



# The Ins and Outs of Becoming a **Pharmacy Technician**



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## Chapter 1: History of Medicine and Pharmacy

### Important People:

Aristotle	Greek scientist, philosopher
Asclepius	Greek god of healing and medicine
Bacon, Roger	English scientist responsible for scientific methods
Crick, Francis	Co-discoverer of the molecular structure of DNA, the double helix
Domagk, Gerhard	Developed sulfonamides and synthetic antibiotics
Fleming, Alexander	Discovered penicillin, the first antibiotic
Galen, Claudius	Greek physician
Hippocrates	Greek physician and philosopher, considered to be the father of medicine
Mendel, Gregor	Scientist and monk, known as the father of genetics
Nightingale, Florence	Nurse who was responsible for improving the unsanitary conditions at a British base hospital during the Crimean War, reducing the death count.
Paracelsus	Swiss physician, philosopher, and scientist
Pasteur, Louis	French scientist, discovered several vaccines and invented pasteurization
Watson, James	Co-discoverer of the molecular structure of DNA, the double helix

### Ancient Beliefs and Treatments

Medicine has been practiced for thousands of years. Archaeological discoveries have unearthed civilizations that have documented the use of minerals, animals, and plant parts to heal sick. Certain remedies such as herbals have been used for centuries for minor ailments such as intestinal problems, arthritis, and gout.

A **dogma**, such as gods being able to both cause and cure illnesses, is based on a set of principles (ex: religious or ideological doctrines) proposed by authoritarians. These principles are based on writings from respected spiritual authorities rather than scientific evidence. To rid a person of an evil spirit, a cut was made into the skull to give the spirit a portal through which to leave. This type of treatment was called **trephining** and often was performed by a tribal **shaman** (a spiritual person in the tribe).

### The Medical Staff

The **staff of Asclepius** is the formal symbol of medicine and is associated with **Asclepius**, the Greek god associated with healing. The staff of Asclepius is a wingless walking stick with a single serpent wrapped around it. Because snakes shed their skin, the snake was believed to signify renewal of youth. The **Caduceus** is often confused as the symbol of the medical field. It is a staff with two entwined snakes and two wings at the top.

### The Evolution of Medicine

Prevalent thoughts included the belief that sickness was an entity within the body that needed a means to leave the body. Another widely held belief was that spirits were responsible for illness. In many cultures, the most common form of treatment, prayer has remained as the only way to cure illness.

**Hippocrates** (460-357 BC) was a third-generation physician. He taught at a school of medicine on Cos, which was one of the first medical schools established. He believed in the concept of that era: life consisted of a balance of four elements that were linked to qualities of good health. These four qualities were wet, dry, hot, and cold. He also believed that illness resulted from an imbalance of the four humors of the body system: blood, phlegm, yellow bile, and black bile. These four humors were linked to the four basic elements: blood is air, phlegm is water, yellow bile is fire, and black bile is earth.

**Aristotle** (384-322 BC) Greek philosopher and scientist in the areas of biology and medicine. He classified human beings as animals. Because the Grecian belief system in those times did not allow dissection of the dead. He described much of human anatomy from observations he made from dissections of other animals. Which included in-depth descriptions of the brain, heart, lungs, and blood vessels.

**Claudius Galen** (129-210) began to study medicine at the age of 16. Although he was born nearly 600 years after Hippocrates, he followed many of the same beliefs, such as eating a balanced diet, exercising, and practicing good hygiene. He contributed greatly to the study of medicine, writing more than 100 books on topics such as physiology, anatomy, pathology, pharmacology. Many of his books were used in medical schools for 1500 years. He proved that blood flowed through the arteries rather than air.

**Roger Bacon** (1214-1294) further refined and explained the importance of experimental methods. During Bacon's time, most explanations were based on tradition, not fact. He is considered an important contributor to what is now known as the scientific method.

**Paracelsus** (1493-1541) A Swiss physician and alchemist, believed it was important to treat illness with one medication at a time. During his time, he was able to produce many medications. He introduced one of the most popular tonics of that time—laudanum, which was to deaden pain.

### **Eighteenth- and Nineteenth-Century Medicine**

From the time of Galen, it was believed that the four humors could be rebalanced using cathartics to clean out the bowels; diuretics to lessen the imbalance of body fluids; emetics to empty the stomach; and bloodletting to lessen body fluids, heart rate, and temperature. Physicians brought this theory to America, where these techniques were widely used.

A well-known victim of bloodletting in America during the eighteenth century was George Washington, who suffered from an infection and died from complications from bloodletting.

One bloodletting treatment involved using leeches. These blood sucking worms had the ability to latch onto the skin with sharp, teethlike appendages and engorge itself to nearly twice its size on a person's blood. Leeches also emit a natural anticoagulant, hirudin, that allows the blood to flow freely.

### **North American Medicine**

In early North America, as new immigrants brought their families from Europe and other parts of the world, disease followed. At that time, doctors were responsible not only for diagnosing conditions, but also for preparing the necessary remedies to cure patients.

The first pharmacists, known as druggists were doctors until pharmacy became a specialty. The term "druggist" was widely used from the 1700 until the mid-1800's to describe the practitioners of pharmacy, eventually leading to the title "Pharmacist".

Remedies used in early American history included cinchona bark (quinine) for the treatment of malaria, mercury was used to treat syphilis, many people died of mercury poisoning because of its toxicity.

The average life expectancy was approximately 40 years, many families lost several children to childhood diseases, such as smallpox, which no vaccines were available. Vaccines did not develop until 1796 with the first immunization against smallpox in England. Smallpox vaccination was stopped in 1971 because the disease had been eradicated worldwide.

## **Opium and Alcohol**

One of the most popular tonics made for medicinal use in early America. Paracelsus introduced the opium-alcohol mixture called laudanum. Laudanum was used widely throughout Europe in the Victorian Era, but during the Civil War to treat painful wounds from the battlefield.

The herb Artemisia absinthium was mixed with alcohol and other additives. Absinthe was served with water and sugar and was purported to rid a person of tapeworms, among other ailments.

## **Origin of Opium (Opiates)**

Opium is a byproduct of the plant Papaver somniferum, commonly known as the opium poppy. The sap is taken from the head of the poppy. The raw opium then is precipitated from the sap. The result of this process is a potent drug that causes an analgesic effect.

When used properly, the opioid drugs were effective and helped many patients who otherwise would suffer extreme pain. Not until 1909, under the Opium Exclusion Act, did the prohibition of opium importation (except for medicinal purposes) begin in the United States.

## **Twentieth-Century Medicine**

**Alexander Fleming** a Scottish physician and bacteriologist accidentally contaminated a plate of bacteria with mold while working in his laboratory in 1928; the mold inhibited the growth of the bacteria, and he named the mold “penicillin”. Many years of failed and successful experimentation by many scientists followed before penicillin was recognized as a useful antibiotic, 1938 penicillin would undergo a mass production and be used worldwide as a helpful antibiotic. Penicillin was the first antibiotic discovered and is still in use today.

**Gerhard Domagk** discovered the first synthetic drug, a sulfonamide in 1938 and was derived from a chemical dye to inhibit bacterial growth. This sulfonamide was used extensively during World War II to treat infections that were a result of battle wounds. Today, sulfonamides are primarily used to treat urinary tract infections.

## **History of Pharmacy**

### **Early Pharmacists**

After the Civil War, apothecaries (pharmacies) began to emerge in towns across America. Manufacturing plants were built, and people were trained to prepare medications accurately. As the physician's role changed from distributing drugs to diagnosing disease and performing surgery, the role of the pharmacist emerged. The first pharmacy school opened in 1821 at the College of Pharmacy and Sciences in Philadelphia. The school is now called the University of the Sciences in Philadelphia.

The instructions for preparing remedies were contained in medical recipe books. Ingredients such as chalk for heartburn, rose petals for headaches, and oils, herbs, and spices filled containers in the apothecary. Another type of container associated with the pharmacy was the show globe. Show globes have been the beacons for pharmacies dating back as far as the early 1600's. It was believed that they were placed in the apothecary stores of the town to let visitors know the status of the health of the town. Red meant there was illness or that the town was in quarantine because of disease, whereas green meant the town was healthy thus it was safe to come into town.

### **Early Pharmacy in America**

The first pharmacy managed by a registered pharmacist opened in New Orleans in 1823. The first soda fountain pharmacy began in the mid-1800s and gained popularity in the early 1900s. Prohibition in 1919 helped with the proliferations of soda fountains. With the invention by a pharmacist, Jacob Baur (1921), of a soda fountain that dispensed carbon dioxide. Pharmacists would make and market their own recipes to be used for various treatments. It was common to find drugs mixed with flavorings, along with effervescent soda water, to treat ailments or provide a boost of energy.

The first 7-Up was made with lithium and was sold from soda fountains for conditions such as gout, uremia, and rheumatism. In 1886, Coca-Cola was invented by John Pemberton, a pharmacist in Georgia. The soft drink was marketed as a tonic and contained extracts of cocaine and caffeine until 1905, when cocaine was removed for the recipe because of changing public opinion regarding its use. After the Harrison Narcotic Drug Act of 1914, that pharmacists were prohibited from making cocaine-containing preparations and began to sell plain soda drinks.

### **Early Pharmacy Technicians**

The first pharmacy technicians were those enlisted in the military because of the high demand for medications to treat injuries and illness. They were trained on the job to fill prescriptions, but also to perform many of the functions of a pharmacist. To this day, military technicians have a broader scope of training than civilian technicians.

An urgent need for standardized training arose in the 1960s as pharmacist organizations, such as American Society of Health-System Pharmacists (ASHP) and the American Pharmacists Association (APhA).

In 1995 the Pharmacy Technician Certification Board (PTCB) was formed, which was responsible for creating a national examination for technicians. As of December 31, 2013, the PTCB has certified more than 525,365 technicians nationwide. Up until the PTCB exam was established, most technicians had a high school diploma, although it was not mandatory; also, background checks were not done in every state. Which the above is most standardized in all states which require background checks being done before technicians receive their state license.

## **Chapter 2: Pharmacy Law, Ethics, and Regulatory Agencies**

The practice of pharmacy is governed by a series of laws, regulations, and rules enforced by federal, state, and local governments. The practice of pharmacy is also subject to policies and procedures established by institutions and/or pharmacy management at each pharmacy site.

A good understanding of these laws is necessary to pass the Pharmacy Technician Certification Board. It is necessary to know your responsibilities when working in pharmacy.

### **FDA History**

The FDA was established in 1862, along with the U.S. Department of Agriculture. The FDA is the oldest consumer protection agency in the U.S. federal government.

### **Description of Laws**

What is an Act? An act is a statutory plan passed by Congress or any legislature that is called a “bill” until it is enacted, at which point it becomes a law. An amendment is a change in the original act or law.

### **1906 Pure Food and Drug Act**

The 1906 Pure Food and Drugs Act was one of the first laws enacted to stop the sale of inaccurately labeled drugs. All manufacturers were required to have a truthful information on the label before selling their drugs. Additional changes were made to this act that ultimately required manufacturers to prove the effectiveness of the drugs through methods such as scientific studies.

### **1914 Harrison Narcotic Act**

The Harrison Narcotics Act of 1914 was enacted in the United States in parallel with international treaties to curb recreational use of opium. Individuals could no longer purchase opium without a prescription. The Harrison Narcotics Act required practitioner registration, documentation regarding prescriptions and dispensing, and implementation of restrictions regarding the importation, sale, and distribution of opium, coca leaves, and any derivative products.

### **1938 Federal Food, Drug, and Cosmetic Act**

The 1938 Federal Food, Drug and Cosmetic Act was enacted because the earlier Pure Food and Drug Act of 1906 was not worded strictly enough and did not include cosmetics. Two important concepts introduced in this new act were adulteration and misbranding. All addictive substances were required to be labeled “Warning: May be habit forming” this act also provided the legal status for the FDA. Adulteration deals with the preparation and/or storage of a medication. Mishandling of the food or drug may cause injury or even death to a consumer. The new law also required drug companies to include package inserts and directions to the consumer regarding safe use.

### **1951 Durham-Humphrey Amendment**

The 1951 Durham-Humphrey Amendment added more instructions for drug companies and required the labeling “Caution: Federal law prohibits dispensing without a prescription.” This amendment also made the initial distinction between **legend drugs** (by prescription only) and **over-the-counter (OTC)** medications that do not require a physician’s order.

