

Brief Contents

Unit 1

Core Concepts in Pharmacology 1

Chapter 1	Introduction to Pharmacology	2
Chapter 2	Drug Approval and Regulation	11
Chapter 3	Principles of Drug Administration	21
Chapter 4	Pharmacokinetics	39
Chapter 5	Pharmacodynamics	51

Unit 2

Pharmacology and the Nurse–Patient Relationship 61

Chapter 6	The Nursing Process and Clinical Judgment Measurement Model in Pharmacology	62
Chapter 7	Medication Errors and Risk Reduction	71
Chapter 8	Drug Administration Throughout the Lifespan	83
Chapter 9	Individual Variations in Drug Response	95
Chapter 10	The Role of Complementary and Alternative Therapies in Pharmacology	105
Chapter 11	Emergency Preparedness and Poisonings	115

Unit 3

The Nervous System 127

Chapter 12	Cholinergic Drugs Affecting the Autonomic Nervous System	128
Chapter 13	Adrenergic Drugs Affecting the Autonomic Nervous System	143
Chapter 14	Drugs for Anxiety and Sleep Disorders	155
Chapter 15	Drugs for Mood and Behavioral Disorders	169
Chapter 16	Drugs for Psychoses	189
Chapter 17	Drugs for Seizures	203
Chapter 18	Drugs for Pain Management	221
Chapter 19	Drugs for Local and General Anesthesia	243
Chapter 20	Drugs for Degenerative Diseases of the Nervous System	259
Chapter 21	Drugs for Muscle Spasms and Spasticity	277
Chapter 22	Substance Use Disorder	289

Unit 4

The Cardiovascular and Urinary Systems 301

Chapter 23	Drugs for Lipid Disorders	302
Chapter 24	Diuretic Therapy and Drugs for Chronic Kidney Disease	317
Chapter 25	Drugs for Fluid Balance, Electrolyte, and Acid–Base Disorders	331
Chapter 26	Drugs for Hypertension	345
Chapter 27	Drugs for Heart Failure	365

Chapter 28	Drugs for Angina Pectoris and Myocardial Infarction	379
Chapter 29	Drugs for Shock	395
Chapter 30	Drugs for Dysrhythmias	407
Chapter 31	Drugs for Coagulation Disorders	423
Chapter 32	Drugs for Hematopoietic Disorders	441

Unit 5

The Immune System 455

Chapter 33	Drugs for Inflammation and Fever	456
Chapter 34	Drugs for Immune System Modulation	471
Chapter 35	Drugs for Bacterial Infections	491
Chapter 36	Drugs for Tubercular, Fungal, Protozoan, and Helminthic Infections	517
Chapter 37	Drugs for Viral Infections	537
Chapter 38	Drugs for Neoplasia	557

Unit 6

The Respiratory System 581

Chapter 39	Drugs for Allergic Rhinitis and the Common Cold	582
Chapter 40	Drugs for Asthma and Other Pulmonary Disorders	597

Unit 7

The Gastrointestinal System 613

Chapter 41	Drugs for Peptic Ulcer Disease	614
Chapter 42	Drugs for Bowel Disorders and Other Gastrointestinal Conditions	629
Chapter 43	Drugs for Nutritional Disorders	647

Unit 8

The Endocrine System 667

Chapter 44	Drugs for Pituitary, Thyroid, and Adrenal Disorders	668
Chapter 45	Drugs for Diabetes Mellitus	689
Chapter 46	Drugs for Disorders and Conditions of the Female Reproductive System	705
Chapter 47	Drugs for Disorders and Conditions of the Male Reproductive System	727

Unit 9

The Integumentary System, Eyes, and Ears 741

Chapter 48	Drugs for Bone and Joint Disorders	742
Chapter 49	Drugs for Skin Disorders	765
Chapter 50	Drugs for Eye and Ear Disorders	783

Contents

About the Authors vii
Preface ix

Unit 1

Core Concepts in Pharmacology 1

1 Introduction to Pharmacology 2

- 1.1 History of Pharmacology 3
- 1.2 Pharmacology: The Study of Medicines 3
- 1.3 Pharmacology and Therapeutics 4
- 1.4 Classification of Therapeutic Agents as Drugs, Biologics, Biosimilars, and Complementary and Alternative Medicine Therapies 4
- 1.5 Therapeutic and Pharmacologic Classification of Drugs 5
- 1.6 Chemical, Generic, and Trade Names for Drugs 6
- 1.7 Prescription and Over-the-Counter Drugs 6
- 1.8 Differences Between Trade-Name Drugs and Their Generic Equivalents 7
- 1.9 Decisions Relative to Proper Drug Choices 8

2 Drug Approval and Regulation 11

- 2.1 Drug Regulations and Standards 12
- 2.2 The Role of the Food and Drug Administration 13
- 2.3 Phases of Approval for Therapeutic and Biologic Drugs 14
- 2.4 Changes to the Drug Approval Process 15
- 2.5 Prescriptive Authority for Nurses 16
- 2.6 Controlled Substances and Drug Schedules 17

3 Principles of Drug Administration 21

- 3.1 Medication Knowledge and Understanding 22
- 3.2 The Rights of Drug Administration 23
- 3.3 Patient Adherence and Successful Pharmacotherapy 23
- 3.4 Drug Orders and Time Schedules 24
- 3.5 Systems of Measurement 25
- 3.6 Enteral Drug Administration 25
 - TABLETS AND CAPSULES 26
 - ORAL TRANSMUCOSAL DRUGS 26
 - NASOGASTRIC AND GASTROSTOMY DRUG ADMINISTRATION 27
- 3.7 Topical Drug Administration 27
 - TRANSDERMAL DELIVERY SYSTEM 28
 - OPHTHALMIC ADMINISTRATION 28
 - OTIC ADMINISTRATION 28

