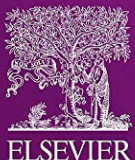


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PHARMACOLOGY

EDITION
10

A PATIENT-CENTERED NURSING PROCESS APPROACH



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Pharmacology

A Patient-Centered Nursing Process Approach

TENTH EDITION

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Dedication

To Joyce LeFever Kee, who originated this book; to Evelyn R. Hayes for her previous contributions to the book; to Dr. Gerald DeLuca and Sister Bernardino Hill for their expert guidance; and in loving memory of my sister, Katrina Sue Bengé.

Linda E. McCuistion

To my grandchildren: Chloe & Sofia DiMaggio, Mia Leboutillier, Catherine, Jack, & Elaine Boudreaux; my daughters: Christy Boudreaux, Maria DiMaggio, & Katie Leboutillier; and my dear friend, Linda McCuistion.

Kathleen Vuljoin DiMaggio

To my Lord and Savior for the gift of nursing and teaching, to Dr. Richard A. Winton for his love and support for many years, and in loving memory of my parents, Matthew and Mary Wagner.

Mary B. Winton

To Tracy L. Yeager, my husband, my soulmate, and support; and to my boys, Jacob and Joshua, for putting up with my hours on the computer; and, I wouldn't be me without thanking my dog, Xander, for being my constant companion.

Jennifer J. Yeager



Meet The Authors

Linda E. Mccuiston



Dr. Linda E. McCuiston received a Diploma of Nursing from the Lutheran Hospital School of Nursing in Fort Wayne, Indiana; Bachelor of Science in Nursing from William Carey College in Hattiesburg, Mississippi; Masters in Nursing from Louisiana State University Medical Center, New Orleans; and PhD in Curriculum and Instruction from the University of New Orleans. She was licensed as an Advanced Practice Nurse in Louisiana and has many years of nursing experience that include acute care and home health nursing. For 20 years, Linda was a Nursing Professor at University of Holy Cross in New Orleans, Louisiana. She received an Endowed Professorship Award in 2000 and 2003. Linda also worked as a nursing professor at South University, Richmond, Virginia.

Linda has served as a past president, vice president, and faculty advisor of the Sigma Theta Tau International Honor Society in Nursing, Xi Psi chapter-at-large. She is a past associate editor of the *NODNA Times*, a New Orleans District Nurses Association newsletter. She has been a member of Phi Delta Kappa and the American Society of Hypertension.

Linda was coordinator for the Graduate Plus internship program, a preceptorship program for new nursing graduates in the state of Louisiana. She has served as a legal nurse consultant; a member of a medical review panel; advisory board member, consultant, and reviewer of a software preparation company focused on the state licensure examination; advisory board member for a school for surgical technicians; and consultant to a local hospital to improve the quality of nursing care and assist acute care facilities in preparation for accreditation.

Linda was chosen as a "Great One-Hundred Nurse" by the New Orleans District Nurses Association in 1993. She is also listed in the 2005/2006 edition of the Empire Who's Who Executive and Professional Registry.

Linda has given numerous lectures and presentations regionally and nationally on a variety of nursing topics. She has published articles in nursing journals and has authored many chapters in several nursing textbooks, including *Pharmacotherapeutics: Clinical Decision Making in Nursing* (1999), *Saunders Manual of Medical-Surgical Nursing: A Guide for Clinical Decision Making* (2002), and *Saunders Nursing Survival Guide: Pathophysiology* (2007). She is author and coauthor of many chapters and coeditor of *Saunders Nursing Survival Guide: Pharmacology* (2007).

Linda enjoys cruises, the beach, and other travel. When at home, she enjoys family, friends, golf, crafts, reading, and writing.

Kathleen Vuljoin Dimaggio



Kathleen Vuljoin DiMaggio received her Bachelor of Science in Nursing from Our Lady of Holy Cross College of New Orleans and her Master of Science in Nursing from Loyola University of New Orleans, with a focus on Healthcare Systems Management. She completed a preceptorship in palliative care at Ochsner Foundation Hospital through Loyola University. She received Level I designation from the National Hospice and Palliative Care Organization in hospice management and development. She is certified with the Louisiana Department of Health and Hospitals Developmental Disabilities as a Registered Nurse Instructor in medication administration. Kathleen has more than 23 years of clinical nursing experience and more than 12 years of baccalaureate nursing education. Her professional practice experience includes medical-surgical nursing and home health and hospice nursing. She has experience in nursing management and has worked as director of nursing for a facility specializing in developmental disabilities. In addition, Kathleen has worked as director

of nursing in home health and hospice care. She has worked in quality improvement, disease management, and case management. Presently, Kathleen enjoys working with junior and senior nursing students as clinical nursing instructor.

Kathleen has served as a volunteer for Junior Achievement of New Orleans, has volunteered for a local hospice agency, and has served in the homeless ministry through her church.

Kathleen is a member of the American Nurses Association, Louisiana State Nurses Association, Academy of Medical-Surgical Nurses, Sigma Theta Tau International Honor Society of Nursing, and Alpha Sigma Nu Jesuit Honor Society.

