A Technician’s Role Optimizing Patient Safety
And Minimizing Medication Errors
A Knowledge Based Course For Technicians

By

Jeff Blackburn, MBA – Healthcare Administration, C.Ph.T.

ACPE No. 0096-9999-10-072-H05-T

Release Date: September 27, 2010
Expiration Date: September 27, 2013

Total number of pharmacy continuing education hours: 6 hours (0.6 CEU’s)

Course Cost: $19.00 (to be paid at time of testing)
Average time to Complete: Approximately Six hours including testing
Course Value: Six Contact Hours
Reading: 41 Pages
Final Exam: 50 Questions
Completion Requirements: Answer 70% of the questions correctly. Evaluation
Statement of Need

Pharmacy technicians play a major role in modern pharmacy practice. The pharmacist relies on the technician to provide an extra layer of safety. It is important for technicians to follow system-based processes and inform the pharmacist whenever they have questions, concerns, or feel processes do not work or are unmanageable.

The foundation of any quality assurance system is proper training of personnel. For technicians working in community pharmacy or the unit dose areas of hospitals, it is important that they be familiar with the drugs they prepare as well as the pharmacies procedures. If you are working in the admixture room, you should be familiar with the drugs as well as the principles of aseptic technique and sterile product preparations. All quality assurance measures will break down if the technician is not both knowledgeable and competent in the area he or she works in.
Course Objectives

Upon successful completion of this activity:

1. Describe the different types of medication errors.

2. Identify causes or factors that contribute to medication errors.

3. Describe things that can be done to prevent medication errors from occurring.

4. List examples of common errors.
**Introduction**

Medications save lives, but they do so only when they’re taken correctly – by the right patient, who takes the right medicine, at the right time, in the right dosage, by the right route, and for the right amount of time. According to the National Patient Safety Foundation, of the 3 billion prescriptions that are filled, as many as 30 million dispensing errors occur. While some of them are not even noticed, others can have serious consequences, even resulting in death at times. The most common pharmacy errors occur when:

- Pharmacy technicians hand out the wrong prescriptions to patients – they get the names wrong, which means the entire set of medicines is wrong. And when patients fail to check the drugs they’ve been given and follow the prescription blindly without even looking at the name, it spells disaster in the making.

- Overworked and negligent pharmacy technicians give out the wrong drug because they don’t read the prescription carefully. This could cause serious consequences if the patient is allergic to the new drug or if it worsens their symptoms and causes them to become more ill.

- Pharmacists and technicians substitute one drug for another without checking with the doctor who prescribed the drug. This could lead to complications because the pharmacist is assuming that he/she is qualified to make the switch.

- They give out drugs that are past their expiration dates and which could either cause harm or not affect a cure since they are worthless past a certain date.

Errors can have profound consequences for the pharmacists who supervise technicians. An Ohio pharmacist pled no contest to involuntary manslaughter of a 2-year-old child who died in 2006 as a result of a chemotherapy compounding error\(^1\). The pharmacy board revoked the pharmacist’s license, and a grand jury indicted him on charges of reckless homicide and involuntary manslaughter. The pharmacist faced up to 5 years in prison. Prosecutors held the pharmacist responsible for the toddler’s death because he oversaw the preparation of her chemotherapy. The child had undergone surgeries and four rounds of chemotherapy to treat a curable malignant tumor at the base of her spine. She was supposed to receive her last dose of chemotherapy on the day of the error. A pharmacy technician mistakenly prepared the infusion using too much 23.4% sodium chloride. According to a news report, the technician mentioned to the pharmacist that the final preparation didn’t seem right, but the error went unnoticed. The infusion was administered to the child, who died 3 days later.

Most of these errors occur when pharmacy technicians and pharmacists are too busy, distracted, and overworked.

---

\(^1\) [http://www.ismp.org/Newsletters/acutecare/articles/20090423.asp](http://www.ismp.org/Newsletters/acutecare/articles/20090423.asp)
Pharmacists are responsible for the safe and appropriate use of medications in all pharmacy practice settings. As part of the multidiscipline healthcare team, the role of the pharmacist is to achieve predefined therapeutic outcomes without subjecting the patient to undue harm.

As pharmacists become more involved in patient specific care, technicians are asked to perform tasks that have previously been restricted to pharmacists. As pharmacy technician responsibilities expand, it is important for technicians to be aware of the significance and causes of medication errors and recognize the technician’s role in preventing drug errors.

Numerous terms are used to describe drug related incidents. The term drug misadventures is used to describe adverse drug reactions (unintended response to drugs used at normal doses) and medications errors (errors related to the medication use process that may or may not result in adverse drug outcomes).² This course focuses on errors that occur during the medication use process, which includes the prescribing, dispensing, and administration phases of medication use, monitoring the patient for expected and unexpected outcomes and patient compliance.

This course provides insight to the incidence and significance of medication errors. It reviews common causes of medication errors and suggests measures to minimize errors. In addition, the importance of medication error reporting and monitoring is highlighted.

---

Pharmacy Technicians’ Role

Pharmacy technicians play a major role in modern pharmacy practice. The pharmacist relies on the technician to provide an extra layer of safety. It is important for technicians to follow system-based processes and inform the pharmacist whenever they have questions, concerns, or feel processes do not work or are unmanageable.

Prescription Drop-Off

If technicians are stationed at prescription drop-off, consider creating a checklist of critical patient information that the technician should obtain from each patient. The date of birth should be written on every hard copy prescription so the pharmacist has a second identifier readily available during verification. Allergy and medical condition (e.g., pregnancy) information should be updated in the patient’s profile at each patient encounter and communicated to the verification pharmacist. Knowing a patient’s medical conditions can help the pharmacist uncover errors.

Order Entry

Medication safety is enhanced when technicians know medical terminology and drug names, especially if they enter prescriptions. New drugs are a risk, because technicians and pharmacists as well, may not be aware of them and may instead see and select something familiar. Pharmacists and technicians should work together to determine the best method of distributing information regarding new drugs on the market.