### **1962 Kefauver-Harris Amendment**

The Kefauver-Harris Amendments enacted in 1962 were groundbreaking in their attempts to ensure the safety and effectiveness of all new drugs on the U.S. market. The amendments gave the FDA specific authority to approve a manufacturer's marketing application before a drug could be made available for commercial use. The amendments also required that drug-related adverse events be reported to the FDA.

### **1970 Comprehensive Drug Abuse Prevention and Control Act (also known as the Controlled Substance Act)**

The Drug Enforcement Administration (DEA) was formed to enforce the laws concerning controlled substances and their distribution. The five-level stair-step schedule of controlled substances requires stricter rules for low numbered classifications and less strict rules for higher numbered categories. Schedule I is the most restrictive and is defined as drugs with no medically accepted use in the United States. The prescription schedule V drug is less restricted and requires less documentation than that of a Schedule II.

### **1970 Poison Prevention Packaging Act (PPPA)**

The Poison Prevention Packaging Act of 1970 required manufacturers and pharmacies to place all medications in containers with childproof caps or packaging. This includes both OTC and legend drugs. The standard specifics that medication should be able to be opened by at least 80% of children under the age of 5 and that at least 90% of adults should be able to open medication within 5 minutes. Exceptions to this act include physician requests for non-childproof caps for their patients, certain legend medications (ex. Nitroglycerin SL tabs), hospitalized patients, or a specific request by the patient.

### **1972 Drug Listing Act: National Drug Code (NDC)**

In 1972 the Drug Listing Act (National Drug Code {NDC}) was implemented under the authority of the FDA. Every drug has a unique 10-digit number divided into three segments. The numbers identify the labeler, product, and trade package size. 55555-333-22, The first set of numbers (labeler code) is assigned by the FDA. The second set (product code) identifies the specifics of the product. The third set of numbers (package code) identifies the specifics of the package size and types. Both product and package codes are set by the drug company.

### **1983 Orphan Drug Act (ODA)**

The 1983 Orphan Drug Act encouraged drug companies to develop drugs for rare diseases by providing research assistance, grants, and cost incentives to manufacturers. Before companies had no incentive to develop medications and spend millions of dollars and many years of trials to treat a disease that affected a small portion of the population. Therefore, several regulatory restrictions were waived for diseases that affected few than 200,000 in the United States. This act also covered diseases that affected more than 200,000 if it could be proved that the cost of developing and testing a drug could not be recovered by the eventual sales. In addition, the act encouraged manufacturers to develop drug for rare diseases by providing marketing exclusivity for orphan drugs for a period of 7 years after FDA approval.

### **1990 Omnibus Budget Reconciliation Act (OBRA '90)**

The origins of the Omnibus Budget Reconciliation Act date to 1987, when Congress addressed the problems regarding health care quality for the elderly. With increasing numbers of elderly entering nursing homes, great concern arose over the substandard care being provided. This affected the responsibilities of practicing pharmacists and health care personnel in general. The act outlines specifics

for pharmacies to participate in the Medicaid Drug Rebate Program. OBRA '90 has profoundly affected pharmacy responsibilities. This act states that a pharmacist must offer to counsel (at the time of purchase) all Medicaid patients who receive new prescriptions. If these provisions are not met, the pharmacy cannot receive federal reimbursement for medications and may face civil liability proceedings. It can also impose fines on both pharmacies and pharmacists for noncompliance, although a patient may refuse counseling.

### **1996 Health Insurance Portability and Accountability Act (HIPAA)**

The Health Insurance Portability and Accountability Act of 1996 established the principle of **protected health information (PHI)**. HIPAA's privacy rules are meant to protect certain health information. Standards of PHI address the use and disclosures of an individual's health information.

Patient Confidentiality is another aspect of ethical work. The definition of confidentiality is to keep privileged information about a customer from being disclosed without his or her consent. This includes information that may cause the patient embarrassment or harm.

### **2005 Combat Methamphetamine Epidemic Act**

Until 2004 the drug pseudoephedrine (PSE) was sold OTC as a decongestant and was not limited in quantity for purchase by the consumer. The OTC status of pseudoephedrine was changed when the U.S. government became aware of its diversion and use as an ingredient in the preparation of methamphetamine. In 2005 Congress passed the Combat Methamphetamine Epidemic Act in response to this problem. The bill addressed all areas of the manufacturing, law enforcement regulations, and sale of this drug. Although it is still labeled "non-controlled substance" the manufacture, distribution, and sale of this drug must follow several strict guidelines. Only a licensed pharmacist or technician may dispense, sell, or distribute this drug.

- \*Pseudoephedrine storage: Behind the counter or locked in a cabinet
- \*The maximum amount sold may not exceed 3.6 gms in a calendar day or 9 gms per 30 days  
Retail, and 7.5 gms per 30 days via mail order.
- \*Purchaser's identification must be provided.
- \*Documentation may be done electronically or via log book, if a log book is used, it must be a Bound book.
- \*Records of all information must be kept for at least 2 years.
- \*Documentation required:
  - Drug Name
  - Drug Strength
  - Drug Amount
  - Date/time of sale
  - Customer's name
  - Customer's address
  - Customer's signature

### **FDA Reporting Process and Adverse Reactions**

The FDA has a toll-free number (1-800-FDA-1088) for reporting any defect found in OTC medications or any drug problem noted by a person. A technician or pharmacist also may use this number to report any problems with a drug, whether it is OTC or legend (prescription).

## **Recalled Drugs**

The FDA does not typically order recalls but instead may request (in writing) a recall by the manufacturer. Only if the manufacturer refuses and there is clear evidence of a risk to human health may the FDA enforce such a request.

The three classes of recalls are as follows:

- \*Class 1: The highest level of recall; it deals with products that could cause serious harm or prove fatal.
- \*Class 2: The next level, which deals with products found to cause a temporary health problem Or to pose a slight threat of serious harm.
- \*Class 3: The lowest level, which is used for products that may have a minor defect or other Condition that would not harm the patient but that prevents the drugs from being resold.

## **Controlled Substances**

Controlled substances, such as barbiturates, opioids, benzodiazepines, and central nervous system stimulants, are substances that are addictive and have the potential to be abused. Each type of controlled substance is assigned a rating that depends on its addictive and abuse potential.

### **Ratings of Scheduled (Controlled) Substance**

The letter C (meaning controlled substance) is used in addition to Roman numerals to indicate the addictiveness and abuse potential of controlled substances. In 1970 Congress established five levels of control based on the potential for abuse. The strongest level in terms of abuse potential are C-I drugs and C-V being the lowest.

C-I	LSD, Cocaine (crack or street), Heroin	Drugs that have no accepted medical Use in the United States and have very High abuse potential
C-II	Morphine, Oxycontin, Percocet Fentanyl, Amphetamines, Opium Lortab, Norco	High potential for abuse; used for medicinal purposes; abuse may lead to severe psychological or physical Dependence
C-III	Acetaminophen/Codeine #2, #3, #4 (Tylenol/Codeine)	Potential for abuse under this schedule may lead to moderate or low physical Dependence or high psychological Dependence. Most C-III are Combination narcotics
C-IV	Valium, Lorazepam, Librium Phenobarbital	Potential for abuse is low. Abuse may be limited physical or psychological Dependence
C-V	Lomotil, Robitussin AC	Low potential, abuse may lead to Limited physical or psychological Dependence

## **DEA Forms**

Form 225: To manufacture or distribute controlled substances  
Form 224: To dispense controlled substances (must be renewed every 3 years using form 224a)  
Form 222: To order or transfer schedule II substances.  
Form 41: Authorization to destroy damaged, outdated, or unwanted controlled substances (Retail once a year, Hospital multiple times)  
Form 106: For loss or theft of a controlled substance.

## **Boxed Warning**

A boxed warning is encased in a bold border in the manufacturer's insert. As a Black Box Warning, even though this is not the official labeling term for the warning is required on medications and other products that carry a high-risk potential for the consumer. The label indicates the proper use of a drug to avoid or decrease the possibility of serious or even life-threatening side effects. Warnings can be very specific or may include an entire class of drugs, such as antidepressants. Antidepressants have been found to cause an increase in suicidal behavior in adolescents, especially those with prior psychiatric disorders.

## **MedGuides**

MedGuides are paper handouts that are available with many prescription medicines. The FDA requires the MedGuides be issued with certain prescribed drugs and biological products when the agency has determined the following:

- Certain information is necessary to prevent serious adverse effects
- The patient should be informed about a known serious side effect of a product
- Patient adherence to directions for the use of a product is essential to the product's effectiveness

## **Pregnancy Categories**

The FDA established five pregnancy categories that indicate the potential of a drug to cause fetal defects; the categories are based on the ratio of risks to benefits.

**Category A:** Adequate and well-controlled studies have failed to demonstrate a risk to the fetus in the first trimester of pregnancy (and there is no evidence of risk in later trimesters)

**Category B:** Animal reproduction studies have failed to demonstrate a risk to the fetus, and there are no adequate and well-controlled studies in pregnant women.

**Category C:** Animal reproduction studies have shown an adverse effect on the fetus, and there are no adequate and well-controlled studies in humans, but potential benefits may warrant use of the drug in pregnant women despite potential risks.

**Category D:** There is positive evidence of human fetal risk based on adverse reaction data from investigational or marketing experience or studies in humans, but potential benefits may warrant use of the drug in pregnant women despite potential risks.

**Category X:** Studies in animals or humans have demonstrated fetal abnormalities and/or there is positive evidence of human fetal risk based on adverse reaction data from investigational or marketing experience, and the risks involved in the use of the drug in pregnant woman clearly outweigh potential benefits.

## **Prescription Regulation**

The FDA and DEA have no authority in determining prescribers. Physicians and other medical prescribers are licensed by their individual state boards. Individuals who can prescribe controlled drugs must be registered as a midlevel practitioner with DEA form 224.

Most states prohibit pharmacy technicians from taking phone orders for legend drugs. All states require a pharmacist to authorize a phoned-in prescription for a controlled substance per DEA regulations.

## **Prescriber Labels and Prescription Orders**

Components of a prescription order and a prescription label are as follows.

- Prescriber's Prescription order
  1. Name of Prescriber
  2. Address and phone number of prescriber
  3. License number of prescriber (DEA number if applicable)
  4. Date prescription was written
  5. Prescriber's signature
- Prescription Label
  1. Name of pharmacy
  2. Address and phone number of pharmacy
  3. Name of prescriber
  4. Date prescription was filled
  5. Prescription number
  6. Any cautions described or provide on auxiliary label

## **Drug Enforcement Administration Verification**

All prescribers must be registered with the DEA to write prescriptions for controlled substances. When approved, the prescribers are given a nine-character identification code. This code is different for each prescriber. There is a method of verifying DEA numbers. The first two characters are composed of letters. The first letter is an A, B, F, M, or X, followed by the first letter of the prescriber's last name. The next 7 digits are composed of numbers that form an equation.

## **Verification Process for Prescriber's DEA number**

Example: Dr. Tom Johnston writes an order for Tylenol #3. The physician's DEA number is AJ1234892

### **Procedural Steps:**

1. Verify that the first letter of the DEA is A, B, F, or M (for nurse practitioners) AJ1234892
2. Determine whether the second letter is the first letter of the prescriber's last name (in this case, J for Johnston) AJ1234892
3. Use the formula: First add the first, third and fifth numbers in the DEA set AJ1234892  
 $(1+3+8=12)$
4. Continue the formula: Second add the second, fourth, sixth numbers then multiply by 2  
AJ1234892 (2+4+9=15; 15x2=30)
5. Complete the formula. Finally add the two sums together (12+30=42)
6. Compare the results, If the last digit from your total;(i.e., 2), matches the last number in the DEA set, the number is valid AJ1234892 in this case the number is valid, if any of the key elements do not match, alert your pharmacist; the DEA is invalid.

## **Occupational Safety and Health Administration**

The purpose of Occupational Safety and Health Administration (OSHA) is to make the workplace safe for employees. A safe workplace involves having safe equipment and materials being able to safely perform tasks, and ensuring that policies and procedures of a company (including pharmacies) are safe. OSHA requires **Safety Data Sheets (SDS)** information on all potentially dangerous chemicals used in the workplace. Most chemicals can be dangerous if ingested or spilled. In all workplaces, including pharmacies, all chemicals must have an SDS on file in an SDS binder, or must be electronically through a database. The binders are normally bright yellow and black. The information on these sheets includes the storage requirements, handling procedures, and actions to take if chemical is either spilled or sprayed into eyes or comes in contact with the skin. The SDS information not only is important, but also required by law.

