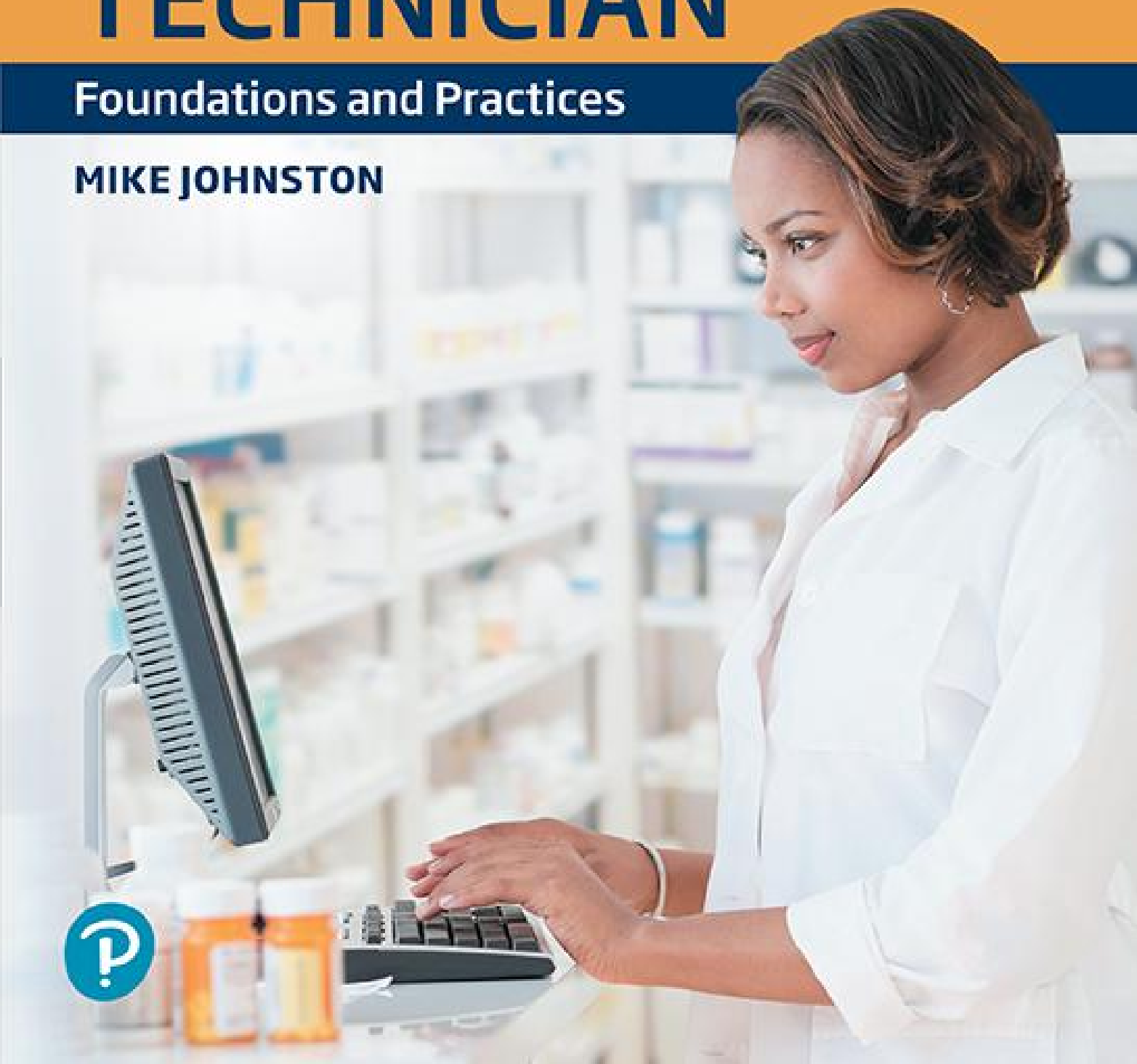
THIRD EDITION

THE PHARMACY TECHNICIAN

Foundations and Practices

MIKE JOHNSTON



The Pharmacy Technician

Foundations and Practices

THIRD EDITION

Mike Johnston
CEO, National Pharmacy Technician Association (NPTA)

Pearson

Vice President, Product Management: Adam Jaworski
Director Product Management–Health Sciences: Katrin Beacom
Content Manager–Health Professions & Nursing: Kevin Wilson
Portfolio Management Assistant: Emily Edling
Associate Sponsoring Editor: Zoya Zaman
Product Marketing Manager: Rachele Strober
Field Marketing Manager: Brittany Hammond
Vice President, Digital Studio and Content Production: Paul DeLuca
Director, Digital Studio and Content Production: Brian Hyland
Managing Producer: Jennifer Sargunar
Content Producer (Team Lead): Faraz Sharique Ali
Content Producer: Neha Sharma
DGM, Global R&P: Tanvi Bhatia
Project Manager, Global R&P: Anjali Singh
Operations Specialist: Maura Zaldivar-Garcia
Cover Design: SPi Global
Cover Art (or Cover Photo): Tom Grill/JGI/GettyImages
Full-Service Management and Composition: Ashwina Ragounath Integra Software Services, Inc.
Printer/Binder: LSC Communications
Cover Printer: LSC Communications
Text Font: TimesLTPro 10/12

Library of Congress Cataloging-in-Publication Data

Names: Johnston, Mike (Pharmacy technician)
Title: The pharmacy technician : foundations and practices / Mike Johnston.
Description: Third edition. | Hoboken, New Jersey : Pearson Education, Inc., [2020] | Includes bibliographical references and index.
Identifiers: LCCN 2019004024 | ISBN 9780135204177 | ISBN 0135204178
Subjects: LCSH: Pharmacy technicians. | Pharmacy.
Classification: LCC RS122.95 .J63 2019 | DDC 615.1023--dc23
LC record available at https://lccn.loc.gov/2019004024

ScoutAutomatedPrintCode

ISBN 10: 0-13-520417-8
ISBN 13: 978-0-13-520417-7

Dedication

To Eric

Thank you for your constant support, patience, and understanding. I am a better man for having met you and blessed to have you by my side.

To Matthew

My baby boy. You have changed my life in every possible way, for the better. You bring an infectious joy to our home and you have caused the capacity of my heart to love to increase beyond my greatest expectation.

And

This textbook is dedicated to the memory of

Emily

Emily passed away, at the age of 2, as a result of a medication error made by a pharmacy technician. I hope that this textbook, along with more stringent regulations, will help prevent such tragedies in the future.

Contents

Preface

Introduction

The Pharmacy Technician: Foundations and Practices addresses today's comprehensive educational needs for one of the fastest growing jobs in the United States—that of the pharmacy technician. The pharmacy technician career is ranked number 19 among the 100 fastest-growing jobs in the United States. According to the U.S. Bureau of Labor Statistics, the pharmacy technician career is growing at approximately 32%, a much higher rate than other jobs in the health professions. This equates to an anticipated net increase in employment opportunities of 108,300 between 2010 and 2020.

In addition to the tremendous workforce demand for pharmacy technicians, professional regulations and requirements are being established for pharmacy technicians across the United States. With many state boards of pharmacy either considering, or having already enacted, requirements for mandatory registration, certification, and/or formal education, the need for a comprehensive and up-to-date pharmacy technician textbook such as *The Pharmacy Technician: Foundations and Practices, 3rd edition* has never been greater.

Learning Made Easy

The core chapter features include

- Clearly defined chapter learning objectives inform students of the expected educational outcomes and provide instructors with tools to measure their students' mastery of the material presented.
- Chapter introductions and summaries provide students with a clearer understanding of the scope and rationale for the content being covered.
- Key terms listed at the beginning of each chapter familiarize students with new terminology; key terms are then bolded and defined within the margins of text to reinforce students' learning.
- Numerous full-color illustrations and photographs allow students to visualize content.
- Step-by-step procedures in relevant chapters provide students with clear directions on how to perform the numerous tasks required of pharmacy technicians.
- *Workplace Wisdom* boxes feature tips, comments, and advice from a seasoned pharmacy technician.
- *Profile in Practice* boxes offer practical exercises that simulate real-world pharmacy problems, giving students the opportunity to apply their learning.
- Review exercises at the end of every chapter assess student comprehension. Exercises include multiple-choice questions, Internet-based assignments, and critical thinking questions.

New to This Edition

- This updated textbook provides the most up-to-date content related to pharmacy technician practice.
- The content in this edition has been updated to align with the latest Pharmacy Technician Certification Exam (PTCE) Blueprint offered by the Pharmacy Technician Certification Board (PTCB).
- This latest edition of *The Pharmacy Technician: Foundations and Practices* has the latest drug information updates and includes the most recently approved new medications.
- Content mapping to ACPE-ASHP Accreditation Standards
- Content mapping to PTCB's Pharmacy Technician Certification Exam (PTCE)
- Industry-leading online assets, activities and certification exam review

Organization of the Text

The Pharmacy Technician: Foundations and Practices, 3rd edition, contains five sections and 38 chapters. The following is a brief description of each section and its chapters.

Section I—Fundamentals of Pharmacy Practice

The first section of the book (Chapters 1–7) provides students with an introduction to pharmacy practice and establishes a framework for the student to build upon. This section includes a comprehensive account of the history of medicine and pharmacy (Chapter 1); an examination of the characteristics, traits, and attributes of a professional pharmacy technician (Chapter 2); a discourse on effective communication, customer service, and patient care (Chapter 3); a detailed explanation of pharmacy law and ethics matters (Chapter 4); an exhaustive review of medical terminology and abbreviations used in pharmacy practice (Chapter 5); an overview of the various dosage formulations and routes of administration (Chapter 6); and a guide to referencing and drug information resources (Chapter 7).

Section II—Community and Institutional Pharmacy

The second section of the book (Chapters 8–15) provides students with an understanding of contemporary pharmacy practice. This section includes a detailed explanation of community-based pharmacy operations (Chapter 8); a thorough explanation of health-system-based pharmacy operations (Chapter 9); an overview of the use of technology in the pharmacy (Chapter 10); an overview of inventory management (Chapter 11) and insurance and third-party billing

(Chapter 12); a detailed review of over-the-counter products (Chapter 13); an introduction to nonsterile, or extemporaneous, compounding (Chapter 14); and an introduction to aseptic technique and preparation of sterile products (Chapter 15).

Section III—Pharmacy Calculations

The third section of the book (Chapters 16–22) provides students with systematic understanding of how to properly perform pharmacy and dosage calculations. This section includes a review of basic math skills necessary to perform advanced pharmacy calculations (Chapter 16); an overview of the various systems of measurement used in pharmacy practice (Chapter 17); a detailed explanation of how to do various dosage calculations (Chapter 18); an introduction on how to perform concentration and dilution calculations (Chapter 19); an overview of how to solve alligations (Chapter 20); an overview of how to do parenteral-based calculations (Chapter 21); and an introduction to business math (Chapter 22).

Section IV—Pharmacology

The fourth section of the book (Chapters 23–34) provides students with a thorough comprehension of pharmacology, including anatomy and physiology. This section includes an introduction to the subject of pharmacology (Chapter 23). It also contains a thorough review of anatomy, physiology, and pharmacology by body system, related to the skin (Chapter 24), the eyes and ears (Chapter 25), the gastrointestinal system (Chapter 26), the musculoskeletal system (Chapter 27), the respiratory system (Chapter 28), the cardiovascular system (Chapter 29), the immune system (Chapter 30), the renal system (Chapter 31), the endocrine system (Chapter 32), the reproductive system (Chapter 33), and the nervous system (Chapter 34).

Section V—Special Topics

The fifth section of the book (Chapters 35–38) gives students an understanding of medication errors (Chapter 35); a thorough comprehension of workplace safety and infection control (Chapter 36); an introduction to special considerations in pharmacy practice for pediatric and geriatric patients (Chapter 37); and an introduction to the use of biopharmaceuticals (Chapter 38).

Appendices

- *Appendix A—Common Over-the-Counter Products* is a current listing of the most commonly used OTC products, organized by drug category.
- *Appendix B—Top 200 Drugs* is a current listing of the most-prescribed medications in the United States, in the order of both total dollars and prescription count.
- *Appendix C—Advanced Career Path Options* offers students a closer look at various advanced practice settings, including long-term care, home infusion service, mail-order pharmacy, nuclear pharmacy, and federal pharmacy.
- *Appendix D—Practice Certification Exams* offers students three unique exams that simulate the national certification exam in both content coverage and question format. Each exam contains 90 questions developed using the content outline of the PTCB national certification exam. Answers to the exams appear in the Instructor's Resource Manual.

