducted include: Desks, Learners books, computer, internet, flipchart, projectors, case studies, sample of medication for seizures and any other trustworthy and reliable resources to enhance learning.

d) Possible methods:

Pairs, small group discussion, brainstorming

e) Learning activity 1.10. Medications for seizures

Teacher' activities

Ask learners to form groups and read in student's books about medication for seizures, indicates them the page. Move around in silence to monitor if they are having some problems, remember to assist those who are weak but without giving them the knowledge. Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete

Learner's Role

- **Learners form groups as instructed**
- **Go to Library to search information as the teacher guided them.**
- **Ask questions where it seems not clear**

- Request assistant if necessary.
- Present their findings to the other students.
- Following carefully to the presentations and ask questions if any.
- Note on chalk board / Manila paper the student's ideas.
- Follow the teacher when ticking the correct findings and correcting those ones which are incorrect

Answers for learning activity 1.10

1. Someone is impressed struggling to handle the person with problems who is sleeping on floor. The person in red t-shirt is trying to hold the person with several abnormal body movements without success. Even the head of the person shown those abnormal movements. After occurrence of seizure the patient is very tired and weak.
2. Seizures are uncontrolled electrical activity in the brain that may lead to symptoms ranging from mild loss of attention to violent muscular contractions that can lead to death. Everyone has the potential to have seizures or convulsion. The seizures occur when there is an abnormal electrical activity in the brain.

Self -assessment 1.10.

1. A
2. C
3. A. True
B. True
c. False

LESSON11. MEDICATIONS FOR SEIZURES

a) Learning objectives:

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

Describe the management of seizures associated with high fever

b) Prerequisites/Revision/ Introduction:

Read the syllabus to determine what students will learn and be able to do by the end of the lesson. 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. This is the eleventh lesson of the first unit of medication for seizures.

In this lesson you will be dealing with seizures related to fever. starting teaching by reminding students that they have learnt about non- medical pathology and neurological at individual task, and bring them to discuss on the content from the student's book and library text book assess how much students already know and what they would be interested in learning about medications for seizures.

c) Teaching aids

Basic materials for a class/ lesson to be conducted include: Desks, Learners books, computer, internet, flipchart, projectors, case studies, sample of medication for seizures and any other trustworthy and reliable resources to enhance learning.

d) Possible methods:

Pairs, small group discussion, brainstorming

e) Learning activities

Teacher' activity 1.11

Ask learners to form groups and read in student's books about medication for seizures, indicates them the page. Move around in silence to monitor if they are having some problems, remember to assist those who are weak but without giving them the knowledge. Tick the correct findings and correct those ones which are incorrect and try again to complete those which are incomplete.

Learner's Role

- **Learners form groups as instructed**
- **Go to Library to search information as the teacher guided them.**
- **Ask questions where it seems not clear**
- **Request assistant if necessary.**
- **Present their findings to the other students.**
- **Following carefully to the presentations and ask questions if any.**
- **Note on chalk board / Manila paper the student's ideas.**
- **Follow the teacher when ticking the correct findings and correcting those ones which are incorrect**

Possible answers for learning activity

1.11.

1. There are four classes of drugs used as anticonvulsants and examples: Barbiturates (Phenobarbital), Hydantoins (Phenytoin, Carbamazepine, Valproic acid), Benzodiazepines (Diazepam, lorazepam) and Succinimides (Ethosuximide).
2. The common side effects of antiseizures drugs are: poor concentration,

short term memory loss, drowsiness, fatigue, hyperactivity, Visual problems (blurred or double vision), speech problems, poor coordination and balance, dizziness and unsteadiness, nausea, vomiting and weight gain or loss.

Self-assessment 1.11

1. C (phenobarbital)
2. B. (benzodiazepines)
3. C. (Succinimides)
4. A. (Tegretol)

Answer for end unit assessment 1.12.

1.6. Unit summary

Fever is interceded by hypothalamus and it induces reactions depending on the status of body temperature.