NASAL ADMINISTRATION 28
VAGINAL ADMINISTRATION 30
RECTAL ADMINISTRATION 30

- 3.8 Parenteral Drug Administration 31
 - INTRADERMAL AND SUBCUTANEOUS ADMINISTRATION 31
 - INTRAMUSCULAR ADMINISTRATION 32
 - INTRAVENOUS ADMINISTRATION 34

4 Pharmacokinetics 39

- 4.1 Pharmacokinetics: How the Body Handles Medications 40
- 4.2 The Passage of Drugs Through Plasma Membranes 40
- 4.3 Absorption of Medications 40
- 4.4 Distribution of Medications 42
- 4.5 Metabolism of Medications 43
- 4.6 Excretion of Medications 44
- 4.7 Drug Plasma Concentration and Therapeutic Response 45
- 4.8 Onset, Peak Levels, and Duration of Drug Action 46
- 4.9 Loading Doses and Maintenance Doses 47

5 Pharmacodynamics 51

- 5.1 Pharmacodynamics and Interpatient Variability 52
- 5.2 Therapeutic Index and Drug Safety 52
- 5.3 The Graded Dose-Response Relationship and Therapeutic Response 53
- 5.4 Potency and Efficacy 54
- 5.5 Cellular Receptors and Drug Action 54
- 5.6 Types of Drug-Receptor Interactions 56
- 5.7 Pharmacology of the Future: Customizing Drug Therapy 56

Unit 2

Pharmacology and the Nurse-Patient Relationship 61

6 The Nursing Process and Clinical Judgment Measurement Model in Pharmacology 62

- 6.1 Overview of the Nursing Process and Clinical Judgment Measurement Model 63
- 6.2 Assessment of the Patient 64
- 6.3 Nursing Diagnoses 65

xvi Contents

- 6.4 Planning: Establishing Goals and Outcomes 66
- 6.5 Implementing Specific Nursing Actions 66
 - PATIENT EDUCATION 67
- 6.6 Evaluating the Effects of Medications 68
- 7 Medication Errors and Risk Reduction 71**
 - 7.1 Defining Medication Errors 72
 - 7.2 Factors Contributing to Medication Errors 72
 - 7.3 The Impact of Medication Errors 74
 - 7.4 Reporting and Documenting Medication Errors 74
 - DOCUMENTING IN THE PATIENT'S MEDICAL RECORD 75
 - REPORTING THE ERROR 75
 - SENTINEL AND PATIENT SAFETY EVENTS 75
 - 7.5 Strategies for Reducing Medication Errors 75
 - 7.6 Medication Reconciliation 77
 - 7.7 Effective Patient Teaching for Medication Usage 77
 - 7.8 How the Healthcare Industry Is Increasing Medication Safety 78
- 8 Drug Administration Throughout the Lifespan 83**
 - 8.1 Pharmacotherapy Across the Lifespan 84
 - 8.2 Pharmacotherapy of the Pregnant Patient 84
 - PHYSIOLOGIC CHANGES DURING PREGNANCY THAT AFFECT PHARMACOTHERAPY 84
 - GESTATIONAL AGE AND DRUG THERAPY 85
 - PREGNANCY DRUG CATEGORIES 85
 - PREGNANCY REGISTRIES 86
 - 8.3 Pharmacotherapy of the Lactating Patient 86
 - 8.4 Pharmacotherapy of Infants 88
 - 8.5 Pharmacotherapy of Toddlers 88
 - 8.6 Pharmacotherapy of Preschoolers and School-Age Children 89
 - 8.7 Pharmacotherapy of Adolescents 90
 - 8.8 Pharmacotherapy of Older Adults 91
- 9 Individual Variations in Drug Response 95**
 - 9.1 The Concept of Holistic Pharmacotherapy 96
 - 9.2 Psychosocial Influences on Pharmacotherapy 96
 - 9.3 Cultural and Ethnic Influences on Pharmacotherapy 97
 - 9.4 Community and Environmental Influences on Pharmacotherapy 98
 - 9.5 Sex and Gender Influences on Pharmacotherapy 98
 - 9.6 Pharmacogenetic Influences on Pharmacotherapy 99

10 The Role of Complementary and Alternative Therapies in Pharmacology 105

- 10.1 Complementary and Alternative Medicine 106
- 10.2 Brief History of Herbal Therapies 106
- 10.3 Herbal Product Formulations 108
- 10.4 Regulation of Herbal Products and Dietary Supplements 109
- 10.5 The Pharmacologic Actions and Safety of Herbal Products 110
- 10.6 Specialty Supplements 111
- 10.7 Patient Teaching Regarding CAM 112

11 Emergency Preparedness and Poisonings 115

- 11.1 The Nature of Worldwide Epidemics 116
- 11.2 Role of the Nurse in Emergency Preparedness and Bioterrorist Threats 117
- 11.3 Strategic National Stockpile 118
- 11.4 Anthrax 119
- 11.5 Viruses 120
- 11.6 Toxic Chemicals 120
- 11.7 Ionizing Radiation 121
- 11.8 Management of Poisonings 122

Unit 3

The Nervous System 127

12 Cholinergic Drugs Affecting the Autonomic Nervous System 128

- 12.1 Overview of the Nervous System 129
- 12.2 Sympathetic and Parasympathetic Divisions 130
- 12.3 Structure and Function of Autonomic Synapses 131
- 12.4 Acetylcholine and Cholinergic Transmission 131
- 12.5 Classification and Naming of Drugs Affecting the Parasympathetic Nervous System 132
- 12.6 Clinical Applications of Cholinergic Drugs 134
 - Nursing Clinical Judgment** Pharmacotherapy with Cholinergic Drugs 136
- 12.7 Clinical Applications of Anticholinergics 137
 - Nursing Clinical Judgment** Pharmacotherapy with Anticholinergic Drugs 140

