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PHARMACOLOGY

**A Nursing
Process
Approach**

Third Edition

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A Nursing Process Approach

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In Loving Memory of My Parents

Esther B. and Samuel H. LeFever

Joyce LeFever Kee

To My Parents

Margaret and Justin Hayes

for their ever-present love and confidence

Evelyn R. Hayes

NOTICE

Pharmacology is an ever changing field. Standard safety precautions must be followed, but as new research and clinical experience broaden our knowledge, changes in treatment and drug therapy become necessary or appropriate. The editors of this work have carefully checked the generic and trade names and verified drug dosages to assure that the dosage information in this work is accurate and in accord with the standards accepted at the time of publication. Readers are advised, however, to check the product information currently provided by the manufacturer of each drug to be administered to be certain that changes have not been made in the recommended dose or in the contraindications for administration. This is of particular importance in regard to new or infrequently used drugs. It is the responsibility of the treating physician or health care provider, relying on experience and knowledge of the client, to determine dosages and the best treatment for their client. The editors and publisher cannot be responsible for misuse or misapplication of the information in this work.

To the Reader

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Preface

This unique clinical pharmacology textbook presents complex pharmacologic principles in a student-friendly and comprehensive manner. *Pharmacology: A Nursing Process Approach*, Third Edition, focuses on the understanding of pharmacologic principles, the administration of medications, and the evaluation of client responses. These foci are essential to the foundations of professional nursing practice. The textbook is designed for students in a variety of nursing programs, for NCLEX review and preparation, and for nurses practicing in a variety of settings.

Organization

The textbook is organized into 14 units and 52 chapters. The first unit presents an overview of pharmacologic principles. Chapter 4 presents a comprehensive review of drug dosage calculations for adults and children. The chapter consists of six sections: Systems of Measurement with Conversion, Methods for Calculation, Calculations of Oral Dosages, Calculations of Injectable Dosages, Calculations of Intravenous Fluids, and Calculations of Pediatric Dosages. Throughout this chapter, we added colorful new photographs of the equipment used to deliver medications. We also use clinical practice problems and real drug labels in full color for practicing dosage calculations. With its variety and number of practice problems using different health care settings, this chapter eliminates the student's need to purchase a separate dosage calculation textbook. The accompanying Student Guide provides additional practice problems with answers and a basic math review.

The rest of the units in this textbook present all the drug families. Each chapter provides an outline, objectives, key terms, drug pharmacokinetics and pharmacodynamics, and the nursing process. Pharmacology is at the forefront of the knowledge explosion. Thus, we added several new chapters in this edition, such as Chapter 6, Cultural Considerations; Chapter 8, Herbal Therapy and Nursing Implications; Chapter

10, Medication Administration in Community Settings; Chapter 31, HIV-Related Agents; and Chapter 32, Vaccines.

Features

Throughout this textbook, we use a variety of features to teach students the fundamental principles of pharmacology and to illustrate the role of the nurse in drug therapy.

- **Prototype Drug Charts.** This edition contains about 100 charts that illustrate basic and comparative data for prototype drugs in selected categories. Students can see how different steps of the Nursing Process correlate to different aspects of drug information and therapy.
- **Nursing Process.** We integrated the Nursing Process throughout the textbook. The Nursing Process presented in each chapter includes Assessment, Nursing Diagnoses, Planning, Nursing Interventions, and Evaluation.
- **Client Teaching.** Under Nursing Interventions, we include Client and Family Teaching information in color type. We have expanded this section and now suggest helpful teaching tips that relate to general information, self-administration, diet, and side effects.
- **Cultural Considerations.** In addition to a new chapter discussing general cultural considerations during drug therapy, we have added a section for Cultural Considerations under Nursing Interventions. These sections provide information when it is relevant for the nurse to consider cultural implications during drug administration.
- **Critical Thinking in Action.** Each chapter concludes with a clinical scenario, followed by a series of critical thinking questions. These exercises challenge students to carefully consider the scenario, and apply their knowledge and analysis skills to respond to the situations.

- **Study Questions.** At the end of each chapter, a series of Study Questions provides students with an immediate review and reinforces the objectives of the chapter. Students can scan the content of the chapter to confirm their answers.
- **Drug Tables.** The comprehensive drug tables found in the therapeutic chapters provide drug names (generic, brand, and Canadian), dosages, uses and considerations, pregnancy categories, and pharmacokinetics.

Other New Features

- A **colorful** design and new illustrations and photographs, including innovative technology for medication administration.
- Expanded Unit introductions with illustrated **overviews of anatomy and physiology**.
- Updated drug information, including the **latest FDA-approved drugs** in all categories.
- Internet sites of interest are listed on the front inside cover.
- **Selected Drug Interactions** listed on the last page of the textbook.

