

Chapter– 1 Pharmacotherapeutics

Topic: Pharmacotherapeutics

1.1

Introduction

Pharmacotherapeutics refers to the branch of pharmacology that deals with the therapeutic uses and effects of drugs. It involves the study of how drugs interact with the body to treat, prevent, or manage diseases and medical conditions. Pharmacotherapeutics encompasses various aspects, including:

1. **Drug Action:** Understanding how drugs exert their effects at the molecular, cellular, and organ levels within the body.
2. **Therapeutic Use:** Determining the appropriate indications for the use of specific drugs based on their pharmacological properties and the patient's medical condition.
3. **Dosage and Administration:** Establishing the optimal dosage regimen and route of administration to achieve the desired therapeutic outcomes while minimizing adverse effects.
4. **Drug Interactions:** Assessing potential interactions between drugs, as well as interactions with food, beverages, or other substances, to avoid adverse outcomes or enhance therapeutic efficacy.
5. **Monitoring and Adverse Effects:** Monitoring patients for therapeutic response and adverse reactions to drugs, and implementing strategies to manage or mitigate adverse effects when they occur.
6. **Patient Education:** Providing information to patients and caregivers about the proper use of medications, potential side effects, and precautions to optimize treatment outcomes.

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Branches of Pharmacotherapeutics

Pharmacotherapeutics is a branch of pharmacology that focuses on the use of drugs and medications to treat diseases and promote health. It encompasses various specialized areas, each with its own focus and objectives. Some of the main branches of pharmacotherapeutics include:

1. **Clinical Pharmacology:** Clinical pharmacology involves the study of drugs in humans, particularly their therapeutic effects, side effects, and interactions with other medications.

It encompasses pharmacokinetics (how drugs move through the ^{PHB Education} body), pharmacodynamics (how drugs interact with the body), and pharmacogenetics (how genetic factors influence drug response).

- 2. Cardiovascular Pharmacotherapy:** This branch focuses on the use of drugs to manage cardiovascular diseases such as hypertension, heart failure, arrhythmias, and ischemic heart disease. It includes medications like beta-blockers, calcium channel blockers, ACE inhibitors, and antiplatelet agents.
- 3. Psychopharmacology:** Psychopharmacology is the study of drugs that affect the brain and behavior. It involves the use of medications to treat various mental health disorders such as depression, anxiety, schizophrenia, bipolar disorder, and attention-deficit hyperactivity disorder (ADHD). Examples of psychotropic drugs include antidepressants, antipsychotics, anxiolytics, and mood stabilizers.
- 4. Infectious Disease Pharmacotherapy:** This branch deals with the use of antimicrobial agents to prevent and treat infectious diseases caused by bacteria, viruses, fungi, and parasites. It includes antibiotics, antiviral drugs, antifungal agents, and antiparasitic medications.
- 5. Oncology Pharmacotherapy:** Oncology pharmacotherapy focuses on the use of medications to treat cancer. It includes chemotherapy drugs, targeted therapy agents, immunotherapy drugs, and hormonal therapies used in the management of various types of cancer.
- 6. Endocrine and Metabolic Pharmacotherapy:** This branch involves the use of drugs to manage endocrine disorders such as diabetes, thyroid disorders, adrenal disorders, and osteoporosis. Medications used include insulin, oral hypoglycemic agents, thyroid hormones, and bisphosphonates.
- 7. Pain Management:** Pain management pharmacotherapy involves the use of analgesic medications to relieve pain and improve quality of life in patients with acute and chronic pain conditions. It includes opioid analgesics, nonsteroidal anti-inflammatory drugs (NSAIDs), adjuvant analgesics, and local anesthetics.
- 8. Respiratory Pharmacotherapy:** This branch focuses on the use of medications to manage respiratory disorders such as asthma, chronic obstructive pulmonary disease (COPD), and allergic rhinitis. It includes bronchodilators, corticosteroids, leukotriene modifiers, and antihistamines.