## **The Joint Commission**

In 1951 several medical associations created the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) as an independent, nonprofit organization that voluntarily accredited hospitals. In 2007 JCAHO changed its branding to The Joint Commission (TJC). Organizations must be surveyed at least every 3 years. Once accredited, the organization may display the TJC seal of approval. The benefits of accreditation and certification include the following:

- \*It provides the community with confidence in the quality and safety of care treatment and Other institutional services
- \*It identifies and addresses risk management and reduction
- \*It provides professional advice and staff education to improve services
- \*It is recognized by many health care insurers and other third parties (Medicare/Medicaid)
- \*It meets regulatory requirements in specific states.

## **Legal Standards**

Each state has its own set of laws that pharmacists, interns, pharmacy technicians, and clerks must follow when working in a pharmacy. All personnel should become familiar with the laws. Remember that the strictest law is the one you follow.

## **Liabilities**

As a technician, you should be aware of federal and state liability laws. A patient can make various charges against a pharmacy technician if the pharmacy technician caused damage because of **negligence** or intentional action in the workplace. A **tort** is defined as an act causing injuries to a person intentionally or because of negligence. Because pharmacy technicians can be held accountable for their actions, this is a fundamental competency of all pharmacy technicians. In addition, the Pharmacy Technician Certification Board (PTCB) requires at least one continuing education (CE) unit in current law to be taken for recertification with a 2-year period. Most states are enacting laws to make technicians accountable for their actions in the pharmacy. Previously, pharmacists had to take responsibility for any mistakes, even if the technician made the mistake.

## **Ethics and Morals in the Workplace**

**Ethics** are the values and morals that are used within a profession. **Morals** are a person's beliefs concerning what is right or wrong in human behavior. In the workplace, however, technicians, pharmacists and other health care providers are faced with patients who might have different morals. In these situations, ethics include the professional behavior of a technician regardless of a patient's morals. The responsibility of the pharmacy staff is to provide services to all patients.

### **Professional Ethics**

Professional ethics are systematic rules or principles governing right conduct. Each practitioner has the duty to adhere to the standards of ethical practice. Pharmacy Technicians have a responsibility to make informed decisions based on their specialized training. Respect is the key component of professional behavior in the pharmacy. Being honest, trustworthy, and an all-round team player demonstrates professional ethics.

### **Preamble for Pharmacy Technicians**

Pharmacy technicians are health care professionals who assist pharmacists in providing the best possible care for patients. The principles of this code, which apply to pharmacy technicians working in any and all settings, are based on the application and support of the moral obligations that guide the pharmacy profession in relationships with patient's health care professionals, and society.

## **Chapter 3: Competencies, Associations, and Settings for Technicians**

### **Terms and Definitions:**

- Accreditation Council for Pharmacy Education (ACPE): National agency for the accreditation of professional degree programs in pharmacy and providers of continuing pharmacy education.
- American Association of Pharmacy Technicians (AAPT): First pharmacy technician association, founded in 1979
- American Pharmacists Association (APhA): Oldest pharmacy association; founded in 1852
- American Society of Health-System Pharmacists (ASHP): Pharmacy association founded in 1942
- Board of Pharmacy (BOP): A state-managed agency that licenses pharmacists and may either register or license pharmacy technicians to work in pharmacy
- National Association of Boards of Pharmacy (NABP): National organization for members of state boards of pharmacy
- National Healthcareer Association (NHA): Certification organization for a variety of health care careers, including the Institute for the Certification of Pharmacy Technicians (ICPT)
- National Pharmacy Technician Association (NPTA): Pharmacy association primarily for technicians; founded in 1999
- Pharmacy Technician Certification Board (PTCB): National board for the certification of pharmacy technicians

### **Competencies**

Competency can be defined as the capability or proficiency to perform a function. The practice of pharmacy includes a wide variety of settings. Technicians must have many different technical skills to function in each area. The following list citing Common Responsibilities and Competencies of a Pharmacy Technician

- Pharmacy Law, Ethics, and Regulatory Agencies
- Dosage Forms and Routes of Administration
- Conversions and Calculations
- Drug Information References
- Community Pharmacy Practice
- Institutional Pharmacy Practice
- Bulk Repackaging and Non-Sterile Compounding
- Aseptic Technique and Sterile Compounding
- Pharmacy Stock and Billing
- Medication Safety and Error Prevention

### **State and National Boards of Pharmacy**

Each state in the United States has its own board of pharmacy (BOP), which is overseen by the National Association of Boards of Pharmacy (NABP). Each state's BOP serves many functions, including registering technicians and licensing pharmacists. The board also provides consumers with a way to file a complaint or report any problems or illegal actions they have experienced in a pharmacy. When new standards are implemented, BOP inspectors may visit any pharmacy to determine its compliance with these new standards. If the pharmacy is found to be in noncompliance the BOP has the authority not only to impose fines but also to close the pharmacy until compliance is attained. If a pharmacy technician is found guilty of a violation of pharmacy law, the BOP can revoke his or her registration or license, depending on the state regulations.

### **Nondiscretionary Duties**

Technicians perform many nondiscretionary duties in the pharmacy setting. These are tasks that do not require professional judgement. Examples include repackaging medications, managing inventory, filling automated dispensing machines, and billing. These tasks are clearly defined and should be easy to follow. This does not mean that anyone can do the job, however, because prior knowledge of pharmacy terms, drugs, and procedures are required. Nondiscretionary duties prohibit technicians from interpreting scientific studies, counseling patients about medications, and conferring with other medical personnel about proper treatments.

### **Inpatient Setting Requirements**

Inpatients pharmacy usually refers to pharmacies located in hospitals or institutions in which patients stay overnight or longer. Most departments in a hospital have medications and supplies that are specific to their department. These are supplied by the inpatient pharmacy. Inpatient pharmacies traditionally have a wider range of stock than outpatient pharmacies so that they can provide all the supplied required by each department.

In addition to knowing the various drugs, strengths, and dosage forms, the technician must be able to immediately and appropriately react when emergency (STAT) orders are received by the pharmacy. Stat orders are to be delivered with 15 minutes or less and As Soon As Possible (ASAP) within 30 minutes. The following are common duties, roles and responsibilities of a technician working in a hospital or other inpatient facility require additional on-the-job training and preparing them for these additional tasks.

- Inventory technician: Orders all stock, handles billing, and talks to drug representatives
- Robot filler: Technicians must be trained to load these million mechanical robots and to keep them running smoothly
- IV technician: Interprets orders and prepare parenteral medications, in both large and small volumes.
- Chemotherapy technician: Prepares all chemotherapeutic agents and their adjunct medications such as antiemetics
- Anticoagulation technician: Assists the anticoagulant pharmacist in contacting patients when follow-up is necessary (dosage change)
- Technician verifiers: Part of the tech-check-tech program. They perform the final check. (Not all states use this)
- Clinical technician: Assists the clinical pharmacist with tracking patients' medication, lab results so that the pharmacist needs to monitor and evaluate drug therapies
- Pharmacy informatics analyst: Works with the clinical applications specialists to maintain pharmacy software and computers.
- Supervisory technicians: Schedules other technicians, and may even hire prospective technicians by reviewing their skills and backgrounds

### **Community (Outpatient) Setting Requirements**

Working in an outpatient pharmacy is one of the most difficult tasks in pharmacy because of the close interaction with patients. This job tests the communication skills and stress levels of the technicians who work with the public. These technicians register refill prescriptions, answering questions regarding insurance coverage. This includes understanding the various rules, regulations, and special codes that may accompany each type of prescription claim.

Larger drug companies that are community based also have recognized the positive aspects of hiring technicians to fill certain positions.

- Insurance billing technician: This person must know the guidelines of Medicare, Blue Cross, Medicaid, and other insurance companies
- Retail technician: This person must have excellent communication skills, phone skills and prescription-filing abilities
- Inventory/stock technician: Person must know contacts for fast service, be able to obtain products and drugs as soon as possible. Perform billing functions, processing returns and recalls
- Technician recruiter: Some outpatient pharmacies and/or temporary agencies employ these technicians to recruit other technicians into their company
- Technician trainer: Employ technicians to train newly hired technicians on the computer programs and to master necessary skills relevant to their specific pharmacy
- Technician manager: Their job is to supervise the pharmacy technician staff, developing and maintain work schedules, making sure registrations and certifications are current and working with the pharmacist to continually train and update the skills of the pharmacy technician employees

### **Closed Door Pharmacy Requirements**

A closed door pharmacy is exactly what its name implies. These pharmacies are not open to the public, and they are normally based away from institutional sites. Closed door pharmacy provides, couriers deliver the medications to home health clients, inpatient hospital pharmacies, specialty clinics, and assisted living or long-term care facilities. Closed door pharmacies are different in that the oral prescriptions usually are packaged differently. Flat cardboard blister packs are prepared by technicians for use by nurse, who administer the drugs in the assisted living, long-term care.

### **Training Programs for the Pharmacy Technician Student**

Since 1982, when pharmacy technician accreditation programs were first established, the ASHP has been the leader in providing course curriculum and standards and offering students the best foundation for becoming technicians. Currently, 33 states require training of pharmacy technicians. Eighteen states require national certification to work as a pharmacy technician. Some states require that technicians pass a state-approved certification exam.

### **Different Levels of Pharmacy Technicians**

There are four levels of pharmacy technicians: pharmacy technicians who have no specialized training or credentials and licensed registered, and certified technicians. Each level has different qualifications, which may differ from state to state.

- **Pharmacy Technician:** The first level of pharmacy technician requires no specialized training. Some states require pharmacy technicians to attain minimum standards, such as a high school diploma; others do not
- **Licensed Pharmacy Technician:** Is licensed by the state board of pharmacy. Licensing is the process by which an agency of the government grants permission to an individual to engage in a given occupation based on the findings that the applicant has attained the minimum degree of competency necessary to ensure that the public health, safety, and welfare will be reasonably well protected.
- **Registered Pharmacy Technician:** Is a pharmacy technician who is registered with the state board of pharmacy. Registration should be used to help safeguard the public through tracking of the technician workforce and preventing individuals with documented problems from serving as

pharmacy technicians. Registration carries no indication or guarantee of the registrant's knowledge or skills. Each state determines whether continuing education is required of technicians to renew their registration

- **Certified Pharmacy Technician:** Is one who has earned national recognition by a nongovernmental testing agency or association. CPhT currently is the main credential available to pharmacy technicians. Certification is an indication of the mastery of a specific core of knowledge. Certified technicians must renew their certification every 2 years and complete at least 20 hours of pharmacy related continuing education, which must include 1 hour of pharmacy law and 1 hour of medication/patient safety.

### **Professionalism in the Workplace**

Pharmacy is an important profession, and pharmacy technician is a great career. As with many things in life you get out of it what you put into it. If you put 100% effort into your career, you can achieve a great deal of satisfaction.

A profession is a job, occupation, or line of work that becomes a career, a profession is founded on specialized training. **Professionalism** is conforming to the right principles of conduct (work ethics) as accepted by others in the profession. It takes time, hard work, and consistency to be respected as a professional. How technicians conduct themselves in various situations reveals their professionalism and their personal maturity.

Employers came up with a list of six soft skills that every employee needs.

1. Communication skills: These skills include the ability to write a coherent memo, or simply be able to explain to a co-worker what one needs.
2. Teamwork and collaboration: Employers need people who can work together toward a common goal, who can easily transition from leader to follower or vice versa, and who can meet assigned deadlines.
3. Adaptability: This skill focuses on the employee's ability to embrace learning and adapt to the changing needs of the organization.
4. Problem solving: Employers expect workers to face problems with a positive attitude. They want people who can explain a dilemma and how it should be approached and devising a solution that provides measurable results
5. Critical observation: This skill involves going beyond the ability to collect and manipulate date; it includes the ability to analyze and interpret it.
6. Conflict resolution: This skill entails being able to negotiate win-win situations to serve the best interest of the company and individuals involved.

To be professional in the workplace, an employee should demonstrate the following qualities:

- Appropriate appearance
- Punctuality and regular attendance
- Honesty
- Task Completion
- Communication skills
- Interpersonal skills, including civility
- Ability to remain focused and attentive

## **Chapter 4: Communication and Role of the Technician with the Customer/Patient**

### **Communication**

Communication is the ability to express oneself in such a way that one is understood readily and clearly. Pharmacy Technicians communicate daily with co-workers, health care professionals and customers. Effective communication skills are critical in achieving optimal patient satisfaction and trust. A competent technician has excellent written and verbal communication skills. Technicians are expected to use skills such as diplomacy, compassion, sensitivity, responsibility, tact, and patience. Good communication is also important for patient safety. A technician who knows exactly what the patient needs and understands how to communicate is able to assist the person with confidence and accuracy.