Kathleen is a recipient of the 2011 and 2015 Endowed Professorship from Eminent Eye, Ear, Nose and Throat Hospital. She has received the Order of St. Louis Award through the Archdiocese of New Orleans and has also received the Florence Nightingale Society Award for Nursing. Kathleen received outstanding faculty of the year award in 2017 from the University of Holy Cross New Orleans. She received the distinction of Professor Emerita from University of Holy Cross New Orleans in May 2018.

Kathleen enjoys spending time with family and friends. She enjoys crocheting, quilting, cooking, and reading.

Mary B. Winton



Dr. Mary B. Winton received her Associate Degree in Nursing from Tarleton State University in Stephenville, Texas, a member of the Texas A&M University System; her Bachelor and Master of Science in Nursing from the University of Texas at Arlington; and her PhD in Nursing from the University of Texas at Tyler. Additionally, she is board certified through the American Nurses Credentialing Center as an Acute Care Adult Nurse Practitioner. Mary has many years of hospital nursing experience in areas including critical care, emergency, and medical-surgical nursing as both a nurse and as a nursing supervisor. Additionally, she was employed with a hospitalist group as an Acute Care Nurse Practitioner for many years. She is currently an Assistant Professor in the College of Health Sciences and Human Services, School of Nursing, at Tarleton State University. Mary has experience in teaching graduate-level pharmacology, pathophysiology, and nursing informatics, and she has vast experience teaching at all levels of the undergraduate nursing program, including nursing pathophysiology, pharmacology, and health assessment.

Mary has served as faculty advisor for the Student Nurses Association at Tarleton. She has been a member of several organizations, including Sigma Theta Tau International Honor Society

in Nursing, Tau Chi chapter; American Nurses Association/Texas Nurses Association; Critical Care Nursing Education; and Rural Nurse Organization. She is actively involved in various university, college, school, and departmental committees.

During her career as a nurse educator, Mary was the recipient of the Texas A&M Student Evaluation Teaching Excellence Award and the O.A. Grant Excellence in Teaching Award. She has also taught English as a Second Language at her church of membership.

Mary's research interests include health disparity among minorities, especially among Korean immigrants; student learning outcomes; and the use of technology in classrooms. She has presented at several conferences and has published on the health care of Korean immigrants.

During her spare time, Mary enjoys spending time with her husband, daughters, and grandchildren. She also enjoys traveling, reading, crocheting, and snow skiing.

Jennifer J. Yeager



Dr. Jennifer J. Yeager graduated from the University of Portland, Oregon, in 1987 with her Bachelor of Science in Nursing degree; she attended the university on an Air Force ROTC nursing scholarship. After graduation, she began her nursing career as an Air Force officer, assigned to Wilford Hall USAF Medical Center in San Antonio, Texas. The Air Force provided Jennifer with excellent experience as a transplant/nephrology nurse; after 6 years on active duty, she entered the civilian world as a transplant coordinator at Methodist Medical Center in Dallas, Texas. While there, Jennifer began her Master of Science in Nursing degree at the University of Texas at Arlington; she completed her degree as an Adult/Gerontological Nurse Practitioner with Educator Role in 1998. After completing ANCC certification in

both specialty areas, she went to work in the Baylor Health Care System as a nurse practitioner in Long-Term Care and Elder House Calls.

Jennifer moved to Stephenville, Texas in 2007 and began teaching at Tarleton State University. She completed her PhD in Nursing at the University of Texas at Tyler in Fall 2013. She teaches a variety of courses, both graduate level and undergraduate.

Jennifer currently serves as Book Salon Chair for the Society for Simulation in Health Care. Along with her coworker, Dr. Mary Winton, she presented findings from their study, *Empathy of Baccalaureate Nursing Students Caring for Aging Patients*, at the Society for Simulation in Health Care's annual convention in San Antonio in January 2019.

To relax, Jennifer enjoys spending time with her family, including multiple dogs. She is a strong advocate for dog rescue organizations and is a member of Pets Are Worth Saving in Stephenville, Texas. Her passion for dogs extends to Animal Assisted Therapy. Xander, her American Staffordshire Terrier, is not only a rescue but also a certified therapy dog who joins her at Tarleton to work with nursing students to reduce anxiety before exams and simulations.



In Recognition

Joyce LeFever Kee taught a pharmacology course to student nurses for 10 years from 1980 to 1990 at the University of Delaware. At the time, there were very few pharmacology texts available, and what was published was not appropriate for some BSN and ADN nursing programs. Daniel Ruth from W.B. Saunders approached Kee in 1990 to write a pharmacology book for nurses. With experience in teaching the subject, Kee developed the contents and format for a pharmacology text.

The chapter Drug Action: Pharmaceutic, Pharmacokinetics, and Pharmacodynamics Phases became the first chapter in the first edition. These drug phases appear both in the Prototype Drug Charts and within the contents in most of the current chapters. There are many drug tables Kee developed that have been updated by coauthors through the years. The important part that Kee established in the chapters were the five steps of the Nursing Process.

Dr. Evelyn R. Hayes joined Kee starting with the first edition. Hayes developed certain chapters and took the responsibility to work with contributors for the book such as the six chapters on Reproductive and Gender-Related Agents among others.

Linda McCuistion joined Kee and Hayes in 2005. McCuistion has updated many of Kee's chapters with new drugs and content.