- The accurate way of Fever diagnosis using the thermometer
- Paracetamol is the chief medication for fever management
- Ibuprofen and aspirin are both anti-inflammatory drugs and antipyretics
- Nonsteroidal anti-inflammatory drugs block prostaglandin and the result is relieving inflammation
- The common side effect of NSAIDs gastric upset in general and bleeding(aspirin
- Pain is subjective perception in nature
- Numeric scale is the commonly used for pain assessment
- For better pain management WHO Ladder is considered
- NSAIDs, adjuvants, weak opioids, strong opioids are used to manage pain
- Lidocaine is a commonly used local anesthetic
- Fever induced seizure are very common in kids
- Antihistamine, decongestants are drugs used to treat common cold and rhinitis
- -Phenobarbital, diazepam and phenytoin are commonly used antiseizure drugs

1.7. Additional information for teachers

Anti-inflammatory drugs

The steroids drugs like prednisolone, dexamethasone act as anti-inflammatory drugs.

Pain physiology and management

Nociceptive Pathways of pain

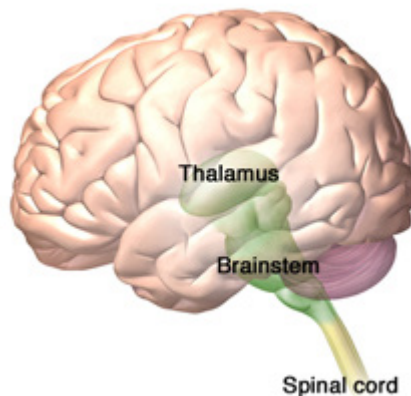
The classic nociceptive pathway involves three types of neurons:

- **Primary sensory neurons in the peripheral nervous system, which conduct painful sensations from the periphery to the dorsal root of the spinal cord**
- **Secondary sensory neurons in the spinal cord or brainstem, which transmit the painful sensation to the thalamus**
- **Tertiary sensory neurons, which transmit the painful sensation from the thalamus to the somatosensory areas of the cerebral cortex.**

There are two major classes of nerve fibers associated with the transmission of pain:

1. Unmyelinated C fibers
2. Myelinated A-delta fibers

Destinations of the Spinothalamic and Spinoreticular Tracts in the Brain



The thalamus is the destination of spinothalamic tract—the sensory pathway responsible for processing pain, temperature, and crude touch. The brainstem reticular formation, which forms a diffuse, central core within the brainstem is the destination of the spinoreticular tract. Source: 3DScience.com. Used by permission.

The C fibers are small and conduct impulses slowly. They respond to thermal, mechanical, and chemical stimuli and produce the sensation of dull, diffuse, aching, burning, and delayed pain. A-delta fibers, which are myelinated and thus conduct impulses rapidly, respond to mechanical (pressure) stimulus and produce the

sensation of sharp, localized, fast pain.

One of the most important central pain pathways is the spinothalamic tract, which originates in the spinal cord and extends to the thalamus. This spinal tract transmits sensory information related to pain, temperature, and crude touch.

Another prominent pathway is the spinoreticular tract, which is involved in nociceptive processing. The spinoreticular tract is similar to the spinothalamic tract in that it is excited by similar sensory fibers. Rather than ascending to the thalamus however, spinoreticular neurons terminate within the brainstem.

The management of pain do not require only drugs. There are many non-pharmacology measures of managing pain. Researches have revealed that they stimulate descending inhibitory pathway and decreases afferent stimulation. These measures include but not limited to music, distraction, massage, positioning, aromatherapy, reflexology, warmth and for children swaddling, non-nutritive sucking etc.

Unrelieved pain

Unrelieved pain is a stressor that can lead to physiologic changes and negative effects on the endocrine, cardiovascular, gastrointestinal, and immune systems. The endocrine system reacts to unrelieved pain by releasing an excessive amount of hormones, ultimately resulting in carbohydrate, protein, and fat catabolism, poor glucose utilization, and other harmful effects. This reaction combined with inflammatory processes can produce weight loss, tachycardia, increased respiratory rate, fever, shock, and death.

The cardiovascular system responds to the stress of unrelieved pain by activating the sympathetic nervous system. Following a surgical procedure, for example, this can include hypercoagulation and increased heart rate, blood pressure, cardiac workload, and oxygen demand. Since the stress response causes an increase in sympathetic nervous system activity, intestinal secretions and smooth muscle sphincter tone increase, and gastric emptying and intestinal motility decrease. This response can cause temporary impairment of gastrointestinal function and increase the risk of ileus (intestinal obstruction). Aggressive pain control may be needed to reduce these effects and prevent thromboembolic complications.