### **Listening Skills**

Active listening is a communication technique in which listeners confirm understanding by restating or summarizing what they have heard in their own words. Active listening helps keep the focus on the patient. Sometimes just listening to a person is all that is required.

If a customer is angry about a medication, regardless of the problem, just listening can ease the person's frustration. Try to listen until the person is finished and empathize with the dilemma. Most customers know a problem with a medication is not the fault of the pharmacy technician, but they want to be heard. Pharmacy technicians must remember to always behave professionally.

### **Nonverbal Communication**

Nonverbal communication, or body language, is the act of giving or exchanging information without using spoken words.

Most people make a judgment of others within the first 30 seconds of meeting. This is so true in the pharmacy setting. A professional should not bring his or her outside personal problems to work. (Leave it at the door). Rolling your eyes or sighing loudly shows impatience and lack of respect for the customer. If you are counting pills and scowling, the patients may assume you are frustrated and that could keep them from asking questions or sharing important information. If your facial expression is pleasant, the patient will most likely respond in a positive manner. Exhibiting positive body language makes your communication with the patient more effective. The primary goal of pharmacy personnel is to help others, which can be accomplished by being friendly and remaining calm. It is imperative that the only body language you convey is that of a helpful and concerned pharmacy technician.

### **Verbal Communication**

Verbal communication is the sharing of information by individuals through the use of speech. Verbal communication is an important tool in pharmacy. It is a skill that must be learned and practiced. To be an effective communicator, you must remember that your words and your voice are not always in agreement. Each is a separate entity and can be used for or against you

### **Vocal Skills: How you Sound**

Your voice is a powerful tool that affects the customer or person to whom you are talking. Words alone do not necessarily convey your meaning or feelings; the inflection (pitch), tone, speed, and volume add multitudes of information that is being picked up by the listener.

### **How to Improve your Vocal Communication Skills**

- Try not to talk using the same tone all the time
- Do not talk to rapidly to a customer
- Talking very slowly indicates you do not know the answer
- People prefer a lower pitched voice; high, squeaky tones can annoy the listener
- A loud or extremely soft voice can annoy and irritate people
- Articulation is extremely important

### **How to Improve your Verbal Skills**

- Reading increases your vocabulary
- Take a course in communication
- Always try to put yourself in the customer's position when talking to him or her

People want to shop where they receive warm, friendly service and where the staff knows their name. Technicians can be that difference! As author and motivational speaker John C. Maxwell said, "People don't care how much you know, until they know how much you care!"

### **Optimize Your Communication**

Below are a few tips to optimize your communication abilities:

1. **Use open-ended questions:** This gets you more than just a "yes" or "no" answer. It shows the patients that the conversation is not just one way and that you care about his or her perspective.
2. **Provide empathetic responses:** This shows the customer that you can see the situation from her point of view. When a patient believes you understand how she feels she is more inclined to share information that could assist with her care.
3. **Minimize distractions:** The goal for every conversation you have with a patient should be to communicate clearly, and make sure your message is understood. If needed move the patient to a quieter place such as a designated counseling area for privacy.

### **Telephone Etiquette**

A key area of communication in the pharmacy workplace is telephone interactions. A knowledge of proper phone etiquette is important when dealing with patients, nurses, and physicians. Etiquette is an unwritten guideline or rule of behavior. A professional attitude and good judgment should be used as all times. With each call the pharmacy technician should decide whether they can handle the call themselves or direct the call to a pharmacist. If a call must be placed on hold, the technician should check back with the caller at 1-2 minute intervals to reassure the caller hasn't been forgotten and to verify the call has not accidentally disconnected.

The following are guidelines when interacting with patients and medical personnel over the phone:

1. Always clearly identify the place of business, your name, and your title when you answer the phone.
2. Carefully listen to the caller to determine the nature of the call.
3. Determine whether the task is within your scope as a technician or whether the call should be forwarded to a pharmacist
4. If the technician can handle the call, make an offer of assistance and restate the purpose of the call before placing the customer on hold or ending the conversation.

## **Written Communication Skills**

In today's workplace, pharmacy technicians must be proficient in written communication.

Information That Should Be Obtained and Written Down in the Message:

- Caller's name
- Floor location and extension (hospital setting), Physician's call-back number (community setting), or the patient's preferred call-back number
- Purpose of the call
- Time of the call
- The initials of the person who took the call
- How soon the information is needed.

Only then can a pharmacist quickly and easily relay the correct information to the appropriate person.

## **Communications with Special Patient Groups**

The technician will have interactions with all types of special patient's groups. The technician should be sensitive to each customer and alert to any special needs to the patient might have. This role begins when the technician greets the patient and accepts the prescription.

1. **Terminally Ill Patients:** Special consideration should be given to patients who are terminally ill. They may be feeling overwhelmed. Although each person copes with his or her own mortality differently, there are "normal" progressive steps that people experience. The five stages that terminally ill patients experience are as follows:

Stage	Example
Denial	"This can't be happening..."
Anger	"It isn't fair. I don't deserve this..."
Bargaining	"Please make me better, And I promise..."
Depression	"I will never be able to see you again..."
Acceptance	"I can do this, everyone does..."

These stages can manifest at any time and last for different lengths and most of all that can come in any order. Therefore, it is important that the pharmacy technician be compassionate.

2. **Non-English-Speaking Patients:** We live in a culturally diverse society, and technicians will encounter customers who do not speak English as their first language. Technicians who speak multiple languages are in high demand and can plan an important role on the pharmacy team. There are many ways pharmacies can help facilitate appropriate communications with LEP (limited English proficiency) patients. They may employ bilingual staff, provide interpreters, use software programs that translate the prescription labels into various languages, or use pictograms to illustrate a variety of instructions.
3. **Hearing-Impaired Patients:** Approximately 36 million Americans have hearing loss, so the chances of a pharmacy technicians encounter a hearing-impaired patient is high. If you become aware that a patient's hearing is limited or fully impaired, you must determine a plan of action to best interact with the patient. First, ask how they would prefer to communicate and note in the computer. Always look at the patient when speaking. Never yell; instead use a moderately low voice if the patient is fully hearing impaired, ask anyone if they know sign language or family can interpret. Remember to direct your communications to the patient and allow him or her to respond to you through the interpreters. It is considered rude in the deaf community not to keep eye contact when speaking.

### **Communication with the Health Care Team**

Today, the pharmacy technician is an important member of the health care team. In all pharmacy settings, teams work to provide the best patient care possible. Trust and communication are key components of a successful team. The following is a few tips to help you become an effective team player:

1. Make sure you clearly understand your job duties and responsibilities
2. Take time to discuss the pharmacy's goals with the team
3. Become a positive part of the decision-making process
4. Stay informed and know the channels of communication
5. Be loyal and work to build trust

Effective communication can increase adherence to treatment and decrease adverse effects, which ultimately leads to improved health and safer patient care.

## **Chapter 5: Dosage Forms and Routes of Administration**

### **Terms and Definitions:**

Absorption: The taking in of nutrients and drugs into the body from food and liquids

Bioavailability: The degree to which a drug or other substance becomes available to the target tissue after administration

Distribution: The movement of a medication throughout the blood, organs, and tissues after administration

Elimination: The final evacuation of a drug or other substance from the body via normal body processes, such as kidney elimination (urine), biliary excretion (bile to stool), sweat, respiration, or saliva

First-pass effect: A process in which a portion of a drug does is metabolized before the drug has a chance to be distributed systemically

Half-life: The time required for half the amount of a substance such as a drug in a living system, to be eliminated or disintegrated by natural processes and/or the time required for the concentration of a substance in a body fluid (blood plasma) to decrease by half

Metabolism: The processes by which the body breaks down or converts medications to active or inactive substances. The primary site of drug metabolism in humans is the liver, however, select drugs are metabolized through other processes.

Pharmacokinetics: The study of the absorption, metabolism, distribution, and elimination of drugs

Much of the terminology in pharmacy and medicine comes from the Latin and Greek languages. Because pharmacy began in Europe, most of the abbreviations have their origins in a foreign language. The medical community uses terms in Latin and Greek. These terms serve as a universal language that all medical, doctors, nurses, pharmacists, technicians, and other medical personnel can understand.

### **“Do Not Use” List**

Because of the concern over drug errors that have occurred from the misinterpretation of medication orders. Both the Institute for Safe Medication Practices (ISMP), and The Joint Commission (TJC) have provided a “Do Not Use List” that outlines the most common misread abbreviations.

<b>Do Not Use</b>	<b>Potential Problems</b>	<b>Use Instead</b>
U, u (unit)	Mistake for “0”, the number “4” (four) or “cc”	Write “Unit”
IU (International Unit)	Mistaken for IV (intravenous) or the Number “10” (ten)	Write “International Unit”
Q.D., QD, q.d, qd (daily) Q.O.D, QOD, q.o.d, qod (every other day) Trailing zero (X.0mg) Lack of leading zero (.X mg)	Mistaken for each other Period after the Q mistaken for “i” and the “O” mistake for “i” Decimal point is missed	Write “daily” Write “every other day” Write X mg Write 0.X mg
MS	Can mean morphine sulfate or magnesium sulfate	Write “morphine sulfate”
MSO4 and MgSO4	Confused for one another	Write “magnesium Sulfate”

## **Classification of Medications**

Classifications of medications place drugs into groups. Many medications are used for reasons other than their intended purpose. It is important to know the body system a medication is intended to affect. Each drug can be further broken down into groupings based on pharmacology intent if use, route of administration (ROA), or mechanism of action. Each type of medication may have several dosage forms. For consumers, the choice may be based on which dosage form is easier to take, or it may be based on cost. For a physician, the best way to administer medications may be based on how rapidly the medication is needed by the patient

### **General Classifications of Medications**

<b>Body System</b>	<b>Drug Classification</b>
Gastrointestinal System	Antacids, H2-antagonists, proton pump inhibitors antiemetics, Laxatives, antidiarrheals
Circulatory System	Anticoagulants, antiplatelets, thrombolytics, antihemorrhagics
Cardiovascular System	Antihypertensives, diuretics, vasodilators, beta-blockers, Calcium channel blockers, angiotensin-converting enzyme (ACE) Inhibitors, angiotensin II receptor antagonists, Antihyperlipidemics
Integumentary System	Emollients, antipruritics, antipsoriatics, medicated dressings
Reproductive System	Hormonal contraceptives, fertility agents, sex hormones
Immune System	Antibiotics, antivirals, vaccines, antifungals, antiparasitics Anticancer agents Immunomodulators
Musculoskeletal System	Anabolic steroids, nonsteroidal anti-inflammatory drugs (NSAID) Antirheumatics, corticosteroids, muscle relaxants, Bisphosphonates
Nervous System	Anesthetics, analgesics, anticonvulsants, antidepressants, Antiparkinsonian drugs, antipsychotics, stimulants
Respiratory System	Decongestants, bronchodilators, cough medications, H1-antagonists
Other	Radiopharmaceuticals, contrast media, antidotes

### **Classifications of Drug Sales**

The three classifications describe drugs' availability to consumers. **Over-the-counter (OTC)** drugs are commonly used and may be purchased without a prescription. (ex. Tylenol, Motrin, Robitussin). **Legend Drugs** require a prescription from a prescriber before they can be used and are often denoted as "RX". (ex. Penicillin, Morphine, Albuterol inhaler). **Behind-the-counter (BTC)** drugs that do not need a prescription but are kept in the pharmacy, their sales are limited by quantity. (ex. Pseudoephedrine)

## Dosage Forms

Dosage form refers to how a drug is available for use or the vehicle by which the drug is delivered. The following sections give a brief explanation of the different dosage forms. All the different forms can be divided into three major categories that are composed of subcategories:

- Solids: Tablets, chewable tablets, enteric-coated tablets, extended-release agents, sublingual tablets, capsules, caplets, lozenges, troches, implant capsules, patches
- Liquids: Syrups, elixirs, sprays, inhalant solutions, emulsions, suspensions, solutions, enemas
- Semisolid: Creams, lotions, ointments, powders, gelatins, suppositories, inhalant powders

### Solids

Solid agents can be contained in various packages and when administered enterally can be given orally, rectally, or sublingually.