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Objective of pharmacotherapeutics

The primary objective of pharmacotherapeutics is to achieve optimal therapeutic outcomes in patients. This involves several goals:

- 1. Treatment of Disease:** Pharmacotherapeutics aims to alleviate symptoms, prevent disease progression, and cure or manage underlying health conditions using pharmacological agents. This includes the selection of appropriate medications based on the patient's diagnosis, medical history, and individual characteristics.
- 2. Promotion of Health and Well-being:** Beyond treating diseases, pharmacotherapeutics also seeks to promote health and enhance overall well-being. This may involve the use of preventive medications, such as vaccines and prophylactic treatments, to reduce the risk of illness and maintain optimal health.
- 3. Management of Symptoms:** Pharmacotherapeutics plays a crucial role in managing symptoms associated with various health conditions, including pain, inflammation, nausea, fever, anxiety, depression, and others.
- 4. Prevention of Complications:** It aims to prevent the development of complications and adverse outcomes associated with certain diseases or medical treatments. This may involve the use of medications to control risk factors.
- 5. Individualization of Therapy:** Interventions are tailored to each patient's unique characteristics, including age, gender, genetic factors, medication tolerance, and lifestyle factors. Individualized treatment plans optimize therapeutic efficacy while minimizing the risk of adverse reactions.
- 6. Optimization of Drug Therapy:** Pharmacotherapeutics involves the judicious selection, dosing, administration, and monitoring of medications to achieve optimal therapeutic outcomes.
- 7. Safety and Minimization of Risks:** Ensuring patient safety is a fundamental objective of pharmacotherapeutics. This includes identifying and mitigating potential risks associated with medication use, such as adverse drug reactions, drug-drug interactions, medication errors, and medication non-adherence.
- 8. Patient Education and Empowerment:** It involves educating patients about their medications, including proper use, potential side effects, precautions, and the importance of adherence to treatment regimens.

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Scope of pharmacotherapeutics

The scope of pharmacotherapeutics, also known as clinical pharmacology or therapeutics, encompasses a broad range of activities related to the use of medications in the treatment and management of diseases. The scope includes, but is not limited to, the following areas:

1. It involves selecting the most appropriate medications for the treatment of various diseases and health conditions. This includes considering factors such as the patient's diagnosis, medical history, comorbidities, allergies, and individual response to treatment.
2. It encompasses determining the optimal dosage and dosing schedule for each medication based on factors such as the patient's age, weight, renal and hepatic function, and the severity of the disease including route of administration and timing of doses.
3. To understanding the pharmacokinetic and pharmacodynamic properties of medications is essential in pharmacotherapeutics.
4. It involves identifying and managing drug-drug interactions, drug-food interactions, and drug-disease interactions that may occur when multiple medications are used concurrently.
5. It involves recognizing and managing adverse drug reactions (ADRs) that may occur with medication use.
6. Ensuring medication safety and quality assurance is a key component of pharmacotherapeutics. This includes promoting the safe and appropriate use of medications.
7. To providing information on medication adherence, lifestyle modifications, and strategies for managing medication-related issues.
8. 'Monitoring patients' clinical response to medication therapy.
9. Pharmacotherapeutics relies on evidence-based practice, which involves integrating the best available evidence from scientific research, clinical trials, and clinical guidelines with clinical expertise.
10. It involves collaboration with other healthcare professionals, including physicians, nurses, pharmacists, and other members of the healthcare team, to ensure comprehensive and coordinated patient care. This may include interdisciplinary care planning, medication therapy management, and communication among healthcare providers to optimize patient outcomes.