Available Ancillaries

Student Resources

- *Lab Manual and Workbook*—The Student Workbook contains chapter objectives, critical review questions, pharmacy calculation and PTCB review questions, activities, case studies, and lab exercises that test students' knowledge of the key concepts presented in the core textbook.
- Student Resource Website: To access the material on student resources that accompany this book, visit **www.pearsonhighered.com/healthprofessionsresources**. Click on view all resources and select Pharmacy Technician from the choice of disciplines. Find this book and you will find the complimentary study materials.

Instructor Resources

To access supplementary materials online from Pearson's Instructor Resource Center (IRC), instructors will need to use their IRC login credentials. If they don't have IRC login credentials they will need to request an instructor access code. Go to **www.pearsonhighered.com/irc** to register for an instructor access code. Within 48 hours of registering, you will receive a confirming e-mail including an instructor access code. Once you have received your code, locate your book in the online catalog and click on the Instructor Resources button on the left side of the catalog product page. Select a supplement, and a login page will appear. Once you have logged in, you can access instructor material for all Pearson textbooks. If you have any difficulties accessing the site or downloading a supplement, please contact Customer Service at **http://support.pearson.com/getsupport**. This book has the following instructor's resources.

- Instructors Manual
- PowerPoint lecture slides
- TestGen
- Image Bank

About the Author

Mike Johnston is one of the most recognized and influential pharmacy technician leaders in the world. In 1999, Mike founded the National Pharmacy Technician Association (NPTA) and led the association from 3 members to more than 20,000 in less than two years, and now more than 60,000 members. Today, as chairman/CEO of NPTA and publisher of *Today's Technician* magazine, he spends the majority of his time meeting with and speaking to employers, manufacturers, industry leaders, and elected officials on issues related to pharmacy technicians, both across the United States and internationally.

Mike serves as the sole pharmacy technician delegate to the *United States Pharmacopeia* (USP) and is the only North American representative member of the European Association of Pharmacy Technicians (EAPT). He is also a Continuing Pharmacy Education (CPE) administrator and field reviewer approved by the Accreditation Council on Pharmacy Education (ACPE).

Mike's background includes experience in community-based pharmacy practice, health-system pharmacy practice, extemporaneous compounding, and as a pharmacy technician instructor. Mike has been nationally certified since 1997 Certified Pharmacy Technician (CPhT) and is also certified in IV/sterile products, chemotherapy, and extemporaneous compounding.

In 2013, Mike opened his own pharmacy—SCRIPTS Compounding Pharmacy—located in the suburbs of Houston, Texas. In addition, he is the author of eight previous textbooks on pharmacy technician education and *Rx for Success—A Career Enhancement Guide for Pharmacy Technicians.*

Mike holds a B.S. with honors in Business Management and Ethics from Dallas Christian College and is currently working on his master's in Business Administration at Dallas Baptist University.

About NPTA

The National Pharmacy Technician Association (NPTA) is the world's largest professional organization specifically for pharmacy technicians. The association is dedicated to advancing the value of pharmacy technicians and the vital roles they play in pharmaceutical care. In a society of countless associations, we believe that it takes much more than just a mission statement to meet the professional needs of and provide the necessary leadership for the pharmacy technician profession—it takes action and results.

The organization is composed of pharmacy technicians practicing in a variety of practice settings, such as retail, independent, hospital, mail-order, home care, long-term care, nuclear, military, correctional facilities, formal education, training, management, sales, and many more. NPTA is a reflection of this diverse profession and provides unparalleled support and resources to members.

NPTA is the foundation of the pharmacy technician profession; we have an unprecedented past, a strong presence, and a promising future. We are dedicated to improving our profession while remaining focused on our members.

Pharmacy technician students are welcome to join more than 60,000 practicing pharmacy technicians as members of NPTA.

For more information:

- call 888-247-8706
- visit **www.pharmacytechnician.org**

Acknowledgments

The author wishes to give special acknowledgment and thanks to the following individuals who represent the greatest contributors to this text.

Marlene Pratt—for your strong leadership, guidance, and insight on this project as an executive

Emily Edling—for your ability to keep everything organized and on track as an editorial assistant.

Adam Jaworski—for your ongoing commitment and support as a publisher.

Mark Cohen—for your initial efforts in signing me with Pearson Education.

Neha Sharma, Ashwina Ragounath, and the entire team at Integra Software Services—for your attention to detail and editing contributions.

Sandy Andrews, Jennifer Susan O'Reilly, Paul Sabatini, and Robin Luke—for being the most amazing team of researchers and assistant writers.

Reviewers

We wish to thank the following individuals for reviewing this textbook for accuracy and providing invaluable suggestions and feedback.

Reviewers from the 3rd Edition

Valerie Connors, RPhT
Pharmacy Technician Instructor
New Brunswick Community College
Fredericton, NB, Canada

Adrienne Guy
Pharmacy Technology Instructor/Clinical Coordinator
Augusta Technical College
Augusta, GA

Stephanie O'Brine, CPhT
Pharmacy Technician Program
Coordinator Yakima Valley College
Yakima, WA

Paula D. Silver, BS, PharmD
Medical Instructor
ECPI University
Virginia Beach, VA

Bobbi Steelman
Director of Education
Daymar College
Bowling Green, KY

Chapter Features

Learning Objectives

Each chapter opens with a list of learning objectives, which can be used to identify the material and skills the student should know upon successful completion of the chapter.

LEARNING OBJECTIVES

After completing this chapter, you should be able to:

- Describe the origins of pharmacy practice from the Age of Antiquity.
- Discuss changes in pharmacy practice during the Middle Ages.
- Describe changes in pharmacy practice during the Renaissance.
- List significant milestones for pharmacy practice from the 18th, 19th, 20th, and 21st centuries.
- Discuss the role biotechnology and genetic engineering could have on the future of pharmacy practice.

Key Terms

The **Key Terms** section appears at the beginning of each chapter. The terms are listed in alphabetical order, and the terminology appears in boldface on first introduction in the text. A feature in the margin gives the definition of the term so that students have definitions immediately available in the context of the chapter content.

KEY TERMS

apothecary, p. 3
biotechnology, p. 10
compounding, p. 3
pharmacogenomics, p. 10
pharmacopoeia, p. 7
pharmacy, p. 3
prescription, p. 8

Information Boxes

Information Boxes containing additional historical, technical, or interesting content related to the chapter appear throughout each chapter.

Working for an Insurance Company

Many insurance companies are now recruiting and hiring pharmacy technicians because of their extensive knowledge of medications, insurance benefits, and the billing process.

Profile in Practice

Profile in Practice boxes in each chapter feature short scenarios that depict realistic pharmacy problems. Students use knowledge they have gained from the chapter to answer the critical thinking questions related to the scenario.

PROFILES IN PRACTICE

Sydney is the lead pharmacy technician at a local community pharmacy; having worked there for nearly seven years, she makes sure that everyone is mindful of her seniority. Sydney refuses to stock the vials, collect the trash, or check out customers, as she feels that she is above these duties.

- *What impact does Sydney's perspective likely have on her coworkers?*
- *How can Sydney improve her professionalism and serve as a better role model for the other pharmacy technicians?*
- *With a clear attitude of arrogance, what reason(s) might the pharmacist or manager use for justifying Sydney's status as lead tech?*
- *How would you handle working in that environment?*

Workplace Wisdom

Workplace Wisdom boxes interspersed throughout each chapter offer helpful tips, comments, and additional resources and provide additional information the student might use on the job.

Workplace Wisdom APhA

After more than 150 years, APhA continues to serve the profession, although it was recently renamed the American Pharmacists Association (APhA). For more information, go to www.pharmacist.com

Chapter Summary

Each **Chapter Summary** is an excellent review of the chapter content.

SUMMARY

The practice of pharmacy has deep, historic roots, in addition to an innovative and promising future. Although it has taken 7,000 years of progress, this profession has evolved from applying dirt and leaves to developing genetically tailored medications that are prepared specifically for each individual's unique DNA structure. The key concepts for this chapter include:

- The need for pharmaceutical products, services, and knowledge has existed since prehistoric times.
- As the profession gains new information and technology, pharmacy continues to evolve to better serve patients.

Chapter Review Questions

Multiple-Choice Questions appear at the end of every chapter to measure the student's understanding and retention of the material presented in the chapter. These tools are available for use by the student or can be used by the instructor as an outcome assessment. Answers appear in the *Instructor's Resource Manual.*

CHAPTER REVIEW QUESTIONS

1. Which civilization provides the earliest known record of apothecary practice?
   A. Ancient Egypt
   B. Ancient China
   C. Ancient Mesopotamia
   D. ncient Greece
2. The _____ is an ancient collection of prescriptions, mentioning more than 700 unique drugs.
   A. *Pen T-Sao*
   B. *Papyrus Ebers*
   C. Terra Sigilata
   D. *Charaka Samhita*
3. Echelons, from ancient _____, were similar to the modern-day pharmacy technician.
   A. China
   B. Egypt
   C. India
   D. Mesopotamia
6. Which organization was established to autonomously set standards for pharmacy education?
   A. ACPE
   B. APhA
   C. BIO
   D. USP
7. Who is responsible for separating the practices of pharmacy and medicine?
   A. Savonarola
   B. King James I
   C. Hippocrates
   D. Frederick II
8. The first official pharmacopoeia originated in which country?
   A. England
   B. Greece
   C. Italy
   D. the United States

Additional Features

Critical Thinking Questions

Thought-provoking **critical thinking questions** appear at the end of chapters to test student's comprehension on the chapter content. Students must rely on the content in the text and their own critical thinking skills to answer the questions.

CRITICAL THINKING QUESTIONS

1. In what ways has the practice of modern pharmacy remained consistent from the Age of Antiquity to today?
2. Describe the crucial differences in the practice of pharmacy during the Middle Ages and today.

Web Challenges

Web Challenges at the end of chapters lead students to perform Internet research related to a chapter's content on the Internet, and then either answer questions related to their search, or prepare information about what they have discovered.

WEB CHALLENGE

1. Find the website for your State Board of Pharmacy and then perform a search for information and requirements for pharmacy technicians in your state. Print out the information you find. (Hint: A list of SBOP contact information is available at www.nabp.net.)
2. Visit the website of each of the national pharmacy organizations listed here. Review the full list of membership benefits offered by each association.
   AAPT—www.pharmacytechnician.com
   APhA—www.pharmacist.com
   ASHP—www.ashp.org
   NPTA—www.pharmacytechnician.org

References and Resources

This listing at the end of each chapter provides additional information (organization contact information, websites, etc.) that is related to chapter content, as well as location information for references used in preparation of the text.

REFERENCES AND RESOURCES

"ACPE Website." *Accreditation Council for Pharmacy Education*. ACPE. 2012. Web. 3 January 2012.

Bender, George A. *Great Moments in Pharmacy*. Detroit, MI: Northwood Institute Press, Print. 1996.

Cowan, David L. and William H. Helfand. *Pharmacy: An Illustrated History*. New York, NY: Harry N. Abrams, Print. 1990.

"ExCPT Exam." *National Healthcareer Association*. NHA. 2012. Web. 3 January 2012.

Haggard, Howard W. *Devils, Drugs, and Doctors*. New York, NY: Harper & Brothers, Print. 1929.

"MTM Central." *American Pharmacists Association*. APhA. 2012. Web. 3 January 2012.

"NPTA Website." *National Pharmacy Technician Association*. NPTA. 2012. Web. 3 January 2012.

Orum-Alexander, Gail G. and James J. Mizner, Jr. *Pharmacy Technician: Practice and Procedures*. New York, NY: McGraw Hill. Print.

"Pharmacogenomics and Personalized Medicine." *Biotechnology Industry Organization*. BIO. 2012. Web. 3 January 2012.

"Pharmacy Technicians and Aides." *Occupational Outlook Handbook, 2010–2011 Edition*. Bureau of Labor Statistics. 2011. Web. 3 January 2012.

"PTCB Website." *Pharmacy Technician Certification Board*. PTCB. 2012. Web. 3 January 2012.

"Report of the Sesquicentennial Stepping Stone Summits—Summit Two on Pharmacy Technicians." *Accreditation Council for Pharmacy Education*. ACPE. 2002. Web. 3 January 2012.

Rouse, Mike. "White Paper on Pharmacy Technicians 2002: Needed Changes Can No Longer Wait." *American Journal of Health-System Pharmacy*. 60 (2003): 37–51. Print.

Procedures

Step-by-step **Procedures** appear where relevant throughout the text to help students systematically work through processes and procedures they will perform on the job.

Examples

Numerous **Examples** appear in the Pharmacy Calculations chapters to help students visualize the most effective ways to work through different problem types.

EXAMPLE 16.22 DIVIDING FRACTIONS

$\frac{2}{8} \div \frac{3}{7} =$ _____

$\frac{2}{8} \times \frac{7}{3} =$ _____

$2 \times 7 = 14$

$8 \times 3 = 24$

So, $\frac{2}{8} \div \frac{3}{7} = \frac{14}{24}$, which can be reduced to $\frac{7}{12}$.