- Tablets and Caplets: The most common type of tablet contains some type of filler. Fillers are composed of inert substances (no active ingredient) that fill space or cover the tablet (sugar coatings). Sugar coatings improve taste and color or hide unpleasant odors. Certain additives may be used to improve the drug's absorption and/or distribution throughout the body. Some tablets are made to be administered sublingually (under the tongue). Other tablets are enteric coated to help protect the drug through the acidic environment of the stomach until it reaches the more alkaline intestine. In other cases, the protective covering may delay the release of the drug as it travels through the stomach so that it will not irritate the stomach or become inactive. Orally disintegrating tablets (ODT's) may be dissolved in the mouth without water, easing administration for individuals who have difficulty swallowing medication or for people who are nauseous. Caplet dosage forms are related closely to tablets but are smooth sided and therefore easier to swallow. The word caplet refers to the shape of the tablet. Tablets are often identified by shape, color, and imprint codes, which are determined by the manufacturer. Manufacturers have developed controlled-release formulations to enable the patient to take the medication less often. This would improve patient compliance. Abbreviations for agents that release medication over different periods of time and in different periods of time and in different quantities are as follows:

*CD	Controlled diffusion
*CR	Continuous/controlled release
*CRT	Controlled-release tablet
*IR	Immediate release*
*LA	Long acting*
*ODT	Orally disintegrating tablet
*SA	Sustained action*
*SR	Sustained/slow release
*TD	Time delay
*TR	Time release
*XL	Extra long*
*XR	Extended release*

\*also, available in capsule forms.

As a rule, dosage forms that are specially made to release over time should not be crushed or broken into pieces. This would alter the release process. However, if the tablets are scored they are approved to be divided for such use.

- Capsules: Capsules are composed of a gelatin container. They can have a hard or soft outer shell. The shells of hard capsules are composed of sugar, gelatin, and water. The color is determined by the manufacturer and is used primarily for identification. Another type of capsule is the pulvule, which is shaped slightly differently for identification purposes. Spansules are capsule that can be pulled apart to sprinkle the medication onto food for children, making it easier to administer. A spansule is specially coated to slow the dissolving rate, allowing the medicine to be delivered at a time. The spansule should not be crushed or chewed. SoftGelatin capsules (gel caps) cannot be pulled apart and often hold medications in liquid form. Capsules are available in different sizes. They vary in color transparency, and identifying marks. Eight sizes are available; each holds a specific volume, and each holds a specific amount of medications. The sizes numbers are 5,4,3,2,1,0,00,000; 5 is the smallest, and 000 is the largest.
- Lozenges and Troches: Lozenges and troches are other forms of tablets that are not intended to be swallowed; they dissolve in the mouth, which releases the medication more slowly. The medications in lozenges and troches are often aimed at local action in the mouth and/or throat. Many cough drops come in this type of dosage form. Lozenges are similar to hard candy. Troches vary in size. Some are larger than normal-sized tablets and are flat; they usually have a chalky consistency so they can dissolve in the mouth. Clotrimazole troches are normally administered buccally (in the cheek) and left to dissolve.
- Transdermal Patches: Transdermal patches are solid pieces of material that hold a specific amount of medication to be released into the skin and absorbed into the bloodstream over time. Patches are convenient dosage forms because they are easily applied and eliminate possible upset stomach. Here is a list of different types of patches and how long they last:
  - \*Nitroglycerin patches: treat angina, on at 0900 off at 2100 daily
  - \*Transderm Scop: treat motion sickness, placed behind ear, and changed every 3<sup>rd</sup> day
  - \*Lidocaine patch: treat topical pain, on at 0900 off at 2100 daily
  - \*Duragesic patch: treat severe pain, changed every 72 hours
  - \*Nicotine patch: stop smoking cessation, changed every 24 hours
  - \*estrogen patch: hormone replacement, changed once a week

Never discard a medication patch in the trash. The medication present on an unprotected, discarded patch may penetrate the skin of a young child or pet. The best approach is to wrap and discard the patch in such a way that a child or pet would not be able to grasp it.

## Liquids

Liquids are composed of various mixtures. Traditionally names for these dosage forms relate to the types of liquid with which the medication is mixed. Depending on the type of taste, speed of action, or route of administration intended.

- Syrups: Syrups are sugar-based solution into which medication has been dissolved. The sugar improves the taste of the drug. Syrups tend to be thicker (more viscous) than water.
- Elixirs: Elixirs are clear, sweetened solutions that contain dissolved medication in a base of water and alcohol (hydroalcoholic base). Drugs that are formulated as elixirs usually require alcohol as a solvent for the drug to be placed into solution. Sweeteners are a necessary component of elixirs to improve the taste. Unlike syrups, elixirs have the same consistency of water.

- Sprays: Sprays are composed of various bases, such as alcohol or water, in a pump-type dispenser. Sprays are available for use in products such as nasal decongestants and topical sunscreens.
- Inhalants and Aerosols: Medications must be delivered directly to the source of inflammation, such as the bronchial tree. Because these areas are so small, the medication particles must be extremely fine to reach them effectively. Inhaler agents are available in a variety of forms, but all must be able to be easily inhaled into the lungs.
- Emulsions: An emulsion is a mixture of two or more immiscible liquids. In an emulsion, one liquid is dispersed throughout the other; emulsions are unstable; an emulsifier (a substance that stabilizes an emulsion) is often added to improve stability and dispersion. For example, an emulsifier may be used to bind oil and water into a mixture.
- Suspensions: Suspensions are liquid dosage forms in which very small solid particles are suspended in the base solution. Certain active ingredients are unstable when dissolved in a solution but stable in a suspension form. Oral suspensions should have a “Shake Well” auxiliary label that is easily visible on the front of the bottle and in the directions.
- Enemas: Enemas may be administered for one of two reasons: retention or evacuation. Retention enemas are used to deliver medication to the body in a manner that bypasses the stomach

### **Semisolids**

Semisolid agents are different in their composition from liquids or solids. Although they contain solids and liquids, they normally are intended for topical application.

- Creams: Creams usually have medications in a base that is part oil and part water and is intended for topical or local use. When an emulsifier is added, the water and oil remain combined. Creams are massaged easily into the skin and do not leave a heavy, oily residue. Creams can be formulated to be used vaginally or rectally, taking into account the sensitive tissues which they will be applied.
- Lotions: Lotions are thinner than creams because their base contains more water. They penetrate well into the skins and do not leave an oily residue after application.
- Ointments: Ointments contain medication in a glycol or oil base such as petrolatum. Ointments can effectively cover the skin's surface while repelling moisture. Ointments can be used rectally or topically and can be formulated and sterilized for use in the eye as an ophthalmic agent.
- Gels: Gels contain medication in a viscous (thick) liquid that easily penetrates the skin and does not leave residue.

- Pastes: Pastes contain a lesser amount of liquid base than do solids. They are used for topical applications and can absorb secretions, unlike other topical agents.
- Powders: One of the main uses of topical powders is to reduce the wetness in an area. Powders also can be spread over a wide area if needed.

## **Pharmacokinetics and Pharmacodynamics**

Pharmacokinetics is an all-inclusive word that presents many different components concerning the actions of the body on a drug, as opposed to pharmacodynamics which describes the effects the drug has on the body.

The following sections describe the overall pharmacokinetics or life of the drug in the body”

A=Absorption: The movement of a drug from its site of administration in the bloodstream. Generally, absorption takes place through the digestive system unless an agent is administered directly into the bloodstream by injection into the veins arteries, muscles. The digestive system is the most convenient, economical, and common route of administration. The small intestine is the primary site of absorption because of the very large surface area across which drugs ay diffuse.

D=Distribution: Is the process by which a drug leaves the bloodstream and enters the tissues of the body. The initial rate of distribution of a drug is heavily dependent on the blood flow to various organs

M=Metabolism: Is the biochemical modification or degradation of drugs in the body. As the drug is distributed throughout the body, some of it renters the bloodstream and ultimately is transferred to the liver. Where most drug metabolism take place. Metabolism changes the chemical structure of the original drug. Many orally administered drugs travel to the liver and a proportion of the dose is metabolized before the drug has a chance to be distributed; this is called the first-pass effect, which lowers the drug’s final bioavailability. Most of the metabolism or a drug takes place in the liver, this is the final processing center of the body.

E=Elimination: Is the last phase of a drug’s life in the body. Although elimination usually is associated with urination, it is important to know that there are many ways a drug can be excreted from the body. In addition to elimination via the kidneys, drug also may be expelled via the feces, exhalation, sweat glands, even breast milk in women who are lactating. Remember that drugs that are not eliminated properly may accumulate in the body, which can lead to toxicity.

## **Bioavailability**

Bioavailability is the proportion of the drug that is delivered to its destination and is available to the site of action for which it was intended. Different drugs clear in different ways and at different time. Drugs that are intended. By definition, an IV injection has a bioavailability of 100% because the drug does not have to be absorbed.

## **Half-Life**

Half-life refers to the time it takes the body to break down and excrete one half of the drug. To be more precise, it is the time taken for the plasma concentration of the drug to decrease by 50%. After approximately four half-hour eliminations, 94% complete. The following is an example.

Order is Vancomycin 1000mg with a half-life of 6 hours

Dose given: at noon

1000mg	1200
500mg	1800
250mg	0000
125mg	0600
62.5mg	1200

## **Bioequivalence**

Bioequivalence is the comparison of drugs from different manufacturers or from the same manufacturer but different batches (lot). This is an important aspect of a drug because patients assume that every tablet they take is exactly the same as the one before and that all are the exact strength as listed on the label. Generic drug manufacturers strive to achieve equivalents with brand name manufacturers so they can compete with the original manufacturer.

## **The Use of Excipients**

All medications are prepared with additives for many different reasons. These additives include coloring for better appearance of the product, and flavorings to disguise taste and/or smell. Many times fillers are used to increase the size of the medication because the amount of drug may be so small that the medication otherwise would be difficult, if not impossible to handle.

Description of Additives:

Type of Additive	Example of Chemical	Reason
Weak salt acid/base	Hydrochloric acid and Sodium Hydroxide (base)	Helps dissolve drug more easily once it arrives in the GI system
Preservative	Parabens	Increases shelf life
Sweetener	Sucrose	Improves taste
Flavoring	Cherry	Improves taste
Coloring	Yellow dye no. 5	Improves visual appearance
Buffer	Sodium acetate	Adjusts Ph
Antifungal	Benzoic acid	Prevents fungal growth
Base	Petrolatum	A common component to which Medication is added for ointments and creams
Filler	Starch, powdered cellulose	Increase size of dosage

## **Chapter 6: Drug Information References**

### **Terms and Definitions:**

Brand/trade names: Trademark of a drug or device held by the originating manufacturing company

Chemical structure: The makeup of a chemical, including the elements, the shape, the bonding types, the molecular configurations, changes. The nature of the chemical's structure has much to do with the chemicals stability, reactivity, and physical and chemical properties

Drug classifications: Categorization based on various characteristics, including the chemical structure of a drug, the action of a drug, and/or the therapeutic or anatomical use of a drug.

Formulary: A list of approved drugs to be stocked by the pharmacy, also a list of drugs covered by an insurance company

Non-Formulary: A list of drugs that are not included in the list of preferred medications that a committee of pharmacists and physicians deems to be the safest, most effective, and most economical; they are drugs not included in the drug list approved for reimbursement by the health care plans

Drug information reference books are some of the most important tools used in pharmacy. Physicians, nurses, and other health care professionals call the pharmacy daily to ask questions about various medications.

### **Researching a Drug**

It is important for technicians to be proficient in accessing accurate drug references and materials; however, technicians should not provide patients with information about side effects, dosing, or compatibility. This is out of the technician's scope of practice, and my doing any of the above you will lose your license.

When a new drug is in the experimentation phase, the creators or the company give the drug a generic or investigational drug name base on its chemical attributes. Later, when the drug has been approved by the U.S. Food and Drug Administration (FDA), a **monograph**, or official label, is created to include important finding, such as side effects that were reported during clinical trials.

The **drug classification** is important because it places the drug into proper categories based on its **chemical structure**, mechanism of action, anatomical function, and/or therapeutic use. Many times, drugs in the same class have the same mechanism of action.

The indications list the main conditions for which the chemical is used. A contraindication list is also an important part of a drug monograph. This identifies types of individuals who should not be given the medication. Reasons may range from certain serious drug-drug interaction to conditions that conflict with the action of the drug.

The founding company assigns the chemical name, generic name, and trade name. which are found in the product's official label. The chemical name is the scientific name given to a chemical in accordance with the nomenclature system developed by the International Union of Pure & Applied Chemistry, Chemical Abstracts Service. Many times, generic names are closely related to the chemical name of the drug, but not always. The trade name (proprietary or brand name) is determined by the company that developed the drug and therefore the exclusive property of that drug.