13 Adrenergic Drugs Affecting the Autonomic Nervous System 143

- 13.1 Norepinephrine and Adrenergic Transmission 144
- 13.2 Clinical Applications of Adrenergic Agonists 146
 - Nursing Clinical Judgment** Pharmacotherapy with Adrenergic Agonists 148

- 13.3 Clinical Applications of Adrenergic Antagonists 149
Nursing Clinical Judgment Pharmacotherapy with Adrenergic Antagonists 151
- 14 Drugs for Anxiety and Sleep Disorders 155**
- 14.1 Types of Anxiety Disorders 156
 14.2 Specific Regions of the Brain Responsible for Anxiety and Wakefulness 157
 14.3 Nonpharmacologic and Pharmacologic Management of Insomnia and Anxiety 158
 14.4 Treating Anxiety and Insomnia with CNS Drugs 159
 14.5 Treating Anxiety and Insomnia with Benzodiazepines 159
 14.6 Treating Anxiety and Insomnia with Antidepressants 160
 14.7 Treating Anxiety and Insomnia with Nonbenzodiazepines 163
 14.8 Use of Barbiturates as Sedatives 163
 14.9 Treatment of Narcolepsy 165
Nursing Clinical Judgment Pharmacotherapy for Anxiety or Sleep Disorders 165
- 15 Drugs for Mood and Behavioral Disorders 169**
- 15.1 Characteristics and Forms of Depression 170
 15.2 Assessment and Nonpharmacologic Treatment of Depression 171
 15.3 Mechanism of Action of Antidepressants 171
 15.4 Treating Depression with Selective Serotonin Reuptake Inhibitors 172
 15.5 Treating Depression with Atypical Antidepressants 172
 15.6 Treating Depression with Tricyclic Antidepressants 176
 15.7 Treating Depression with Monoamine Oxidase Inhibitors 176
 15.8 Characteristics of Bipolar Disorder 179
 15.9 Pharmacotherapy of Bipolar Disorder 179
 15.10 Characteristics of Attention-Deficit/Hyperactivity Disorder 180
 15.11 Pharmacotherapy of Attention-Deficit/Hyperactivity Disorder 182
Nursing Clinical Judgment Pharmacotherapy for Mood Disorders 184
- 16 Drugs for Psychoses 189**
- 16.1 The Nature of Psychoses 190
 16.2 Schizophrenia 190
 16.3 Pharmacologic Management of Psychoses 191
 16.4 Treating Psychoses with Phenothiazines 192
 16.5 Treating Psychoses with Nonphenothiazines 194
 16.6 Treating Psychoses with Second-Generation (Atypical) Antipsychotics 196
Nursing Clinical Judgment Pharmacotherapy with Antipsychotic Drugs 197
 16.7 Treating Psychoses with Dopamine System Stabilizers 199
- 17 Drugs for Seizures 203**
- 17.1 Causes of Seizures 204
 17.2 Classification of Seizures 205
 17.3 General Concepts of Antiseizure Pharmacotherapy 206
 17.4 Mechanisms of Action of Antiseizure Drugs 207
 17.5 Treating Seizures with Barbiturates 209
 17.6 Treating Seizures with Benzodiazepines 211
 17.7 Treating Seizures with Hydantoins and Related Drugs 211
 17.8 Treating Seizures with Succinimides 213
Nursing Clinical Judgment Pharmacotherapy with Antiseizure Drugs 215
- 18 Drugs for Pain Management 221**
- 18.1 Assessment and Classification of Pain 222
 18.2 The Neural Mechanisms of Pain 222
 18.3 Complementary and Alternative Therapies for Pain Management 224
 18.4 Classification of Opioids 225
 18.5 Pharmacotherapy with Opioid Agonists 225
 OPIOIDS WITH MIXED AGONIST-ANTAGONIST ACTIVITY 227
 18.6 Pharmacotherapy with Opioid Antagonists 228
 18.7 Treatment for Opioid Dependence 229
Nursing Clinical Judgment Pharmacotherapy with Opioids for Pain 230
 18.8 Pharmacotherapy with NSAIDs 231
 ASPIRIN, IBUPROFEN, AND COX-2 INHIBITORS 231
 CENTRALLY ACTING DRUGS 233
 18.9 Adjuvant Analgesics 234
 18.10 Classification of Headaches 235
 18.11 Drug Therapy for Migraines 236
Nursing Clinical Judgment Pharmacotherapy for Migraines 238
- 19 Drugs for Local and General Anesthesia 243**
- 19.1 Regional Loss of Sensation Using Local Anesthesia 244
 19.2 Mechanism of Action of Local Anesthetics 244
 19.3 Classification of Local Anesthetics 246
 ESTERS 246
 AMIDES 246