Practice Problems

Practice Problems are also interspersed throughout the Pharmacy Calculations chapters to give students ample opportunities to apply the information they have learned in the chapter.

Procedure 25-1

General Guidelines for Using an Ophthalmic Product
Patients should be advised to follow these basic precautions and standards when placing eye drops or ointment into the eye.

1. Wash hands thoroughly with soap and water.
2. Remove contact lenses before putting in ophthalmic medication. Wait 15 minutes after administering the medication before putting lenses back in.
3. Never touch the tip of the tube to the eye or anything else.
4. Wipe any excess medication from the eyelids and lashes by using a tissue. Recap the medication container, and store it in a proper location at the correct temperature.
5. Wash hands immediately to remove any medication.
6. If more than one type of eye medication is used, wait for 5 to 10 minutes before administering the second medication.
7. Sometimes, eye medications can cause a few moments of blurry vision; wait until the vision completely clears before resuming activities such as driving.

Practice Problems 16-10
Ratios as Percentages

Convert the following ratios to percentages.

1. 6:8 = _____
2. 1:25 = _____
3. 1:250 = _____
4. 1:10 = _____
5. 4:16 = _____

Illustrations and Photos

Numerous **full color illustrations and photos** appear throughout the chapters to provide students with visuals and comparisons to reinforce the lesson.

Section I

Fundamentals of Pharmacy Practice





History of Pharmacy Practice

CHAPTER 1

LEARNING OBJECTIVES

After completing this chapter, you should be able to:

- Describe the origins of pharmacy practice from the Age of Antiquity.
- Discuss changes in pharmacy practice during the Middle Ages.
- Describe changes in pharmacy practice during the Renaissance.
- List significant milestones for pharmacy practice from the 18th, 19th, 20th, and 21st centuries.
- Discuss the role biotechnology and genetic engineering could have on the future of pharmacy practice.

KEY TERMS

apothecary, p. 3
biotechnology, p. 10
compounding, p. 3
pharmacogenomics, p. 10
pharmacopoeia, p. 7
pharmacy, p. 2
prescription, p. 8

INTRODUCTION

Pharmacy is an ancient profession. Although the word *pharmacy* comes from the ancient Greek word *pharmakon*, meaning "drug," the actual origin of pharmacy practice has been traced back to ancient times more than 7,000 years ago.

At first glance, learning about the history of pharmacy practice may seem unnecessary for someone who is preparing to become a pharmacy technician. However, if you are to understand many of the concepts, theories, and practices that are covered in the following chapters, you must understand the evolution of the profession. Many of the principles used in pharmacy thousands of years ago are still practiced. Knowing this history will help you appreciate the evolution of this profession and the development of professional guidelines and regulations.

Rx Symbol

Rx is commonly considered an abbreviation for the Latin word *recipere* or *recipe*, which means "Take, thou." Additional medical abbreviations also use *x*: for example, sx = signs and symptoms , tx = treatment, hx = history, and dx = diagnosis. However, the Rx symbol is not really the standard letters "R" and "x," but actually a symbol of an italic R with a leg that hangs down below the line with a line crossing it like an x (Figure 1-1). According to the 1931 book *Devils, Drugs, and Doctors*,

> Rx is not, as is frequently supposed, an abbreviation of a Latin word meaning recipe or compound, but is an invocation to Jupiter, a prayer for his aid to make the treatment effective.... [S]ometimes in old medical manuscripts all the R's occurring in the text were crossed.

In other words, the Rx symbol was derived from the ancient symbol for the Roman god Jupiter.

FIGURE 1-1 The Rx symbol.
auttkhamkhauncham/123rf.com

FIGURE 1-2 Ancient humans and medicine.
(Image by Robert Thom. Printed with permission of American Pharmacists Association Foundation. Copyright 2009 APhA Foundation.)

The Age of Antiquity

The Age of Antiquity refers to the time span of 5000 BCE (BC) up through (AD) 499 CE. This is the time of ancient humans and the great ancient empires.

Ancient Humans

The origin of pharmacy can be traced back to the crude and simple discoveries of ancient humans, who are most commonly referred to as cavemen (Figure 1-2). Ancient humans learned from observing their environment, as well as acting on instinct. They watched as both birds and beasts applied cool water, leaves, dirt, or mud to themselves; consequently, these materials became the first soothing remedies for humans as well. By trial and error, humans learned which plant and mineral remedies worked best, and eventually they began to share this knowledge with others.

Ancient Mesopotamia

Babylon, which is referred to as the cradle of civilization, provides the earliest known record of **apothecary** practice. Around 2600 BCE, healers were priest, pharmacist, and physician all in one. Archaeologists have found clay tablets that record the symptoms of illness, as well as prescriptions and instructions for **compounding**, or preparing, remedies.

Mithradates VI

Mithradates VI, also known as Mithradates the Great, was king of Pontus and Armenia Minor (modern-day Turkey) from 120 BCE to 63 BCE (Figure 1-3). For seven years after the assassination of his father, Mithradates lived in the wilderness and developed an immunity to poisons by regularly consuming them in small, nonlethal doses. In addition, he used his prisoners as subjects for testing poisons and antidotes. Based upon his experiences, studies, and writings, Mithradates developed a "universal antidote" for poisoning, known as Mithradates' antidote. He is regarded as the father of toxicology.

Ancient China

According to legend, in 2000 BCE, Chinese Emperor Shen Nung took interest in and researched the medicinal value of several hundred herbs, testing many of them on himself. Additionally, he wrote the first *Pen T-Sao*, or native herbal, recording 365 drugs. In modern times, Shen Nung is worshipped as the patron god of native Chinese drug guilds.

Ancient Egypt

The practice of pharmacy in ancient Egypt was conducted by two classes of workers: echelons and chiefs of fabrication.

pharmacy the art and science of preparing and dispensing medication.

apothecary Latin term for pharmacist; also used as a general term to refer to the early practice of pharmacy.

compounding producing, mixing, or preparing a drug by combining two or more ingredients.

FIGURE 1-3 Mithradates.
Source: DEA/J. E. BULLOZ/Getty Images

Echelons were gatherers and preparers of drugs, similar to the modern-day pharmacy technician, whereas chiefs of fabrication were the head pharmacists.

Although our knowledge of Egyptian medicine comes from records made as early as 2900 BCE, the most important Egyptian pharmaceutical document is the *Papyrus Ebers*, written in 1500 BCE. The *Papyrus Ebers* is a collection of 800 prescriptions that specifically mentions 700 unique drugs.

Ancient India

More than 2,000 drugs are recorded in the *Charaka Samhita*, an ancient Indian manuscript originating from as early as 1000 BCE. The *Charaka Samhita*, which means "compendium of wandering physicians," is the work of multiple authors and was written in Sanskrit, an ancient Indian language.

Ancient Greece and Rome

Terra Sigilata, or "sealed earth," was the first therapeutic agent to bear a trademark. Originating in ancient Greece prior to 500 BCE off the island of Lemnos, Terra Sigilata was a small clay tablet, similar in size to an aspirin. Each year, the people of Lemnos dug clay from a pit on a Lemnian hillside in the presence of political and religious leaders. The clay was washed, refined, shaped into uniform tablets, impressed with an official seal, sun-dried, and then distributed commercially. Thus, it is a precursor to today's branded and marketed drugs.

Hippocrates

FIGURE 1-4 Hippocrates of Cos. (Stock Montage/Hulton Archive/Getty Images.)

Hippocrates of Cos was an ancient Greek physician who lived between 460 BCE and 377 BCE (Figure 1-4). He was a third-generation physician, philosopher, and professor at the Cos School of Medicine. Known as the father of medicine, Hippocrates is commonly regarded as one of the most notable figures of all time in medicine. One of his writings, *Corpus Hippocraticum*, rejected the widely held view that illness was connected to mystical or demonic forces; instead, it positioned medicine as a branch of science.

Hippocrates developed the theory of humors, in which an individual's health was supposed to be connected to the balance, or harmony, of four basic bodily fluids, known as *humors*, which also related to a mood or personality characteristic: blood (joyful/happy), phlegm (lethargic), yellow bile (irritable), and dark or black bile (angry).

In total, Hippocrates published more than 70 writings related to or referencing the practice of medicine and apothecary. Modern physicians still take the Hippocratic Oath, as part of which they pledge to "do no harm."

Theophrastus

Theophrastus, one of the greatest early Greek philosophers and natural scientists, observed and wrote extensively on the medicinal qualities of herbs (Figure 1-5). Known as the father of

FIGURE 1-5 Theophrastus.

A Comparison of the Original Hippocratic Oath with the Modern Version

The Original Hippocratic Oath (translated into English)	The Modern Hippocratic Oath
I swear by Apollo, the healer, Asclepius, Hygieia, and Panacea, and I take to witness all the gods, all the goddesses, to keep according to my ability and my judgment, the following Oath and agreement: To consider dear to me, as my parents, him who taught me this art; to live in common with him and, if necessary, to share my goods with him; to look upon his children as my own brothers, to teach them this art, without charging a fee; and that by my teaching, I will impart a knowledge of this art to my own sons, and to my teacher's sons, and to disciples bound by an indenture and oath according to the medical laws, and no others. I will prescribe regimens for the good of my patients according to my ability and my judgment and never do harm to anyone. I will not give a lethal drug to anyone if I am asked, nor will I advise such a plan; and similarly I will not give a woman a pessary to cause an abortion. But I will preserve the purity of my life and my arts. I will not cut for stone, even for patients in whom the disease is manifest; I will leave this operation to be performed by practitioners, specialists in this art. In every house where I come I will enter only for the good of my patients, keeping myself far from all intentional ill-doing and all seduction and especially from the pleasures of love with women or with men, be they free or slaves. All that may come to my knowledge in the exercise of my profession or in daily commerce with men, which ought not to be spread abroad, I will keep secret and will never reveal. If I keep this oath faithfully, may I enjoy my life and practice my art, respected by all men and in all times; but if I swerve from it or violate it, may the reverse be my lot.	I swear to fulfill, to the best of my ability and judgment, this covenant: I will respect the hard-won scientific gains of those physicians in whose steps I walk, and gladly share such knowledge as is mine with those who are to follow. I will apply, for the benefit of the sick, all measures [that] are required, avoiding those twin traps of overtreatment and therapeutic nihilism. I will remember that there is art to medicine as well as science, and that warmth, sympathy, and understanding may outweigh the surgeon's knife or the chemist's drug. I will not be ashamed to say "I know not," nor will I fail to call in my colleagues when the skills of another are needed for a patient's recovery. I will respect the privacy of my patients, for their problems are not disclosed to me that the world may know. Most especially must I tread with care in matters of life and death. If it is given to me to save a life, all thanks. But it may also be within my power to take a life; this awesome responsibility must be faced with great humbleness and awareness of my own frailty. Above all, I must not play at God. I will remember that I do not treat a fever chart, a cancerous growth, but a sick human being, whose illness may affect the person's family and economic stability. My responsibility includes these related problems, if I am to care adequately for the sick. I will prevent disease whenever I can, for prevention is preferable to cure. I will remember that I remain a member of society with special obligations to all my fellow human beings, those sound of mind and body, as well as the infirm. If I do not violate this oath, may I enjoy life and art, respected while I live and remembered with affection thereafter. May I always act so as to preserve the finest traditions of my calling and may I long experience the joy of healing those who seek my help.

botany, his observations and writings, which date back to about 300 BCE, were surprisingly accurate, as measured by present research and knowledge. Among his work, Theophrastus classified plants according to their methods of growth, locales, sizes, and practical uses.

Dioscorides

During the 1st century of the Common Era, another Roman named Pedanios Dioscorides accompanied the Roman armies on their journeys throughout the known world in order to study medicinal treatments. He recorded his observations and developed precise

rules for collecting, storing, and using drugs. His writings, a five-volume book titled *De Materia Medica*, were used by medical professionals as late as the 16th century and contained information on more than 600 plants and minerals (Figure 1-6). *De Materia Medica*, considered the precursor to all modern pharmacopoeias, is the principal historical reference on the medicines used by the Greeks, Romans, and other cultures of antiquity.

Galen

Galen practiced and taught both pharmacy and medicine in Rome during 130–200 CE (Figure 1-7). After attending medical schools in Greece and Egypt, he eventually became the personal physician for the Roman imperial family. Galen contributed to the study of medicine by writing more than 100 books on topics that included physiology, hygiene, pathology, pharmacology, blood-letting, and therapeutics. His principles for preparing and compounding medicines reigned in the Western world for 1,500 years, and his name is still associated with the class of pharmaceuticals compounded by mechanical means—galenicals.

The Middle Ages

The Middle Ages lasted from 500 CE through 1500 CE. Once called the Dark Ages, while this historic period is not noted for cultural or scientific progress, a number of significant developments occurred in the practice of pharmacy.