Teaching and Learning Resources

Pharmacology: A Nursing Process Approach, Third Edition, is accompanied by ancillary resources to provide pharmacology instructors and students with a complete teaching/learning package. These resources include:

- **Study Guide.** It provides application of the nursing process to clinical situations through a variety of

formats. In addition to multiple choice and completion questions, the student guide offers labeling exercises, matching exercises, word searches, and critical thinking case studies. Answers are provided.

- **Instructor's Electronic Resource CD-ROM.** This CD-ROM provides three instructor's resources. The **Online Instructor's Manual** contains objectives, outlines, and teaching strategies to promote critical thinking. The Instructor's Manual also provides a basic math test and answers. Instructors receive this resource in both Microsoft Word and WordPerfect. Instructors can incorporate their own materials or simply print chapters out as is. The **ExaMaster** electronic test bank consists of more than 900 questions. The ExaMaster program allows instructors to generate tests, incorporate their own questions, and maintain a grade book. Finally, the CD-ROM also includes an **Electronic Image Collection**, featuring more than 40 colorful illustrations from the textbook. These images can be imported into any electronic lecture presentation or printed on transparency acetates. This valuable CD-ROM is available only to schools that adopt *Pharmacology: A Nursing Process Approach*, Third Edition.

It is our hope that nursing students will enhance their knowledge of pharmacology and their roles in drug therapy through this textbook and its accompanying resources.

Joyce LeFever Kee
Evelyn R. Hayes

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*Joyce L. Kee
Evelyn R. Hayes*

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Unit I



A Nurse's Perspective of Pharmacology

Assessing a client's response to drug therapy is an ongoing nursing responsibility. To adequately assess, plan, intervene, and evaluate drug effects, the nurse needs to have knowledge of the pharmacologic, pharmacokinetic, and pharmacodynamic phases of drug action. A drug chart—see Introduction to Drug Chart Use—organizes specific drug data needed for preparation and application of the nursing process. Client teaching is essential to promote client and family adherence to the drug regimen and therapy.

Along with understanding the three phases of drug action, nursing process, and client teaching, applying of principles of drug administration and calculating drug doses are important functions in nursing practice. Chapter 3, Principles of Drug Administration, contains basic learning material for the administration of medications. It describes the “ten rights” in drug administration, drug orders, drug distribution, drug charting, guidelines for drug administration, and routes for drug administration with illustrated parenteral sites.

Chapter 4, Medications and Calculations, provides practice in drug calculation for adult and child dosages. This chapter could be assigned as an overall review of drug calculation. Chapters 3 and 4 may be used for drug administration and calculation in place of a nursing fundamentals text or a drug calculation text.

Drug Action: Pharmaceutical, Pharmacokinetic, and Pharmacodynamic Phases

Outline

Objectives	Excretion, or Elimination	Side Effects, Adverse Reactions, and Toxic Effects
Terms	Pharmacodynamics	Pharmacogenetics
Introduction	Onset, Peak, and Duration of Action	Tachyphylaxis
Pharmaceutic	Receptor Theory	Placebo Effect
Pharmacokinetics	Therapeutic Index and Therapeutic Range (Therapeutic Window)	Summary
Absorption	Peak and Trough Levels	Nursing Process
Distribution	Loading Dose	Study Questions
Metabolism, or Biotransformation		

Objectives

Define the three phases of drug action.

Identify the two processes that occur before tablets are absorbed into the body.

Describe the four processes of pharmacokinetics.

Explain the meaning of pharmacodynamics, the receptor, and nonreceptors in drug action.

Define the terms *protein-bound drugs*, *half-life*, *therapeutic index*, *therapeutic drug range*, *side effects*, *adverse reaction*, and *drug toxicity*.

Check drugs for half-life, percentage of protein-binding effect, therapeutic range, and side effects in a drug reference book.

Terms

active absorption	high therapeutic index	pharmacokinetic
adverse reactions	ligand-binding domain	pinocytosis
agonists	loading dose	placebo effect
antagonists	low therapeutic index	protein-binding
bioavailability	metabolism	rate limiting
creatinine clearance	nonselective drug response	receptor
disintegration	nonspecific drug response	side effects
dissolution	onset of action	tachyphylaxis
distribution	passive absorption	therapeutic index
duration of action	peak action	therapeutic window
elimination	peak level	therapeutic range
first-pass effect	pharmaceutic phase	time-response curve
free drugs	pharmacodynamic	toxicity
half-life	pharmacogenetics	trough level