

PHARMACOLOGY

LEARNING OBJECTIVES

- Acquire knowledge on the general principles of general pharmacology, including pharmacokinetics and pharmacodynamics.
- Acquire knowledge on the different classes of drugs used for different systems, the main mechanisms of action, therapeutic uses, side effects and toxicity;
- Acquire knowledge of the main drug interactions;
- Acquire knowledge of the principles of pharmacovigilance;

SUGGESTED READING:

- H. P. Rang, M. Maureen – Farmacologia- Ed.Elsevier

CONTENT

General pharmacology:

1. Introduction to Pharmacology: knowing the general concepts of drug and adverse reaction;
2. Know the principles of drug development, clinical trials (phase I, II and III), and pharmacovigilance;
3. Introduction to the concept of Pharmacokinetics:
 - Know the concepts of Absorption, Diffusion, Excretion and determining factors (Fick's law, plasma proteins, tissue vascularisation, drug solubility);
 - Know the principles of drug metabolism (phase I and II reaction) and first pass effects;
 - Know the general concepts behind pharmacogenomics;
 - Know how to describe the main causes of variability in drug response;
 - Know and be able to describe the concepts of clearance, half-life, bioavailability, therapeutic index, tolerance and sensitivity.
4. Introduction to the concept of Pharmacodynamics
 - Know the concepts of receptor, drug-receptor binding, dose-response relationship of a drug, concept of agonist and antagonist and modification of the dose-response curve;
 - Know the concept of potency and efficacy of a drug,
 - Classify the basic molecular receptor types in pharmacology: nuclear receptors, G-protein-coupled receptors, channel receptors, ligand-activated receptors, transporters, cell adhesion proteins and enzymes;
 - Know the general principle of dose-response relationship following: single administration or repeated administration.

Specific pharmacology:

PHARMACOLOGY OF THE NERVOUS SYSTEM

1. Pharmacology of the autonomic nervous system (ANS):
 - Know the anatomical and functional principles of the Autonomic Nervous System, including pre and postganglionic receptors and neurotransmitters.
 - Know how to explain the main drugs that are agonists and antagonists of nicotinic, muscarinic and adrenergic receptors and their mechanisms of action.
2. Anxiolytics and hypnotic-inducing drugs:
 - Know the pathophysiology of anxiety and insomnia and the receptors involved
 - Be able to explain the main drugs used for anxiety and their mechanisms of action, including benzodiazepines; barbiturates and Z-drugs.
3. Antidepressant drugs:
 - Know the pathophysiology of depression and its connections with anxiety,
 - Be able to illustrate and describe the main drugs used to treat depression, including tricyclics, selective and non-selective serotonin and noradrenaline inhibitors and their mechanisms of action.

- Be able to describe the main adverse effects
4. Antipsychotic drugs:
- Know the pathophysiology of psychosis,
 - Know how to explain the main drugs used for psychosis (atypical and typical antipsychotics).

- Be able to describe the mechanisms of action and the main adverse effects
5. Anti-epileptic drugs:
- Know the pathophysiology of epilepsy and classification of seizures
 - Know the main old and new generation antiepileptic drugs and their applications and mechanisms of action.
 - Be able to describe the main adverse effects
6. Drug addiction:
- Know the pathophysiology of addictions, the main causes, and the brain circuits involved
 - Know how to classify the systemic effects of substance abuse and the mechanisms of addiction.
 - Know the pharmacology and management of chronic addiction and acute intoxication by substance abuse.
7. Principles of pain management:
- Understand the physiology of pain
 - Know how to describe the main analgesic drugs: non-steroidal anti-inflammatory drugs, morphine and non-morphine-like drugs, their mechanisms of action and side effects.
8. General and local anaesthetics:
- Know the main general and local anaesthetics used in the clinic, the principles of pharmacokinetics underlying their functioning and use, their clinical applications and side effects.
9. Drugs therapy for neurodegenerative diseases:
- Know the pathophysiology of neurodegenerative diseases (Alzheimer's and Parkinson's disease)
 - Be able to explain the main classes of drugs used for neurodegenerative diseases and their associated side effects and mechanisms of action.

PHARMACOLOGY OF THE CARDIOVASCULAR SYSTEM

1. Antianginal drugs:
- Know the pathophysiology of angina and classification of types of angina
 - Understand the main drugs used for angina (nitroderivatives, calcium antagonists and beta blockers), their mechanisms of action, their application to types of angina and their adverse effects.
2. Antihypertensive drugs and heart failure:
- Know the physiology of the hypertension process and regulatory systems involved
 - Know how to describe the main hypertensive drugs: diuretics, renin/angiotensin system drugs, sympatholytics, digitalis and their mechanisms of action.
 - Describe the main adverse effects associated with anti-hypertensive drugs.
3. Antiarrhythmic drugs:
- Know the pathophysiology of arrhythmias and their classifications
 - Describe the main antiarrhythmic drugs acting on voltage-dependent sodium, calcium and potassium channels, their mechanisms of action and their adverse effects.
4. Anticoagulant drugs
- Know the coagulation process and pathological changes
 - Know how to explain the main anti-platelet and anticoagulant drugs and their mechanisms of action.
5. Anti-cholesterol drugs
- Understand the process of cholesterol biosynthesis
 - Be able to explain cholesterol-blocking drugs and mechanisms.