FIGURE 1-6 Dioscorides.

FIGURE 1-7 Galen.
Source: Photo Researchers/Getty

Monasteries

During the Middle Ages, pharmacy and medicine were practiced and preserved in the monasteries; scientists are known to have been taught in the cloisters as early as the 7th century. The monks gathered herbs in the wild or raised them in their own gardens and then prepared them according to the art of the apothecary to aid the sick and injured. Medicinal herb gardens can still be found at many monasteries in numerous countries.

The First Apothecaries

Late in the 8th century, the Arabs separated the roles of the apothecary and physician, establishing the first apothecaries (privately owned drug stores) in Baghdad (Figure 1-8). In addition to the Greco-Roman knowledge of apothecary, the Arabs used their natural resources to develop syrups, confections, conserves, distilled waters, and alcoholic liquids. As the Muslims traveled across Africa, Spain, and southern France, they brought this new system of pharmacy with them, and it was eventually adopted by Western Europe, where public pharmacies began to appear. However, it was not until 1240 CE, in Sicily and southern Italy, that pharmacy was separated from medicine. At the palace of Frederick II of Hohenstaufen, who was both Emperor of Germany and King of Sicily, pharmacists were presented with the first European edict completely separating their responsibilities from those of medical practitioners.

FIGURE 1-8 The first apothecaries. (Image by Robert Thom. Printed with permission of American Pharmacists Association Foundation. Copyright 2009 APhA Foundation.)

The First Pharmacopoeia

It was in Florence, Italy, that the idea of a **pharmacopoeia** with official status, to be followed by all apothecaries, originated (Figure 1-9). The *Nuovo Receptario*, as originally titled in Italian, was published and became the legal standard for the city-state of Florence in 1498. It was the result of collaboration between the Guild of Apothecaries and the Medical Society, marking one of the earliest manifestations of constructive interprofessional relations. The professional groups received advice and guidance from the powerful Dominican monk Savonarola, who at the time was the political leader in Florence.

The Renaissance

The Renaissance period, which includes the 16th and 17th centuries (1500–1600 CE), was filled with scientific advancements, a renewed interest in culture and the arts, and expanded exploration, which included the European exploration of the Americas.

The First Anglo-Saxon Organization for Pharmacists

Trade in drugs and spices had been very lucrative during the Middle Ages. In the British Isles, the Guild of Grocers, which represented shopkeepers, monopolized this trade and maintained jurisdiction over the apothecaries. After years of effort, the apothecaries found allies among court physicians; in 1617, King James I granted them a charter to form a separate company known as the "Master, Wardens and Society of the Art and Mystery of the Apothecaries of the City of London"—despite vigorous protests from the grocers. This marked the first organization of pharmacists in the Anglo-Saxon world.

The First Apothecary in the American Colonies

Many Europeans, particularly those who had some wealth and those who were religious nonconformists, were attracted to the opportunities presented by the American colonies. John Winthrop, the first governor of the Massachusetts Bay Colony and the founder of Boston, sought advice from English apothecaries and physicians when he was unable to persuade professionals to emigrate from Britain to the colony. In 1640, he began providing apothecary products by selling imported drugs, as well as those derived from plants native to New England.

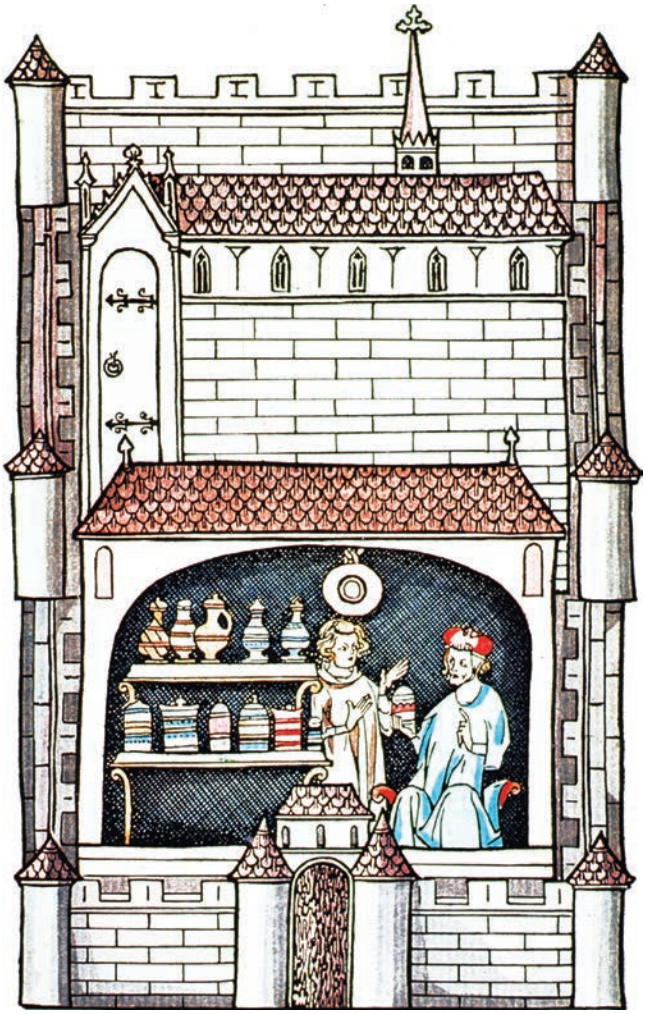


FIGURE 1-9 The first pharmacopoeia. (Image by Robert Thom. Printed with permission of American Pharmacists Association Foundation. Copyright 2009 APhA Foundation.)

The 18th Century

During the 18th century, the American colonies united, fought the British Empire to gain their independence, and ultimately formed the United States of America. Notable advancements in the practice of pharmacy and medicine, however, were occurring on both sides of the Atlantic Ocean.

Elizabeth Marshall: America's First Female Pharmacist

In 1729, Christopher Marshall, an Irish immigrant, established an apothecary shop in Philadelphia. Over 96 years, the shop became a leading retail store, one of the first large-scale chemical manufacturers, a training school for pharmacists, and an important supply depot during the American Revolution. Eventually, management of the apothecary shop was taken over by Marshall's granddaughter Elizabeth, America's first female pharmacist.

pharmacopoeia a compilation or listing of pharmaceutical products that also contains their formulas and methods of preparation.

FIGURE 1-10 Benjamin Franklin.

Benjamin Franklin: America's First Hospital

Founded by Benjamin Franklin, colonial America's first hospital was established in Philadelphia in 1751, with the hospital's pharmacy beginning operations in 1752 (Figure 1-10). Although Jonathan Roberts was the first hospital pharmacist in America, it was his successor, John Morgan, whose influence upon pharmacy and medicine made important changes to the development of professional pharmacy in North America. First as pharmacist, and later as physician, Morgan supported the use of written **prescriptions** and advocated for the independent practice of the two professions.

Andrew Craigie: America's First Apothecary General

Andrew Craigie, a Bostonian, was the first man to hold the rank of a commissioned pharmaceutical officer in the American army. Appointed commissary of medical stores by the Massachusetts Committee of Safety, less than two months later Craigie was present at the Battle of Bunker Hill, on June 17, 1775, taking care of the sick and wounded. When Congress reorganized the Medical Department of the army in 1777, Craigie became the first Apothecary General; his duties included procurement, storage, manufacture, and distribution of the army's required drugs. He also developed an early pharmaceutical wholesaling and manufacturing business.

The 19th Century

During the 1800s (the 19th century), America was a young country and the practice of American pharmacy was being established.

America's First College of Pharmacy

In the early 1800s, pharmacists were faced with two major threats: deterioration of the practice of pharmacy as they had known it and a discriminatory classification by the University of Pennsylvania medical faculty. Pharmacists held a protest meeting in Carpenters' Hall on February 23, 1821, in Philadelphia. At a second meeting, on March 13, the pharmacists voted to form the Philadelphia College of Pharmacy, a school of pharmacy with a self-policing board, which became America's first educational institution for pharmacy.

The American Pharmaceutical Association

In October 1852, Daniel B. Smith, William Procter, Jr., and 20 delegates of the Philadelphia College of Pharmacy founded the American Pharmaceutical Association (APhA) to meet the needs for better communication among pharmacists, standards for education and apprenticeship, and quality control over imported drugs. Membership was opened to "all pharmacists and druggists of good character who subscribed to its Constitution and to its Code of Ethics."

Workplace Wisdom **APhA**

After more than 150 years, APhA continues to serve the profession, although it was recently renamed the American Pharmacists Association (APhA). For more information, go to **www.pharmacist.com**

The Father of American Pharmacy

William Procter, Jr., is known as the father of American pharmacy (Figure 1-11). In 1837, he graduated from the Philadelphia College of Pharmacy; Procter operated a retail pharmacy, served the college as professor of pharmacy for 20 years, was a leader in founding the American Pharmaceutical Association, served

FIGURE 1-11 The father of American pharmacy, William Procter, Jr. (Image by Robert Thom. Printed with permission of American Pharmacists Association Foundation. Copyright 2009 APhA Foundation.)

prescription an order, by an authorized individual, for the preparation or dispensing of a medication.

that organization as its first secretary and later as its president, served 30 years on the USP Revision Committee, and was editor of the *American Journal of Pharmacy* for 22 years. In 1869, though retired, Procter continued to edit the journal in a small publication office. He returned to chair the Philadelphia College of Pharmacy in 1872, before passing away in 1874.

The United States Pharmacopoeia

Published in 1820, the first *United States Pharmacopoeia* (USP) was the first book of drug standards to achieve acceptance by an entire nation. In 1877, the USP was in danger of discontinuation, because of a lack of interest from the medical profession, but Dr. Edward R. Squibb, a manufacturing pharmacist and physician, took the problem to the APhA, which formed a USP Revision Committee. The publication quickly regained authoritative stature and continues to be published today.

Workplace Wisdom **USP**

To learn more about USP standards and publications, go to **www.usp.org**

FIGURE 1-12 Gregor Mendel. (Image from the National Library of Medicine.)

The Role of USP in Pharmacy Practice

After more than 150 years, the relevance of the USP to pharmacy practice continues to evolve and grow. Today, the USP is considered the official public standards-setting authority for all prescription and over-the-counter medicines, dietary supplements, and other health-care products manufactured and sold in the United States. Currently, the National Pharmacy Technician Association (NPTA) serves as an official delegate member of USP, providing insights and a voice for pharmacy technicians.

The Father of Modern Genetics

Gregor Mendel (1822–1884) is known as the father of modern genetics (Figure 1-12). An Austrian priest and scientist, Mendel showed that the inheritance of traits follows particular laws, through his study of inherited traits in pea plants. The significance of Mendel's work was not recognized until his research was rediscovered at the turn of the 20th century.

The 20th Century

The 20th century (1900s) was a period of impressive scientific discoveries and advancement, including in the field of medicine. In addition, it was in the early 1900s that the federal government began to regulate the practice of pharmacy.

The Discovery of Penicillin

In 1928, Alexander Fleming, a Scottish physician and bacteriologist discovered penicillin by accident. While studying the properties of staphylococci, Fleming stacked all of his cultures on a bench in his unkempt laboratory prior to taking a month-long vacation with his family. Upon his return, he noticed that one culture had become contaminated with a fungus. The staphylococci that was directly in contact with the fungus had been destroyed. Afterward, Fleming grew the mold in a pure culture and discovered that it produced a substance, which he initially called "mold juice," which killed a variety of disease-causing bacteria. In 1929, Fleming named the substance penicillin, but mass production of the world's first antibiotic did not begin until World War II.

The American Council on Pharmaceutical Education

In 1932, multiple pharmacy-related associations cofounded the American Council on Pharmaceutical Education (ACPE) as an autonomous agency to establish standards for pharmacy education. ACPE initially established standards for the baccalaureate degree in pharmacy and then added the doctor of pharmacy standards as an alternative. In the year 2000, it announced a conversion to the doctor of pharmacy (PharmD) as the sole entry-level degree for the profession of pharmacy. In 1975, ACPE developed standards for the approval of continuing pharmacy education providers. In 2003, the agency's name was changed to the Accreditation Council for Pharmacy Education (ACPE).

The Polio Vaccine

In the 1950s, polio was considered the most frightening public health epidemic in the postwar era in America. It was the deadly disease that left President Franklin Roosevelt crippled. In 1952 alone, there were more than 58,000 reported cases, which left over 3,100 dead and 21,000 paralyzed. Jonas Salk developed an injectable vaccine for the disease in the late 1940s, and it was tested on nearly two million school children (Figure 1-13). The successful trial results and the vaccine for polio were released in 1955.

FIGURE 1-13 Jonas Salk.
Source: NYPL/Science Source/Getty Images

Biotechnology

Biotechnology drugs are produced using living organisms such as yeast, bacteria, or mammalian cells. Although producing drugs from living organisms is not new, modern biotechnology has greatly expanded the number of different drugs that can be produced by using living organisms.