It is important that the technician understands the safety features of the computer system and does not create workarounds to improve efficiency at the risk of decreasing accuracy and safety. Drug alerts can be numerous, and the technician may be inclined to override an alert and not “bother” the pharmacist. All alerts that involve medication interactions, allergies, duplications, and other clinical warnings should be relayed to the pharmacist. Pharmacists should communicate unnecessary or superfluous alerts with corporate or commercial software designers and discuss the possibility of turning off those alerts.

Filling/Dispensing

Many mix-ups during this production phase occur due to incorrectly reading a label. The problem is aggravated by confirmation bias, whereby one selects based on what is familiar or expected on the label, rather than what is actually there. For example, a technician may choose a medication container based on a mental picture of the item, whether it is a characteristic of the drug label, the shape, size, or color of the container, or the location of the item on a shelf. Consequently, the wrong product may be picked. Physically separating drugs with look-alike labels and packaging can help reduce these types of errors. The use of bar code technology, viewing scanned images of products and prescriptions by pharmacists, and other technology for verification in the production process will help catch errors in this step.
Point of Sale

Errors may also occur with a correctly filled prescription if it is dispensed to a patient for whom it is not intended. This can be avoided by consistent use of a second identifier at the point of sale. The person picking up the prescription should be asked to provide the patient’s address or date of birth. The technician should then check this against the information on the prescription receipt and vial. Reviewing each medication with the patient or caregiver at the point of sale provides the best final check. Implement a process for technicians to refer dispensing of high-alert medications to pharmacists at the point of sale. Use notations on bags for patients that may be new, have had major changes in medications or dosages, and other established internal protocols to direct technicians to refer the patient to the pharmacist for counseling.

Internal errors should be discussed among pharmacists, technicians, and clerks. To foster proactive learning, it is important to share errors occurring at other pharmacies. This includes errors and prevention strategies reported nationally, such as those published in the ISMP Medication Safety Alert! Community/Ambulatory Care Edition

Types of Medication Errors

Medication errors can occur at any point during the medication use process. They do not only occur in the pharmacy. For example, medication errors can also occur when a physician writes an order (during the prescribing process), when a nurse transcribes a medication order, when office personnel phone in a prescription to the pharmacy, or when patients do not take their medication as directed (patient compliance).

Pharmacy technicians should be aware of and concerned with all types of errors, not only those specifically occurring in the pharmacy. Sometimes a pharmacist may miss an error and a technician may be the one to notice it. According to the ASHP Guidelines on Preventing medication Errors in Hospitals, medication errors can be categorized into 11 different types. It is not always obvious as to which category an error belongs because of the complex nature of the medication use process. Errors may occur due to multiple factors and therefore may fit several categories.

Prescribing Errors

A prescribing error occurs at the time a drug is ordered by a prescriber for a specific patient. It may include the selection of an incorrect drug, dose, dosage form, route of administration, length of therapy, or number of doses. An inappropriate rate of administration, wrong drug concentration or inadequate or wrong instructions for use are also considered prescribing errors. When evaluating whether a medication was prescribed in error, it is important to consider patient characteristics such as allergies, weight, age, medical indication (condition being treated), and concurrent drug therapy,

3 American Society of Hospital Pharmacists, ASHP guidelines on preventing medication errors in hospitals AM J Hosp Pharm 2003,50;305-14.
among other factors. For example, a prescription for amoxicillin 250mg PO TID may be appropriate to treat a middle ear infection in a 5 year old child but would be too high a dose for a 12 month old infant and thus would be considered a prescribing error. Prescriptions that are filled incorrectly due to illegible handwriting are also considered prescribing errors.

**Omission Errors**

Failure to administer an ordered dose to a patient in a hospital, nursing home, or other facility before the next scheduled dose would be considered an omission error. This would occur when a dose is completely omitted as opposed to one that is administered late. If a dose is ordered to be held for medical reasons it is not considered an error. Examples of times when an omitted dose would not be an error are when the patient cannot take anything by mouth (NPO) prior to a procedure or when health care providers are waiting for drug level results to be reported. Medications that are not administered because a patient refuses to take them would not be an error.

**Wrong Time Errors**

Timing of administration for some medications is critical to their effectiveness. Maintaining an adequate blood level of some drugs, such as antibiotics, frequently depends on evenly spaced around-the-clock dosing. Administering doses too early or too late may affect the drug serum level and subsequently the efficacy of the drug. Nursing homes and hospitals frequently have predefined schedules to avoid medications being administered inconsistently. It would not be realistic to expect that all morning doses be administered at exactly 8:00am. Therefore, an acceptable interval surrounding the scheduled time is usually established. An institution may determine that medications administered within 30 minutes of the scheduled time (30 minutes before or after) is acceptable. Medications administered outside of this window would be considered wrong time errors. Wrong time errors are occasionally unavoidable because the patient is away from the patient care area for a test or the medication may not be available at the time it is due.

**Unauthorized Drug Errors**

Administration of a medication to a patient without proper authorization by the prescriber is categorized as an unauthorized drug error. This might occur if a medication for a one patient is administered to another, or if a nurse gave a medication without a physician order. Patients at home sometimes “share” prescriptions as well. Refilling a prescription that has no refills remaining without authorization from the physician would be another example of an unauthorized drug error.

Some health care facilities have guidelines or protocols established that allow flexibility in administering medications based on specific patient parameters. For example, a postsurgical protocol may allow a nurse to administer potassium chloride injection when a patient’s serum potassium level falls below a specified level. The dose of potassium
chloride may vary depending on how low the serum level is. Administration of medications outside of the established guidelines would be an example of an unauthorized drug error.

**Improper Dose Errors**

Improper dose errors occur when a patient is given a dose that is greater than or less than the prescribed dose. This type of error may occur if there is a delay in documenting (or absence of documentation) a dose that results in an additional dose being administered. Inaccurate measurement of an oral liquid would be an improper dose error. Excluded from this category would be doses that cannot be accurately measured or are not specified as in topical applications. Variances that occur from apothecary to metric conversions would be excluded as well.