The U.S. Adopted Names Council has established a list of work stems (prefixes, root words, and suffices) that identify a drug's classification. These word parts reflect a specific drug classification. Knowing the word parts makes it easier to learn what a specific drug does.

### **Examples of Trade Drug Names that Indicate the Function of the Drug**

Lopressor: For hypertension; conveys lowering of blood pressure  
Lotensin: For hypertension; conveys lowering of blood pressure  
Lipitor: Lowers blood lipids (cholesterol); conveys treatment of lipids  
Neurontin: Treats conditions affecting the neurons (nerves); conveys treatment of nerves  
Restoril: Treats insomnia; conveys restfulness  
Wellbutrin: Treats depression; conveys wellness  
Celexa: Treats depression; conveys celebration, wellness  
Viagra: Treats erectile dysfunction; conveys vigor, vitality

### **Examples of Similar Endings of Generic Drug Names**

#### **Some beta-blockers end in -olol (these agents are primarily used to treat high blood pressure (HBP))**

- atenolol (Tenormin)
- nadolol (Corgard)
- timolol (Blocadren)

#### **Some angiotensin-converting enzyme (ACE) inhibitors end in –pril (these agents are primarily used to treat high blood pressure (HBP))**

- captopril (Capoten)
- enalapril (Vasotec)
- lisinopril (Prinivil, Zestril)

#### **Some calcium channel blockers end in -dipine\* (these agents are primarily used to treat HBP and heart rhythm disorders) \*verapamil (Calan) and diltiazem (Cardizem), which are also calcium channel blockers, are exception to this pattern.**

- amlodipine (Norvasc)
- nicardipine (Cardene SR)
- nifedipine (Procardia XL, Adalat CC)

#### **H2-receptor antagonists end in -tidine (the agents are primarily used to treat ulcers and gastro esophageal reflux disorders (GERD)).**

- cimetidine (Tagamet)
- ranitidine (Zantac)
- famotidine (Pepcid)

#### **Proton pump inhibitors end in -prazole (these agents are primarily used to treat gastro esophageal reflux disorders (GERD)).**

- esomeprazole (Nexium)
- lansoprazole (Prevacid)
- omeprazole (Prilosec)

## **References used in Pharmacy**

Most references have a section on how to use the text or online “help” sections to aid the reader in the use of computerized resources. It is helpful for the technician to be familiar with performing a reference search before it is required. Knowing how to use the reference properly allows the technician to find the correct information in a timely manner.

Many reference materials are available to technicians and pharmacists in a variety of formats, and it should be noted that online interfaces, such as Micromedex and Clinical Pharmacology, are increasingly prevalent in the pharmacy setting.

The following are examples of commonly used reference materials used in a pharmacy setting:

**Drug Facts and Comparisons:** Is one of the books most frequently used by pharmacists. First published in 1946 and was created for quick and accurate reference and drug comparison.

Sections in Drug Facts and Comparison:

<b>Section in Order of Reference</b>	<b>Contents of Each Section</b>	<b>Specific Information</b>
Section 1	Index	Generic and trade names
Section 2	Keeping Up	Orphan, Investigational, And temporary listings
Section 3	Drug monographs	14 chapters of drug Descriptions
Section 4	Drug Identification	More than 250 drugs Shown in color
Section 5	Appendix	Dosage calculations and List of manufacturers

**Physicians' Desk Reference:** Is a popular reference found in most physician's offices and pharmacies.

The PDR has been in publication for more than 50 years.

Sections in Physicians' Desk Reference:

<b>Section in Order of Reference</b>	<b>Contents of Each Section</b>	<b>Specific Information</b>
Section 1	Manufacturer indexing	Lists addresses and Phone numbers
Section 2	Generic and Trade names	Serves as an index for Referencing Manufacturers
Section 3	Product category index	List products by Classification or Method of action
Section 4	Product Identification Guide	Drugs shown in color
Section 5	Product information	Most drugs approved By the FDA
Section 6	Diagnostic product information	Information on drug Products used as Diagnostic agents
Miscellaneous Section	Miscellaneous information	List of drug information Centers, keys to Controlled substances, Pregnancy ratings, Poison control centers

**Drug Topics Red Book:** One of the longest published reference guide. This book is a good source of information pertaining to average and wholesale drug costs and prices. Community (retail) pharmacies, rather than hospital pharmacies, are more likely to use this book.

**The Orange Book:** Is a comprehensive list of approved drug products with therapeutic equivalence evaluations that is provided by the FDA. This is the book to use for determining whether a generic drug is the same as a brand drug. Other information includes discontinued drug products, orphan products designations, and approval lists. The Orange book publication is updated annually.

**United States Pharmacopoeia-National Formulary (USP-NF):** Provides access to official standards of the FDA. It is a guide for the specifications—tests, procedures, and acceptance criteria—required for pharmaceutical manufacturing ad quality control. This book aids compliance with standards and lists new product development and approvals.

**United States Pharmacists' Pharmacopeia:** Is a comprehensive compilation of information on compounding products and ingredients and their safety. Also, included are the most recent sterile preparation guidelines for USP, the most common non-formulary agents, veterinary compounding, dietary supplements, and laws pertaining to compounding.

**Clinical Pharmacology:** is an electronic drug compendium commonly encountered in retail and health system pharmacies. Similar to Drug Facts and Comparisons, the reference is very popular because of its ease of use and quick access to needed information. Clinical Pharmacology is an officially recognized compendium by the Centers for Medicare & Medicaid Services (CMS) because of its extensive amount of drug information, including off-label drug uses supported by clinical evidence.

**Trissel's Handbook on Injectable Drugs:** Mostly used in the hospital setting. The Handbook on Injectable Drugs by Lawrence Trissel is a well-known reference used for information on parenteral agents. Although technicians cannot relay information from this book to physicians or nurses, they can find the information and have it ready for the pharmacist. In this way, they can facilitate a rapid response from the pharmacy to the necessary medical personnel.

## **Chapter 7: Community Pharmacy Practice**

### **Terms and Definitions:**

Auxiliary label: A label that provides supplementary information about proper and safe administration, use, or storage of medication

Bank identification number (BIN): A six-digit number on a prescription drug card that is used for routing and identification to process a prescription

Behind-the-counter (BTC) medication: A class of medication kept behind the pharmacy counter that requires a pharmacist's intervention before the medication can be sold to a patient. BTC medications are not considered prescription medications.

Dispense as Written (DAW) code: a numeric set of codes created by the National Council for Prescription Drug Programs (NCPDP), that is used when filling prescriptions, they can affect reimbursement amounts from the insurance company.

Drug Enforcement Administration (DEA) number: an alphanumeric number consisting of two letters and seven numbers that is assigned to prescribers authorized by the DEA to prescribe controlled substances

Federal Legend: A statement required on the labeling of all prescription medications. "Federal law prohibits dispensing with a prescription."

Inscription: The name, dosage form, strength, and quantity of the medication prescribed.

National Drug Code (NDC) number: a unique 10 or 11-digit number, composed of three segments, that is assigned to a medication. The first four digits identify the drug manufacturer, the next four identify specifics about the product, and the last two identify the drug packaging.

Nonproprietary (generic) name: A short name coined for a drug or chemical that is not subject to proprietary (trademark) rights and is recommended or recognized by an official body

Proprietary (brand or trade) name: A brand name or trademark under which a drug product is marketed.

Signature (signa or sig): The directions on a prescription that explain how the patient is to take the prescribed medication; a Latin expression meaning to "write on label"

Subscription: the part of the prescription that provides specific instructions to the pharmacist on how to compound prescription

Superscription: The heading of a prescription, represented by the Latin symbol Rx, meaning "Take thou" or "You take"; the symbol that has come to represent prescription or pharmacy.

Community pharmacy, also known as retail is a vital component of our health care delivery system. There are many types of community pharmacies, including independent, franchise, and chain pharmacies. The **independent pharmacy** originally was known as the "corner drugstore" in a community. Often these pharmacies were classified as a sole proprietorship. A sole proprietor is someone who owns an unincorporated business by himself or herself. The owner of an independent pharmacy was normally the pharmacist in charge (PIC). A **franchise** is an authorization granted to a person or group of people, that allows them to operate under a franchisor's well-established trade name and usually under the franchisor's guidance. Examples of franchise pharmacies include Medicine Shoppe, Good Neighbor Pharmacy. A **chain pharmacy** is a corporate-owned group of pharmacies that share a brand and central management and usually have standardized business methods and practices. A chain must have at least two locations and have a central headquarters that is overseen by a board of directors. Examples of chain pharmacies include CVS and Walgreens.

## **Role of the Pharmacy Technician**

The primary role of the pharmacy technician in a community pharmacy is the same as that in an institutional setting or any other pharmacy setting: To Assist the Pharmacist. The following are some of the more common duties.

- Provide customer service
- Take the information needed to fill a prescription from customers or health professionals
- Input various types of date into a pharmacy information system
- Compound prescriptions
- Package and label prescriptions
- Price medications
- Organize inventory and alert pharmacists to any shortages of medications or supplies
- Accept payment for prescriptions and process insurance claims
- Arrange for customers to speak with the pharmacist if customers have questions about medications or health matters
- Perform pharmacy housekeeping tasks

## **Prescription**

A prescription is an order for medication issued by a physician, dentist, or other properly licensed practitioner. There are two broad legal classifications of medications: those that can be obtained only by a prescription, or legend medications, and those that can be obtained without a prescription. Or an over-the-counter (OTC) medication. A prescription medication also known as a legend medication because it also known as legend medication because it bears the Federal Legend, which states: "Federal law prohibits dispensing with a prescription."

## **Prescription Information**

The first thing a pharmacy technician must do when receiving a prescription is determine whether the patient has had prescriptions filled from that pharmacy before. If not, the pharmacy technician collects the necessary information, which includes:

- Patient's complete name
- Patient's home address (street, city, state, and zip code)
- Patient's telephone numbers (home, work, and mobile)
- Patient's birth date
- All allergies (drug and food)
- Patient's current physical condition
- Prescription drug card information (group number, member number, and relationship to the cardholder)
- Whether the patient wants to receive generic medications
- A list of any OTC and BTC medications the patient takes
- A list of herbal supplements the patient takes

This information is used to develop a patient profile for the individual. A patient profile is a list of the patient's prescriptions and all related information, including the original date of fill, refill dates, and the prescribing practitioner. The Omnibus Budget Reconciliation Act of 1990 (OBRA) requires that every ambulatory pharmacy maintain patient profiles.

Originally prescriptions were written using Latin abbreviations, and measurements were expressed using the apothecary and avoirdupois systems. Some Latin abbreviations are still used in the practice of pharmacy today. The metric system is the official system of measurement for weight and volumes in the United States.

## **Prescriber Information**

A valid prescription must contain specific information. Every prescription is required to have:

- Prescriber information:  
Prescriber's information includes, the prescriber's name, office address, and telephone number, and if prescribed medication is a controlled substance, the physician's DEA number must be included
- Patient information
- A superscription:  
The superscription (RX symbol) is a contraction of the Latin verb recipe, meaning "take the drug." It is used as the heading on a prescription and usually preceded the inscription. The Rx symbol represents prescription and the pharmacy
- Inscription:  
The inscription contains the medication name, dosage form strength, and quantity
- A subscription:  
The prescription's subscription consists of directions to the pharmacist or pharmacy technician on how to compound a prescription. Many of the medications dispensed today do not require compounding and therefore do not contain a subscription.
- A signa:  
Signature (signa or sig) is a Latin expression meaning to "write on label". The signa is the directions to the patient on how to take the prescribed medications. The signa tells the patient how much, when and how long to take the medication.
- Date:  
The date the prescription was written must appear on the prescription. Some medications, such as controlled substances, must be filled or refilled within 6 months of the date the prescription was written

## **Dispense as Written (DAW) Codes:**

DAW codes are a numeric set of codes, created by the NCPCP, that are used when entering prescriptions into the computer. If a pharmacist or pharmacy technician fails to submit a prescription claim using the correct DAW code, the pharmacy may not be reimbursed properly for the medication that was dispensed. A pharmacy may be audited by a third-party provider to verify that the DAW code was used correctly, if revealed used improperly the pharmacy may be held responsible for refunding claims that were submitted incorrectly.

- 0 No product selection indicated
- 1 Substitution not allowed by provider
- 2 Substitution allowed-patient requested product dispensed
- 3 Substitution allowed-pharmacist selected product dispensed
- 4 Substitution allowed-generic drug not in stock
- 5 Substitution allowed-brand drug dispensed as generic
- 6 Override
- 7 Substitution not allowed-brand drug mandated by law
- 8 Substitution allowed-generic drug not available in marketplace
- 9 Other

**Prescription adjudication** is the process by which a prescription is submitted electronically to a third-party payer so that the pharmacy can find out whether it will receive reimbursement for the medication.