xviii Contents

- 19.4 Characteristics of General Anesthesia 247
- 19.5 Pharmacotherapy with Intravenous General Anesthetics 248
Nursing Clinical Judgment Pharmacotherapy with Local Anesthetics 249
- 19.6 Pharmacotherapy with Inhaled General Anesthetics 250
Nursing Clinical Judgment Pharmacotherapy with General Anesthetics 253
- 19.7 Drugs as Adjuncts to Anesthesia 254
NEUROMUSCULAR BLOCKERS 255
- 20 Drugs for Degenerative Diseases of the Nervous System 259**
- 20.1 Degenerative Diseases of the Central Nervous System 260
- 20.2 Characteristics of Parkinson Disease 260
- 20.3 Treating Parkinson Disease with Dopamine-Enhancing Drugs 262
- 20.4 Treating Parkinson Disease with Anticholinergic Drugs 265
- 20.5 Characteristics of Alzheimer Disease 266
- 20.6 Treating Alzheimer Disease with Cholinesterase Inhibitors 266
- 20.7 Characteristics of Multiple Sclerosis 269
- 20.8 Treating Multiple Sclerosis with Disease-Modifying Drugs 270
- 20.9 Characteristics and Treatment of ALS 272
Nursing Clinical Judgment Pharmacotherapy for Neurodegenerative Diseases 272
- 21 Drugs for Muscle Spasms and Spasticity 277**
- 21.1 Causes of Muscle Spasms 278
- 21.2 Pharmacologic and Nonpharmacologic Strategies to Treat Muscle Spasms 278
- 21.3 Centrally Acting Skeletal Muscle Relaxants Treat Muscle Spasms at the Brain and Spinal Cord Levels 278
- 21.4 Causes and Treatment of Spasticity 280
- 21.5 Direct-Acting Antispasmodics Treat Muscle Spasms Directly at the Muscle Tissue 281
- 21.6 Neuromuscular Blockers Block the Effect of Acetylcholine at the Receptor 283
Nursing Clinical Judgment Pharmacotherapy for Muscle Spasms or Spasticity 284
- 22 Substance Use Disorder 289**
- 22.1 Overview of Substance Use Disorder 290
- 22.2 Neurobiologic and Psychosocial Components of Substance Use Disorder 290
- 22.3 Physical and Psychologic Dependence 290
- 22.4 Withdrawal Syndrome 291
- 22.5 Tolerance 292
- 22.6 Central Nervous System Depressants 292
SEDATIVES AND SEDATIVE-HYPNOTICS 292
OPIOIDS 293
ETHYL ALCOHOL 293
- 22.7 Cannabinoids 295
MARIJUANA AND RELATED SUBSTANCES 295
- 22.8 Hallucinogens 295
LSD 295
RECREATIONAL AND CLUB DRUGS 296
- 22.9 Central Nervous System Stimulants 296
AMPHETAMINES AND METHYLPHENIDATE 296
COCAINE 297
CAFFEINE 297
- 22.10 Nicotine 297
TOBACCO USE AND NICOTINE PRODUCTS 297
- 22.11 The Nurse's Role in Substance Use 298
- Unit 4**
- The Cardiovascular and Urinary Systems 301**
- 23 Drugs for Lipid Disorders 302**
- 23.1 Types of Lipids 303
- 23.2 Types of Lipoproteins 303
- 23.3 Lipid Levels and Cardiovascular Disease 304
- 23.4 Managing Lipid Levels Through Positive Lifestyle Changes and Pharmacotherapy 305
- 23.5 Pharmacotherapy with Statins 306
- 23.6 Bile Acid Sequestrants for Reducing LDL-C Levels 308
- 23.7 Ezetimibe for Reducing LDL-C Levels 310
- 23.8 Pharmacotherapy of High Triglyceride Levels 311
- 23.9 Pharmacotherapy of Familial Hypercholesterolemia 311
Nursing Clinical Judgment Lipid-Lowering Pharmacotherapy 312
- 24 Diuretic Therapy and Drugs for Chronic Kidney Disease 317**
- 24.1 Functions of the Kidneys 318
- 24.2 Renal Reabsorption and Secretion 318
- 24.3 Diagnosis and Pharmacotherapy of CKD 319
- 24.4 Mechanisms of Action of Diuretics 320
- 24.5 Pharmacotherapy with Loop Diuretics 321
- 24.6 Pharmacotherapy with Thiazide Diuretics 323
- 24.7 Pharmacotherapy with Potassium-Sparing Diuretics 324

- 24.8 Miscellaneous Diuretics for Specific Indications** 326
Nursing Clinical Judgment Pharmacotherapy with Diuretics 327
- 25 Drugs for Fluid Balance, Electrolyte, and Acid-Base Disorders** 331
- 25.1 Body Fluid Compartments** 332
- 25.2 Osmolality, Tonicity, and the Movement of Body Fluids** 332
- 25.3 Regulation of Fluid Intake and Output** 333
- 25.4 Intravenous Therapy with Crystalloids and Colloids** 333
 CRYSTALLOIDS 333
 COLLOIDS 334
- 25.5 Physiologic Role of Electrolytes** 335
- 25.6 Pharmacotherapy of Sodium Imbalances** 336
 HYPERNATREMIA 337
 HYPONATREMIA 337
- 25.7 Pharmacotherapy of Potassium Imbalances** 338
 HYPERKALEMIA 338
 HYPOKALEMIA 338
- 25.8 Buffers and the Maintenance of Body pH** 340
Nursing Clinical Judgment Intravenous Fluid and Electrolyte Replacement Therapy 340
- 25.9 Pharmacotherapy of Acidosis** 341
- 25.10 Pharmacotherapy of Alkalosis** 342
- 26 Drugs for Hypertension** 345
- 26.1 Factors Responsible for Blood Pressure** 346
- 26.2 Physiologic Regulation of Blood Pressure** 347
- 26.3 Etiology and Pathogenesis of Hypertension** 347
- 26.4 Nonpharmacologic Management of Hypertension** 348
- 26.5 Guidelines for the Management of Hypertension** 349
- 26.6 Treating Hypertension with Diuretics** 351
- 26.7 Treating Hypertension with Drugs That Block the Renin-Angiotensin-Aldosterone System** 352
 ANGIOTENSIN-CONVERTING ENZYME INHIBITORS 353
 ANGIOTENSIN RECEPTOR BLOCKERS 353
 ALDOSTERONE ANTAGONISTS 353
 RENIN INHIBITOR 353
- 26.8 Treating Hypertension with Calcium Channel Blockers** 354
- 26.9 Treating Hypertension with Adrenergic Antagonists** 354
 BETA-ADRENERGIC BLOCKERS 357
 ALPHA₁-ADRENERGIC BLOCKERS 358
 ALPHA₂-ADRENERGIC AGONISTS 358
- 26.10 Treating Hypertension with Direct Vasodilators** 359
Nursing Clinical Judgment Pharmacotherapy for Hypertension 360
- 27 Drugs for Heart Failure** 365
- 27.1 The Etiology and Pathogenesis of Heart Failure** 366
- 27.2 Classification and Pharmacologic Management of Heart Failure** 368
- 27.3 Treatment of Heart Failure with Angiotensin-Converting Inhibitors and Angiotensin Receptor Blockers** 368
- 27.4 Treatment of Heart Failure with Diuretics** 370
- 27.5 Treatment of Heart Failure with Beta-Adrenergic Blockers (Antagonists)** 371
- 27.6 Treatment of Heart Failure with Cardiac Glycosides** 371
- 27.7 Treatment of Heart Failure with Vasodilators and Positive Inotropic Drugs** 372
Nursing Clinical Judgment Pharmacotherapy for Heart Failure 375
- 28 Drugs for Angina Pectoris and Myocardial Infarction** 379
- 28.1 Pathogenesis of Coronary Artery Disease** 380
- 28.2 Pathogenesis of Angina Pectoris** 380
- 28.3 Nonpharmacologic Management of Angina** 381
- 28.4 Treating Angina with Organic Nitrates** 382
Nursing Clinical Judgment Pharmacotherapy with Organic Nitrates 383
- 28.5 Treating Angina with Beta-Adrenergic Blockers** 384
- 28.6 Treating Angina with Calcium Channel Blockers** 386
- 28.7 Diagnosis of Myocardial Infarction** 387
- 28.8 Treating Myocardial Infarction with Fibrinolytics** 388
- 28.9 Adjunct Drugs for Symptoms and Complications of Acute Myocardial Infarction** 390
 ANTIPLATELET AND ANTICOAGULANT DRUGS 390
 NITRATES 391
 BETA-ADRENERGIC BLOCKERS 391
 ANGIOTENSIN-CONVERTING ENZYME INHIBITORS 391
 PAIN MANAGEMENT 391
- 29 Drugs for Shock** 395
- 29.1 Symptoms and Types of Shock** 396
- 29.2 Treatment Priorities for a Patient in Shock** 397
- 29.3 Treating Shock with Intravenous Fluid Therapy** 398
- 29.4 Treating Shock with Vasoconstrictors (Vasopressors)** 398
- 29.5 Treating Shock with Inotropic Drugs** 400
Nursing Clinical Judgment Pharmacotherapy for Shock 401
- 29.6 Pharmacotherapy of Anaphylaxis** 402
- 30 Drugs for Dysrhythmias** 407
- 30.1 Etiology and Classification of Dysrhythmias** 408
- 30.2 Conduction Pathways in the Myocardium** 408
- 30.3 The Electrocardiograph** 410