**Wrong Dosage Form Errors**

Doses administered or dispensed in a different form from that ordered by the prescriber are classified as wrong dosage form errors. Depending on state laws and health care facility guidelines, dosage form changes may be acceptable to accommodate particular patient needs. Dispensing a liquid formulation to a patient who has difficulty swallowing tablets without a specific prescription might be an example of an acceptable dosage form change.

**Wrong Drug Preparation Errors**

Drugs requiring reconstitution (adding liquid to dissolve a powdered drug), dilution, or special preparation prior to dispensing or administration are subject to drug preparation errors. Examples include reconstituting a cephalexin oral suspension with an incorrect volume of water, using bacteriostatic saline for injection instead of water for injection to reconstitute a lyophilized powder for injection, or not breaking the seal of a ready-to-mix heparin bag. Using a wrong base product when compounding an ointment is another example of a wrong drug preparation error.

**Wrong Administration Technique Errors**

Doses that are administered using an inappropriate procedure or incorrect technique are categorized as wrong administration technique errors. A subcutaneous injection that is given too deep or an intravenous (IV) drug that is allowed to infuse via gravity instead of using an IV pump is classified in this category. Eye drops instilled in the wrong eye is another example of an error in this category.

**Deteriorated Drug Errors**

Although sometimes cumbersome, monitoring expiration dates of products is very important. Drugs used past their expiration date may have lost potency and may no longer be effective or may be less effective. Refrigerated drugs stored at room
temperature may decompose to the point that their efficacy is less than optimal. Medications that are dispensed or administered beyond their expiration date or medications that have deteriorated due to improper storage are listed as deteriorated drug errors.

**Monitoring Errors**

Monitoring errors result from inadequate drug therapy review. Ordering serum drug levels for a patient on phenytoin (seizure medication), but not reviewing them or not responding to a level outside of the therapeutic range would be a monitoring error. Not ordering drug levels when required or prescribing an antihypertensive agent, which lowers blood pressure, and failing to check blood pressure would be errors as well.

**Compliance Errors**

Medication errors are committed by patients too, when they fail to adhere to a prescribed drug regimen. These errors may be detected when a patient requests refills for prescriptions at unreasonable intervals (too long after or too soon before a refill is due) without a reasonable explanation.

**Other Errors**

Errors that cannot be placed into 1 of the 11 categories are grouped together in a miscellaneous category. Some of the errors are defined in the ASHP guidelines seem to primarily apply to patients in a health care facility. These same definitions can actually be applied to home health care, clinic, or physician office, as well as the out-patient pharmacy practice settings.

**Incidence**

Although medication errors are not uncommon, it is difficult to determine the actual numbers of medication errors. Few studies provide a complete and thorough evaluation of errors within the entire medication use process. It is hard to project data from studies on medication errors because of the different methods used to detect errors and the various definitions of errors. In addition, the focus of some studies is on just physician, nursing, or pharmacy errors, or just one component of the medication use process.

Medication errors can occur at any point in the medication use process. Millions of doses are administered daily in health care facilities and patient homes, and the volume of prescriptions filled annually in community based pharmacies is over 1.5 billion. Based on these estimates alone, it is apparent that even with a high rate of accuracy, a small percent of errors can result in a large number of medication errors.

The number of new drugs and dosage forms available continues to grow, making it difficult to keep up with new developments in pharmacy. Staying abreast of technological advances and complex medication regiments requires professional
commitment. Medication error awareness and prevention must be a high priority in all health care facilities and pharmacies.

**Medication Error Rates**

This section describes medication errors rates reported in some studies. It is intended to provide an overview of the complexity of studying medication errors due to the different monitoring, measuring, and reporting techniques used. It also reviews differences in the studies that contribute to varying medication error rates.

The Harvard Medical Study\(^4\) that looked at the incidence of adverse events in hospitalized patients found that 19% of the adverse events that occurred in hospitalized patients were related to drug complications. This study demonstrates that complications from drugs, including those caused by errors, are a significant cause of medical management injuries in hospitalized patients.

Physician prescribing error rates in hospital and community setting have been reported to be 0.3 – 1.9%. One study determined that almost one-third (28.3%) of the prescribing errors were potentially harmful if not followed up by a pharmacist.\(^5\) Further, it has been observed that errors occurring earlier in the medication use process (prescribing phase) are more likely to be detected and corrected than those occurring later in the process (administration).

Physician prescribing is only the first step in the medication use process. Other studies have evaluated medication errors occurring at various other stages as well. Error rates of pharmacist dispensing in the outpatient setting have been reported to be approximately 12%.\(^6\) There is conflicting data evaluating the relationship between the number of serious errors and the number of prescriptions filled. It has been estimated that the medication error rate in health care institutions not using a unit dose system is one error per patient per day.

Medication error studies report different error rates. The pharmacy technician should recognize that the differences in how a study was performed, the various techniques and definitions used, and the scope of the study. Many errors are identified and corrected before medications reach the patient. Studies also show that a small percentage of errors leads to adverse events in patients.

---


Medication Error Reporting

The rate of medication errors is often based on incident reports. Ideally, incident reports are completed by health care providers when a medication error is discovered. However, health care providers do not always submit incident reports because many personnel lack the knowledge to identify errors, the time required to document them, or they are afraid of negative consequences.

Many times errors are discovered when a pharmacist checks a prescription or medication order prior to dispensing. The error is promptly corrected before it ever reaches the patient. Often times, an error is not documented because it is not recognized as an error or the reporting process is cumbersome. For these reasons, the number of medication errors is probably higher than reported.

Reporting medication errors can sometimes be a fearful experience. Health care personnel may be afraid of disciplinary action, punitive actions, or of the backlash of reporting an error made by a coworker. They may also be concerned about liability issues should a negative outcome occur due to an error.

It is apparent that medication errors occur in all practice settings on a daily basis. Fortunately, the majority of these errors are detected and corrected before the medication ever reaches the patient. Medication errors do however reach the patient and some errors result in negative outcomes.

