

# Part 1

## INTRODUCTION

- 1 ..... Why Technicians Need to Study Pharmacology and Therapeutics
- 2 ..... Pharmacokinetics
- 3 ..... Pharmacogenomics



# Chapter 1

## Why Technicians Need to Study Pharmacology and Therapeutics

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### KEY TERMS AND DEFINITIONS

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**Medication**—a substance that is used to diagnose, cure, mitigate, treat, or prevent a disease state in a human or animal.

**Pharmacokinetics**—the study of the movement of a drug through body systems, including its absorption, distribution, metabolism, and excretion.

**Pharmacology**—the study of drugs and medications, including their origins, properties, actions, and effects on the body.

**Precipitate**—solid particles, usually insoluble, that settle out of a solution.

**Therapeutics**—a branch of medicine that deals with the application of remedies to disease states.

### LEARNING OBJECTIVES

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*After completing this chapter, you should be able to*

1. Define *medication, pharmacology, and therapeutics* and explain how they are related to one another.
2. Describe reasons why it is important for pharmacy technicians to study pharmacology and how it provides benefit to pharmacy practices.

3. Explain how an understanding of pharmacology enhances a technician's abilities to better help patients and other pharmacy staff.
4. List examples of how a pharmacy technician's professional development and career advancement are related to understanding pharmacology.
5. Explain how pharmacy professional development has changed from the past to today.

All across the country, every day, thousands of prescriptions and medication orders are filled. In a hospital, the **medications**, or drugs, will be taken to the bedside and administered by a nurse, and in a retail pharmacy patients will collect the medication to take at home as prescribed. Every single dose is prescribed with an intended purpose. Each prescription has been evaluated on many different levels before it ever reaches the patient. Drug researchers are constantly developing new medications with the intent of alleviating a specific disease state. Prescribers are evaluating patients' needs to determine what medications will be necessary. Finally, pharmacists are reviewing the prescriptions and dispensing the medications to the patients to provide them the **therapeutic** effects they need. Along the way, each of these professionals has an obligation to do their best to provide care to the patient. They are part of a team of professionals united to provide care to a patient. A pharmacy technician is an integral part of that team and provides care to each and every patient with each and every dose.

Being a pharmacy technician means taking on the responsibility to provide the best care to every patient. To accomplish that task, it is important to develop a unique set of skills. These include knowing the different brands and generics, understanding the basics of prescription insurance, and calculating doses based upon what is prescribed. To perform these duties professionally, it is important to have a knowledge of pharmacology. **Pharmacology** is the study of drugs, and includes where medications originate, how they are developed, and their effects in the body. Having a basic understanding of pharmacology provides the technician with the ability to provide great care to the patients. Without that understanding, a technician is like a carpenter who doesn't know what a hammer is.

In a community pharmacy, during a typical work shift technicians will be responsible for numerous prescriptions or orders. In a retail pharmacy, prescriptions will be sent electronically or handed over in person. Upon receipt, the technician reviews each prescription to ensure it is complete before

updating a patient's profile with the medication and directions for use and processing it through any insurance. Then the technician will count the correct amount to dispense, prepare the prescription with the correct package information, and prepare it for review by the pharmacist. The technician will also prepare the prescription for shipping, delivery, or for pick up by the patient. Once the patient comes to pick up the prescription, the technician will verify what the patient is receiving and confirm the patient understands the prescription directions. If a patient needs counseling, it is the responsibility of the technician to have the pharmacist explain particulars of the prescription, its directions, administration technique, and even side effects.

In a hospital setting, the process for handling a medication order starts after it has been verified by the pharmacist. When the medication label is printed the technician will review it and begin preparing the order for the patient. This means selecting the correct medication from stock, performing dose calculations, and, for oral medication, preparing a unit dose at the processing counter. For sterile intravenous solutions, the technician will mix the solution in a clean room, and finally, making sure it is delivered to the correct nursing unit medication room and placed in the proper area for the nurses to retrieve. In almost every pharmacy, the technician plays a vital role in preparing medications. Proper performance of each of the steps to prepare a medication is enhanced by a knowledge of pharmacology.

Why is it so important to have an understanding of pharmacology? The answer seems straightforward, yet many technicians will simply state that it is the responsibility of the pharmacist, not the technician, to know why and how the medications are used. In reality, knowing the basics of pharmacology will allow a pharmacy technician the opportunity to provide a better quality of care to patients, become a vital asset to the pharmacist, and advance his or her career opportunities.

With a basic understanding of pharmacology, a technician gains a plethora of valuable knowledge that can be used to assist patients every day. Application of that knowledge allows the technician to make an impact on a patient's life and provide the best care possible. For example, if Mrs. Smith calls the pharmacy and asks the technician for a refill on her "water pill," a technician with a knowledge of pharmacology will be able to identify the diuretic medication in the patient's profile. This technician knows that diuretics are used to help remove excess water from a patient's body, which will decrease the patient's blood pressure. Mrs. Smith also needs to refill her "sugar pills." The technician will know to check the patient's profile for her diabetes medication. Understanding the different types

of medications, their chemical structure, and the intended use of each of the medications allows the technician a level of independence that a pharmacist can count on.

Each medication has its own unique set of storage, handling, and compounding guidelines. These guidelines are related to a medication's classification and other properties. Some medications, for instance, must be protected from light, while others might need to be refrigerated. If a medication is not placed under the proper storage conditions, it could possibly deteriorate or even undergo a chemical change. When compounding sterile products, a technician must be aware that some medications require reconstitution with specific fluids. If the incorrect fluid is used, a **precipitate** could form, exposing the patient who receives it to dangerous particulate matter. While it might sound trivial, disregarding the proper procedure when storing, handling, or compounding a medication can make a dramatic difference and lead to considerable harm to a patient.