The majority of biotechnology drugs are manufactured through a process called *recombinant DNA technology*, in which a human gene that is capable of triggering the production of a specific protein is inserted into a living organism that is then cultured in a laboratory (Figure 1-14). The organism incorporates the gene into its cell structure and begins producing the desired protein (drug).

The proteins (drugs) produced by recombinant DNA technology are very fragile and can be administered only by injection into the vein or under the skin. If taken orally, the proteins will be destroyed by stomach acids and enzymes before they enter the patient's bloodstream.

Some of the drugs now produced by biotechnology were once made by different means. Insulin, for example, was once extracted from the tissue of animals. Most, however, are not producible by other methods.

The majority of biotechnology drugs now under development are being tested for use in the treatment of cancer or cancer-related conditions, which could have a major impact on the future health care of cancer patients. Currently, the Food and Drug Administration (FDA) has approved 254 biotechnology drugs for 385 indications.

biotechnology a technique that uses living organisms to make or modify specific products.

pharmacogenomics the study of individual genetic differences in response to drug therapy.

FIGURE 1-14 DNA sequencing.
Source: SPL/Custom Medical Stock Photo

Pharmacogenomics

It is not uncommon for patients to be given medications that either do not work effectively for them or cause unwanted or dangerous side effects. These patients return to their doctors again and again, hoping to find a drug that will work for them. Enter **pharmacogenomics**, a very promising and appealing alternative.

Imagine that you go to your doctor's office. After a simple and rapid test of your DNA, your doctor changes his or her mind about the drug he or she was intending to prescribe for you because the genetic test indicates that you could suffer a severe negative reaction to that particular medication. Upon further examination of your test results, the doctor finds that you would benefit greatly from a new or different drug and that there would be little likelihood that you would react negatively to it. This is how the promise of pharmacogenomics is portrayed, and it is not as far off in the future as you might expect.

Evolution of the Pharmacist's Role

The 20th century saw the role of the modern American pharmacist evolve through four unique stages or eras: the traditional era, the scientific era, the clinical era, and the pharmaceutical care era.

The Traditional Era

From the early 1900s through the 1930s, pharmacists continued the traditional, preexisting practice of pharmacy, in which their role consisted primarily of formulating and dispensing drugs derived from natural sources.

The Scientific Era

Beginning in the late 1930s, the practice of pharmacy began to take a significantly more scientific-based approach. This era was marked by the development of new drugs, scientific testing

of the effects of drugs on the human body, new regulations pertaining to the efficacy of medications, and the mass production of synthetic drugs and antibiotics. Several factors caused this shift in practice. Both world wars required the production of massive quantities of drugs, both existing and newly developed, for the soldiers. A large number of new drugs were discovered and manufactured. In particular, the discovery and development of penicillin-based drugs saved countless lives during World War II. Unfortunately, the era also saw numerous recorded incidents of fatalities and adverse reactions to nonregulated drugs.

The Clinical Era

In the 1960s, the pharmacy practice shifted again, with the approval of many new medications. Pharmacists were now expected to dispense not only medications but also drug information, warnings, advice, and helpful suggestions to their patients. This era transformed pharmacy into a cognitive-based profession slightly before the United States as a whole entered the ongoing information age.

The Pharmaceutical Care Era

Toward the end of the 20th century, the practice of pharmacy shifted yet again. This time, however, it transformed into a combination of the three prior eras. The practice of pharmacy and the role of the pharmacist became focused on ensuring positive outcomes for drug-related therapies. This overarching philosophy, known as *pharmaceutical care*, is actually a combination of formulation and dispensing of drugs (traditional era), a scientific approach to evidence and outcome-based results (scientific era), and provision of expanded consultations and cognitive-based services (clinical era). Going forward into the 21st century, there are many new and ever-changing trends in the pharmaceutical era. The era continues to evolve with new inventions and changes in technology—all areas of which the pharmacy technician should keep abreast of.

Evolution of the Pharmacy Technician

As previously discussed, the role of pharmacy technician can be traced back to the echelons in ancient Egypt. However, this role did not evolve significantly until the late 20th century. In the early and mid-1900s, pharmacy technicians were referred to as clerks, assistants, aides, or pharmacy support personnel. Most pharmacy assistants were the children of pharmacists who worked at the family-owned pharmacy. Any training they received was informal and acquired on the job.

Military Pharmacy Technicians

In the mid-1940s, the U.S. military pioneered the evolution of the professional pharmacy technician by developing standardized training and competency requirements and delegating more responsibilities to more knowledgeable pharmacy technicians. The original military classification was "pharmacy specialist," but the position evolved into today's pharmacy technician.

Move for Standardization

Although the move for standardizing pharmacy technician requirements, competencies, and job duties first took root during the 1970s, it was not until the 1990s that they began to transform notably. Some of these changes included the development of a national certification examination, formation of a model curriculum for training, and specific mention of technicians in state pharmacy practice acts. While the industry as a whole has adopted various standards for pharmacy technicians, the standards are unfortunately neither equal nor consistent across some state lines. National organizations and stakeholders continue to push for collective standardization among pharmacy technician regulations, competencies, and duties.

National Certification

Since 1995, the Pharmacy Technician Certification Board (PTCB) has certified over 425,000 pharmacy technicians through their certification exam and transfer process. Research indicates that there are approximately 275,000 actively certified pharmacy technicians through PTCB, individuals who have met the requirements to maintain their certification. Several thousand additional pharmacy technicians have completed the national certification process through the Exam for the Certification of Pharmacy Technicians (ExCPT), administered by the National Healthcareer Association (NHA). The NHA recently acquired the ExCPT from the Institute for the Certification of Pharmacy Technicians (ICPT) to add to its large and diverse portfolio of health career certification programs. Certification requirements vary by state, so it is imperative to check with your State Board of Pharmacy to determine if a specific certification exam is required in your state.

This push for professional certification demonstrates the seriousness of this profession and the need for standardized competencies in the workplace. Prior to the PTCB exam, most technicians had only a high school diploma, although it was not mandatory; also, background checks were not done in every state.

Where We Are Today

As of 2013, all but six states (Colorado, Hawaii, Michigan, New York, Pennsylvania, and Wisconsin) regulate the practice of pharmacy technicians. Although a lack of consistency among state regulations pertaining to pharmacy technicians continues, momentum for standards and regulations has been evidenced over the past decade. Some states require mandatory, accredited formal education and training, while others require certification (either national or state), and many states now require registration, licensure, or a combination of all three. It is critical that you contact your own State Board of Pharmacy and educate yourself about the most current standards, guidelines, and regulations required to practice as a pharmacy technician as these requirements vary state by state and are evolving quickly. Table 1-1 shows some important milestones for pharmacy technicians.

TABLE 1-1 Pharmacy Technician Milestones

Mid-1940s	The U.S. Army establishes a training program for "pharmacy specialists."
1968	The U.S. Department of Health, Education, and Welfare recommends "the Bureau of Health Manpower should support … the development of a pharmacist aide curriculum in junior colleges and other educational institutions."
1969	The American Society of Hospital (now Health-System) Pharmacists (ASHP) workshop notes "the establishment of nationally recognized educational standards for pharmacy technicians would be of value." The American Pharmaceutical (now Pharmacists) Association (APhA) task force delineates tasks that pharmacists and technicians may perform.
1970	ASHP releases *Statements on Supportive Personnel in Hospital Pharmacy*.
1971	ASHP establishes a mechanism to accredit hospital-based pharmacy technician training programs.
1973	The National Association of Chain Drug Stores (NACDS) supports greater use of pharmacy technicians and favors on-the-job training.
1975	ASHP releases *Training Guidelines for Hospital Pharmacy Technicians: Supportive Personnel*.
1977	The American College of Apothecaries (ACA) suggests that the education of pharmacy technicians be conducted exclusively by accredited colleges that offered the doctor of pharmacy degree; ASHP publishes *Manual for Hospital Pharmacy Technicians: A Programmed Course in Basic Skills*.
1980	ASHP develops *Minimum Competencies for Institutional Pharmacy Technicians with Training Guidelines*.
1981	The Michigan Pharmacists Association (MPA) creates a certification exam for pharmacy technicians; ASHP creates a technical assistance bulletin on outcome competencies and training guidelines for institutional pharmacy technician training programs; ASHP recommends the establishment of an accreditation standard for pharmacy technician training programs.
1982	ASHP creates standards for accreditation of pharmacy technician training programs.
1983	ASHP accredits the first technician training program; ASHP approves resolution endorsing certification and registration of pharmacy technicians.
1987	The Illinois Council of Hospital Pharmacists (ICHP) creates a certification exam for pharmacy technicians.
1988	APhA advocates training in programs under a pharmacist's guidance; ASHP hosts first conference on pharmacy technicians.
1991	The Pharmacy Technician Educators Council (PTEC) is established.
1995	APhA, ASHP, ICHP, and MPA create the Pharmacy Technician Certification Board (PTCB).
1996	APhA and ASHP release *White Paper on Pharmacy Technicians*.
1999	The National Pharmacy Technician Association (NPTA) is established.
2001	NABP becomes a partner of PTCB; second edition of the *Model Curriculum for Pharmacy Technician Training* is released.
2003	The *White Paper on Pharmacy Technicians 2002* is released.

The Future of Pharmacy and the Pharmacy Technician

As we move further into the 21st century, the future of medicine and pharmacy practice appears to be poised for the greatest and most significant advancements to date.

Occupational Outlook for Pharmacy Technicians

According to the Bureau of Labor Statistics (BLS), employment for pharmacy technicians with training and experience is expected to increase much faster than the average job, and opportunities are expected to be good. The BLS anticipates employment of pharmacy technicians to increase by 25% to 31% from 2008 to 2018. They cite that "job opportunities for pharmacy technicians are expected to be good, especially for those with previous experience, formal training, or certification." In addition, advancement opportunities, such as lead tech and supervisory positions, are most readily available for pharmacy technicians with significant training or experience working in large pharmacies and health systems.

Medication Therapy Management and Pharmacists

Medication therapy management (MTM) is a service that optimizes therapeutic outcomes for individual patients, and since the mid-2000s it has become an increasingly focused trend for the practice of pharmacists. Through MTM services, pharmacists are able to provide medication therapy review, pharmacotherapy consultations, immunizations, and disease state management and health and wellness programs. As the practice of MTM evolves and pharmacists move more toward a path of providing clinical and consultative services, pharmacy technicians will be relied upon to assist with specific MTM activities and become increasingly involved in the general pharmacy practices traditionally handled by pharmacists.

SUMMARY

The practice of pharmacy has deep, historic roots, in addition to an innovative and promising future. Although it has taken 7,000 years of progress, this profession has evolved from applying dirt and leaves to developing genetically tailored medications that are prepared specifically for each individual's unique DNA structure. The key concepts for this chapter include:

- The need for pharmaceutical products, services, and knowledge has existed since prehistoric times.
- As the profession gains new information and technology, pharmacy continues to evolve to better serve patients.

CHAPTER REVIEW QUESTIONS

1. Which civilization provides the earliest known record of apothecary practice?
A. Ancient Egypt
B. Ancient China
C. Ancient Mesopotamia
D. Ancient Greece

2. The _____ is an ancient collection of prescriptions, mentioning more than 700 unique drugs.
A. *Pen T-Sao*
B. *Papyrus Ebers*
C. Terra Sigilata
D. *Charaka Samhita*

3. Echelons, from ancient _____, were similar to the modern-day pharmacy technician.
A. China
B. Egypt
C. India
D. Mesopotamia

4. Which individual is recognized as the father of American pharmacy?
A. Christopher Marshall
B. Benjamin Franklin
C. William Procter, Jr.
D. Dr. Edward R. Squibb

5. Which era of pharmacy practice in the 20th century is characterized by new regulations pertaining to medication efficacy?
A. The traditional era
B. The scientific era
C. The clinical era
D. The pharmaceutical care era

6. Which organization was established to autonomously set standards for pharmacy education?
A. ACPE
B. APhA
C. BIO
D. USP

7. Who is responsible for separating the practices of pharmacy and medicine?
A. Savonarola
B. King James I
C. Hippocrates
D. Frederick II

8. The first official pharmacopoeia originated in which country?
A. England
B. Greece
C. Italy
D. the United States

9. Which individual is recognized for shifting the view of medicine from the mystic to the scientific?
A. Hippocrates
B. Galen
C. Savonarola
D. Frederick II

10. The U.S. _____ marked a major milestone in the evolution of pharmacy technicians, by establishing a training program for "pharmacy specialists," in the mid-1940s.
A. Air Force
B. Army
C. Marine Corp
D. Navy

CRITICAL THINKING QUESTIONS

1. In what ways has the practice of modern pharmacy remained consistent from the Age of Antiquity to today?
2. Describe the crucial differences in the practice of pharmacy during the Middle Ages and today.