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Preface

The tenth edition of *Pharmacology: A Patient-Centered Nursing Process Approach* is written for nursing students who can benefit from presentation of the principles of pharmacology in a straightforward, student-friendly manner. It focuses on need-to-know content and helps students learn to administer drugs safely and eliminate medication errors through extensive practice of dosage calculations and evidence-based application of the nursing process.

Organization

Pharmacology: A Patient-Centered Nursing Process Approach is organized into 18 sections and 55 chapters. **Section I** is an introduction to pharmacology and includes thoroughly updated chapters on drug action, the drug approval process, cultural and pharmacogenetic considerations, drug interactions, over-the-counter drugs, ethical considerations, pediatric and geriatric considerations, drugs for substance use disorder, complementary and alternative therapies, life span issues, patient collaboration in community settings, the nursing process, patient-centered care, and the role of the nurse in drug research.

Section II focuses on patient safety and quality in pharmacotherapy, medication administration, and it features a comprehensive review of drug dosage calculations for adults and children that is a unique strength of this book. This unit, tabbed for quick reference, includes Systems of Measurement With Conversion Factors, Calculation Methods: Enteral and Parenteral Drug Dosages, Calculation Methods: Drugs That Require Reconstitution, Calculation Methods: Insulin Dosages, and Calculation Methods: Intravenous Flow Rates. Five methods of dosage calculation are presented with color coding for easy identification: basic formula, ratio and proportion/fractional equation, dimensional analysis, body weight, and body surface area. Integral to the sections on dosage calculations are clinical practice problems that feature actual drug labels in full color, which provide extensive practice in real-world dosage calculations. With this wide array of practice problems in a variety of health care settings, this unit eliminates the need to purchase a separate dosage calculations book.



Section III addresses nutrition, fluids, and electrolytes with separate chapters that cover vitamin and mineral replacement, fluid and electrolyte replacement, and nutritional support.

Sections IV through XVIII make up the core of *Pharmacology: A Patient-Centered Nursing Process Approach* and cover the drug classifications that students must understand to practice effectively. Each drug family chapter includes a chapter outline, learning objectives, at least one prototype drug chart, a drug table, and an extensive nursing process section.

- The **prototype drug charts** are a unique tool that students can use to view the many facets of a prototype drug through the lens of the nursing process. Each prototype drug is one of the common drugs in its drug class. The charts include drug class, contraindications, dosage, drug-lab-food interactions, pharmacokinetics, pharmacodynamics, therapeutic effects/uses, side effects, and adverse reactions. With these charts, students can see how the steps of the nursing process correlate with these key aspects of drug information and therapy.
- The **drug tables** provide a quick reference to routes, dosages, uses, and key considerations for the most commonly prescribed medications for a given class. They list the drug's generic names, dosages, uses and considerations, and specific information on half-life and protein binding.
- The **nursing process boxes** provide a convenient summary of related concepts for concept-based curricula, patient assessments, patient problems, plan of care, and outcomes. These sections also include cultural content, nursing interventions, suggestions for patient teaching, and relevant herbal information.

Additional Features

Throughout this edition, we have retained, enhanced, and added a variety of features that teach students the fundamental principles of pharmacology and the role of the nurse in drug therapy:

- **Review questions** at the end of each chapter help prepare students for the NCLEX® examination with its increasing emphasis on pharmacology; answers are listed upside down below the questions for quick feedback.
- **Patient safety boxes** include information on medication safety, complementary and alternative therapies, and more.
- **Critical thinking case studies** conclude most chapters. These clinical scenarios are followed by a series of questions that challenge students to carefully consider the scenario and apply their knowledge and analytical skills to respond to the situations.
- **Complementary and alternative therapies** appear throughout the text to provide students with a quick reference to information on popular herbs and their side effects, drug interactions, and more.
- **Anatomy and physiology** is contained in all drug therapy chapters, including illustrated overviews of normal anatomy and physiology. These introductions give students the foundation for understanding how drugs work in various body systems.
- **High-alert drugs** () and **safety concerns** () are identified within the text with distinctive icons that make it easy to find crucial information.

Teaching and Learning Resources

The tenth edition of *Pharmacology: A Patient-Centered Nursing Process Approach* is the core of a complete teaching and learning package for nursing pharmacology. Additional components of this package include resources designed specifically for students, resources designed specifically for faculty members, and resources designed for both students and faculty.

For Students

A comprehensive *Study Guide*, available for purchase separately, provides thousands of study questions and answers, including clinically based situational practice problems, drug calculation problems and questions (many with actual drug labels), and case studies to help students master textbook content. Answers are provided at the end of the *Study Guide*.

A completely updated Evolve website (<http://evolve.elsevier.com/McCuistion/pharmacology>) provides additional resources for students, including the following:

- **Review questions for the NCLEX® Examination** organized by chapter
- **Downloadable key points** for content review on the go
- **Pharmacology animations and videos**
- **Unfolding case studies** with review questions

For Faculty Members

The updated faculty Evolve website (<http://evolve.elsevier.com/McCuistion/pharmacology>) includes all of the student resources mentioned previously plus the following instructor-only resources:

- **TEACH for Nurses Lesson Plans** focus on the most important content from each chapter and provide innovative strategies for student engagement and learning. The lesson plans include strategies for integrating nursing curriculum standards (QSEN, concept-based learning, and BSN essentials), links to all

relevant student and instructor resources, and an original instructor-only case study in each chapter.