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Rational use of medicines

Rational use of medicines refers to the appropriate and judicious use of medications in clinical practice to achieve optimal therapeutic outcomes while minimizing risks and promoting patient safety. Some important aspects of rational use of medicines include:

- 1. Selection of Appropriate Medications:** Healthcare providers should carefully consider the patient's diagnosis, medical history, allergies, and other relevant factors when selecting medications. The chosen medications should be effective for the intended indication and supported by scientific evidence.
- 2. Evidence-Based Practice:** Treatment decisions should be guided by the best available evidence from clinical research, systematic reviews, and clinical practice guidelines.
- 3. Individualized Treatment Plans:** Medication regimens should be individualized to each patient based on factors such as age, gender, genetics, renal and hepatic function, and other pharmacokinetic and pharmacodynamic considerations. This may involve adjusting drug dosages, selecting alternative formulations, or considering drug interactions.
- 4. Appropriate Dosage and Administration:** Healthcare providers should prescribe medications at the correct dosage and frequency to achieve therapeutic goals while minimizing the risk of adverse effects. Patients should be educated on how to take their medications correctly, including the timing of doses, route of administration, and any special instructions.
- 5. Monitoring and Assessment:** Patients receiving medication therapy should be monitored regularly to assess treatment response, identify any adverse effects or complications, and make adjustments to the treatment plan as needed. This may involve clinical assessments, laboratory tests, imaging studies, or other monitoring tools.
- 6. Promotion of Adherence:** Healthcare providers should actively promote medication adherence by educating patients about the importance of taking their medications as prescribed.
- 7. Cost-Effectiveness:** When selecting medications, healthcare providers should consider the cost-effectiveness of treatment options, taking into account factors such as drug prices, insurance coverage, and potential cost savings associated with improved health outcomes.

- 8. Avoidance of Overuse and Misuse:** Healthcare providers [PHB Education](#) should avoid overprescribing medications or using them inappropriately for non-indicated conditions. This includes avoiding unnecessary polypharmacy, minimizing the use of antibiotics for viral infections, and avoiding the use of medications with limited efficacy or significant risks.
- 9. Promotion of Rational Prescribing Practices:** Healthcare providers should adhere to rational prescribing practices, such as prescribing medications by their generic names, avoiding unnecessary brand-name medications, and limiting the use of high-cost or high-risk medications unless absolutely necessary.
- 10. Continuing Education and Quality Improvement:** Healthcare providers should engage in continuing education and professional development to stay informed about the latest advances in pharmacotherapy and evidence-based practice.

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Evidence-based medicine

Evidence-based medicine (EBM) is an approach to clinical practice that integrates the best available scientific evidence with clinical expertise and patient values and preferences to inform decision-making. It involves the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients.

Characteristics of evidence-based medicine include:

- 1. Use of Best Available Evidence:** EBM emphasizes the importance of using the best available evidence from high-quality research studies, including randomized controlled trials (RCTs), systematic reviews, meta-analyses, and clinical practice guidelines.
- 2. Clinical Expertise:** EBM recognizes the value of clinical expertise, which involves the ability of healthcare providers to integrate their knowledge, skills, and experience with the available evidence to make informed clinical decisions.
- 3. Patient Values and Preferences:** EBM emphasizes the importance of considering patients' values, preferences, and unique clinical circumstances when making treatment decisions.
- 4. Critical Appraisal of Evidence:** Healthcare providers engaged in evidence-based practice critically appraise the validity, relevance, and applicability of research evidence to their clinical practice. This involves assessing the methodological quality of studies, evaluating the strength of evidence, and considering potential biases or limitations.

5. **Integration of Evidence into Practice:** EBM involve tailoring treatment recommendations to the specific needs, preferences, and circumstances of each patient while considering factors such as comorbidities, contraindications, and cost-effectiveness.
6. **Continuous Learning and Improvement:** EBM includes staying up-to-date with the latest research findings, participating in continuing education activities, and critically reflecting on clinical practice to identify areas for improvement.
7. **Promotion of Quality and Safety:** EBM aims to improve the quality, safety, and effectiveness of patient care by basing clinical decisions on the best available evidence.