XX Contents

- 30.4 Nonpharmacologic Treatment of Dysrhythmias 410
- 30.5 Phases of the Myocardial Action Potential 411
- 30.6 Mechanisms and Classification of Antidysrhythmic Drugs 412
- 30.7 Treating Dysrhythmias with Sodium Channel Blockers 412
- 30.8 Treating Dysrhythmias with Beta-Adrenergic Antagonists 412
- 30.9 Treating Dysrhythmias with Potassium Channel Blockers 414
- 30.10 Treating Dysrhythmias with Calcium Channel Blockers 416
- 30.11 Miscellaneous Drugs for Dysrhythmias 418
 - Nursing Clinical Judgment** Pharmacotherapy with Antidysrhythmic Drugs 418
- 31 Drugs for Coagulation Disorders 423
 - 31.1 The Process of Hemostasis 424
 - 31.2 Removal of Blood Clots 425
 - 31.3 Alterations of Hemostasis 425
 - THROMBOEMBOLIC DISORDERS 425
 - COAGULATION DISORDERS 426
 - 31.4 Mechanisms of Coagulation Modification 426
 - 31.5 Pharmacotherapy with Anticoagulants 427
 - HEPARIN, LOW-MOLECULAR-WEIGHT HEPARINS, AND RELATED DRUGS 427
 - VITAMIN K ANTAGONISTS 429
 - DIRECT THROMBIN INHIBITORS 430
 - FACTOR XA INHIBITORS 431
 - 31.6 Pharmacotherapy with Antiplatelet Drugs 432
 - Nursing Clinical Judgment** Pharmacotherapy with Anticoagulant and Antiplatelet Drugs 433
 - 31.7 Pharmacotherapy with Fibrinolytics 434
 - Nursing Clinical Judgment** Pharmacotherapy with Fibrinolytics 435
 - 31.8 Pharmacotherapy with Hemostatics 436
 - 31.9 Pharmacotherapy of Hemophilia 437
- 32 Drugs for Hematopoietic Disorders 441
 - 32.1 Hematopoiesis 442
 - 32.2 Pharmacotherapy with Erythropoiesis-Stimulating Drugs 444
 - 32.3 Pharmacotherapy with Colony-Stimulating Factors 444
 - Nursing Clinical Judgment** Pharmacotherapy with Colony-Stimulating Factors 446
 - 32.4 Pharmacotherapy with Platelet Enhancers 447
 - 32.5 Classification of Anemias 447
 - 32.6 Pharmacotherapy with Vitamin B₁₂ and Folic Acid 448
 - 32.7 Pharmacotherapy with Iron Compounds 449
 - Nursing Clinical Judgment** Pharmacotherapy for Anemia (Folic Acid, Vitamin B₁₂, and Iron Deficiency) 452