Unrelieved pain may be especially harmful for patients with metastatic cancers. Stress and pain can suppress immune function, including the natural killer cells that play a role in preventing tumor growth and controlling metastasis.

Anesthetics drugs

Apart from their classification as local and general anesthetics, anesthetics are also classified based on their chemical composition as follows:

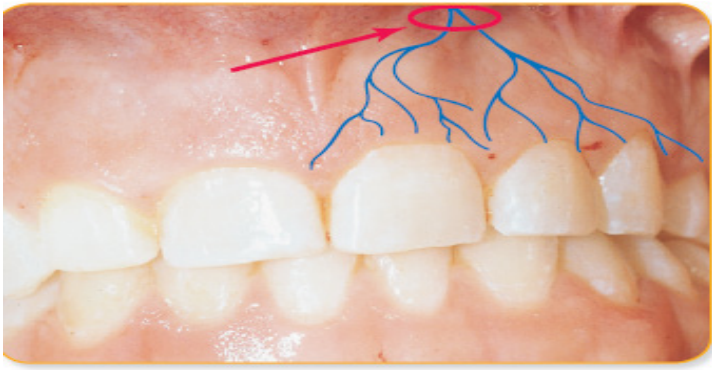
Chemical class	Example
Esters	Benzocaine, chlorprocaine, cocaine, procaine Hydrochloride, tetracaine
Amides	bupivacaine hydrochloride, lidocaine hydrochloride, mepivacaine
Miscellaneous Agents	Dyclonine,(for ear, nose, and throat Procedures),pramoxine (for minor medical Procedures)

There are five major routes for applying local anaesthetics. These routes are summarized as follows:

Topical



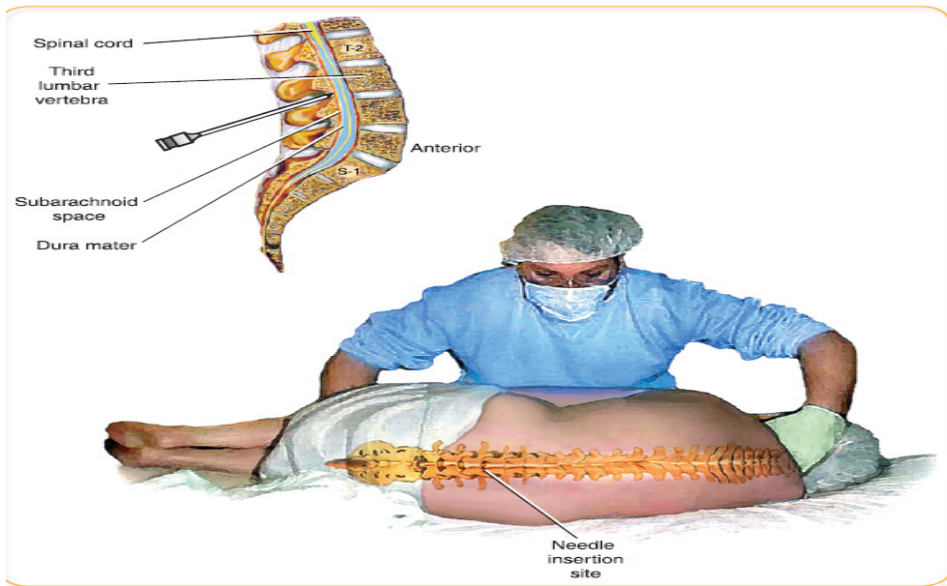
Nerve block



Infiltration



Spinal and Epidural



1.8. Answer for end unit assessment 1.12.

1. B. Paracetamol is a commonly used antipyretic and may have an analgesic effect
2. True
3. nonsteroidal anti-inflammatory drugs (NSAIDs), salicylates, acetic acid classes
4. A. Cyclo-oxygenase
5. C. Aspirin
6. D. Phenobarbital
7. B. Antihistamines, anti-inflammatories and decongestant drugs .
8. A. Dizziness, ringing in ears, difficult in breathing, nausea, vomiting, diarrhea and mental confusion
9. D. Penicillin procaine
10. C. Aspirin
11. A. Destroy the cause of inflammation
12. Anti-inflammatory agents are drugs that block the effects of the inflammation. They act by blocking of prostaglandin mediators. They also reduce fever by direct effects on the thermoregulatory center in the hypothalamus
13. To manage Mr. the following class of medications are needed