- **ExamView Test Bank** features more than 1000 NCLEX® Examination–format questions that include alternate-item questions as well as rationales and page references for each question.
- **PowerPoint Collection** features customizable slides with images, integrated audience response system questions, and new unfolding case studies with questions.
- **Image Collection** provides approximately 125 full-color images from the book.

This textbook may be supplemented with the drug content found on government agency websites, which supply the latest information regarding changes to drug brand names.

It is our hope that *Pharmacology: A Patient-Centered Nursing Process Approach* and its comprehensive ancillary package will serve as a dynamic resource for teaching students the basic principles of pharmacology as well as their vital role in drug therapy.

Linda E. McCuistion

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Acknowledgments

We wish to extend our sincere appreciation to the many professionals who assisted in the preparation of the tenth edition of *Pharmacology: A Patient-Centered Nursing Process Approach* by reviewing chapters and offering suggestions.

We wish to especially thank Joyce LeFever Kee, who originated this pharmacology textbook, and her coauthor Evelyn R. Hayes, who worked tirelessly on many editions of this book.

We wish to thank the current contributors: Christina DiMaggio Boudreaux, Linda Laskowski-Jones, Suzanne Riche, and Jared Robertson.

We wish to thank those who created and updated the previous established chapters: Margaret Barton-Burke, Joseph Boullata, Jacqueline Rosenjack Burchum, Katherine L. Byar, Michelle M. Byrne, Karen Carmody, Robin Webb Corbett, Sandy Elliott, Linda Goodwin, Janice Heinssen, Marilyn Herbert-Ashton, Judith W. Herrman, Kathleen J. Jones, Bettyrae Jordan, Robert J. Kizior, Paula R. Klemm, Anne E. Lara, Linda Laskowski-Jones, Ronald J. LeFever, Patricia S. Lincoln, Patricia O'Brien, Laura K. Williford Owens, Byron Peters, Lisa Ann Plowfield, Larry D. Purnell, Nancy C. Sharts-Hopko, Jane Purnell Taylor, Donald L. Taylor, Lynette M. Wachholz, Marcia Welsh, Gail Wilkes, and M. Linda Workman.

Of course, we are deeply indebted to the many patients and students we have had throughout our many years of professional nursing practice. From them we have learned many fine points about the role of therapeutic pharmacology in nursing practice.

Our deepest appreciation goes to pharmaceutical companies for use of their drug labels. Pharmaceutical companies that extended their courtesy to this book include the following:

- Abbott Laboratories
- AstraZeneca Pharmaceuticals

- Aventis
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- DuPont/Merck Pharmaceuticals
- Eli Lilly and Company
- Elkins-Sinn, Inc.
- Glaxo-Wellcome
- Marion Merrell Dow, Inc.
- McNeill Laboratory, Inc.
- Merck and Co., Inc.
- Parke-Davis Co.
- Pfizer Inc.
- Rhone-Poulenc Rorer
- SmithKline Beecham Pharmaceutical
- Wyeth-Ayerst Laboratories

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UNIT I

Introduction to Pharmacology

OUTLINE

The Nursing Process and Patient-Centered Care
Drug Development and Ethical Considerations
Pharmacokinetics and Pharmacodynamics
Pharmacogenetics
Complementary and Alternative Therapies
Pediatric Considerations
Drug Therapy in Older Adults
Drugs in Substance Use Disorder

1

The Nursing Process and Patient-Centered Care

OUTLINE

Concept,
Patient Problems,
Nursing Process,
 Nursing Process: Patient-Centered Collaborative Care,
Critical Thinking Case Study,
Review Questions,

OBJECTIVES

- Explain the steps of the nursing process and how each step relates to safe drug administration.
- Develop a set of patient-centered goals.
- Discuss at least eight principles for health teaching related to drug therapy.
- Analyze the nurse's role as related to planning medication administration.

<http://evolve.elsevier.com/McCuiston/pharmacology>

The nursing process is used by nurses for the appropriate delivery of patient care and drug administration. It describes the who, what, where, when, why, and how of nursing practice, including drug administration. By following the steps of the nursing process, the nurse is supported in prioritizing safe nursing care and medication administration.

In everyday practice, nurses have many important tasks; however, drug administration is at the top of the list. It is estimated that about 40% of the nurse's time is spent administering medication. Knowledge of medications is essential to patient safety. Nurses are often the first line of defense against drug errors in patient care. Federal, state, and local authorities issue regulations and guidelines for practice, and each state has a nurse practice act

that defines the scope and function under which the nurse practices. Health care institutions also have policies that help nurses follow federal and state guidelines and regulations.

The main focus of this chapter is the nursing process as it relates to pharmacology and the safe administration of patient- and family-centered care. [Chapter 9](#) offers additional information on safety and quality in pharmacotherapy.

Concept

New to the 10th edition is the term “Concept.” In each chapter, within the section entitled “Nursing Process,” the reader will note the word “Concept.” The concept influences the delivery of the patient’s care. Nursing care plans using a nursing diagnosis organize patient information around a medical diagnosis. Concepts focus on the patient-centered model of care instead of a disease-centered model of health care.