ENDOCRINE SYSTEM PHARMACOLOGY

1. Introduction to the endocrine system:
- Know the basic principles of the anatomy and physiology of the hypothalamus-pituitary axis, the feedback and feedforward control system
 - Be able to describe the main hormones involved and of relevance to pharmacology.

2. Pharmacology GH and prolactin hormones
 - Know the pathological changes related to irregularities in their release: acromegaly, gigantism, dwarfism, hyper- and prolactinemia
 - Know how to describe the main drugs and mechanisms for replacement therapy or blockers: somatostatin receptor antagonists and dopamine agonists (bromocriptine, cabergoline)
3. Thyroid pharmacology
 - Know the pathologies linked to hyper- and hypothyroidism
 - Know how to describe the main drugs used for replacement therapy for hypothyroidism and anti-thyroid drugs for hyperthyroidism and the associated side effects.
4. Glucocorticoid pharmacology
 - Know the main hormones of the adrenal cortex: cortisol, aldosterone and dehydroepiandrosterone, their biosynthesis and physiological effects.
 - Know the pathologies linked to cortisol overexposure (Cushing's syndrome) and causal factors
 - Know how to explain the pharmacology of glucocorticoids: replacement therapy and cortisol production blockers.
5. Sex hormones pharmacology
 - Know the main sex hormones (oestrogen, progesterone and androgen), production regulation and physiological functions (menstrual cycle regulation and male and female organ development)
 - Know how to illustrate pathologies related to sex hormones: breast and prostate cancers, primary and secondary ovarian failure
 - Know how to describe the drugs used for the dysfunctions of the sexual endocrine pathways and their mechanisms: selective and non-selective oestrogen, progesterone and androgen blockers.
 - Know the applications for different related diseases and side effects
6. Oxytocin and vasopressin pharmacology
 - Know the main agonist and antagonist drugs, their applications and side effects

PHARMACOLOGY OF THE RESPIRATORY SYSTEM and ALLERGIC REACTIONS

1. Pharmacology of asthma
 - Know the pathophysiology of asthma
 - Understand the main anti-asthmatic drugs (bronchodilators and glucocorticoids), routes of administration and associated adverse effects.
2. Allergy medication
 - Know the processes of histamine release and the associated physiological and pathological effects.
 - Describe the main antihistamine drugs, their therapeutic applications and side effects.
3. Anti-inflammatory drugs
 - Understand the pathophysiology of the inflammatory process
 - Know how to describe classes of anti-inflammatory drugs, molecular targets, applications and side effects

PHARMACOLOGY OF THE GASTROINTESTINAL SYSTEM

1. Principles of physiology of the gastrointestinal system
 - Understand the pathophysiology of ulcers
 - List the main antacid drugs, proton pump inhibitors, muscarinic antagonists, histamine antagonists, and the mechanisms by which they act.
2. Antiemetic drugs
 - Know the physiological mechanisms of emesis, the pathological consequences and pharmacology for its positive and negative modulation.

PRINCIPLES OF CHEMOTHERAPY

1. Cancer chemotherapies
 - Know the molecular mechanisms underlying neoplastic formation and the characteristics of neoplastic cells
 - Know how to explain the general principles of anticancer drugs and associated adverse reactions: cytotoxic drugs, hormonal drugs and targeted therapies
2. Chemotherapy of infections
 - Know the general principles of antibiotic drugs: bacteriostatic, bactericides, molecular targets
 - Know how to explain the main classes of antibiotic drugs, mechanisms, applications and side effects
3. Antifungals
 - Know the cellular and molecular characteristics of fungal cells
 - Know how to explain the main classes of antifungal drugs, mechanisms, applications and side effects

MODULE: CLINICAL AND PAEDIATRIC GENERAL NURSING SCIENCES

MED/45 COURSE OBJECTIVE

- The student will be able to apply the nursing process to drug therapy for the purposes of preparation, administration of drugs and monitoring of drug-related parameters.
- The student will be able to apply therapeutic procedures for the preparation, administration of drugs and monitoring of drug-related parameters.
- The student will be able to develop manual skills for the administration of drugs according to the learned methodologies.
- The student will be able to perform calculations for the dosage, dilution and administration of the active ingredients of drugs.