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List of Some Essential Medicine 2022

Medicine	Dosage form(s) and strength(s)
1. General Anaesthetics and Oxygen	
Halothane	Liquid for inhalation
Isoflurane	Liquid for inhalation
Ketamine	Injection 10 mg/mL, Injection 50 mg/mL
Nitrous oxide	As licensed for medical purpose
Oxygen	As licensed for medical purpose
Propofol	Injection 10 mg/mL
Sevoflurane	Liquid for inhalation
Thiopentone	Powder for injection 0.5 g Powder for injection 1 g
1.2 Local Anaesthetics	
Bupivacaine	Injection 0.25 %, Injection 0.5 %, Injection 0.5 % with 7.5 % glucose
Lignocaine	Topical forms 2-5 % , Injection 1 % Injection 2 %, Injection 5 % with 7.5 % glucose
Lignocaine (A) + Adrenaline (B)	Injection 1% (A) + 1:200000 (5 mcg/mL) (B) Injection 2% (A) + 1:200000 (5 mcg/mL) (B)
1.3 Preoperative Medication and Sedation for Short Term Procedures	
Atropine	Injection 0.6 mg/mL
Glycopyrrolate	Injection 0.2 mg/mL
Midazolam	Tablet 7.5 mg Nasal, Spray 0.5mg Nasal Spray 1.25 mg Injection 1 mg/mL Injection 5 mg/mL
Morphine	Injection 10 mg/mL, Injection 15 mg/mL
1.4 Muscle Relaxants and Cholinesterase Inhibitors	
Atracurium	Injection 10 mg/mL
Baclofen	Tablet 5 mg, Tablet 10 mg, Tablet 20 mg
Neostigmine	Tablet 15 mg, Injection 0.5 mg/mL
Succinylcholine	Injection 50 mg/mL
Vecuronium	Powder for injection 4 mg Powder for injection 10 mg

1.5 Non-opioid Analgesics, Antipyretics and Non-steroidal Anti- inflammatory Drugs	
Acetylsalicylic acid	Tablet 300 mg to 500 mg Effervescent/ Dispersible/ Enteric coated Tablet 300 mg to 500 mg
Diclofenac	Tablet 50 mg, Injection 25 mg/mL
Ibuprofen	Tablet 200 mg, Tablet 400 mg Oral liquid 100 mg/5 mL (p)
Mefenamic acid	Tablet 250 mg, Oral liquid 100 mg/5 mL (p)
Paracetamol	Tablet 500 mg, Tablet 650 mg Oral liquid 120 mg/5 mL (p) Oral Liquid 125 mg/5 mL (p) Oral Liquid 250 mg/5 mL (p) Injection 150 mg/ mL Suppository 80 mg Suppository 170 mg
1.6 Opioid Analgesics	
Fentanyl	Injection 50 mcg/mL
Morphine	Tablet 10 mg, Injection 10 mg/mL, Injection 15 mg/mL
Tramadol	Capsule 50 mg, Capsule 100 mg, Injection 50 mg/mL
1.7 Medicines used to treat Gout	
Allopurinol	Tablet 100 mg, Tablet 300 mg
Colchicine	Tablet 0.5 mg
Azathioprine	Tablet 25 mg (p) Tablet 50 mg
Hydroxychloroquine	Tablet 200 mg, Tablet 400 mg
Methotrexate	Tablet 2.5 mg, Tablet 5 mg, Tablet 10 mg
Sulfasalazine	Tablet 500 mg

1.8

Standard Treatment Guidelines

Standard Treatment Guidelines (STGs) are systematically developed statements that assist healthcare providers in making decisions about appropriate healthcare interventions for specific clinical conditions. These guidelines are based on the best available evidence and aim to optimize patient care by promoting consistency, quality, safety, and cost-effectiveness in clinical practice.