Impact of Medication Errors

The outcomes of medication errors range from minor discomfort to devastating long term disability or death. It is often difficult to predict the outcome and significance of a medication error because so many factors are involved. Such factors include the type of medication error, the health status of the patient, pharmacologic classification of the drug involved, route of drug administration, timing of drug administration, the cost to the health care system, and the damage to the patient’s trust in care providers.

Author’s Personal Note on Patient Impact

My mentor in pharmacy was extremely strict when it came to patient safety. I once asked her why it seemed so personal and she relayed the following. When her brother was a child he was given too high a dosage of a particular drug which caused his kidneys to shut down. After over 20 years of dialysis, he was finally given a kidney transplant. Due to complications during the procedure, he passed away. While it was never reported as such, the medication error was ultimately the cause of his death. This tragedy has been a constant reminder to me as to the impact of what we do as pharmacy technicians.
Impact on the Patient

In a report of five pediatric patients who received overdoses of vincristine (a chemotherapy drug), three patients died and two recovered.\(^7\) Of the three patients who died, two received a 10-fold overdose and the third patient was very ill with advanced stage leukemia. The two children who recovered were in remission (their leukemia was under control) at the time and received smaller overdoses. In this situation, the health status of the patients and magnitude of the overdose helped determine the significance of the error.

Sometimes not receiving a drug or receiving it late may harm patients as well. Administration of a phenytoin (seizure medication) dose was delayed 28 hours in an elderly patient and resulted in a seizure. The patient fell and fractured her jaw during the seizure, which required extensive surgery. All of these events can be attributed to one medication error – late administration of the phenytoin. Many case reports describe adverse drug events due to medication errors.

Financial Impact of Medication Errors

Not only can mediation errors lead to negative patient outcomes, but they can also prolong hospital stays and increase health care expenses. The treatment of adverse drug events is estimated to cost billions of dollars annually. It was estimated that $1.5 million was spent in a single year to treat adverse drug events at one hospital. Another study evaluated the cost of drug related morbidity and mortality in the ambulatory setting. In this study it was estimated that the United States spends $76.6 billion annually to manage those drug related occurrences, some of which were due to medication errors.\(^8\) Not only must the cost of additional medical management be considered, but the legal fees or out-of-court settlements resulting from malpractice claims must also be considered.

In one case almost $14,000 in medical costs were incurred to treat a patient who experienced recurrent hypoglycemia (low-blood sugar) due to a prescription error. The pharmacist inadvertently dispensed glyburide (Diabeta, drug for high blood sugar) instead of diazepam (Valium, an anti-anxiety medication).

Loss of Trust

Patients may lose trust or faith in the medical community as a result of experiencing or reading about an adverse drug event. They may choose to switch pharmacies or physicians, or maybe even hesitate to seek medical help for fear of not receiving quality care. Patients may also seek non-conventional treatments from outside the medical community. Personnel responsible for medication errors that result in significant patient injury may lose confidence in themselves as practitioners as well.

It is fortunate that most medication errors are detected and corrected before the medication is dispensed to the patient or the patient care area. However, medication errors do occur and may result in reversible or permanent negative patient outcomes. They can also be associated with a financial impact to an individual, institution, and the overall health care system.

**Causes of Medication Errors and Ways to Prevent Them**

Medication errors can be attributed to a number of different causes. It would be unfair to place blame solely on an individual without considering factors that might contribute to an error. Administrators of health systems are constantly striving to decrease the presence of factors in the medication use system that contribute to medication errors. In turn, each health care provider must also strive to minimize the occurrence of medication errors. One of the best ways to do this is to become familiar with the most common causes of medication errors. Medication errors are most often attributed to one or more of the following: calculation errors, careless use of zeros and decimal points, prescribing, illegible handwriting, missing information, drug product characteristics, compounding/drug preparation errors, prescription labeling, and work environment or staffing issues.

**Calculation Errors**

There are reports of numerous medication errors that were caused by errors in mathematical calculations. In some cases, patients have died as a result of miscalculated doses. Calculation errors are made by prescribers, pharmacists checking doses for appropriateness or calculating doses, technicians compounding products and nurses preparing or administering doses. Calculation errors made by health care personnel occur frequently even with the use of calculators.

The pediatric population is particularly at risk since many drugs are not available in a pediatric formulation, so adult formulations must be diluted or manipulated multiple times to get the appropriate dose. One study evaluated errors in drug computations for health care personnel in a neonatal intensive care unit. Test scores were 75.6% (range of 45 – 95%) correct answers for nurses, 89.1% for physicians and 96% for pharmacists. Many of the errors made in this study would have resulted in doses 10 times higher or lower than the dose ordered.

Personnel with multiple years of experience are just as likely to make mathematical errors as inexperienced personnel. Calculation errors are often made by using the wrong concentration of stock solutions, misplacing a decimal point, or using wrong conversions. Personnel also neglect to double check their work, rely on their memory instead of looking up a conversion, or do not ask themselves, “Does the answer seem reasonable?”

---

Another way to decrease the risk of a calculation error is to ask a pharmacist or another technician to double check the calculation prior to preparing the product. The calculation should be performed independently and compared to the original answer. This system is an effective way to prevent calculation errors.

**Decimal Points and Zeros**

Misplacing a decimal point by one point results in errors 10-fold or possibly 100-fold greater than or less than intended. For drugs with a narrow therapeutic range (e.g., digoxin, phenytoin, lidocaine, aminoglycoside antibiotics) the consequences can be significant.

Decimal point errors can occur as a result of a miscalculation, as described above and also when writing orders or instructions. Failure to write a leading zero in front of a number less than one (e.g., .1mg instead of 0.1mg) might be read as the whole number (1mg), or writing unnecessary trailing zeros can also be confusing (e.g., 10.0mg instead of 10mg may be interpreted as 100mg). Medication order sheets with lines can sometimes cause a decimal to be overlooked. Therefore, when writing numbers, a leading zero should always be used with a decimal point for number less than one (0.1mg not .1mg) and a decimal pint and trailing zeros should never be used for whole numbers (10mg not 10.0mg).

