

Introduction to Pharmacotherapy

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Pharmacotherapy is the use of drugs to prevent, treat, or manage disease. It integrates knowledge from basic sciences, clinical medicine, and patient-centered care to achieve optimal therapeutic outcomes.

1. Core Objectives

Goal	What it Means
Efficacy	Select agents that produce the desired therapeutic effect.
Safety	Minimize adverse drug reactions (ADRs) and drug-drug interactions.
Adherence	Choose regimens that patients can follow consistently.
Cost-effectiveness	Use therapies that provide value for the health system and the patient.
Individualization	Tailor treatment to age, organ function, genetics, comorbidities, and patient preferences.

2. Fundamental Concepts

2.1 Pharmacodynamics (PD)

- **Mechanism of Action (MoA):** How a drug interacts with a biological target (receptor, enzyme, ion channel).
- **Dose-Response Relationship:**
 - *Efficacy* – maximal effect a drug can produce.
 - *Potency* – concentration needed to achieve a given effect.
- **Therapeutic Index (TI):** Ratio of toxic dose to effective dose; a wide TI = safer drug.

2.2 Pharmacokinetics (PK) – “What the body does to the drug”

Process	Key Parameters	Clinical Implications
Absorption	Rate, extent (bioavailability)	Food effects, formulation choice

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Process	Key Parameters	Clinical Implications
Distribution	Volume of distribution (Vd), protein binding	Tissue penetration, drug?drug displacement
Metabolism	Phase I (oxidation, reduction), Phase II (conjugation)	Enzyme inducers/inhibitors, genetic polymorphisms
Excretion	Renal clearance, biliary excretion	Dose adjustment in renal/hepatic impairment

3. Drug Classification Overview

Class	Typical Indications	Representative Agents	Key Safety Points
Analgesics	Pain	Acetaminophen, NSAIDs, Opioids	GI bleeding (NSAIDs), respiratory depression (opioids)
Antibiotics	Bacterial infections	Penicillins, Cephalosporins, Fluoroquinolones	Allergic cross?reactivity, C. ?difficile risk
Antihypertensives	Hypertension, heart failure	ACE?I, ARBs, ??blockers, Calcium channel blockers	Electrolyte shifts, renal function monitoring
Antidiabetics	Type?2 diabetes	Metformin, SGLT2?i, GLP?1 RAs	Lactic acidosis (metformin), ketoacidosis (SGLT2?i)
Psychotropics	Mood, psychosis, anxiety	SSRIs, SNRIs, Atypical antipsychotics	Serotonin syndrome, metabolic syndrome
Anticoagulants	Thrombosis prevention	Warfarin, Direct oral anticoagulants (DOACs)	Bleeding risk, INR monitoring (