Concepts are related to the patient’s problems, the medications, or topics of care listed within the nursing process. A definition will immediately follow each concept. (EX. Concept: Safety—Protecting the patient from possible injury by practicing safe medication administration.)

Patient Problems

This 10th edition identifies patient problems and needs as the basis for the nursing process plan of care. The problems closely identify with the previous use of NANDA-1 language in the 9th edition. Nursing problems will replace the use of nursing diagnoses. By using the terminology of patient problems, the language better identifies nursing clinical practice, especially as it relates to the patient's response to medications.

The Nursing Alliance for Quality Care (NAQC) is an organization that supports quality patient-centered health care. The NAQC in partnership with the American Nurses Association (ANA) has published guidelines that support the core principles of patient-centered quality care. These guidelines aim to foster the patient relationship as the cornerstone of patient safety and quality. The NAQC's mission is to advance the highest quality, safety, and value of consumer-centered health care for all individual patients, their families, and their communities. NAQC believes it is the nurse's role to cultivate successful patient and family engagement. Family engagement is an essential component in reducing drug errors. The nurse serves as a patient advocate by supporting the patient's right to practice informed decision making and by maintaining patient-centered engagement in the health care setting. These guidelines include nurses at all levels of education and across all health care settings. NAQC principles are fundamental to patient-centered practice and safety in pharmacotherapy.

Nursing Process

The nursing process is a six-step decision-making approach that includes (1) Concept, (2) Assessment, (3) Patient Problem (replaces diagnosis), (4) Planning, (5) Implementation (nursing intervention), and (6) Evaluation. The purpose of the nursing process is to identify a patient's problem and provide care. The nursing process is an essential core of practice for nurses. It supports the nurse in prioritizing the safe, timely delivery of care, including drug administration. The nursing process is continuous and moves back and forth between the various steps. Careful attention to each phase of the process promotes the patient's success within the prescribed care including the medication regimen. These steps are discussed as each relates to health teaching and drug therapy.

Nursing Process: Patient-Centered Collaborative Care

Concept

The Concept centers its focus for nursing care around the reason the care is being provided to the patient. It is a more holistic view of the patient rather than the disease model. The term *Concept* includes health, illness, and health promotion of the patient. This involves preventive, primary, acute, and chronic health care for the ill patient. By focusing on the Concept, the nurse will provide patient education, restorative health needs, medication administration, and possibly emergency care. The nurse's attention is on promoting the patient's good health needs.

Concept: Clinical Decision Making

- Understanding and organizing a patient's health problems and taking necessary action by using the nursing process to achieve successful outcomes

Assessment

During the **assessment** phase, the nurse gathers information from the patient about the patient's health and lifestyle. Assessment includes both subjective and objective data. The nurse should always perform a complete systemic assessment of the patient's body systems. In the assessment, the nurse asks the patient questions about their illness, including the drug regimen. The nurse can also obtain information from family members, health professionals, and the medical record. The assessment phase is paramount because the nurse will use the information gathered to form the basis of the patient's plan of care, which includes drug administration. Careful attention to each phase of the nursing process encourages the patient's success with the prescribed medication regimen.

Subjective Data

Subjective data includes information provided verbally by the patient, family members, friends, or other sources. The patient must verbalize subjective data, which are imperceptible by the nurse's senses. Subjective data is based on what patients or family members communicate to the nurse. The nurse may ask open-ended questions, allowing the patient to answer directly, such as, "Please tell me about your current medications." The nurse may help the patient explain or describe subjective data but must never speak for the patient. Subjective data comprises what the patient personally has to say about his or her medications, health problems, and lifestyle. Examples of pertinent information that the nurse can use to help solicit a response from the patient include the following:

- Inquire about the patient's current health history, including family history.
- Question whether or not the patient has problems swallowing (dysphagia).
- Have the patient verbalize signs and symptoms of his or her illness.
- Discuss the patient's current health concerns:
 - Knowledge of medications and side effects
 - Over-the-counter (OTC) remedies, nutritional supplements, herbal remedies, and contraceptives
 - Knowledge of side effects to report to the physician
 - Attitude and beliefs about taking medications
 - Allergies
 - Financial barriers
 - Use of tobacco, alcohol, and caffeine
 - Cultural dietary barriers
 - The patient's home safety needs
 - Caregiver needs and support system

Enhancing the patient's adherence to their drug therapy regimen is an essential component of health teaching. The patient's attitudes and values about taking medication is an important consideration when determining readiness to learn. Attitudes and values should be considered when planning interventions to support the patient's decision to adopt healthy behaviors related to their medications. In addition, the patient's social support system should be emphasized. This special support system is unique to the individual and may be composed of persons who assist in preparing, organizing, and ordering medications. A support system can alert a patient to side effects, encourage actions that promote medication compliance, and notify the health care provider if a problem arises.

Objective Data

Objective data is what the nurse directly observes about the patient's health status. It involves collecting the patient's health information by using personal senses: seeing, hearing, smelling, and touching. Objective data collection provides additional information about the patient's symptoms and also targets the organs most likely to be affected by drug therapy. For example, if a drug is nephrotoxic, the patient's creatinine clearance should be assessed.