Technicians must be aware of the potential for decimal point errors due to misplaced or missing decimal points when interpreting orders. Questionable orders should be brought to the attention of the pharmacist.

**Abbreviations**

Medical terminology and drug names are frequently abbreviated which can lead to medication errors. Use of the abbreviation “AZT” for zidovudine (Retrovir – an antiretroviral agent) for a patient with AIDS could be detrimental if the patient received azathioprine (Imuran – an immunosuppressant sometimes abbreviated AZT) instead of zidovudine.

Another example of an abbreviation error is the use of “U” as an abbreviation for units. This abbreviation might result in a 10-fold error were the “U” to be read as a “zero” (e.g., 10U insulin may be read as 100 insulin). A daily order written as “QD” instead of “daily” may be troublesome since it could be read as “QID” (four times a day) or “OD” (every other day).

There are many accepted abbreviations in health care. Use of abbreviations can be efficient if everyone understands and agrees on the definitions. The Joint Commission requires that institutions maintain an approved list of acceptable abbreviations and terms.
Not being aware of the accepted interpretation of abbreviations can lead to errors. Creating new abbreviations that are not understood by others should be avoided. The American Society of Health-System Pharmacists (ASHP) recommends that an approved list be developed by the Pharmacy and Therapeutics Committee (or its equivalent). Abbreviations not appearing on the approved list should be reviewed carefully before processing an order. Another recommendation from ASHP is to write out directions for medication use rather than using nonstandard or ambiguous abbreviations. The complete drug name, preferably the generic, should be used.

Technicians should become familiar with the list of abbreviations approved for their pharmacy. Such a list can be obtained from a pharmacy supervisor. Community pharmacies generally do not have a formal, approved list of abbreviations. However, posting a list of commonly accepted medical abbreviations in the pharmacy may be beneficial.

**Prescribing Issues**

Medication errors may result from the way a drug is prescribed. Issues associated with the prescribing component of the medication use process that may contribute to an error include verbal orders, confusion with the concentration of a product, illegible handwriting, missing information, use of the apothecary system, and writing doses based on the course of therapy as opposed to a daily dose. This section describes how these prescribing issues may lead to errors and ways to minimize potential prescribing errors.

**Verbal Orders**

Verbal orders can lead to medication errors when they are not transmitted clearly and the use of cell phones and static connections can make verbal orders even more difficult to understand. With the number of similar sounding products available, it is easy to misunderstand a verbal order. In one case report, a verbal order was received by a nurse from a physician and then transmitted to a community pharmacy. The nurse inadvertently confused “Ismelin” (guanethidine – potent antihypertensive agent) for “Hismanal” (astemizole – antihistamine) and the patient received the potent antihypertensive agent for his allergy symptoms.

Verbal orders should be reserved for situations when it is impossible or impractical for the prescriber to write the order or enter the order via computer. The order should be read back to the prescriber by the recipient to ensure clarity of the order. A written copy of the verbal order should be placed in the patient’s medical record. Institutional pharmacies routinely require the prescriber to confirm verbal orders by signature. The use of verbal orders should be avoided in chemotherapy prescribing due to the complexity of these orders and the potentially lethal impact of mistakes with these drugs.

Although cell phones, foreign terminology, accents, and poor connections can make taking a verbal order difficult, it is the responsibility of the technician to ask the other party to clarify parts of the order that are not clear. Simply asking the other party to spell...
the names of the drugs or other words that are unclear and repeating the order back to the other party can help ensure that the right order is received. Many states limit the acceptance of verbal medication orders to registered pharmacists. State law and pharmacy policy should be consulted to determine what role, if any, technicians play in accepting verbal orders.

**Drug Concentration**

Sometimes the concentration of a liquid formulation is missing from the prescription, which could result in a wrong dose being dispensed. For example, an order for amoxicillin suspension ½ tsp (2.5ml) TID does not specify the concentration of the suspension causing confusion as to the actual dose ordered. It is unclear if the physician ordered 62.5mg (1/2 tsp of 125mg/5ml) or 125mg (1/2 tsp of 250mg/5ml).

Writing “1 amp,” “1 vial,” or “1 cap” can lead to errors when products come in multiple strengths, doses, or vial sizes. An “amp” of magnesium sulfate might be filled with a 2ml amp (8 mEq), a 20ml amp (16 mEq), or 10ml amp of 50% concentration (40 mEq). Ambiguous doses should be clarified by a pharmacist prior to processing by the technician.

**Illegible Handwriting**

Physicians’ poor handwriting is frequently joked about. However, illegible handwriting of any health care provider is no laughing matter when it contributes to medication errors. With the many sound-alike and look-alike drug names on the market, it is easy to understand how illegible handwriting can lead to errors. One report describes a poorly written order for Aredia (pamidronate – a blood calcium lowering agent) 60mg IV that was filled and administered as “Adria,” a commonly spoken name for Adriamycin (doxorubicin – a chemotherapy agent). The patient received approximately 20% of the dose before the error was noticed. The patient experienced bone marrow toxicity (decrease in blood cell counts) as a consequence. Both agents are reasonable drugs for a cancer patient and are prescribed in doses of 60mg, but the poorly written drug name led to the mix-up.

The entire order should be carefully evaluated when trying to decipher illegible handwriting. Sometimes the dose or route of administration may be helpful in determining what drug was ordered. Assistance from a pharmacist should be obtained when orders are difficult to interpret due to illegible handwriting. The prescriber should be contacted by the pharmacist to clarify orders that cannot be accurately interpreted. In some practice setting, technicians may have a role in obtaining order clarifications.

Standardized preprinted order forms for complex drug regimens are one way to minimize illegible handwriting. Computerization and typewritten labeling can reduce medication errors by making the medication labels easier to read for both health care personnel and patients. The use of upper and lower case lettering also improves readability.
**Missing Information**

Lack of medical information about the patient, such as age, weight, height, and indication, can contribute to medication errors. Medical information is important because dose usually depends on indication and severity of the condition. Unfortunately, physicians do not routinely write the indications on prescriptions and patients do not always fully understand their conditions.