- i. Analgesic: Paracetamol 1G IV then 500mg tids
Antipyretics: Paracetamol
Antiseizures: Diazepam 2-10mg IM or Iv slowly repeat after 4 hrs if recurrence or phenobarbital sodium 30-320mg IM or IV repeat every 6hrs if recurrence.
- ii. As the patient has history of gastritis, the salicylates and nonsteroidal antiinflammatory drug like ibuprofen, diclofenac are contraindicated because they may worsen gastritis.

1.9.Additional activities

1.9.1.Remedial Activities

1. Fever and pain are a common sign for patients. The physiology of pain.
2. Describe the mechanism of action of NSAIDs anti-inflammatory drugs
3. NSAIDs and opioids can be combined (True or false)

Answers to remedial activities

1. **Physiology** of pain: pain occurs when sensory nerve endings called **nociceptors** (also referred to as pain receptors) come into contact with a painful or noxious stimulus. The resulting nerve impulse travels from the sensory nerve ending to the spinal cord, where the impulse is rapidly shunted to the brain via nerve tracts in the spinal cord and brainstem. The brain processes the pain sensation and quickly responds with a motor response in an attempt to cease the action causing the pain.
2. They act by blocking prostaglandin synthesis
3. True

1.9.2.Consolidation activities

1. Enumerate drugs used to treat fever, pain, inflammation, and common cold and rhinitis

Answers to consolidation activities

- i. Fever: Paracetamol, aspirin, Ibuprofen
- ii. Pain: Morphine, tramadol, paracetamol, aspirin, ibuprofen, diclofenac
- iii. Inflammation: Ibuprofen, aspirin, diclofenac
- iv. Common cold and rhinitis: Cholorpheniramin, desloratidin, ephedrine.....

1.9.3.Extended activities

1. Why are most of medications for inflammation treat at the same fever?
2. Opioids acts at

A.Spinal cord and brain

B.Spinal cord only

C.Brain only

D.Spinal cord and site of stimulation

3. NSAIDs causes stomach aches, give at least 2 reasons
4. Patients receiving ibuprofen on a regular basis should be told to contact nurse practitioner immediately if they note

A.Slow heart rate

B.Unusual bruising

C.Upset stomach

D.Slight dizziness

5. Antipyretic which causes decreased platelet aggregation and that causes gastric ulcers is

A.Diclofenac

B.Ibuprofen

C.Aspirin

D.Paracetamol

6. Salicylates increase the clotting time by

Answers to extended activities

1. Among the signs of inflammation, the hotness or fever is included
2. (A) Spinal cord and brain
3. (B) They are acidic and by their action of blocking cox 1, they block gastric mucosa turnover

4. Unusual bruising
5. (C) Aspirin
6. Inhibiting aggregation

2.1 Key unit competence

At 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

There may be a diversity in answers from the respondents.

- 1) Image A shows a patient with a peptic ulcer (Gastric ulcer). That patient requires the management that uses the drugs acting on the gastrointestinal tract.

Image B displays a patient with abdominal pain, and the stomach which might have a lot of acid in it. That patient will also be managed using different medications acting on the gastrointestinal tract.

Image C shows a patient who is vomiting. In the management of the patient's condition, the drugs acting on the gastrointestinal tract that include antiemetic drugs.

Finally, the image D shows a patient with abdominal pain as she exhibits features indicating that she is having pain. In her management, drugs acting on the gastrointestinal tract will be included such as antispasmodics.

- 2) In image E, home-made rehydration solution is getting prepared. Different products (salt and water) are getting dissolved in water at appropriate proportions to prepare the solution.

The image F shows a sachet of ORS (Oral rehydration salt). It is a ready-made product of oral rehydration salts that are used in the management of dehydration at varying levels. The oral rehydration salts are used in the management of different gastrointestinal conditions that induce vomiting or diarrhea.