1. NURSE RESPONSIBILITY IN THE ADMINISTRATION OF DRUGS: Clinical risks from drugs

Learning objectives

- The student will understand the regulations underlying appropriate therapeutic prescription.
- The student will understand the rules of correct administration.
- The student will understand adverse drug events: medication errors and adverse reactions
- The student will be able to classify errors in drug therapy
- The student will be able to identify medication errors and describe strategies to prevent them.
- The student will understand the rules of a correct prescription.

Contents

- Clinical risk from drugs
- Medication errors and adverse reactions; strategies for risk reduction
- Rules for correct administration
- Criminal conduct offence
- Safe administration of drugs
- Reporting mistakes

CALCULATIONS AND DOSAGE OF DRUGS FOR CORRECT ADMINISTRATION: Elements of mathematics applied to pharmacology

Learning objectives

- The student will be able to perform calculations for the dosage, dilution and administration of the active ingredients of drugs.

Contents

- Doses and dosage
- Unit of measurement
- Equivalences and proportions
- Calculation checks

2. MEDICATION

Learning objectives

- The student will understand how to store medication.
- The student will be able to describe the different types of dosage form
- The student will be able to describe the different routes of administration

Contents

- Origin, composition, dosage form
- Interactions
- Storage of medication
- Narcotic drugs: storage and record keeping

3. DRUG ADMINISTRATION:

Learning objective

- The student will understand how to administer a drug orally.
- The student will understand how a drug is administered through the skin and mucosa.
- The student will be able to describe the devices used for parenteral drug administration.
- The student will understand how to conduct intradermal drug administration.
- The student will understand how to administer a drug subcutaneously.
- The student will understand how to administer a drug by intramuscular injection.
- The student will understand how to administer a drug intravenously.
- The student will understand the positioning and management of vascular access procedures.

Contents

- Purpose
- Assessment before administration
- Routes of administration
- The oral route; how to take it; administering drugs via nasogastric intubation
- Rules for crushing medication and patient safety

Administering drugs through skin and mucous membranes:

- The sublingual route
- The rectal route
- The transdermal route
- Eye, ear and nose instillations and application of ointments; application of vaginal suppository and pessaries

Administer drugs by injection:

- The intradermal route
- The subcutaneous route, hypodermoclysis
- The intramuscular route
- The intravenous route

Vascular accesses:

- Central and peripheral venous accesses: positioning, monitoring and management methods
- Infusion therapies: characteristics of solutions, osmolality and pH



- Complications: infections, phlebitis, infiltrations and extravasations
- Characteristics of the infusion set
- Total Parenteral Nutrition

4. CARING FOR PATIENTS ON CORTICOSTEROIDS

Learning objectives

The student will be able to apply the nursing process to the patient undergoing corticosteroid therapy.

Contents

- Method of administration, dosage and duration of therapy
- Corticosteroid withdrawal syndrome
- Most common adverse effects
- Patient education on the correct intake of corticosteroids
- Interactions with other drugs

5. CARING FOR PATIENTS ON ORAL HYPOGLYCAEMIC DRUGS AND/OR INSULIN THERAPY

Learning objectives

The student will be able to apply the nursing process to the patient undergoing therapy with insulin and oral hypoglycaemic drugs.

Contents

- How insulin is administered
- Hypoglycaemia and hyperglycaemia: recognition of signs and symptoms and treatment
- Patient education on correct insulin intake

- **CARING FOR PATIENTS ON CARDIOVASCULAR DRUGS**

Learning objectives

The student will be able to apply the nursing process to the patient taking cardiovascular drugs: cardiotonics, antiarrhythmics, antihypertensives, diuretics

Contents

- Education of people on decompensation drugs
- Digital care for patients taking medication
- Care of people on diuretics
- Nitrates: modes of administration and monitoring of effects
- Notes on monitoring people taking catecholamine
- Caring for people undergoing treatment with antiarrhythmic drugs (Flecainide, Amiodarone, β -blockers, Ca- antagonists)
- Patient education on antihypertensive drugs

6. ASSISTANCE TO PERSON ON ANTITHROMBOTIC DRUGS

Learning objectives

The student will be able to apply the nursing process to the patient on anticoagulant and antiplatelet drugs, thrombolytics.

Contents

Therapeutic education for people on antiplatelet drugs
Care of people on anticoagulant drugs and education on the medication (low molecular weight heparin, dicumarolic and DITs)

7. ASSISTING THE PERSON ON ANTI-INFLAMMATORY AND PAINKILLER MEDICATION

Learning objectives

- The student will be able to apply the nursing process to the patient undergoing treatment with analgesic, anti-inflammatory, antipyretic drugs.

Contents

- Educating the patient on NSAIDs
- Educating the patient on paracetamol
- Care of the patient on opioid therapy

8. ADHERENCE TO DRUG THERAPY

- Definition of adherence
- Frequent causes of poor adherence