Thorough and complete medication profiles should be maintained for all patients. These profiles should include current prescription and nonprescription medications, allergies, age, height, and weight of the patient. Previous medication use is also helpful. Profiles should be kept current and referred to on a routine basis. It may be necessary to question the patient or contact the prescriber to obtain this information, because pharmacists often need it to check an order for appropriateness.

**Course Dose vs. Daily Dose**

It is common for chemotherapy drug regimens to be prescribed on a per “course” or cycle of treatment basis, as opposed to per dose basis. This practice increases the chances for medication errors because the orders are often difficult to interpret. Many chemotherapy treatments require a patient to receive medication over several days and then rest (receive no drug treatment) for several days or weeks. This allows the patient time to recover from the side effects and the drugs to work in the optimal phase of the tumor cell cycle. One course of treatment may consist of several drugs given on one or more days during a specified time period.

An example of a course dose in fluorouracil 4g/m IV on days 1, 2, 3, and 4. This order might be interpreted as 4g/m of fluorouracil (a cytotoxic agent) daily for four days – a total of 16 g/m. One could also interpret it as 4 g/m to be divided into four daily doses (1 g/m daily on days 1, 2, 3, and 4). It is easy to see how course doses can be misinterpreted. Errors such as this can result in massive overdoses leading to significant morbidity or death.

**Manufacturer and Drug Product Related Causes**

A review of medication errors reported to the United States Pharmacopeial Convention (USP) revealed that the most common error reported was related to a problem with drug product characteristics (e.g., drug name, packaging). The USP has a medication error reporting program in conjunction with the Institute for Safe medication Practices. This program focuses on product design and characteristics. In addition to the USP program, the Food and Drug Administration (FDA) accepts reports of medication errors or potential errors via a toll-free number. The FDA receives and reviews all medication error reports, whether made initially to the USP or to the FDA. Reports of potential errors can also be reported to the FDA. Among other things, the FDA uses this information to alert health care providers prior to an actual error occurring.
Characteristics of drug products that may contribute to medication errors include such things as look-alike and sound-alike drug names, the use of numbers or letters as part of the drug name, product labeling, and color coding. Drug product problems identified by USP are forwarded to pharmaceutical manufacturers. Pharmaceutical manufacturers can then address the problems by making appropriate modifications to the drug products.

**Look-Alike and Sound-Alike Drug Names**

There are many case reports of medications errors due to confusion surrounding drug names. There are hundreds of examples of drug names that either sound or look like another trade or generic drug name.

Sometimes errors occur because drug names look and sound similar, and may even be used to treat common condition. For example, amrinone (Inocor – a cardiac agent) was inadvertently administered to a patient instead of amiodarone (Cordarone – an antiarrhythmic agent). Both drugs may be used in treating cardiovascular conditions and their generic names sound somewhat alike.

Sloppy handwriting or misspelling can contribute to drug names confusion. An order carelessly written for interferon 1 ml (an immunologic agent) was interpreted and prepared as Imferon 1 ml (iron dextran). In this case, the patient’s mother questioned the dark brown coloring of the drug before it was administered and the mix-up was corrected before the patient received the wrong drug.

The likelihood of confusing two drugs with similar names is increased when the dosages of both drugs are the same. Lanoxin (digoxin) and Levoxine (a brand name for levothyroxine) have similar looking and sounding names and are both commonly prescribed at a dose of 0.125mg daily. Due to these similarities, the pharmaceutical manufacturer of Levoxine changed the trade name to Levoxyl in an effort to avoid confusion with Lanoxin.

One report describes an error resulting from two ophthalmic ointment products having brand names that are spelled and pronounced identically. One brand name, Ocu-Mycin (gentamicin 3%), contains a hyphen and the other, Ocumycin (bacitracin/polymixin B) does not. Given as a verbal order with vague directions such as “take as directed,” one would have no way of knowing which drug was intended.

A frequently reported mix-up occurs between quinine (an anti-malarial) and quinidine (an anti-arrhythmic). The names are similar, routine doses are the same and they are frequently stocked next to one another. It is easy to see how picking one drug instead of the other could happen.

It is easy to see how sound-alike names or look-alike names can be confusing with the increasing number of drug products available. Pharmaceutical manufacturers have the
responsibility to carefully select drug product names keeping patient safety in mind. Health care providers can help identify potentially dangerous drug names by notifying the FDA with their concerns.

*Numbers or Letters as Part of the Drug Name*

Manufacturers sometimes include numbers or letters as a prefix or suffix to the brand name (e.g., Tylenol #3, Percocet-5, Procardia XL). The intent may be to indicate strength or that a product is an extended release formulation, but it can lead to errors. Numbers in the drug name may be misinterpreted as the dose.

*Product Labeling*

As a marketing strategy, product labels often emphasize a manufacturer’s name or logo, making it difficult to readily identify the drug name and dose. Manufacturers often use the same labeling scheme including letter size, print, and background color to readily associate the product with the manufacturer. Sometimes this strategy, which makes all labels look alike, can be detrimental.

*Color Coding*

Relying on the color of product packaging is not a safe practice. Manufacturers may change their packaging color scheme at any time and color coding schemes for similar products may differ among manufacturers. Drug products with similar colors may be inadvertently misplaced in the stock areas and could easily be dispensed in error.
A Systematic Approach to Preventing Medication Errors

It is important for technicians to be familiar with the systems designed to provide additional checks in the medication use process. A well designed system will help prevent medication errors. Errors cannot be attributed to human error alone. Errors are frequently due in part to defective or inadequate systems. Some of the components of a well designed system include adhering to legal requirements, policies and procedures, multiple checks, standardized order forms and checklist, and monitoring systems.