Unit 5

The Immune System 455

- 33 Drugs for Inflammation and Fever 456
 - 33.1 The Function of Inflammation 457
 - 33.2 The Role of Chemical Mediators in Inflammation 457
 - 33.3 General Strategies for Treating Inflammation 458
 - 33.4 Treating Inflammation with NSAIDs 459
 - SALICYLATES 460
 - IBUPROFEN AND IBUPROFEN-LIKE NSAIDS 461
 - SELECTIVE COX-2 INHIBITORS 461
 - 33.5 Treating Acute or Severe Inflammation with Corticosteroids 462
 - 33.6 Treating Fever with Antipyretics 463
 - Nursing Clinical Judgment** Pharmacotherapy with Anti-Inflammatory and Antipyretic Drugs 465
- 34 Drugs for Immune System Modulation 471
 - 34.1 Innate (Nonspecific) Body Defenses and the Immune Response 472
 - 34.2 Humoral Immune Response and Antibodies 472
 - 34.3 Administration of Vaccines 473
 - 34.4 Cell-Mediated Immunity and Cytokines 476
 - 34.5 Pharmacotherapy with Immunostimulants 477
 - Nursing Clinical Judgment** Pharmacotherapy with Immunostimulants 481
 - 34.6 Indications for Immunosuppressants 482
 - TRANSPLANTATION 482
 - INFLAMMATORY AND AUTOIMMUNE DISORDERS 482
 - CANCER THERAPIES 482
 - 34.7 Immunosuppressant Medications for Preventing Transplant Rejection and Inflammatory Disorders 484
 - Nursing Clinical Judgment** Pharmacotherapy with Immunosuppressants 485
- 35 Drugs for Bacterial Infections 491
 - 35.1 Pathogenicity and Virulence 492
 - 35.2 Describing and Classifying Bacteria 492
 - 35.3 Classification of Anti-Infective Drugs 492
 - 35.4 Actions of Anti-Infective Drugs 493
 - 35.5 Acquired Resistance 493
 - 35.6 Selection of an Effective Antibiotic 496
 - 35.7 Host Factors 496
 - HOST DEFENSES 496
 - LOCAL TISSUE CONDITIONS 497
 - ALLERGY HISTORY 497
 - OTHER PATIENT VARIABLES 497
 - 35.8 Pharmacotherapy with Penicillins 497
 - 35.9 Pharmacotherapy with Cephalosporins 498

35.10	Pharmacotherapy with Tetracyclines	501
35.11	Pharmacotherapy with Macrolides	502
35.12	Pharmacotherapy with Aminoglycosides	503
35.13	Pharmacotherapy with Fluoroquinolones	506
35.14	Pharmacotherapy with Sulfonamides and Urinary Antiseptics	506
35.15	Pharmacotherapy with Carbapenems and Miscellaneous Antibacterials	508
	Nursing Clinical Judgment Pharmacotherapy with Antibacterial Drugs	511
36	Drugs for Tubercular, Fungal, Protozoan, and Helminthic Infections	517
36.1	Pharmacotherapy of Tuberculosis	519
36.2	Characteristics of Fungi	519
	Nursing Clinical Judgment Pharmacotherapy with Antitubercular Drugs	521
36.3	Classification of Mycoses	522
36.4	Mechanism of Action of Antifungal Drugs	523
36.5	Pharmacotherapy of Systemic Fungal Diseases	523
36.6	Pharmacotherapy with the Azole Antifungals	524
	SYSTEMIC AZOLES	524
	TOPICAL AZOLES	525
36.7	Pharmacotherapy of Superficial Fungal Infections	525
	Nursing Clinical Judgment Pharmacotherapy with Antifungal Drugs	528
36.8	Pharmacotherapy of Malaria	529
36.9	Pharmacotherapy of Nonmalarial Protozoan Infections	530
36.10	Pharmacotherapy of Helminthic Infections	532
37	Drugs for Viral Infections	537
37.1	Characteristics of Viruses	538
37.2	Replication of HIV	539
37.3	General Principles of HIV Pharmacotherapy	540
37.4	Classification of Drugs for HIV and AIDS	540
37.5	Pharmacotherapy with Reverse Transcriptase Inhibitors	542
37.6	Pharmacotherapy with Protease Inhibitors	543
37.7	Pharmacotherapy with Integrase Strand Inhibitors and Entry Inhibitors	544
	Nursing Clinical Judgment Pharmacotherapy for HIV Infection	546
37.8	Prevention of Perinatal Transmission of HIV	547
37.9	Postexposure Prophylaxis of HIV Infection Following Occupational Exposure	548
37.10	Pharmacotherapy of Herpesvirus Infections	548
37.11	Pharmacotherapy of Influenza	550
37.12	Pharmacotherapy of Viral Hepatitis	551
	HEPATITIS A	551
	HEPATITIS B	551
	HEPATITIS C AND OTHER HEPATITIS VIRUSES	552

37.13	Prevention and Treatment of Coronavirus-19 Infection	553
	Nursing Practice Application Pharmacotherapy for Non-HIV Viral Infections	553
38	Drugs for Neoplasia	557
38.1	Characteristics of Cancer	558
38.2	Causes of Cancer	558
38.3	Goals of Cancer Chemotherapy: Cure, Control, and Palliation	559
38.4	Growth Fraction and Success of Chemotherapy	560
38.5	Achieving a Total Cancer Cure	560
38.6	Special Chemotherapy Protocols and Strategies	561
	COMBINATION CHEMOTHERAPY	561
	DOSING SCHEDULES	561
38.7	Toxicity of Antineoplastic Drugs	562
38.8	Pharmacotherapy with Alkylating Agents	563
38.9	Pharmacotherapy with Antimetabolites	564
	FOLIC ACID ANALOGS	565
	PURINE AND PYRIMIDINE ANALOGS	567
38.10	Pharmacotherapy with Antitumor Antibiotics	568
38.11	Pharmacotherapy with Natural Products	568
38.12	Pharmacotherapy with Hormones and Hormone Antagonists	569
	CORTICOSTEROIDS (GLUCOCORTICOIDS)	570
	GONADOTROPIN-RELEASING HORMONE ANALOGS	570
	ESTROGEN RECEPTOR ANTAGONISTS	571
	ANDROGEN ANTAGONISTS (ANTIANDROGENS)	572
38.13	Pharmacotherapy with Biologic Response Modifiers and Targeted Therapies	574
38.14	Miscellaneous Antineoplastics	574
	Nursing Clinical Judgment Pharmacotherapy for Cancer	577