Within pharmacology is a branch called **pharmacokinetics**. This is the study of the absorption, distribution, metabolism, and excretion of medications within the body. Pharmacokinetics can influence several aspects of a prescription. Medications being administered orally by a tablet or via injection of a solution have different pathways and even different mechanisms for how they work in the body. An experienced and educated technician is able to discern what routes of administration are most effective for each medication. For example, vancomycin is not absorbed via the gastrointestinal tract. Therefore, if a systemic course of vancomycin is needed, it will be administered intravenously (IV),<sup>1</sup> while if it is being used to treat an intestinal infection, it may be given orally. Knowing this can give insight into the disease state that a patient has, and can be applied to better meet the needs of the patient.

With an understanding of pharmacology, technicians are able to help pharmacists more safely and effectively. Pharmacists must be confident in placing their trust in the technicians with whom they work. In today's health-care environment, pharmacists are taking on increasingly advanced roles. They are responsible for many nontraditional duties that, years ago, were not considered pharmacists' responsibilities. Nowadays, many people count on their local pharmacist to administer flu shots, help with Medicare enrollment, and even counsel on smoking cessation. With the ever-evolving functions that pharmacists are assuming, it is expected that the role of the technician will advance as well. Accountability for safe, legal, and efficient pharmacy operations is shared between the pharmacist

and the technician. As current trends continue, technicians' responsibilities are expected to expand and increase.

With pharmacists spending more and more time meeting the clinical needs of patients, the daily operations of the pharmacy have transitioned to become the obligation of the technician. All across the country pharmacists administer flu vaccines (and many other immunizations), and it is common for the technician to prepare the patient and ask appropriate screening questions. While the technician assists with the vaccination record, a pharmacist will counsel a patient seeking a cold remedy. In a hospital setting this concept is no different. Relying on a technician to complete an order can allow the pharmacist to step away and discuss the needs of the patient with other healthcare providers.

Technicians today are breaking out of their traditional job descriptions into new roles and duties. Such new career opportunities would not be available today if technicians had not pushed for advancement and prepared for new tasks. In a number of states, technicians are already able to administer immunizations, provide final reviews of medication refills, and transcribe new prescriptions called in from a doctor's office.<sup>2</sup> Each of these innovations came from professionals realizing the potential of pharmacy technicians. With the proper training, advanced technician roles in pharmacy operations have become more prevalent. It is important that technicians are good stewards of these positions, which requires application of checks and balances. Technicians can use their knowledge of pharmacology to provide checks for themselves. For example, when immunizing a patient, knowing the length of the needle is important for proper administration. When providing a final check on a refill, knowing the difference between the variations of formulations can ensure the correct product is chosen. When transcribing a medication order, knowing the indication of the drug will provide context for the complete prescription, including dosage form, route of administration, and schedule. A knowledge of pharmacology provides the ability to enhance the care technicians provide with every task.

As technicians assume additional responsibilities, expectations will shift regarding what a technician is required to do and know. This shift in focus is nothing new to pharmacy. In the early twentieth century, for example, Abraham Flexner, a renowned educator at the time, was asked by the American Medical Association to evaluate the state of medical colleges.<sup>3</sup> In his report, he noted that being a pharmacist was not a professional occupation because the pharmacist simply submitted to the wishes of the physician. In response to those remarks, the Association of Colleges of Pharmacy

altered educational practices and required a more rigorous curriculum for pharmacy students. This reform led to pharmacists becoming more autonomous and taking additional roles not traditionally considered. As technicians begin to take on new skills and new knowledge, their autonomy will increase just as it did with pharmacists. Technicians will be asked to do more because they know more.

When patients go to a hospital, they expect to receive the best care and believe that the doctors who treat them have studied and understand the basics of medicine. This expectation applies to pharmacy care as well. Patients needing prescriptions believe that taking medications will give them the therapeutic effects that are intended, and they trust the pharmacy staff to apply their skills to be sure this occurs. The only way to fulfill these expectations is to be competent and knowledgeable in pharmacy. Part of being a professional technician is taking on the responsibility of knowing aspects of pharmacy that will make you more effective at your job. The American Association of Pharmacy Technicians Code of Ethics<sup>4</sup> states that it is the first consideration of the technician "to ensure the health and safety of the patient, and to use knowledge and skills to the best of his/her ability in serving others." Taking on this responsibility to the patients requires extensive knowledge and learning.

Technicians' capabilities are elevated by the study of pharmacology. With a basic foundational knowledge of how medications impact the body, a technician can make decisions that positively affect the health of their patients. Technicians should be a valuable resource to any pharmacist with whom they work, and with the proper degree of passion, a technician can continue to expand their profession into new areas. It is a large responsibility to take on, but when lives are at stake it is important to know that the person who is dispensing medications has been educated to meet the obligations of their duties.

## REFERENCES

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## REVIEW QUESTIONS

1. How does a technician having a basic understanding of pharmacology provide a benefit to the technician, patient, and pharmacist?
2. What direct impact does the pharmacy technician's role have on the care that a patient receives? Is there also an indirect impact?
3. What are some ways that technicians have been able to advance their professional development, and how is that dependent upon understanding pharmacology? How do you see the technician's role advancing in the future?
4. Explain how the Pharmacy Technician Code of Ethics promotes the ideal of learning pharmacological principles.