Another important system that bears mentioning, even though it is not part of the technician’s responsibilities, is patient counseling. This is especially vital in an outpatient setting where the patient is primarily responsible for compliance. When the medication is picked up, the pharmacist and patient discuss how to take the drug, any possible side effects, and why it is important for the patient to take the medication exactly as it has been prescribed by the physician. Patient counseling plays a very important role in preventing medication errors because it increases the likelihood that patients will take their medication as prescribed.

Legal Requirements

The law requires that a knowledgeable individual be available to double check the prescribing process and oversee the use of medications. The law requires a licensed pharmacist to be on duty during pharmacy business hours. Licensed pharmacists have to graduate from an accredited school of pharmacy, pass a licensure examination, and pass the state pharmacy law examination in order to practice pharmacy in that state.

Policies and Procedures

Policies and procedure manuals formally establish a system to prevent the occurrence of medication errors. It is estimated that 33% of errors discovered were due to noncompliance with pharmacy policies and procedures.

Multiple Check Systems

This is another system designed to prevent medication errors. This can include the pharmacist reviewing a physician order, a pharmacy technician preparing a medication for the pharmacist to check, a nurse inspecting the dose from the pharmacy, and a patient asking questions. A popular check system encourages each person to read the label three times. A double check system is especially important when dealing with potentially lethal drugs such as chemotherapeutic agents.
Standardized Order Forms

Standardized preprinted order forms have been developed to prevent medication errors by making medication orders easier to read by the prescriber and easier for the pharmacist and nurse to interpret. The forms also help reduce errors primarily associated with illegible handwriting and informally educate the prescriber about which medications are on the hospital formulary.

Checklists

Checklists are usually included on a standard order form. This system ensures a systematic, thorough procedure to check medications before they are prescribed, dispensed, or administered.

Education and Training

Pharmacy technicians should be familiar with the classes of medications, the generic and trade names of drugs, and their forms and dosage. To obtain this knowledge a technician can participate in formalized training, departmental programs, or on-the-job training. Even if the technician receives the bulk of their training through formal methods such as a community college, they still should be thoroughly trained on the department’s policies and procedures since much of that is specific to the pharmacy.

To compliment formal and on-the-job training, technicians should also read pharmacy literature and participate in local pharmacy organizations.

When an Error Occurs

Though we have looked at many ways to prevent medication errors, in all practice settings, medication errors do occur. Once an error has been identified, what next? Although making a mistake can be frustrating, it is important to focus on work habits so that the same error will not happen again. It is the technician’s responsibility to inform the pharmacist and be forthcoming with all details.

If the error is caught before the patient receives the medication, it can be corrected before it leaves the pharmacy. If the patient has received the drug the course of action depends on the details of the error. The pharmacist usually investigates the error and the severity of the consequences before contacting the nurse or physician.
Documentation

When a medication error occurs, the medication error reporting form should be completed according to the institution’s procedures. The form should be filled out and reviewed by those involved in the error to ensure that the content is accurate. After the form is completed, it is usually sent to the pharmacy supervisor and then to risk management if necessary. The forms should reviewed by a committee or some other quality assurance process.

Watching for Trends

One of the responsibilities of the quality assurance committee or pharmacy supervisor is to look for medication errors that occur frequently. When looking for trends in the medication error process, it is important to focus on systems rather than individuals. In most cases medication errors are due more to poor drug distribution systems, miscommunications, faulty pharmaceutical packaging, labeling, and lack of information than any one person.

Making Changes

If a trend in the frequency of medication errors is found then changes must be made to reduce the possibility of future errors. The changes may involve personnel education, revising department policies, or purchasing a piece of equipment to automate a task and reduce the chance of error.

Two of the best ways to educate the staff on medication errors is to post a summary of the errors that have occurred within the pharmacy and to make medication errors a regular topic during staff meetings. As a technician it is important to pay close attention to what errors are being made and any discussion concerning those errors.

Once a change has been made, it is important to monitor the change in the system to ensure that the desired result has been achieved and the errors have been reduced.
QUALITY ASSURANCE AND MEDICATION ERRORS

Introduction to Quality Control

Quality is often considered to be a relative term. What may be considered acceptable quality for one person may be completely unacceptable to another. In pharmacy, like most businesses, the customers have something to say about what is acceptable quality. These customers, usually patients, nurses, or physicians, have a broad set of expectations as to what products and services are acceptable. These services include the speed with which the prescription/medication orders are processed, the information that is provide along with the medications, as well as clinical services such as checking for drug interactions, monitoring for side effects, and referring patients to other providers when necessary.

However, unlike other businesses, the customer is not the sole judge of quality. All pharmacy personnel must be aware that patient safety is the most important quality factor. As a healthcare professional, the patient looks to you to make the proper decisions, even at the expense of time or convenience. Testing for variances in prescriptions and other work performed in a pharmacy falls under the broad framework of quality assurance. It is important to remember that improving quality within a pharmacy is a continual process. It is not enough to assure quality, you must always seek to improve the processes and systems within your practice setting. This is the concept behind the term continuous quality improvement.

Principles of Quality Assurance

The previous section of this course talked about the processing prescriptions. If you think about all of the things that can go wrong during that process, you will have some idea as to what a daunting task quality assurance can be. Some of the most common areas where errors occur include:

- Interpreting the prescription or medication order.
- Entering the order in the computer.
- Choosing the medication. Mistakes in the strength or dosage form.
- Dispensing the proper amount.
- Attaching the label.
- Attaching the auxiliary labels.
- Giving the medications to the patients.
Errors occur in all pharmacy settings. These errors can occur with oral medications, injectables, or compounded prescriptions. However, the process of assuring quality differs between oral medications and other forms. With oral drugs you can check the color and markings on the tablet or capsule to see if the correct drug was picked and you can recount the tablets to check for the proper amount. This allows for every prescription of oral medications to be checked for accuracy by a pharmacist.

The process of checking injectable products or compound prescriptions is much more difficult, if not impossible, through visual inspection alone. Most injectable products are clear and colorless, regardless of how much drug was put in the solution. Compound creams and ointments are usually the color and consistency of the base product, whether no drug or 10 times the proper amount was added. To assure quality for these products, pharmacist must use different techniques.