The pharmacy is notified of the status of the claim within a few seconds of submission. Some situations claim is rejected. If the prescription claim is rejected, the pharmacy is notified of the reason with a one- or two-digit rejection code. The prescription claim must be corrected before it is resubmitted.

### **Prescription Claim Rejection Codes**

<b>Code</b>	<b>Meaning</b>
5	Missing or invalid pharmacy number
6	Missing or invalid group number
7	Missing or invalid cardholder ID number
8	Missing or invalid person code
9	Missing or invalid birth date
11	Missing relationship code
19	Missing days' supply
22	Missing or invalid DAW/product selection code
25	Missing or invalid prescriber ID
26	Missing or invalid unit of measure
54	Non-matched National Drug Code (NDC) number
60	Drug not covered for patient
75	Prior authorization required
79	Refill too soon

### **Prescription Labeling**

Every prescription filled should have a visually appealing and professional label. This professional appearance conveys to the patient that care was taken in filling the prescription.

A legal prescription label is required to have several pieces of information:

- Name, address and telephone number of the dispensing pharmacy
- A prescription number (which is used to identify a particular prescription order and to refill the prescription)
- Prescriber's name
- Patient's name
- Date the prescription was dispensed
- Name, strength, and quantity of the medication dispensed
- Directions for use (should be in an easy to understand format for the patient)

\*\*\*Some states may require the name or initials who dispensed the medication. Often the number of refills appear on the label. Some pharmacies may list the drug manufacturer's lot number on the label; this makes it easier to identify a medication that has been recalled from the drug manufacturer.

### **Auxiliary Labels**

Auxiliary labels are normally printed with the pharmacy label. The auxiliary label provides patients with additional information about taking their medication. Auxiliary label should be affixed to the prescription container so that important information, such as the NDC number, lot number, or expiration date, is covered.

Commonly used Auxiliary Labels for Side Effects:

<b>Classification</b>	<b>Commonly Used Auxiliary Label</b>
Contraceptives	Take as directed
Nonsteroidal Antiinflammatory	May cause dizziness/drowsiness
Drugs (NSAIDs)	Take with food
Narcotics	Do not drink alcohol, and/or drinking may increase the effects of the drug
Macrolide Antibiotics	Take on an empty stomach; Take with plenty of water
All Antibiotics	Take until gone
Sulfa Antibiotics	May cause sensitivity to light
Warfarin	Take on an empty stomach Take with plenty of water Do not take aspirin unless prescribed

### **Other Pharmacy Technician Duties**

#### **Prescription Refilling**

Instructions for refilling a prescription are provided by the prescriber on the original prescription. The pharmacy technician must obtain the following information from the patient:

- Patient's name
- Patient's contact telephone number
- Prescription number
- Medication name and strength
- Physician's name
- Whether the patient will wait or return for the prescription

Many states permit a pharmacy technician to contact the prescriber's office for authorization of a refill. Depending on the system used by the pharmacy, the pharmacy technician may submit a request electronically, transmit a fax of the prescription, or use the telephone to call the prescriber's office.

#### **Transferring a Prescription**

Both federal and state laws govern the transfer of a prescription from one pharmacy. The pharmacy technician may pull the original prescription from its file or pull it up on the computer, but the pharmacist is responsible for ensuring that the information transferred is correct. Once the prescription has been transferred to another pharmacy, the original prescription becomes void. The transferring pharmacist must record the following information from the receiving pharmacist

- Date of transfer
- Name, address and telephone number of the receiving pharmacy
- Name of the pharmacist at the receiving pharmacy
- Number of refills transferred
- National Association of Boards of Pharmacy (NABP) number for the receiving pharmacy

- DEA number of the receiving pharmacy (controlled substances only, except schedule II as those are required a new prescription each time)

The following must appear on the back of the prescription or in the computer system. The receiving pharmacist must record the following information from the transferring pharmacist:

- Date of the transfer
- Name, address and telephone number of the pharmacy where the prescription was originally filled
- Name of the pharmacist at the original pharmacy
- Number of refills received
- Original date of the written prescription
- NAPB number for the originating pharmacy
- DEA number of the originating pharmacy (for controlled substances only)

\*\*\*Many states allow a prescription to be transferred only one time.

### **Pharmacy Layout**

The state board of pharmacy regulates the practice of pharmacy for that state. Their regulations determine the physical standards for all pharmacies. The prescription department of the pharmacy is required to have enclosures that protect the prescription drugs area from unauthorized entry and theft, regardless of whether a pharmacist is on duty. Only authorized personnel, such as pharmacists, pharmacy interns, or pharmacy technicians, are permitted in the pharmacy.

- Prescription Window: Where a patient drops off the prescription to be filled. The pharmacy technician collects the necessary information that will be used in developing the patient profile.
- Pharmacy Bench: Is the work area of the pharmacy. Numerous tasks are performed at the bench including:
  1. Entering patient and prescriber information and prescriptions into the computer
  2. Adjudicating prescription claims
  3. Scanning prescriptions into the pharmacy's computer
  4. Pouring and counting medication
  5. Scanning the manufacturer's drug container for quality assurance purposes
  6. Packaging and labeling the prescription
  7. The pharmacist checking the final product against the original prescription order
  8. Bagging the patient's prescription

A state board of pharmacy may require the pharmacy bench to be a specific length. Pharmacy technicians must maintain a clean and clutter-free work area to reduce the possibility of errors.

- Pharmacy Stock Area: Some pharmacies will arrange medications on shelves alphabetically by brand or by generic names.
- Non-Sterile Compounding Area: Should be away from other workflow to minimize distractions to the compounder and contamination of the product. A sink with hot and cold running water and proper drainage is required by all state boards of pharmacy.
- Sterile Compounding Area: This area must comply with the United States Pharmacopeia Chapter <797>. The American Society of Health-system Pharmacists (ASHP) and the National Coordinating Committee on Large Volume Parenterals (NCCLVP) also have released guidelines describing the conditions and practices needed to process compounded sterile preparations (CSP).

- Reconstitution Area: All community pharmacies have an area where medications are reconstituted. (reconstitution is the process in which dehydrated product is returned to a liquid state).
- Repackaging Area: Some community pharmacies may repackage medications if they provide pharmacy services to long-term care facilities. The pharmacy must maintain accurate records for repackaged medications. A beyond-use date (BUD) is assigned by the pharmacy to replace the drug manufacturer's expiration date. The USP has changes its beyond-use dating method for nonsterile solid and liquid dosage forms that are packaged in a single unit and unit dose containers is 1 year or less, unless stability data or the manufacturer's labeling indicated otherwise.

#### **Repackaging Log Information**

Date	Date the drug is repackaged, which includes date, month, and year
Drug	Drug name, usually by generic and then brand name, if indicated on The repackaging log sheet
Dosage Form	Examples include tablet, capsule, spansule, troche, suspension, Elixir, solution
Drug Manufacturer	Drug manufacturer (usually abbreviated)
Drug Manufacturer's Lot number	Control number located on the side of the label or on the bottom of the bottle
Drug Manufacturer's Expiration date	Located with the lot number; remember that if the date indicates only the month and year, the medication is good through the end of The month
Assigned pharmacy	Each item repackaged in pharmacy is given a number consecutive to the previous batch prepared
Lot number	
Pharmacy beyond-Use date (BUD)	New date assigned to repackaged medication according to United States Pharmacopeia <797> guidelines
Pharmacy Technician	Must initial logbook entry
Pharmacist	Must check off each item repackaged

- Pharmacy Records: All community pharmacies must maintain the original prescription on file for the minimum time required by the state board of pharmacy. The pharmacy must maintain all controlled substance invoices for a minimum of 2 years, according to federal regulations. These records include completed DEA Form 222, Form 41, DEA form 106, biennial inventories, and change of the pharmacist in charge (PIC).
- Patient Bins: once a prescription has received its final check by the pharmacist it is placed in the bin ready for pick up. (usually arranged by alphabetically order)
- Consultation Area: Changes made through OBRA '90, a pharmacy must have an area designated for patient consultation. If offer to counsel is accepted by the patient, the pharmacist counsels the person. Information provided during counseling may include:
  1. The name and description of the medication
  2. The dosage form, dosage, route of administration (ROA), and duration of drug therapy
  3. Special directions and precautions for preparation, administration, and use by the patient
  4. Common adverse or severe side effects or interactions and therapeutic contraindications that may be encountered, including their avoidance and the action required if they occur
  5. Techniques for self-monitoring drug therapy
  6. Proper Storage
  7. Prescription refill information
  8. Action to be taken in the event of a missed dose

The consultation area should allow the pharmacist and patient to speak in privacy, away from others

### **Communication**

Customer service is defined as the provision of service to customers before, during, and after a purchase. Customer service in health care is different from that in other industries because the customers are recipients of medical services that are critical to their health.

The “five rights” of medication administration used by nurses also apply to the pharmacy technician. They are:

- Right Patient: The patient’s identity must be verified against the prescription order to ensure that the correct patient is receiving the medication
- Right Medication: It must be verified that the medication written on the prescription order is the same medication being prepared for the patient
- Right Time: The pharmacist must ensure that the medication is to be taken by the patients at the correct time it was ordered by the physician
- Right Dose: The medication dose being prepared must be confirmed against the written medication order before it is dispensed.
- Right Route of Administration: The pharmacist must verify the correct route for delivering the ordered medication to the patient by reading the order and preparing the medication appropriately.

Developing excellent customer service skills is important in any job and even more important as a pharmacy technician. Customers that come to your pharmacy will remember if you were rude, uninformative, helpful, or courteous. Your attitude can have a direct effect on whether a pharmacy customer comes back, and it can also alter your image as a technician.

Here are some helpful tips you can use on the job:

- Appearance: Individuals who shop and pick up their prescription at your pharmacy appreciate a well-groomed pharmacy technician. The way you look has an impact on how others see you.
- Attitude: Courtesy and knowledge are important. Be sure to keep up with the pharmacy field and know your subject
- Efficiency: It is imperative to complete your work efficiently and correctly the first time. Mistakes in pharmacy can cause serious illness or even death
- Helping: Going the extra mile and assisting other co-workers when they are overwhelmed will make you a star worker. Co-workers will also return the favor when you need it.

## **Chapter 8: Institutional Pharmacy Practice**

Probably one of the most challenging settings in which a pharmacy technician can work is a hospital pharmacy, also known as the institutional pharmacy. As a result of the current changes in the pharmacist's role in hospitals, the number of highly skilled technicians needed has increased. Because of the increase in patient volume and the need for pharmacy interventions and evaluations as they pertain to patient profiles, today's pharmacists do not have time to perform many of the important tasks they did in the past. Technicians have assumed control of these tasks, which include preparing intravenous medications, chemotherapy medications, loading patient's drawers or Pyxis machines to name a few.

### **Hospital Pharmacy Standards and Procedures**

Policies and Standard Operating Procedures. All pharmacies have a policies and procedures (P&P) manual. This manual contains the policies that outline the rules of the facility and the procedures that explain how, when and/or why the policies are to be executed; in other words, the protocol of the facility. Example, information contained in the P&P manual concerns daily work routines and responsibilities, benefits, protocols for emergency situations, mandatory training, and other important and useful information. Technicians should be familiar with the P&P manuals at their facilities.

### **Hospital Protocol**

Protocol also defines the guidelines within the hospital, such as the formulary medications (those that are approved for use) and non-formulary medications (those not approved). Formularies are developed by a group of physicians and pharmacists from a variety of medical specialties who do not work for the entity requiring the formulary. These group members review new and current medications to evaluate selections based on cost, effectiveness and safety of the drugs and patient demographics. These rules must be enforced and update constantly. The Pharmacy and Therapeutics Committee (P&T) composed of pharmacists, physicians, nurses, other health care workers and administrators, meets on a routine basis to discuss appropriate changes to the protocol. The purpose of the committee is to choose the best medicine for patients at the best cost.

### **Regulatory Agencies**

All hospitals must meet federal and state guidelines if they are to be reimbursed for patients who have Medicare or Medicaid insurance coverage. Each state's board of pharmacy may inspect pharmacies to guarantee that all personnel are working within legal guidelines. The board has the authority to fine and even close, any pharmacy that is noncompliant with current laws.