Unit 6

The Respiratory System 581

39	Drugs for Allergic Rhinitis and the Common Cold	582
39.1	Physiology of the Upper Respiratory Tract	583
39.2	Pharmacotherapy of Allergic Rhinitis	584
39.3	Pharmacology of Allergic Rhinitis with H ₁ -Receptor Antagonists	585
39.4	Pharmacotherapy of Allergic Rhinitis with Intranasal Corticosteroids and Mast Cell Stabilizers	587
39.5	Pharmacotherapy of Nasal Congestion with Decongestants	588
	COMMON COLD	590
39.6	Pharmacotherapy with Antitussives	590

- 39.7 Pharmacotherapy with Expectorants, Mucolytics, and Drugs for Cystic Fibrosis 591

Nursing Clinical Judgment Pharmacotherapy for Symptomatic Cold and Allergy Relief 593

40 Drugs for Asthma and Other Pulmonary Disorders 597

- 40.1 Physiology of the Lower Respiratory Tract 598
 40.2 Administration of Pulmonary Drugs via Inhalation 598
 40.3 Pathophysiology of Asthma 599
 40.4 Treating Acute Asthma with Beta-Adrenergic Agonists 601
 40.5 Treating Chronic Asthma with Anticholinergics 604
 40.6 Treating Chronic Asthma with Methylxanthines 605
 40.7 Prophylaxis of Asthma with Corticosteroids 605
 40.8 Prophylaxis of Asthma with Leukotriene Modifiers and Mast Cell Stabilizers 606
 40.9 Biological Therapies for Asthma Prophylaxis 608
 40.10 Pharmacotherapy of COPD 608
Nursing Clinical Judgment Pharmacotherapy for Asthma and COPD 609

Unit 7

The Gastrointestinal System 613

41 Drugs for Peptic Ulcer Disease 614

- 41.1 Normal Digestive Processes 615
 41.2 Acid Production by the Stomach 616
 41.3 Etiology and Pathogenesis of Peptic Ulcer Disease 617
 41.4 Pathogenesis of Gastroesophageal Reflux Disease 617
 41.5 Management of Peptic Ulcer Disease and Gastroesophageal Reflux Disease 617
 41.6 Pharmacotherapy with Proton Pump Inhibitors 618
 41.7 Pharmacotherapy with H₂-Receptor Antagonists 618
 41.8 Pharmacotherapy with Antacids 620
 41.9 Pharmacotherapy of *H. Pylori* Infection 622
Nursing Clinical Judgment Pharmacotherapy for Peptic Ulcer and Gastroesophageal Reflux Diseases 623
 41.10 Miscellaneous Drugs for Peptic Ulcer Disease 624

42 Drugs for Bowel Disorders and Other Gastrointestinal Conditions 629

- 42.1 Normal Function of the Lower Digestive Tract 630
 42.2 Pathophysiology of Constipation 631
 42.3 Pharmacotherapy with Laxatives 631
 42.4 Pathophysiology of Diarrhea 633
 42.5 Pharmacotherapy with Antidiarrheals 634
 42.6 Pharmacotherapy of Irritable Bowel Syndrome 635

- 42.7 Pharmacotherapy of Inflammatory Bowel Disease 637

Nursing Clinical Judgment Pharmacotherapy for Bowel Disorders 638

- 42.8 Pathophysiology of Nausea and Vomiting 639
 42.9 Pharmacotherapy with Antiemetics 640
 SEROTONIN (5-HT₃) RECEPTOR ANTAGONISTS 640
 ANTICHOLINERGICS AND ANTIHISTAMINES 640
 PHENOTHIAZINES AND DOPAMINE RECEPTOR ANTAGONISTS 640
 CORTICOSTEROIDS 640
 OTHER ANTIEMETICS 642
 EMETICS 642
Nursing Clinical Judgment Pharmacotherapy with Antiemetic Drugs 643
 42.10 Pharmacotherapy of Pancreatitis 644

43 Drugs for Nutritional Disorders 647

- 43.1 Role of Vitamins in Maintaining Health 648
 43.2 Classification of Vitamins 648
 43.3 Recommended Dietary Allowances 648
 43.4 Indications for Vitamin Pharmacotherapy 648
 43.5 Pharmacotherapy with Lipid-Soluble Vitamins 649
 43.6 Pharmacotherapy with Water-Soluble Vitamins 651
 43.7 Indications for Mineral Pharmacotherapy 653
 43.8 Pharmacotherapy with Minerals 655
Nursing Clinical Judgment Pharmacotherapy with Vitamins and Minerals 657
 43.9 Etiology of Undernutrition 658
 43.10 Enteral Nutrition 658
 43.11 Parenteral Nutrition 659
Nursing Clinical Judgment Enteral and Parenteral Nutrition Therapy 660
 43.12 Etiology of Obesity 661
 43.13 Pharmacotherapy of Obesity 662

Unit 8

The Endocrine System 667

44 Drugs for Pituitary, Thyroid, and Adrenal Disorders 668

- 44.1 The Endocrine System and Homeostasis 669
 44.2 Indications for Hormone Pharmacotherapy 669
 44.3 The Endocrine Structures of the Brain 670
 44.4 Pharmacotherapy with Hypothalamic and Pituitary Hormones 671
 GROWTH HORMONE 673
 ANTIDIURETIC HORMONE 673
 44.5 Normal Function of the Thyroid Gland 673
Nursing Clinical Judgment Pharmacotherapy with Hypothalamic and Pituitary Hormones 674

- 44.6 Pharmacotherapy of Hypothyroidism 676
- 44.7 Pharmacotherapy of Hyperthyroidism 677
 - Nursing Clinical Judgment** Pharmacotherapy for Thyroid Hormone Replacement Therapy 679
- 44.8 Normal Function of the Adrenal Glands 680
 - GONADOCORTICOIDS 680
 - MINERALOCORTICOIDS 680
 - GLUCOCORTICOIDS 680
- 44.9 Regulation of Corticosteroid Secretion 680
- 44.10 Pharmacotherapy with Corticosteroids 681
- 44.11 Pharmacotherapy of Cushing Syndrome 683
 - Nursing Clinical Judgment** Pharmacotherapy with Systemic Corticosteroids 684