WEB ACTIVITY

1. Take the University of Arizona's History of Pharmacy Museum Virtual Tour: Go to **http://www.pharmacy.arizona**. Then select the Visitors menu, and then select Museum.

REFERENCES AND RESOURCES

"ACPE Website." *Accreditation Council for Pharmacy Education*. ACPE. 2012. Web. 3 January 2012.

Bender, George A. *Great Moments in Pharmacy*. Detroit, MI: Northwood Institute Press, Print. 1996.

Cowan, David L. and William H. Helfand. *Pharmacy: An Illustrated History*. New York, NY: Harry N. Abrams, Print. 1990.

"ExCPT Exam." *National Healthcareer Association*. NHA. 2012. Web. 3 January 2012.

Haggard, Howard W. *Devils, Drugs, and Doctors*. New York, NY: Harper & Brothers, Print. 1929.

"MTM Central." *American Pharmacists Association*. APhA. 2012. Web. 3 January 2012.

"NPTA Website." *National Pharmacy Technician Association*. NPTA. 2012. Web. 3 January 2012.

Orum-Alexander, Gail G. and James J. Mizner, Jr. *Pharmacy Technician: Practice and Procedures*. New York, NY: McGraw-Hill. Print.

"Pharmacogenomics and Personalized Medicine." *Biotechnology Industry Organization*. BIO. 2012. Web. 3 January 2012.

"Pharmacy Technicians and Aides." *Occupational Outlook Handbook, 2010–2011 Edition*. Bureau of Labor Statistics. 2011. Web. 3 January 2012.

"PTCB Website." *Pharmacy Technician Certification Board*. PTCB. 2012. Web. 3 January 2012.

"Report of the Sesquicentennial Stepping Stone Summits—Summit Two on Pharmacy Technicians." *Accreditation Council for Pharmacy Education*. ACPE. 2002. Web. 3 January 2012.

Rouse, Mike. "White Paper on Pharmacy Technicians 2002: Needed Changes Can No Longer Wait." *American Journal of Health-System Pharmacy*. 60 (2003): 37–51. Print.





The Professional Pharmacy Technician

CHAPTER 2

LEARNING OBJECTIVES

After completing this chapter, you should be able to:

- Summarize the educational requirements and competencies of both pharmacists and pharmacy technicians.
- Describe the two primary pharmacy practice settings, and define the basic roles of pharmacists and pharmacy technicians working in each setting.
- Explain six specific characteristics of a good pharmacy technician.
- Demonstrate the behavior of a professional pharmacy technician.
- Explain the registration/licensure and certification process for becoming a pharmacy technician.

KEY TERMS

ambulatory pharmacy, p. 17
association, p. 24
attire, p. 19
attitude, p. 19
certification, p. 23
community pharmacy, p. 17
compassion, p. 22
direct patient care, p. 16
doctor of pharmacy (PharmD), p. 16
empathy, p. 22
health-system pharmacy, p. 17
institutional pharmacy, p. 17
licensing, p. 23
pharmacist, p. 16
pharmacy, p. 16
pharmacy technician, p. 16
profession, p. 16
registration, p. 23

INTRODUCTION

A pharmacy technician is an integral part of the pharmacy staff and a member of the larger field of health occupations. Pharmacy technicians are professionals, working within the most trusted profession in the United States. It stands to reason, then, that a pharmacy technician must maintain specific competencies, undergo specialized education and training, and exhibit key personal characteristics.

This chapter provides an overview of the pharmacy profession, the traits and characteristics of a good pharmacy technician, and the framework within which one prepares for a future as a professional pharmacy technician.

Overview of the Pharmacy Profession

A **profession** is an occupation that requires advanced education and training; each profession generally has a professional association, code of ethics, and process of certification or licensing. Historically, there were only three recognized professions: medicine, ministry, and law. **Pharmacy**, which evolved from the profession of medicine, is the profession of preparing and dispensing medications, as well as supplying drug-related information to patients and consumers. Today, the practice of pharmacy is based upon delivering **direct patient care**, which can encompass many aspects of the health care of a patient, including providing pharmaceutical care, counseling, patient education, and, in some cases, even the administration of medication, such as immunizations.

By definition, a *professional* is any individual engaged within a specific profession. Pharmacy includes two classifications of practicing professionals: **pharmacists** and **pharmacy technicians**. Pharmacists are educated, skilled individuals licensed to practice pharmacy and dispense medications, whereas pharmacy technicians are educated, skilled individuals who are trained to work in a pharmacy under the supervision of a pharmacist.

Qualifications and Educational Requirements

Pharmacy professionals are subject to regulations that impose educational and training requirements, so that they will have the knowledge base and competencies necessary to practice pharmacy.

Pharmacists

Pharmacists graduate from pharmacy school with a **doctor of pharmacy (PharmD)** degree, although up until the year 2000, the entry-level degree for pharmacists was the bachelor of science in pharmacy (BS Pharm) degree. A PharmD degree requires a minimum of six years of college, which include at least two years of prepharmacy study and four years of study at a college of pharmacy accredited by the Accreditation Council for Pharmacy Education (ACPE). In addition to the academic requirements, individuals must complete an extensive internship, usually consisting of 1,500 hours, at a local pharmacy under the supervision of a licensed preceptor. Some states require that internship hours must be completed solely after graduation from pharmacy school. To become a licensed pharmacist, an individual must pass the North American Pharmacist Licensure Examination (NAPLEX) and in most states a drug law exam, such as the Multistate Pharmacy Jurisprudence Examination (MPJE). Age requirements vary by state. Pharmacists are required to be licensed with their State Board of Pharmacy (SBOP), as well.

Pharmacy Technicians

In the past, most pharmacy technicians were simply trained on the job, but on-the-job training (OJT), by its very nature, is employer specific and limited to the precise tasks required in the job for which the person was hired. In most cases, OJT does not provide instruction in or guarantee understanding of the theory or background surrounding pharmacy practice. Therefore, formal education requirements, competency exams, and registration with an SBOP are progressively replacing OJT. Most states require, at a minimum, that individuals have a high school diploma or GED equivalent and/or are 18 years of age and have no history of felonies or drug-related misdemeanors in order to practice as a pharmacy technician, as are the qualifications for the national certification exams. Later in this chapter you will learn more about preparing for your future as a pharmacy technician.

Accredited Pharmacy Technician Training Programs The American Society of Health-System Pharmacists (ASHP) and the Accreditation Council for Pharmacy Education (ACPE) have collaborated to accredit pharmacy technician training programs. Although accreditation is voluntary in most states, the accreditation program has set the benchmark for standardized pharmacy technician curriculum and program guidelines. A list of the goal categories prescribed in their Model Curriculum for Pharmacy Technician Training is provided in Table 2-1.

Roles of Pharmacy Professionals

Although pharmacy is a collaborative practice, in which pharmacists and pharmacy technicians work as a team, specific—and even regulated—differences between their roles, responsibilities, and authority exist.

TABLE 2-1 Model Curriculum for Pharmacy Technicians—Goal Categories

1. Personal/Interpersonal Knowledge and Skills
2. Foundational Professional Knowledge and Skills
3. Processing and Handling of Medications and Medication Orders
4. Sterile and Non-Sterile Compounding
5. Procurement, Billing, Reimbursement and Inventory Management
6. Patient- and Medication-Safety
7. Technology and Informatics
8. Regulatory Issues
9. Quality Assurance

profession an occupation that requires advanced education and training.

pharmacy the profession of preparing and dispensing medications, as well as supplying drug-related information to patients and consumers.

direct patient care care provided to a patient that encompasses various aspects, including pharmaceutical care, counseling, patient education, and medication administration.

pharmacist educated, skilled individual licensed to practice pharmacy and dispense medications.

pharmacy technician educated, skilled individual trained to work in a pharmacy under the supervision of a pharmacist.

doctor of pharmacy (PharmD) a doctoral degree in pharmacy practice.

Pharmacists

The role of the pharmacist is extensive and varies significantly depending on the practice setting. For example, in a community pharmacy setting the pharmacist might counsel patients about over-the-counter remedies, whereas in a hospital pharmacy setting the pharmacist might advise physicians about the best drugs to prescribe for certain indications. The following discussion explores the basic duties of a pharmacist and should not be considered absolute or exhaustive.

The primary jobs of all pharmacists are to dispense medications prescribed by authorized medical professionals and provide vital information to patients about medications and their use. Pharmacists also monitor the health and progress of patients in response to drug therapy to ensure that the medications being used are safe and effective.

Pharmacists in ambulatory (community-based) pharmacies counsel patients about prescription drugs and answer questions pertaining to possible side effects or interactions among various drugs. In addition, they provide information about and make recommendations of over-the-counter drugs and medical devices. Some pharmacists in community pharmacies provide specialized services to help patients manage specific conditions, such as diabetes, and some are trained to administer vaccines.

Pharmacists who work in **health-system pharmacies**, such as in hospitals, nursing homes, and long-term care facilities, prepare and dispense medications for individual patients and advise the medical staff on the selection and effects of drugs. They also assess, plan, and monitor drug regimens (see Figure 2-1). Pharmacists may also evaluate drug use patterns and outcomes for patients in hospitals or other institutional settings.

Pharmacy Technicians

As with the pharmacist, the role of a pharmacy technician varies considerably depending on the practice setting and state regulations. The following information explores the basic duties of a pharmacy technician and again should not be considered absolute or exhaustive.

Pharmacy technicians assist pharmacists to provide pharmaceutical care. It is common for technicians to perform routine tasks, such as computer entry, medication preparation, selection, counting, and labeling. The pharmacist is required to review and verify every prescription before it is dispensed to a patient. Technicians are also required to refer any patient questions regarding prescriptions, drug information, or related health matters to the pharmacist. In addition, pharmacy technicians routinely prepare reports, maintain documentation, and order supplies.

FIGURE 2-1 A pharmacist in a hospital setting often advises other medical personnel or monitors patient drug regimens.
Source: Michal Heron/Pearson Education/PH College

In **community pharmacies**, technicians also create and maintain patient profiles, handle insurance (third-party) billing, and manage the inventory.

In health-system pharmacies, technicians may review patient charts; prepare and deliver medications to nursing stations; perform unit-dose packaging; and, if trained and/or certified to do so, prepare sterile products such as intravenous (IV) antibiotics and chemotherapy (see Figure 2-2). Detailed information on the duties and practices of pharmacy technicians working in retail and health-system pharmacies is provided in Chapters 8 and 9, respectively.

Practice Settings

The two general classifications of pharmacy practice settings are ambulatory pharmacies and institutional pharmacies. **Ambulatory pharmacies** are community-based pharmacies, often referred to as retail pharmacies, which include chain retail drugstores, grocery store pharmacies, home health care, mail-order facilities, and other pharmacies from which patients can obtain medications without living on-site (see Figure 2-3). **Institutional pharmacies**, or health-system pharmacies, are found in places such as hospitals, long-term care facilities, extended-living facilities, and retirement homes (see Figure 2-4). Additional practice settings, such as specialty pharmacies, include home infusion, managed care, nuclear pharmacies, and the military.

FIGURE 2-2 Trained or certified pharmacy technicians may prepare sterile products.
Source: Edwige/Science Source

As a rule of thumb, if patients can travel to the pharmacy or have the pharmacy travel to them, they are using

health-system pharmacy common name for an institutional pharmacy.

community pharmacy name commonly used for an ambulatory or retail pharmacy.

ambulatory pharmacy community-based pharmacy; includes chain retail drugstores, grocery store pharmacies, home health care, mail-order facilities, and other pharmacies from which patients can obtain medications without living on-site.

institutional pharmacy a pharmacy found in places such as hospitals, long-term care facilities, extended-living facilities, and retirement homes, which require patients to reside on-site.

FIGURE 2-3 An ambulatory (community) pharmacy.

FIGURE 2-4 An institutional (health-system) pharmacy.
Source: Matthew Borkoski/Getty

an ambulatory pharmacy. If patients and the pharmacy are housed in the same facility, the pharmacy is called an institutional pharmacy.

Working Hours

Schedules and shifts vary from pharmacy to pharmacy, depending on the practice setting and the hours of operation for each specific pharmacy. Pharmacy technicians routinely work evenings, weekends, and/or holidays; this is particularly true for newer technicians who have less seniority on the job.

The majority of chain retail pharmacies are open seven days a week. Independently owned community pharmacies are typically open on weekdays only, although some may be open on the weekends as well. Most institutional pharmacies operate 24 hours a day, and many chain pharmacies now also operate a number of 24-hour pharmacies, dispersed geographically, within a specific city. Table 2-2 shows an example of the hours and shift schedules for pharmacy technicians at a typical chain retail pharmacy, specialty pharmacy, and 24-hour pharmacy.