Main features of Standard Treatment Guidelines include:

- 1. Evidence-Based Recommendations:** STGs are developed based on a thorough review and synthesis of the latest available evidence from high-quality research studies, including randomized controlled trials (RCTs), systematic reviews, meta-analyses, and other sources of clinical evidence. Recommendations are graded based on the strength of the evidence and the balance of benefits and risks.
- 2. Clinical Expertise and Consensus:** STGs are typically developed by multidisciplinary panels of experts, including healthcare providers, clinical specialists, researchers, and other stakeholders. These panels rely on their collective clinical expertise and judgment to interpret the evidence and formulate recommendations that are relevant and applicable to clinical practice.
- 3. Comprehensive Coverage:** STGs cover a wide range of clinical conditions, diseases, and health issues commonly encountered in healthcare settings. They address various aspects of patient care, including diagnosis, treatment, prevention, and management of complications, with specific recommendations tailored to different patient populations, settings, and contexts.
- 4. Clear and Actionable Recommendations:** STGs provide clear, concise, and actionable recommendations for healthcare providers to follow when managing specific clinical conditions. Recommendations are typically organized in a structured format, with guidance on diagnostic criteria, treatment options, dosing regimens, monitoring parameters, and follow-up care.
- 5. Adaptation to Local Contexts:** While STGs are based on global evidence and best practices, they are often adapted to suit the local context, resources, and healthcare infrastructure of specific regions or countries. This may involve considering factors such

as the prevalence of certain diseases, availability of healthcare resources, cost-effectiveness of interventions, and local treatment patterns.

- 6. Promotion of Rational Use of Medicines:** STGs aim to promote the rational use of medicines by providing evidence-based recommendations on appropriate prescribing practices, drug selection, dosage adjustments, and treatment algorithms. By adhering to STGs, healthcare providers can minimize unnecessary variations in clinical practice, reduce inappropriate prescribing, and improve patient outcomes.
- 7. Continuous Review and Updating:** STGs are dynamic documents that undergo regular review and updating to incorporate new evidence, emerging research findings, changes in clinical practice, and advances in medical knowledge. This ensures that the guidelines remain current, relevant, and reflective of the latest developments in healthcare.

Hypothyroidism that isn't treated can lead to other health problems, including:

- **Goiter.** Hypothyroidism may cause the thyroid gland to become larger. This condition is called a goiter. A large goiter may cause problems with swallowing or breathing.
- **Heart problems.** Hypothyroidism can lead to a higher risk of heart disease and heart failure. That's mainly because people with an underactive thyroid tend to develop high levels of low-density lipoprotein (LDL) cholesterol — the "bad" cholesterol.
- **Peripheral neuropathy.** Hypothyroidism that goes without treatment for a long time can damage the peripheral nerves. These are the nerves that carry information from the brain and spinal cord to the rest of the body. Peripheral neuropathy may cause pain, numbness and tingling in the arms and legs.
- **Infertility.** Low levels of thyroid hormone can interfere with ovulation, which can limit fertility. Some of the causes of hypothyroidism, such as autoimmune disorders, also can harm fertility.
- **Birth defects.** Babies born to people with untreated thyroid disease may have a higher risk of birth defects compared with babies born to mothers who do not have thyroid disease. Infants with hypothyroidism present at birth that goes untreated are at risk of serious physical and mental development problems. But if the condition is diagnosed within the first few months of life, the chances of typical development are excellent.
- **Myxedema coma.** This rare, life-threatening condition can happen when hypothyroidism goes without treatment for a long time. A myxedema coma may be triggered by sedatives, infection or other stress on the body. Its symptoms include intense cold intolerance and drowsiness, followed by an extreme lack of energy and then unconsciousness. Myxedema coma requires emergency medical treatment.

4.6

Pharmacological managements

Classification of Drugs: Treatment Options

1. Symptom relief medications
2. Anti Thyroid Drugs - ATD

- Methimazole, Carbimazole
- Propylthiouracil (PTU)
- 3.** Radio Active Iodine treatment - RAI Rx.
- 4.** Thyroidectomy - Subtotal or Total (Surgical)
- 5.** NSAIDs and Corticosteroids - for SAT