45 Drugs for Diabetes Mellitus 689

- 45.1 Regulation of Blood Glucose Levels 690
- 45.2 Etiology and Characteristics of Type 1 Diabetes Mellitus 690
- 45.3 Pharmacotherapy for Type 1 Diabetes Mellitus 692
 - Nursing Clinical Judgment** Pharmacotherapy with Insulin 695
- 45.4 Etiology and Characteristics of Type 2 Diabetes Mellitus 696
- 45.5 Pharmacotherapy for Type 2 Diabetes Mellitus 696
 - SULFONYLUREAS 698
 - BIGUANIDES 699
 - ALPHA-GLUCOSIDASE INHIBITORS 699
 - THIAZOLIDINEDIONES 699
 - MEGLITINIDES 699
 - INCRETIN THERAPIES 699
 - SODIUM-GLUCOSE CO-TRANSPORTER 2 INHIBITORS 699
 - Nursing Clinical Judgment** Pharmacotherapy for Type 2 Diabetes 701

46 Drugs for Disorders and Conditions of the Female Reproductive System 705

- 46.1 Hypothalamic and Pituitary Regulation of Female Reproductive Function 706
- 46.2 Ovarian Control of Female Reproductive Function 706
- 46.3 Estrogens and Progestins as Oral Contraceptives 707
 - Nursing Clinical Judgment** Pharmacotherapy with Hormonal Contraceptives 712
- 46.4 Other Drugs For Modifying Conception And Pregnancy 713
- 46.5 Hormone Therapy During Menopause 714
- 46.6 Pharmacotherapy with Progestins 715
- 46.7 Pharmacologic Management of Uterine Contractions 718
 - Nursing Clinical Judgment** Pharmacotherapy with Oxytocin 720
- 46.8 Pharmacotherapy of Female Fertility 721
- 46.9 Pharmacotherapy of Female Hypoactive Sexual Desire Disorder 722

47 Drugs for Disorders and Conditions of the Male Reproductive System 727

- 47.1 Hypothalamic and Pituitary Regulation of Male Reproductive Function 728
- 47.2 Pharmacotherapy with Androgens 728
 - Nursing Clinical Judgment** Pharmacotherapy with Androgens 731
- 47.3 Pharmacotherapy of Male Infertility 731
- 47.4 Pharmacotherapy of Erectile Dysfunction 732
- 47.5 Pharmacotherapy of Benign Prostatic Hyperplasia 734
 - Nursing Clinical Judgment** Pharmacotherapy for Benign Prostatic Hyperplasia 737

Unit 9

The Integumentary System, Eyes, and Ears 741

48 Drugs for Bone and Joint Disorders 742

- 48.1 Role of Calcium and Vitamin D in Bone Homeostasis 743
- 48.2 Pharmacotherapy of Hypocalcemia 745
- 48.3 Pathophysiology of Metabolic Bone Diseases 745
- 48.4 Pharmacotherapy of Metabolic Bone Diseases 748
 - VITAMIN D THERAPY 748
 - BISPHOSPHONATES 748
 - SELECTIVE ESTROGEN RECEPTOR MODULATORS 750
 - OTHER DRUGS FOR METABOLIC BONE DISEASE 751
 - Nursing Clinical Judgment** Pharmacotherapy for Osteoporosis 752
- 48.5 Pharmacotherapy of Osteoarthritis 753
- 48.6 Pharmacotherapy of Rheumatoid Arthritis 755
- 48.7 Pharmacotherapy of Gout and Hyperuricemia 755
 - TREATMENT OF ACUTE GOUT 756
 - Nursing Clinical Judgment** Pharmacotherapy for Rheumatoid Arthritis and Osteoarthritis 757
 - TREATMENT OF CHRONIC GOUT AND PROPHYLAXIS 759
 - Nursing Clinical Judgment** Pharmacotherapy for Gout 760

49 Drugs for Skin Disorders 765

- 49.1 Structure and Function of the Skin 766
- 49.2 Classification of Skin Disorders 767
- 49.3 Pharmacotherapy of Bacterial, Fungal, and Viral Skin Infections 768
- 49.4 Pharmacotherapy with Scabicides and Pediculicides 769
 - Nursing Clinical Judgment** Pharmacotherapy for Lice or Mite Infestation 770
- 49.5 Pharmacotherapy of Acne 771

xxiv Contents

- 49.6 Pharmacotherapy of Rosacea 772
 - Nursing Clinical Judgment** Pharmacotherapy for Acne and Rosacea 773
- 49.7 Pharmacotherapy of Dermatitis 774
- 49.8 Pharmacotherapy of Psoriasis 777
 - TOPICAL THERAPIES 777
 - SYSTEMIC DRUGS 778
 - BIOLOGIC THERAPIES 779
 - NONPHARMACOLOGIC THERAPIES 779
- 49.9 Pharmacotherapy of Alopecia 779

50 Drugs for Eye and Ear Disorders 783

- 50.1 Anatomy of the Eye 784
- 50.2 Types of Glaucoma 785
- 50.3 Pharmacotherapy of Glaucoma 786
 - PROSTAGLANDIN ANALOGS 786
 - AUTONOMIC DRUGS 786

- CARBONIC ANHYDRASE INHIBITORS AND MISCELLANEOUS DRUGS 788
- OSMOTIC DIURETIC 789
- Nursing Clinical Judgment** Pharmacotherapy for Glaucoma 789

- 50.4 Pharmacotherapy for Eye Exams and Minor Eye Conditions 790
- 50.5 Pharmacotherapy with Otic Medications 791

Appendix A Answers 797

Appendix B Institute for Safe Medication Practices 839

Appendix C Calculating Dosages 843

Index 847

Special Features 895