The image G shows a healthcare provider who is hanging and preparing the infusion. That infusion will be administered intravenously, and it may help in the management of different gastrointestinal conditions such as diarrhea and vomiting which may cause dehydration.

The image H displays an image of the bottle containing antispasmodic tablets.

Different gastrointestinal conditions cause spasmodic pain, and these spasms may be managed effectively with antispasmodics.

Finally, the image I shows an antiemetic medication called motilium. It may be used in the management of different gastrointestinal conditions that may induce vomiting.

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	Body fluid compartments	Calculate body fluid requirements	2
		Appreciate the importance of timely management of diarrhea and vomiting	
9	Intravenous fluids and calculation of drop rate	Discuss intravenous fluid to manage fluids and electrolytes imbalances	2
		Calculate body fluid requirements	
		Calculate correctly drop rate before intravenous fluid administration	
		Administer appropriately the intravenous fluids	
		Document correctly the administered fluids	

10	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	
11	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	
12	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 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)**
 - **Intravenous fluids**
 - **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 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 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 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. FALSE
3. FALSE

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 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 has a direct toxic effect on H. pylori.

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 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 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 each 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: Body fluid compartments

a) Learning objectives:

By the end of the session, the students should be able to describe confidently the mechanism of action of body fluid compartments, 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 laxative drugs.

You then assess how much students already know and what they would be interested in learning about body fluid compartments.

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 2.8. Body fluid compartments

Teachers' activities:

- Ask students to do in pairs 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 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 activity 2.8

1. The 3 key factors in the movement of fluids are: Osmolality, tonicity and osmolarity
2. The 4 components of extracellular fluid are:
 - Plasma
 - Interstitial fluid and lymph
 - Bone and dense connective tissue water
 - Transcellular (cerebrospinal, pleural, peritoneal, synovial, and digestive secretions)
3. (B) Intracellular fluid and extracellular fluid compartments

Answers for self-assessment 2.8

1. (A) 30-35ml/kg

2. (C)Weight
3. TRUE

Lesson 9: Intravenous fluids and calculation of drop rate.

a) Learning objectives:

Introduce the session by briefly reviewing the objectives and using the lecturing that you prepared on the Intravenous fluids and calculation of drop rate.

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

- **Describe general principles for the administration of intravenous therapy.**
- **Discuss the use of infusion devices for intravenous therapy.**
- **Calculate drip rates for IV infusions correctly.**
- **Explain the nurse's responsibility during administration of fluids**

a) Prerequisites/Revision/Introduction:

This is the ninth lesson of the second unit of drugs acting on the gastrointestinal tract. In this lesson you will be dealing with balance between fluid input and fluid output. 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.

You then assess how much students already know and what they would be interested in learning about the intravenous fluids and calculation of drop rate.

An in introduction remind students that in clinical practice, restoring and maintaining proper fluid volume, composition, and distribution is a significant problem in the treatment of seriously ill patients and those with or at risk of fluid and electrolytes imbalance, nurse's responsibility during administration of fluids so that they can prepare themselves for this lesson.

Even if IV solutions come from the pharmacy with labeled directions for flow rates, the nurse administering the solution, as the individual responsible for the administration, must do the calculation and verify that it is correct before hanging. This course covers basic principles of administration of IV fluids and calculation of IV drip rates, Classification of intravenous fluids, nurse's responsibility during administration of fluids. Mathematical calculations will be demonstrated and opportunities for self-assessment are included.

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.

b) 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.

c) Possible methods:

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

d) 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 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**

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.