The following are examples of objective data assessed by the nurse concerning medication administration:

- Physical health assessment
- Laboratory and diagnostic test results
- Data from the physician's notes (i.e., health history)
- Measurement of vital signs
- The patient's body language

Patient Problem

A **patient problem** is made based on analysis of the assessment data, and it determines the type of care the patient will receive. When data show an abnormality during the assessment, it can serve as the defining characteristic of a problem; more than one applicable patient problem may be generated. The nurse formulates the patient problem, which guides the development of the plan of care to provide patient-centered quality care.

Common patient problems related to drug therapy include the following:

- Abdominal pain
- Confusion
- Decreased adherence
- Need for health teaching
- Cognitive decline
- Nonadherence

Use of patient problems is beneficial to the patient because its focus is on the individual patient's care as related to actual problems derived from the patient's illness and not the actual disease process.

Planning

During the **planning** phase, the nurse uses the data collected to set goals or expected outcomes and interventions that address the patient's problems.

Goals are patient centered, describe a specific activity, and include a time frame for achievement and reevaluation. Planning includes the development of nursing interventions used to assist the patient in meeting medication goals. To develop patient-centered goals and outcomes, collaboration with the patient and/or family is necessary. Effective **goal setting** has the following qualities:

- The expected change is realistic, measurable, and includes reasonable deadlines.
- The goal is acceptable to both the patient and nurse.
- The goal is dependent on the patient's decision making ability.
- The goal is shared with other health care providers, including family or caregivers.
- The goal identifies components for evaluation.

Examples of well-written comprehensive goals include the following:

- The patient will independently administer the prescribed dose of 4 units of regular insulin by the end of the fourth session of instruction.
- The patient will prepare a 3-day medication recording sheet that correctly reflects the prescribed medication schedule by the end of the second session of instruction.

Implementation of Nursing Interventions

The **implementation** phase is the part of the nursing process in which the nurse provides education, drug administration, patient care, and other interventions necessary to assist the patient in accomplishing the established medication goals. In most practice settings, administration of drugs and assessment of the drug's effectiveness are important nursing responsibilities.

Patient Teaching

It is important for the nurse to keep in mind factors that help promote patient learning: the patient's *readiness* to learn and investment in *his or her* learning. If the patient buys into wanting to practice good health principles, learning can be successful. The nurse and patient together must become fully engaged in the learning process.

Timing is another important factor. What is the best time for the patient to learn? Is the patient a morning or night person? People seem to learn best if the time between the learning and implementation is short. The environment should be conducive to learning with a temperature that is comfortable and an environment that is quiet. It is important for the nurse to recognize that certain barriers to learning exist. Pain is an obstacle, and the patient's teaching should be postponed until pain is relieved. Be mindful of language barriers. If the patient does not speak the same language as the nurse, an interpreter may be needed. The patient's age may be another important obstacle. If the patient is young, or perhaps elderly and forgetful, a family member or significant other will need to be present.

Patient teaching is essential to the patient's recovery. It allows the patient to become informed about his or her health problems and to participate in creating interventions that can lead to good health outcomes. It is within the scope and practice of the nurse to embrace patient education and to use health-teaching strategies.

Nurses have a primary role in teaching both patients and families about drug administration. It is important that teachings are tailored to the patient's educational level and that the patient trusts the nurse for learning to begin. When possible, it is always important to include a family member or friend in the teaching to provide support to the patient with reminders and encouragement; they can also detect possible side effects that may occur in the patient. The following are important principles to remember when teaching patients about their medications:

General

Instruct the patient to take the drug as prescribed. Consistency in adhering to the prescribed drug regimen is important.

Provide simple written instructions with the doctor and pharmacy names and telephone numbers.

BOX 1.1 Patient Teaching Card

Name of drug: Acetaminophen 325–650 mg

Reason for taking the drug: Minor aches, pains, and fever

Dosage: One or two tablets as needed every 4 to 6 hours; maximum dose is 3250 mg daily unless under health care provider supervision, then 4 g daily may be used.

Time to take the drug: 8:00 a.m./2:00 p.m./8:00 p.m.

Possible side effects: Nausea, upper stomach pain, itching, loss of appetite, dark urine, and jaundice

Possible adverse effects: Overdosage can affect the liver and cause hepatotoxicity.

Notify health care provider: If side effects occur

Health care provider's telephone #: _____

Warning:

- *Never* take this medication with alcohol.
- If pregnant or nursing, notify the health care provider before taking the medication.
- Do not take this medication with other over-the-counter (OTC) drugs or supplements without notifying the health care provider.

Advise the patient to notify his or her health care provider if any of the following occur:

- The dose, frequency, or time of the drug is adjusted.
- A female patient becomes pregnant.
- An OTC medication or supplement is added.

Side Effects

Give the patient instructions that will help minimize any side effects (e.g., avoid direct sunlight with drugs that can cause photosensitivity or sunburn). Advise patients of any expected changes in the color of urine or stool, and counsel the patient who has dizziness caused by orthostatic hypotension to rise slowly from a sitting to a standing position.

Self-Administration

Perform an ongoing assessment of the patient's motor skills and abilities. Remember that modifications may be necessary to the teaching plan based on the assessment.

Instruct the patient according to the prescribed route: eye or nose instillation, subcutaneous injection, suppository, oral/mucosal (e.g., swish-and-swallow suspensions), and inhaled via a metered-dose inhaler with or without a spacer. Include a return demonstration in the instructions when appropriate.