Workplace Wisdom **Work Shifts**

First shift is commonly referred to as the "day shift."
Second shift is also known as the "swing shift."
Third shift is often referred to as the "graveyard shift."

Remember, the pharmacy hours and shift schedules outlined in this chapter are only examples. Each pharmacy has its own specific hours of operation and schedules, including breaks and mealtime allowances. The schedules described here refer to full-time positions, but many part-time positions are available for pharmacy technicians. In addition, some pharmacy technicians work seven days on followed by seven days off, or work 10- or 12-hour shifts, similar to nurses.

TABLE 2-2 Typical Pharmacy Technician Hours/Shifts

	Day	Pharmacy Hours	First Shift	Second Shift	Third Shift
Typical chain pharmacy hours/shifts	Monday–Friday	8:00 a.m.–10:00 p.m.	8:00 a.m.–4:00 p.m.	11:00 a.m.–7:00 p.m.	2:00 p.m.–10:00 p.m.
	Saturday/Sunday	10:00 a.m.–6:00 p.m.	10:00 a.m.–6:00 p.m.	n/a	n/a
Specialty pharmacy hours/shifts	Monday–Friday	9:00 a.m.–5:00 p.m.	9:00 a.m.–5:00 p.m.	n/a	n/a
	Saturday/Sunday	Often closed on both days of the weekend, although this varies by pharmacy	n/a	n/a	n/a
24-hour pharmacy hours/shifts	Monday–Friday	12:00 a.m.–12:00 p.m.	8:00 a.m.–4:00 p.m.	4:00 p.m.–12:00 a.m.	12:00 a.m.–8:00 a.m.
	Saturday/Sunday	12:00 a.m.–12:00 p.m.	8:00 a.m.–4:00 p.m.	4:00 p.m.–12:00 a.m.	12:00 a.m.–8:00 a.m.
Staggered 30-minute lunch is included in this time block.					

Pharmacy Technician Pay

Pharmacy technician pay and salaries vary from state to state as do certification requirements. Salaries also vary depending on the employment status of the tech, meaning that if they are a lead tech or have been with the hospital or retail pharmacy for a while, then their pay is often more than a tech who just started working. Technicians can also obtain raises and bonuses for a job well done.

Characteristics of a Good Pharmacy Technician

Pharmacy technicians must possess a wide range of knowledge and skills. Successful pharmacy technicians are intimately involved in providing critical health care to all types of people. They operate in strict compliance with written procedures and guidelines and answer directly to the pharmacist for the quality and accuracy of their work. The pharmacist is ultimately responsible for technicians' activities and performance and is their direct supervisor.

Because pharmacy technicians deal with private medical and insurance information as well as dangerous substances, they must act according to the highest ethical and professional standards. Breaches of this public trust can lead to serious consequences. When a one-hour-photo clerk makes a mistake, you lose your pictures and he or she could lose his or her job. When a pharmacy technician makes an error, the result can be serious health consequences and even death. Although the pharmacist is ultimately responsible for checking each technician's work, a technician can be held liable in court for errors of negligence or omission.

Display a Professional Manner and Image

"If you aren't managing your own professional image, others are," according to Harvard Business School professor Laura Morgan Roberts. She adds,

> People are constantly observing your behavior and forming theories about your competence, character, and commitment, which are rapidly disseminated throughout your workplace. It is only wise to add your voice in framing others' theories about who you are and what you can accomplish.

As defined by Roberts, "Your professional image is the set of qualities and characteristics that represent perceptions of your competence and character as judged by your key constituents." As a pharmacy technician, your "key constituents" are your patients, customers, coworkers, and managers. Among the many attributes that contribute to a professional image, attitude, attire, and grooming consistently rank at the top.

Attitude

Attitude is a psychological concept. It can be positive, negative, or ambivalent, and generally it is a result of social learning from one's environment. When pursuing a professional image, however, a positive attitude is the only option. Attitude is technically defined as:

- The posture of the body in connection with an action or mood
- A way of acting, thinking, or feeling
- The position of an aircraft in relation to the horizon line

These definitions provide tremendous insight. Although most individuals recognize that attitude is a way of acting, thinking, or feeling, many forget the connection between attitude and the posture of the body—this is body language. You can say all the right things and take all the proper actions, but your body language cannot hide your true feelings and attitude (see Figure 2-5).

FIGURE 2-5 Displaying a positive attitude, in direct contact with customers, with coworkers, or while on the telephone, demonstrates your professionalism as a pharmacy technician.
Source: Michal Heron/Pearson Education/PH College

The last definition may at first seem inapplicable or inappropriate, but under the surface there is a great correlation. The attitude reading on a pilot's flight deck provides him or her with critical information regarding the position of the aircraft in relation to the horizon. If the attitude is in check and correctly aligned, the pilot is then able to proceed safely and increase the altitude (height) of the plane. The same can be said about one's professional image and attitude: So long as it is in check and correctly aligned, the individual is positioned to advance and grow within his or her profession.

Workplace Wisdom **Tips on Having a Positive Attitude**

- Create and maintain a can-do mindset.
- Approach and respond to others in a pleasant and upbeat manner.
- Maintain enthusiasm despite criticism.
- Express support, loyalty, and appreciation.
- Demonstrate an "I care" policy.

Attire

Attire, or clothing, refers to all items used to cover the body, including the hands, feet, and head. Attire has two primary purposes: function and image. Numerous attire elements are required and necessary when working in pharmacy environments; many (such as gloves, shoe covers, and face masks) are related to specific skills and practice settings (see Figure 2-6).

We discuss personal protective equipment and other items in later chapters. However, there is one common item that both serves as a functional attire element and relates to maintaining

attitude a way of acting, thinking, or feeling.

attire clothing.

FIGURE 2-6 The attire and protective equipment you use on the job depends on your job function and the practice setting in which you work.
Source: Edwige/Science Source

a professional image: the lab coat or smock. It is customary for pharmacy personnel to wear a lab coat in all practice settings, and, interestingly, it serves both defined purposes for attire, function, and image. The lab coat is functional in that it is a protective garment that keeps the individual's clothing from coming into contact with liquid medications, ointments, and chemicals. It also provides numerous, spacious pockets for storing reference booklets, notepads, calculators, and pens.

In addition, the lab coat contributes to a pharmacy technician's professional image. It is immediately recognizable by patients and customers and inspires trust in the person wearing it. The public shares an unspoken expectation that a healthcare professional, such as a pharmacist or pharmacy technician, who is wearing a lab coat is knowledgeable and trustworthy.

Most pharmacies also establish a specific dress code for their employees for the primary purpose of maintaining a professional image. In general, pharmacies use one of two dress codes: business or scrubs.

Business Pharmacy personnel are expected to dress above business-casual standards; however, the traditional definition of business attire is altered to be practical in the pharmacy environment. Men should wear slacks or dress pants, a button-down shirt, and a tie. Women can wear slacks, conservative skirts, blouses, shells, cardigans, or dresses. Most fabrics are appropriate, but denim is usually not acceptable. Business dress codes are most often adopted by retail pharmacies and management at health-system pharmacies.

General Lab Coat Guidelines

- White lab coat (short or long)—pharmacist
- Colored lab coat (short)—pharmacy technician
- White smock—pharmacy technician
- Sleeveless vest—pharmacy technician, pharmacy clerk, cashier

Scrubs Many pharmacies require personnel to wear scrubs, a medical uniform consisting of a pullover shirt and pants. The pharmacy typically predetermines the color of scrubs required and may or may not issue uniform scrubs to the staff. This dress code is most often adopted by health-system pharmacies.

Grooming

People present themselves to the public in a variety of ways. They may cut, dye, and style their hair; grow facial hair; use makeup or perfume and cologne; wear jewelry; mark their skin with tattoos; or have body piercings. All these options contribute to one's image, but do not constitute clothing per se; these elements are collectively classified as *grooming*.

Pharmacy professionals represent both their employer and the profession to patients and customers; therefore, it is important for each employee to use good judgment and good habits in grooming and personal hygiene.

Grooming standards vary, and in some cases are regulated, by practice setting and employer. However, the following are basic grooming standards for professionals:

- Hair should be kept neat, clean, and professional; coloring should appear natural.
- Men should be clean shaven or maintain a neat, trimmed mustache and/or beard.
- Makeup should be used in moderation, and a natural skin color should be maintained.
- Fingernails should be kept trimmed and clean.
- A single pair of appropriate earrings may be worn.
- Additional piercing and tattoos should not be visible when one is in professional attire.
- Perfume/cologne should be used sparingly, or avoided altogether, at the workplace.

Be Trustworthy and Confidential

National surveys consistently show that pharmacy is among the most trusted professions in the United States, more so than doctors and clergy. Patients have an unmatched, inherent trust in their pharmacists and by extension their pharmacy technicians. Trust is a treasured gift and one that should be handled reverently. As a pharmacy technician, it is your responsibility to deserve and maintain your patients' trust. After all, with the potential of fatal errors, patients are essentially putting their lives in your hands each time you type and fill their prescription. One large component of being trustworthy is confidentiality. Aside from explicit and stringent laws, such as the Health Insurance Portability and Accountability Act (HIPAA), confidentiality is a primary responsibility of any health-care professional. As a pharmacy technician, you will be given access to very detailed, private information regarding your patients and you are to be responsible and respectful when handling such details. The following are a few tips on how to be trustworthy and maintain confidentiality:

- Always be truthful and honest, especially when you make a mistake.
- Be reliable and accountable; keep your promises.
- Remember that open and honest dialogue is reciprocated.
- Safeguard the privacy of your patients and information.
- Treat others and their personal information as you would desire yours to be treated.

- Study HIPAA privacy laws carefully to make sure you are fully informed of your responsibilities and liabilities.
- Never make assumptions regarding who may or may not have access to privileged and confidential information.
- Always err on the side of caution when handling confidential information.
- When in doubt, ask the pharmacist or pharmacy manager before taking action, sharing information, or making comments.

Demonstrate Initiative and Responsibility

Pharmacy technicians should be proactive in their role in the pharmacy and be accountable for the outcomes of their actions and behavior. In other words, a pharmacy technician should demonstrate initiative and responsibility within professional boundaries. The following are some practical examples of how to express these characteristics:

- Use professional resources and references effectively.
- Anticipate problems and develop solutions in advance.
- Become a valuable resource through personal research, knowledge, and networking.
- Brainstorm and suggest innovative ideas and solutions.
- Follow through on all promises and commitments.
- Take full responsibility for mistakes made and learn from them.

Steps to Problem Solving

Be prepared to address and solve problems in your role as a pharmacy technician. Problems will arise, despite everyone's best efforts and intentions; the key is to be able to solve them when they do occur. As a pharmacy technician, you will encounter a wide variety of problems. Some problems will be clinical and practice related, while others will be emotional and individual related. Sometimes the problem will be with a patient or customer; other times it will be with a manager or coworker. Here are four basic steps to problem solving:

1. Understand the problem. Ask yourself: Can you clearly identify and state the problem? What are you trying to accomplish? What information or outcome is needed?
2. Devise a solution. You can develop a solution in a variety of ways, such as looking for a pattern, examining related problems, reviewing best practices or case studies, or establishing subgoals and working backward from the desired result.
3. Carry out the solution. Once you have devised a solution, take action. Implement the solution and check for results along the way.
4. Review the outcomes. After fully implementing the solution, take a look back and ask yourself: Did the solution produce the desired results? Has the problem in fact been solved? Was there a better alternative to solve the problem? Upon review, make any necessary changes and continue to progress.

Work as a Team Member

The efficiency of a pharmacy depends directly on the effectiveness of its team-centered approach to practice. The best teams have strong leaders, committed members, a shared vision, and effective communication. Although the pharmacist-in-charge (PIC) or pharmacy manager is the team leader of the pharmacy, your participation and attitude can greatly shape the work outcomes and stability of your team. Here are some specific examples of how to work as a team member:

- View yourself as an integral part of the team, neither above nor below it.
- Build positive working relationships with all pharmacy staff members.
- Share information, knowledge, and experience openly with your coworkers.
- Cooperate with other staff members to achieve desired outcomes.
- Be open to feedback from your coworkers and provide feedback when appropriate.
- Work to remove any barrier to your team's effectiveness.

Tips on Building Consensus

The pharmacy staff is typically a small group of individuals with inherent small group dynamics, such as the importance of consensus building. Consensus allows a group to achieve goals more efficiently, resolve conflict, and create workable solutions. Here are some tips on how to build consensus:

- Always look for areas of agreement.
- Develop genuine relationships with your coworkers.
- Listen more than you speak.
- Support and reinforce positive actions, behaviors, and mindsets.
- Never make assumptions or judge others.

PROFILES IN PRACTICE

Sydney is the lead pharmacy technician at a local community pharmacy; having worked there for nearly seven years, she makes sure that everyone is mindful of her seniority. Sydney refuses to stock the vials, collect the trash, or check out customers, as she feels that she is above these duties.