Answers for Learning activities 2.9

1. The IV fluids are classified considering the effect that they may exert to the cells when they reach human body. According to their tonicity, intravenous fluids are classified as isotonic, hypertonic and hypotonic.
2. The indications of IV fluids include the following:
 - To refill total body water. Example: NS 0.09% (In case of diarrhea for example)
 - To restore blood volume and pressure. Example: RL (In case of hypotension)
 - To shift water from one fluid compartment to another. Albumin 5% (In case of severe burn)
 - To restore and maintain electrolyte and acid–base balance. NS 0.09% or RL (In case of vomiting)
3. Answer: Total volume = 500 ml
Total time to administer = 2 hours
Drop factor = 20
So, Drops per minute (DPM) = $500/2 * 20/60 = 83.33$

Answers for Self-assessment 2.9

True or false

1. True: Isotonic solutions are used: to increase the EXTRACELLULAR fluid

volume

2. False: if a cell is placed in a hypotonic solution, there will be a net flow of water into the cell, and the cell will gain volume.
3. True: Crystalloids have small molecules, are cheap, easy to use, and provide immediate fluid resuscitation, but may increase oedema. Colloids have larger molecules, cost more, and may provide swifter volume expansion in the intravascular space, but may induce allergic reactions, blood clotting disorders, and kidney failure
4. False. It is mandatory to take history before intravenous fluid administration

Choose the correct answer

1. C
2. B
3. B
4. D

Answer:

Total volume = 1000 ml

Total time to administer= 3hours

Drop factor = 20

So, Drops per minute (DPM) = $1000/3 * 20/60 = 111$

Lesson 10: ORS and homemade rehydration solution

a) Learning objectives:

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

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

e) 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.

b) 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.

c) Possible methods:

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

d) Learning activities 2.10. ORS and homemade rehydration

Teachers' activities:

- **Ask students to do in small groups the activity 2.10 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 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 2.10

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)

Self-assessment 2.10

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 11: 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.

f) Learning activities 2.11. Antispasmodic drugs

Teachers' activities:

- Ask students to do in small groups, pairs activity 2.11 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 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 2.11 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 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 2.11

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 2.11

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

3.6. 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 as 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.

3.7. 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

Answers to end unit assessment 2.12.

1. (C) Skin color
2. (D) Antacids.
3. (A) They 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 = $500\text{ml} \times 20 / 180\text{min} = 55 \text{ drops/min}$

3.9. Additional activities

3.9.1. 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. 1.F
2. 2.T

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

3.9.2.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%
5. 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
6. Which of the following drugs has been approved to specifically treat traveler's diarrhea?
 - a.Rifaximin
 - b.Metoclopramide
 - c.Promethazine
 - d.Hyoscine
7. 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

3.9.3. 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: $1000\text{ml} \times 10 / 120 = 83 \text{ drops/min}$

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.

1.1. 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 Describe general principles guiding the pharmacotherapy of hypertension using vasodilators and sympatholytic 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			2
	National treatment guidelines for Diabetes mellitus drugs	Utilize national treatment guidelines for NCDs in clinical management	
11	Antiinflammatory drugs in asthma 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

- Hypertension is a high blood pressure above normal ranges.
- Mild, moderate and severe
- Diuretics, calcium channel blockers, angiotensin converting enzyme inhibitors, angiotensin II receptor antagonists/bloc a kers, 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.

a) 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.

b) 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.

c) 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 activity 3.2

1. Diuretics are drugs that increase sodium excretion and lower blood volume.
2. Thiazides: E.g.: Hydrochlorothiazide; 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 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 activity 3.4

1. Two categories of drugs that interfere with the activity of angiotensin"
 - **Angiotensin enzyme inhibitors**
 - **Angiotensin receptor blockers**
2. Examples for each category:
 - **Angiotensin enzyme inhibitors: Captopril and Enalapril**
 - **Angiotensin receptor blockers: Losartan, valsartan**

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 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 selfassessment3.5

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 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 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

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 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 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

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 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.

Self-assessment 3.10

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

Lesson 11. Introduction to anti-asthmatic drugs

a) Learning objectives:

By the end of the session, the students will be able to define asthma and classify anti-asthmatic 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, medical pathology and surgical pathology. Assess how much students already know and what they would be interested in learning about anti-asthmatic 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 3.11. Introduction to anti-asthmatic drugs

Teachers' activities:

- **Ask students to do in small groups 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 in small groups 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 activity 3.11

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

Self-assessment 3.11

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

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

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 beclomethasone

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

TEP 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 BMI >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
3. 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.

Eclampsia : 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
- Furosemide, 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

- Hydralazine 0.2-0.6mg/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.

3.8. Answers to 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

3.9. Additional activities

3.9.1 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

3.9.3.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

3.9.3. 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).

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