The use of drug cards is a helpful teaching tool (see [Box 1.1](#)). Drug cards can be obtained from the health care provider, pharmacy, drug manufacturer, or simply designed by the patient or caretaker. They are helpful components for teaching. Drug cards may include: the name of the drug; the reason for taking the drug; the drug dosage; times to take the drug; possible side effects; adverse effects; when to notify the care provider; and specific facts that should or should not be done when taking the medication (e.g., take with food, do not crush tablets).

Diet

Advise the patient about foods to include in their diet and foods to avoid. Many foods interact with certain drugs. Depending on the nature of the interaction, certain foods have the ability to decrease drug absorption, increase the risk of drug toxicity, or create other problems that are important safety concerns.

Important Nursing Considerations

The nurse must keep in mind the patient's cultural needs to individualize the teaching plan. Begin by identifying your own cultural beliefs, practices, and values to keep them separate from those of the patient. If a language barrier exists, arrange for an interpreter who speaks the patient's language. Research shows family members are not recommended as an effective interpreter because they may hinder communication. Ask the patient if there is something special you should know concerning his or her cultural needs.

BOX 1.2 Important Points for Patients and Families to Remember

- Medications should be taken as prescribed by your health care provider. If problems arise with the dose or timing or if side effects occur, contact your medical provider.
- If drugs are placed in a drug box, keep the original labeled containers.
- Keep all drugs out of the reach of children.
- Before using any over-the-counter (OTC) drugs, including vitamins and nutritional supplements, check with your health care provider. This includes the use of aspirin, ibuprofen, and laxatives. Consider consulting the pharmacist before buying or using a product.
- Bring all drugs with you when you visit the health care provider.
- Know the purpose of each medication and which side effect necessitates a call to the health care provider.
- Do not drink alcoholic beverages around the time you take your medications. Alcohol is absolutely contraindicated with certain medications, and it may alter the action and absorption of the medications.
- Be aware that smoking tobacco also can alter the absorption of some medications (e.g., theophylline-type drugs, antidepressants, pain medications). Consult your health care provider or pharmacist for specific information.

Additional suggestions include the following:

- Space instruction over several sessions, and be flexible in the timing of medication teaching as desired by the patient.
- Allow time for patients to respond to questions. Ask open-ended questions, and have patients demonstrate their understanding of treatments rather than verbalizing them.
- Review community resources related to the patient's plan of care including medications.
- Collaborate with the patient and family and other health care staff and agencies to meet the patient's health care needs.
- Identify patients at risk for noncompliance with their drug regimen. Alert the health care provider and pharmacist so they can develop a plan to minimize the number of drugs and the number of times drugs are administered.
- Evaluate the patient's understanding of the medication regimen on a regular basis.
- Empower the patient to take responsibility for his or her drug management.
- General points to remember and tips for successful patient education are presented in [Box 1.2](#).

Many people take multiple drugs simultaneously several times each day, which presents a challenge to patients, their families, and nurses. This

complex activity of taking several drugs can be segmented into several simple tasks that include the following:

- Drug boxes (Fig. 1.1) obtained from a local pharmacy may be used to prepare and organize medications. These boxes have labeled compartments for each day of the week and several rows of compartments for drugs taken multiple times a day. The boxes sort the drugs according to the time of day each pill is to be taken. They can simplify the task of taking medications. However, it is important to remember the pill boxes must be filled correctly. A trusted relative or friend can always assist the patient when filling the boxes.

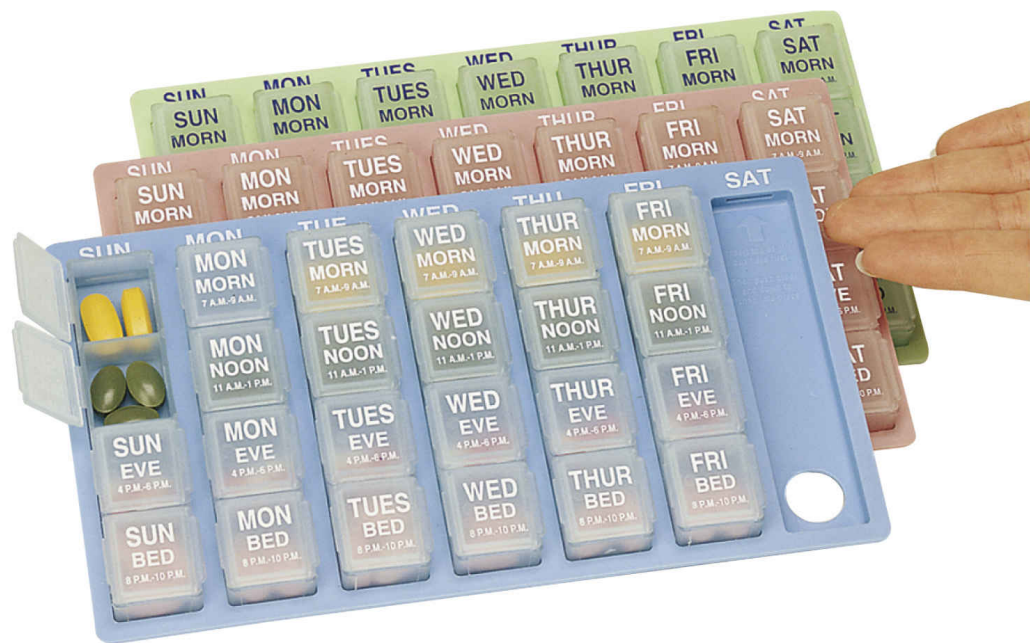


FIG. 1.1 Medication box and pill organizer.
Courtesy Apothecary Products, Inc., Burnsville, MN.