The following are some of the agencies that govern the operations of hospitals:

1. The Joint Commission (TJC): Hospitals pay a fee for TJC accreditation. They visit once every 2 years to evaluate standards compliance. The Joint Commission can require compliance with applicable local rules and regulations so it can indirectly enforce United States Pharmacopeia <797> (USP <797>) in states that have adopted USP <797> in their pharmacy rules and regulations.
2. Centers for Medicare and Medicaid Services (CMS): The CMS inspects facilities and must give approval for hospitals to provide care and receive reimbursement for patients covered by Medicaid and Medicare
3. Department of Health and Human Services (HHS): This department is the primary agency that protects the health of the American people and provides essential human services.
4. Department of Public Health (DPH): Every state's department of public health inspects hospitals and hospital pharmacies to ensure that they are in compliance with DPH regulations

5. State Board of Pharmacy (BOP): Develops, implements, and enforces pharmacy practice standards in that state for the purpose of protecting the public.

#### **Examples of Hospital Codes:**

- Code Red: Fire
- Code Blue: Medical emergency—Adult
- Code White: Medical emergency—Pediatric
- Code Pink: Infant abduction
- Code Purple: Child abduction
- Code Yellow: Bomb Threat
- Code Gray: Combative Person
- Code Silver: Person with a weapon and/or hostage situation
- Code Orange: Hazardous material spill/release
- Code Triage Internal: An internal disaster
- Code Triage External: An external disaster

#### **Stat, ASAP, and Standing Orders**

Medication orders that need to be filled within minutes are referred to as “stat orders”, they should take precedence over all other orders. Normally, a stat order can be filled in 5 to 15 minutes, depending on the preparation. Stat orders can mean the difference between life and death; they must be taken seriously. If possible, all stat orders should be hand delivered to ensure it arrives at the correct destination and quickly.

An “ASAP” is or normally as urgent as a stat order. However, they should be placed in front of the new orders to ensure fast processing by the pharmacist. They should be taken up to the destination within 30 minutes.

“Standing Orders” are written protocols for drugs or treatment that are used in a specific situation. For example, if a procedure is to be performed, a preprinted order with the list of medications to be administered is on file for the physician to use. This saves the physician from having to write orders each time he/she performs the procedure. This includes PRN (as needed) drugs that can be given in case the patient needs additional medication.

#### **Automated Dispensing System**

An example of an automated dispensing system (ADS) is the Pyxis MedStation 4000 system. This automated system uses a biometric user identification security system. This means the user’s fingerprint is scanned and verified before the system grants the user access. Most hospitals have incorporated automated dispensing systems to hold all types of stock. These containers are available in many different sizes, from countertop models to 6-foot-tall cabinets that hold tubing, large volume IV’s, and dressings. The three main advantages of this type of cabinet are as follows:

- Inventory Control: Inventory sheets can be generated in the pharmacy. Also, the patient can be charged exactly as each item is dispensed from the ADS machine.
- Reduced wait time: Nurses can directly access the patient’s drugs from the ADS. No starter dose needs to be sent to the floor from the pharmacy.
- Accuracy: Nurses who access the ADS machine are allowed only to take the specific medication or medications orders. In this way, an incorrect medication is less likely to be dispensed.

## **Intravenous Preparation**

Only specially trained and properly garbed (hat, mask, booties, gloves) pharmacy personnel can make IV's and Chemotherapy medications.

The pharmacy technician is responsible for stocking the IV room with all the supplies needed for the day. The technician also must make sure the work area stays clean.

## **Abbreviations and Descriptions of Pharmacy Stock:**

### **Types of Containers Used in Preparing Parenteral Medications**

Amp	Ampule; 1- to 50m glass container
Vial	0.5- to 100ml glass or plastic container with a stopper
MDV	Multidose vial; holds multiple doses of medication
SDV	Single dose vial; holds one dose of medication

### **Common Types of Solutions Used/Ordered for Parenteral Agents**

Diluent	Agent used to dilute medications; can be sterile water, normal saline
D5NS	5% Dextrose in normal saline
NS	Normal Saline; has a concentration of 0.9% sodium chloride
LR	Lactated Ringers
D5W	5% Dextrose in water

### **Routes of Administration to Parenteral Agents**

IV	Intravenous; into the vein
IV push	Into the vein directly from a syringe
IM	Intramuscular; into the muscle
ID	Intradermal injections up to 1ml into the upper layers of the skin
SUBCUT	Subcutaneous; under the skin
IT	Intrathecal

## **Supplies**

Syringes: are used in the pharmacy available in eight basic sizes: 0.5, 1, 3, 5, 10, 20, 30, and 60ml. Most syringes are made of plastic and must be discarded after one use. Glass syringes rarely are used in pharmacy, although they can be used when a patient is allergic to plastic. Glass syringes, unlike plastic can be sterilized and reused.

Needles: Needles are made of aluminum or stainless steel and are available in many different gauges (sizes) and lengths. A limited number of needle gauges are available in the pharmacy. The most common needle size for preparing IV medications are 19, 18, 16 gauges. These needles are normally 1 to 1.5 inches long.

## **Aseptic Technique**

Aseptic Technique is a set of procedures used to prevent the contamination of an object by microorganisms. Use of this technique is important in the preparation of all IV medications, IV nutrition solutions (TPN= Total Parenteral Nutrition), Chemotherapy products.

## **Horizontal Vs Vertical Laminar Flow Hoods:**

Horizontal flow hood or laminar airflow workbench (LAFW) is used for preparing non-hazardous IV medications. A high-efficiency particulate air (HEPA) filter is located at the back of the hood. When working inside the horizontal flow hood, the orientation of the hands must not block the flow of first-air.

First-air is the air issuing directly from the HEPA filter. This means that hands cannot be moved between the vial, needle, or IV bag and the first-air. You must work 6 inches inside of the hood to gain sterility of the iv product. In horizontal flow hood the air moves towards you.

Vertical flow hood also known as Biological safety cabinet (BSC) are used to prepare chemotherapeutic agents. The air is pulled down toward the table top filter from the ceiling of the hood, which contains the first HEPA filter. The chemotherapy hood does not allow the air to leave the container compartment; instead, the air is recycled through a second HEPA filter that removes any particulate matter before the air is recirculated into the work environment. The flow of air vertically helps protect the person preparing the agents from unwanted exposure.

## **Chapter 9: Bulk Repackaging and Non-Sterile Compounding**

### **Terms and Definitions:**

Cream: A hydrophilic base

Elixir: A base solution that is a mixture of alcohol and water

Emulsion: A mixture of two or more liquids that do not usually blend using a stabilizing agent; the process of making an emulsion is called emulsification.

Hydrophilic: Having a strong affinity for water; any substance that easily mixes with water

Hydrophobic: Lacking an affinity for water; any substance that does not mix or dissolve in water

Ointment: A hydrophobic product such as petroleum jelly

Solute: The ingredient that is dissolved into a solution

Solvent: The greater part of a solution that dissolves a solute

Suspension: A solution in which a powder does not dissolve into the base; the solution must be shaken before use

Syrup: A sugar-based liquid

Triturate: To grind or crush powder, such as a tablet into fine particles

### **Bulk Repackaging**

Institutional pharmacies often purchase medication in bulk quantities. Only one drug product at a time should be prepackaged in a specific work area. All federal and state laws and regulations must be followed. Label requirements include:

- Proprietary name
- Nonproprietary name
- Dosage form
- Strength
- Strength of an individual dose
- Total contents delivered
- Beyond-use-date
- Lot number

The following are five possible reasons a pharmacy may repackage bulk medications:

1. Certain medications are not available unit dosed
2. The cost of repackaging bulk medication may be less than purchasing it unit dosed
3. Repackaging may allow the pharmacy to provide a patient with a new medication more quickly, rather than having to order the drug and wait for it to be delivered.
4. Labeling each individual dose reduces the chance of errors
5. If unit dose medication is not used, it can be returned to stock and used for another patient later.

### **Documentation**

Keeping track of the products you are repackaging is a major step that must not be overlooked. Just as manufacturers must document all drugs they have packaged, so must the pharmacy. If a manufacturer recalls a drug that has been repackaged, it is essential to have an accurate count of how many unit doses were made with the recalled product and to be able to identify them by lot number on each.

**Example of Unit Dose Record Log Sheet Information:**

<b>Item</b>	<b>Description</b>
Date	Date the drug is repacked, which includes day, month and year.
Drug	Drug name, usually by generic and then brand name if indicated on log sheet
Dosage Form	Tablet, capsule, spansule, troche, suspension, elixir, solution.
Manufacturer	Manufacturer of drug, usually abbreviated
Manufacturer's lot number	Control number located on side of label or on bottom of bottle.
Manufacturer's Expiration date	Located with the lot number; remember that if the date only indicates month and year, the drug is good through the end of the month
Pharmacy lot number	Each item repackaged in the pharmacy is given a number consecutive to the previous batch prepared
Pharmacy beyond-use-date	One year from the date packaged or the expiration date
Technician	On the manufacturer's container, whichever is earlier
Pharmacist	Must initial logbook entry Each item repackaged must be checked off by a Pharmacist

**Non-Sterile Compounding Equipment****Measuring devices:**

Types of Graduated Cylinders

**Type**

Glass

Plastic

Cylindrical

Conical

**Use**

Used for hot liquids or liquids not compatible with plastic devices

Used for cold liquids

Used to measure liquids more accurately

Wider platform is more stable when measuring viscous liquids and make it easier to mix solutions however, because sides flare outward, reading meniscus is more difficult for accuracy of measurement

\*\*When reading the calibrations of a beaker or graduated cylinder, you must have the liquid at eye level. You must read the graduated cylinder at the bottom of the liquid line, also known as the meniscus.

**Types of Compounding Mixing Equipment**

Mortars and Pestles:

**Type**

Glass

Porcelain

**Use**

Used for preparing liquids such as solutions and suspensions and for mixing oily or staining materials

Used for blending powders and pulverizing soft aggregated or crystals

Spatulas:

Type	Use
Plastic	Used for mixtures that may react with metal
Metal	Used for mixing ointments or creams and handling dry chemicals
Long (>6 inches)	Used for ointments or creams and powder blends for capsules
Short (<6 inches)	Used in handling dry chemicals

## Weighing Equipment

One of the most expensive pieces of compounding equipment is the balance or scale used to weigh powders. Scales differ in their range of weight and style. A Class III balance, also called a Class A balance, is a torsion balance. This type of scale uses a counterbalance (weights) to determine the weight of the substance being measured, and is referred to as a mechanical scale (required by most state boards of pharmacy). This type of scale has special weights that are labeled in a range of milligrams to grams. The minimum weighable quantity for a Class A balance is 120mg. Always place the weights on the right side of the balance using a weighing boat or paper. This is done to ensure continuity of measurement.

## Preparing Solutions

When preparing solutions, you must understand the major parts of the liquid: The solvent is the vehicle used to dissolve something; the solute is the ingredient or agent in the solvent and the solution is the result, the final mixture of the solute and solvent. Two of the most important techniques of mixing solutions are to measure carefully and mix thoroughly. A drug's solubility dictates the type of dosage form that must be prepared. For example, if the drug is water soluble, a syrup or solution can be prepared; however, if it is insoluble, an elixir, a suspension or possibly an emulsion can be made. The pH also effects the solubility of a drug. In such cases buffers may be used to maintain the correct solubility characteristics.

## Solubility Characteristics

1. Small particles dissolve faster than large particles
2. Stirring increases the dissolution rate
3. The more soluble the drug, the faster it dissolves
4. Viscous liquids decrease dissolution rates
5. Increased temperature normally increases the dissolution rate
6. Mixing an electrolyte with a nonelectrolyte drug can either increase or decrease the dissolution rate

\*\* When orders indicate solution to be a specific strength with instructions to "qs" to a final volume, this means that the solution is to yield a final volume and final strength exactly as ordered by the physician. The "qs" (quantity sufficient) means to add a sufficient quantity of liquid to reach that final required volume.

## Solids Tablets and Capsules

Tablets and Capsules can be compounded by pharmacy technicians. These preparations have the advantage of providing a custom-made medication for each patient's specific needs. Molds are used to make these oral dosage forms. A product can be made accurately using careful measuring, weighing, and mixing procedures. Capsules come in different sizes depending on the strength the medication is

needed. Advantages of capsules include masking of ingredients' taste and ease of swallowing compared to tablets. Capsules are composed of vegetable-based or gelatinous materials.

**Capsule Size:**

<b>Contains Approximate Amount (mg)</b>	<b>Number</b>
1000	000
750	00
500	0
400	1
300	2
200	3
150	4
100	5

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