- *What impact does Sydney's perspective likely have on her coworkers?*
- *How can Sydney improve her professionalism and serve as a better role model for the other pharmacy technicians?*
- *With a clear attitude of arrogance, what reason(s) might the pharmacist or manager use for justifying Sydney's status as lead tech?*
- *How would you handle working in that environment?*

Adapt to Change

The practice of pharmacy is in a constant state of evolution and change. As the demand for pharmaceutical services grows, new drugs become approved, and advances in technology are implemented, the scope and standards of pharmacy practice change. As a pharmacy technician, you must anticipate changes with a positive attitude and a readiness to adapt. Here are some practical examples of demonstrating adaptability:

- Be flexible.
- View changes as progress or improvements.
- Adapt your own attitudes and behavior to work effectively with different people and situations.
- Accept and learn to work with changing priorities, strategies, procedures, and methods.
- Maintain work effectiveness in new or changing situations.
- Handle pressure and stress properly.

Be Knowledgeable

Pharmacy technicians are required to master a great deal of knowledge and information. From being able to recognize the brand name and generic name equivalent of drugs to performing pharmaceutical calculations to understanding pharmacology—these are but a few of the many areas in which a pharmacy technician must be knowledgeable. Your pharmacists, patients, and coworkers will all be depending upon you having a mastery of the information you need to perform your job. On top of that, pharmacy information is constantly changing—new drugs, indications, drug recalls, best practices, or regulations are always being introduced—so your journey of learning will never cease. Here are some tips on remaining well informed:

- Learn the Top 200 Drugs, including brand/generic equivalence, classification, therapeutic indication, strengths, and dosage forms, as soon as possible. Until you have mastered this information, be sure to keep a pocket reference guide with you.

Principles of Negotiation

One of the best approaches to conflict resolution is principled negotiation, which goes along with the characteristic of being adaptable. In 1981, Roger Fisher and William Ury published their now classic book on conflict resolution, *Getting to Yes*. According to their book, the following are the four essential principles of negotiation, which are still valid:

1. Separate the people from the problem.
2. Focus on interests, not positions.
3. Develop mutually beneficial options.
4. Insist on objective criteria.

compassion a deep awareness of and sympathy for another's suffering.

empathy a feeling of concern and understanding for another's situation or feelings.

- Subscribe to and read industry trade journals such as *Today's Technician, Drug Topics, US Pharmacist,* and *Pharmacy Times* to keep abreast of the latest news, trends, and information.
- Attend pharmacy conferences, local, statewide, or national, to network and learn from both industry leaders and your peers.
- Select and complete continuing education (CE) programs that are relevant to your job and that will improve your knowledge base. Take the time to truly study the information presented, as opposed to simply rushing through the course to obtain the necessary credits.
- Join a professional organization, such as the National Pharmacy Technician Association (NPTA), and become active. One of the primary benefits of membership in a professional organization is receiving timely news and information on industry trends and best practices.

Pharmacy professionals are required to complete CE programs to remain knowledgeable, but continuous professional development is also important. Here are some recommendations regarding CE and professional development:

- Stay informed by reading trade journals and maintaining active membership in professional organizations.
- Attend pharmacy seminars and conferences.
- Take the initiative to learn new skills.
- Learn from and seek others' ideas, perspectives, and experiences.
- Seek feedback on performance.
- Adopt others' appropriate suggestions for improving your performance.
- Look for new ideas to improve personal, team, and pharmacy effectiveness.

Remember Compassion and Empathy

It is a basic principle, but one that is often overlooked: Pharmacy professionals serve patients who may be sick and/or in pain. With few exceptions, the customers or patients with whom a pharmacy technician interacts are seeking relief or treatment for an illness, disease, or other medical condition. It is important to treat all patients with **compassion** and **empathy**. Here are some points to keep in mind:

- Treat all people with dignity and respect.
- Be considerate, caring, and kind.
- Focus your efforts on helping the patient.
- Be understanding and forgiving of patients' behaviors and attitudes.
- Assume the best about others.
- Try to imagine yourself in the patient's situation.

Preparing for Your Future as a Pharmacy Technician

Professionals are identified by several means, all of which are useful in the proper settings. Registration, licensing, and certification are some of the most common. It is important to under-

stand these terms, as there has been much confusion in the pharmacy profession over their use.

- **Registration** is simply the process of listing or being named to a list.
- **Licensing** is permission granted by a government entity for an individual to perform an activity. The person has to meet certain standards, which are often set by law and are usually intended to protect the public.
- **Certification** is recognition granted by a nongovernmental agency, attesting that an individual has met the required levels of competency.

Registration/Licensure for the Pharmacy Technician

Most states now require pharmacy technicians to become either registered or licensed with the SBOP. Each state decides whether it will register or license, and the baseline eligibility requirements for either also vary by state. Common eligibility requirements include the following:

- High school graduation or GED equivalent
- Attainment of a certain age, such as 18 years or older
- No felony conviction(s)
- Formal education or training as a pharmacy technician
- Passage of an SBOP competency exam
- Certification

These regulations and requirements vary by state, so you should consult your SBOP for specific information.

Certification for the Pharmacy Technician

When a pharmacy technician becomes certified, the certification agency verifies that the candidate has met the agency's or board's standards for skills and knowledge necessary to practice as a pharmacy technician. This signifies to employers, coworkers, and patients that a certain level of competence has been verified.

National certification for pharmacy technicians became possible in 1995 with the founding of the Pharmacy Technician Certification Board (PTCB). Although the PTCB continues to be the standard in technician certification, other agencies have recently emerged and achieved recognition. Of these newer exams, the Exam for the Certification of Pharmacy Technicians (ExCPT) has received the greatest recognition and acceptance.

Workplace Wisdom **Certification Exams for Pharmacy Technicians**

- ExCPT—**www.nhanow.com/pharmacy-technician**
- PTCE—**www.ptcb.org**

registration the process of listing or being named to a list.

certification recognition granted by a nongovernmental agency, attesting that an individual has met the required levels of competency.

licensing permission granted by a government entity for an individual to perform an activity.

Exam for the Certification of Pharmacy Technicians

The ExCPT was developed by the Institute for the Certification of Pharmacy Technicians (ICPT) and is now a part of the National Healthcareer Association (NHA). The ExCPT is accredited by the National Commission for Certifying Agencies (NCCA), nationally recognized and endorsed by the National Community Pharmacists Association and the National Association of Chain Drug Stores (NACDS).

The ExCPT is offered as a computerized exam at over 600 PSI Testing Centers throughout the United States. The exam consists of 110 multiple-choice questions, which must be completed within 2 hours. The exam measures the candidate in three areas of competence:

1. *Regulations and technician duties*, such as the role of pharmacists and pharmacy technicians, functions that a technician may and may not perform, prescription department layout and workflow, pharmacy security, the role of government agencies, inventory control, and pharmacy law (25% of exam).
2. *Drugs and drug products*, such as drug classification, mechanisms of action, dosage forms, and knowledge of the most commonly prescribed drugs (25% of exam).
3. *The dispensing process*, including preparation of prescriptions, dispensing of prescriptions, pharmacy calculations, sterile products, unit dosing, and repackaging (50% of exam).

Complete information on the ExCPT is available at **www.nhanow.com/pharmacy-technician**.

Candidates must meet certain qualifications in order to sit for the exam. For example, the candidate must be at least 18 years old; have a high school diploma or GED; have completed a training program or have one-year work experience in the field; not have been convicted of a felony; and not have any registration or license revoked, suspended, or subject to any disciplinary action by a state health or regulatory board.

The cost of the exam is $105. Individuals who fail to pass the exam must wait 30 days before retaking the exam. After three failed attempts, the individual must wait one year before retaking it again.

Renewal of certification, or *recertification*, is required every two years. To be recertified, individuals must have completed 20 hours of CE, including 1 hour of pharmacy law. The fee for recertification is $50.

Pharmacy Technician Certification Exam

The Pharmacy Technician Certification Exam (PTCE) is offered by the PTCB, based in Washington, DC. The PTCE is accredited by NCCA and nationally recognized and endorsed by the National Association of Boards of Pharmacy, the American Pharmacists Association, and the ASHP. More than 425,000 individuals have passed the PTCE, which is officially recognized by 44 individual SBOPs.

The PTCE is offered as a computerized exam at over 220 Pearson VUE Testing Centers. The exam consists of 90 multiple-choice questions and must be completed within 120 minutes

(2 hours). The content of the exam has been reorganized into nine knowledge areas:

1. Medications
2. Federal Requirements
3. Patient Safety and Quality Assurance
4. Order Entry and Processing

Complete information on the PTCE is available at **www.ptcb.org**.

Candidates must meet certain qualifications in order to sit for the exam. For example, the candidate must have a high school diploma or GED; not have been convicted of a felony or have any drug- or pharmacy-related conviction including misdemeanors; have had no denial, suspension, revocation, or restriction of registration or licensure by any SBOP; and have no admission of misconduct or violation of regulations of any SBOP.

The cost of the exam is $129. Individuals who fail to pass the exam must wait 60 days before retaking the exam. After three failed attempts, the individual must appeal to the PTCB to request to take the exam again.

Renewal of certification, or recertification, is required every two years. To be recertified, individuals must have completed 20 hours of CE, including one hour of pharmacy law and one hour of patient safety. The fee for recertification is $40 if done online or $65 if done by mail.

Workplace Wisdom Continuing Education Resources

Numerous CE programs designed for pharmacy technicians exist. Typically, CE programs consist of an article with learning objectives and a multiple-choice test, which can be completed online or by mail. Additional CE programs include webinars, seminars, conferences, and podcasts. Here are some CE resources for pharmacy technicians:

- **www.cecity.com**
- **www.drugtopics.com**
- **www.pharmacytimes.com**
- **www.pharmacytechnician.org**
- **www.powerpak.com**
- **www.rxschool.com**
- **www.uspharmacist.com**

Continuing Education

The Accreditation Council for Pharmacy Education (ACPE) accredits organizations as approved providers of continuing pharmacy education (CPE), which is more commonly referred to as continuing education, or rather CE. ACPE does not develop and accredit individual programs, but rather develops and enforces the standards for CPE as well as accredits and monitors ACPE-approved providers. Each CPE activity, or course, is assigned a unique identification number, known as the Universal Activity Number (UAN), such as 0384-0000-10-008-H04-T. Each component of the UAN represents specific information pertaining to the activity. The first four digits indicate the official ACPE-approved provider number. For example, the NPTA is provider number 0384, so each of its accredited CPE activities will begin with that code; the second four digits represent the provider number of the cosponsor of the program, with 0000 indicating no cosponsor and 9999 indicating a nonaccredited cosponsor; and the next two digits indicate the year of the activity's initial release date. Most CPE activities are approved for three years. Following the two-digit year code, a three-digit unique course identification number is provided. After the course number, a three-digit code, beginning with either an "H" or an "L" followed by a two-digit topic designator of 01, 02, 03, 04, or 05, is provided. "H" indicates that the CPE activity is a home study course, whereas "L" denotes that it is a live course. The topic designators indicate that the activity is based upon disease state management or drug therapy (01), AIDS therapy (02), pharmacy law (03), general pharmacy (04), or patient safety (05). Finally the course ends with either a target audience designator of "P" for pharmacists or "T" for pharmacy technicians. This information can be very valuable when you are looking for CPE activities that meet specific requirements, such as being approved for pharmacy technicians, a live course, and an activity that will meet the pharmacy law credit requirement. For more information on ACPE accreditation, visit **www.acpe-accredit.org**.

In addition to the CE requirements associated with recertification as a certified pharmacy technician, many states also require pharmacy technicians to complete CE in order to maintain their registration or licensure. In most cases, CE credits completed for recertification can also apply toward state requirements. CE requirements vary by state, so it is important to check with your SBOP for current requirements.

Specialized Certifications

In addition to national certification, several specialized certifications are available for qualified pharmacy technicians. The NPTA offers the following advanced certification programs: sterile products/IV certification, chemotherapy certification, and nonsterile/extemporaneous compounding certification. Each of these specialized certifications consists of a home study module, hands-on training, and skill technique validations. Applicants must be either nationally certified or currently enrolled in an approved pharmacy technician training program. By obtaining advanced training and specialized certifications, such as those offered by the NPTA, pharmacy technicians have greater career opportunities and earning potential. Employers generally prefer to hire qualified individuals with advanced certifications, and several SBOPs actually require such training and certification in order for pharmacy technicians to be permitted to practice these advanced skills. More information on the NPTA's certificate programs can be found at **www.pharmacytechnician.org**.

Professional Organizations

In general, an **association**, or professional organization, is a group of individuals united for a specific purpose or cause. Associations are organized for various reasons, but typical

association a group of individuals who voluntarily form an organization to accomplish a common purpose.