BOX 1.3 Medication Recording Sheet

Medication	Dosage	Days of Week							
		Daily	S	M	T	W	Th	F	S
Captopril	12.5 mg								
Digoxin	0.25 mg								
Furosemide	40 mg								

- Multidose pill packets are available from many local pharmacies. The pharmacy will package the patient's prescription medications into easy-to-open packages. Many pharmacies can provide a 30-day supply of the patient's prescription medications, individually packaged and labeled according to dose, date, and time at no extra cost.

- A recording sheet may be helpful. When the drug is administered, the patient or family member marks the sheet, which is designed to meet the patient's individual needs. For example, the time can be noted by the patient, or it can be entered beforehand, with the patient marking the designated time the dose is taken (Box 1.3).
- Alternatives to recording sheets are also available, and alarm reminder devices may be used.

Throughout the teaching plan, the nurse promotes patient independence (e.g., self-administering, safely storing, and ordering of the drug regimen). Always keep in mind patients' goals and outcomes when teaching. Box 1.4 presents a checklist for health teaching in drug therapy.

Evaluation

In the **evaluation** phase of the nursing process, the nurse determines whether the goals and teaching objectives have been met. The nurse continues to use ongoing assessment data to evaluate the successful attainment of the patient's objectives and goals. If the objectives and goals are not met, the nurse will revise the objectives, goals, and interventions to ensure success. If the objectives, goals, and interventions are met, the nurse will document the successful attainment in the nursing plan of care.

BOX 1.4 Checklist for Health Teaching in Drug Therapy

- Reinforce the importance of drug adherence.
- Before giving the patient written material, ensure the patient can read.
- Always complete a health history and physical assessment on the patient.
- Assess all of the drugs on the patient's profile for possible drug interactions.
- Explain the reason the patient is taking the drug, the time it should be administered, and whether it should be taken with or without food.
- Review the side effects and adverse reactions, and make sure the patient has the doctor's telephone number and knows when to notify the health care provider or pharmacist.
- Discern whether the patient needs baseline or monthly laboratory work to monitor drug levels.
- Keep in mind that patient validation of learning may include a return demonstration of psychomotor skills (insulin administration).
- Show the patient how to record drug administration on a sheet of paper by indicating day and time drug is taken.

- Discuss the patient's financial resources and, if needed, consult a social worker for resources.
- Discuss the patient's support system such as family or friends as caregivers.
- Provide the patient with a list of community resources.

Critical Thinking Case Study

Mr. J.D. is a 66-year-old man who just arrived on the medical surgical unit after an appendectomy. He is complaining of pain. You are the nurse assigned to care for Mr. J.D.

1. What critical assessment data do you need to identify and collect?
2. Formulate a nursing problem based on the assessment data.
3. Describe two nursing interventions to assist the patient.
4. How can you evaluate the effectiveness of the nursing interventions?

Review Questions

1. During a medication review session, a patient states, "I do not know why I am taking all of these pills." Based on this piece of subjective data, which problem will the nurse identify?
 - a. Pain
 - b. Knowledge
 - c. Fatigue
 - d. Anxiety
2. The nurse is developing goals in collaboration with a patient. Which is the best goal statement?
 - a. The patient will self-administer albuterol by taking a deep breath before inhaling.

- b. The patient will self-administer albuterol by the end of the second teaching session.
 - c. The patient will independently self-administer the prescribed dose of albuterol by the end of the second teaching session.
 - d. The patient will organize his or her medications according to the time each medication is due.
3. When developing an effective medication teaching plan, which component will the nurse identify as *most* essential?
- a. Written instructions
 - b. The patient's readiness to learn
 - c. Use of colorful charts
 - d. A review of community resources
4. When developing an individualized medication teaching plan, which topics will the nurse include? (Select all that apply.)
- a. Adherence to the prescribed drug regimen
 - b. Always use the prescribed drug route
 - c. Know adverse side effects to report to doctor
 - d. Always double the next dose if drug is missed
 - e. Tell the doctor when taking over-the-counter (OTC) supplements
5. The Nursing Alliance for Quality Care's focus is for health care providers to strive for which goal?
- a. Quality and safety in medication administration
 - b. Confidentiality as determined by the patient
 - c. Development of a patient relationship/family engagement
 - d. Patient independence within the family of origin

6. Which teaching strategy is most likely to succeed in health teaching with the patient and family?
 - a. Know the reason why each drug was ordered.
 - b. Have patients learn the generic name of each pill.
 - c. A repeat demonstration should follow the nurse's teaching.
 - d. Have the patient identify the number and color of the pills.
7. Prioritize the steps of the nursing process.
 - a. Planning
 - b. Problem (diagnosis)
 - c. Assessment
 - d. Evaluation
 - e. Implementation
 - f. Concept

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