**Quality Assurance Techniques**

While the theory of random sampling is beyond the scope of this course, and it is unlikely that as a technician you would be involved in these quality assurance measures, you should be aware of what you can do. While there are several approaches, various measures should be put into the process. To begin with, you can make sure that only the correct components are present during mixing or compounding. Co-workers can double check each other by examining the components and amount both before and after combining. If you are repackaging a large amount of products, you could open a small percentage of the final product to make sure they are correct. If any errors are found, then more products would be opened to see if it is widespread. If more incorrect products are found, then the entire batch of products might be opened and repackaged correctly.

Be aware that when pharmacy managers are attempting to measure service indicators – such as time for prescriptions to be dispensed, prescription error rates, or out-of-stock frequencies – they are involved in the same process of quality assurance.

**Quality Control of Solid Oral Medications**

When the technician is processing oral medications, the pharmacist will usually check every order. It is good practice to leave the original container out so the pharmacist can make sure it is the correct product. The directions on the prescription label will be checked against the prescription or medication order. The pharmacist will also check the auxiliary labels that were placed on the bottle. In hospitals where solid oral medications are placed in cart, a similar process can be used. Because nurses check the medications again before giving them to the patient, a few states allow technicians to check each other on cart fills. Whatever techniques are used, it is the pharmacist that dispenses or authorizes dispensing to the patient and provides any needed counseling about the proper use of the medication.
Quality Control of Sterile Products

It is good practice when you are working in the intravenous admixture or compounding areas that you have nothing in the laminar-flow hood or preparation area except those items you are using to prepare the specific product. A pharmacist will check your work but keep in mind that a visual inspection is not as useful as it is with solid forms. To assist with the check, keep all injectable product vials – empty or not – out for inspection. It is also a good idea to have the syringe pulled back to the amount you put in the admixture. For very complicated types of admixtures (TPN, chemotherapy, heparin) the pharmacist should check all calculations.

The final measure in the IV admixture quality assurance system is to check a small percentage of the products. For example, to check the sterility of intravenous admixtures, a 2% sample of the outgoing product may be chosen each day for testing of bacterial or fungal contamination. Because these tests often destroy the product, these units must sometimes be made again. If any of the samples are found to have bacteria, the percentage sampled may be temporarily increased to 5%. If further contaminated units are found, then the system may be declared “out of control” and the decontamination process should be undertaken. This process can include decontaminating the preparation area, checking the technique of personnel, and retraining employees when needed. This process and increased sampling should be continued until the system is back “in control.”

Training

The foundation of any quality assurance system is proper training of personnel. For technicians working in community pharmacy or the unit dose areas of hospitals, it is important that they be familiar with the drugs they prepare as well as the pharmacies procedures. If you are working in the admixture room, you should be familiar with the drugs as well as the principles of aseptic technique and sterile product preparations. All quality assurance measures will break down if the technician is not both knowledgeable and competent in the area he or she works in.
MEDICATION ORDERS AND PRESCRIPTIONS

Receiving the Order

A medication order is typically a written request from a physician to a pharmacy in an inpatient setting, a prescription is usually a medication order written on a prescription blank that is intended to be filled in an outpatient pharmacy. While the process may differ in each setting, the idea of getting the correct medication to the patient on time is the same. For the rest of this section, they will be used interchangeably.

A prescription can come to the pharmacy in a variety of ways: fax, pneumatic tube, or via telephone. Many states have very strict requirement concerning who can both phone in and receive a prescription over the phone, so it is a good idea to consult your employer’s policy before receiving any orders over the phone. However the order is received by the pharmacy, there are two steps that should be taken. First review the order for clarity and completeness, then prioritize so that the most urgent prescriptions are processed first.

Clarity and Completeness

It is important that the information on a prescription be complete. Some of the information is required by state law or by the pharmacy’s policy. If something is missing, it is important to get the complete information before proceeding. The technician may be able to clarify the order. However, the pharmacist should be involved in some clarifications. If in doubt, ask.

Ideally, a new order should have all the following information:

- Patient name
- Indication for use of the medication
- Generic drug name
- Date
- Prescribers name
- Prescribers signature
- Dosage form
- Strength
- Dose
- Quantity
- Frequency of administration
- Time of administration
Prioritization

Prioritizing orders in a pharmacy is the process of comparing the urgency of new orders against the urgency of existing orders. This ensures that the patients who need it most will be processed first. A technician can evaluate an order’s priority by checking the directions for use, type of drug, intended use of the drug, and the patient’s specific circumstances.

In an institutional setting, some orders are marked “stat” which comes from the Latin word *statim*, which means immediately. The technician should also look for other time indicators such as “Give 2 hours prior” for surgical or other diagnostic procedures. If no specific time is denoted, the technician can make some assumptions. Medications for fever, pain, or nausea are usually considered priority due to the need to relieve the patients’ discomfort. Prioritizing orders requires some knowledge of the drugs and common sense. Most hospitals have policies in place that may alter order priority and the technician should be familiar with the specifics of each institutional pharmacy.

While outpatient settings do not typically have stat orders, the service aspect is the primary concern. A first come first served basis may be appropriate for many customers, but pharmacy personnel should be sensitive to the needs of the patients. Those who are in pain, vomiting, or have infectious diseases should receive a higher priority. And common sense dictates that customers who are waiting should be served before later pick-ups or mail orders.

Processing Prescriptions

Once you have obtained all necessary information and you are satisfied that the prescription is valid, you are ready to prepare the prescription for the patient. It is very important that the right patient get the right drug at the right time, labeled with the right directions. This is central to the operation of any pharmacy and you must take the responsibility seriously. This process involves many different steps. First we will highlight some of the differences between an institutional setting and an outpatient setting. Then we will take a closer look at some of the issues that affect both environments.
Pharmaceutical Abbreviations

When prescribers write prescriptions, they use abbreviations for Latin terms. A pharmacy technician will need to memorize these common abbreviations.

*a* can be an abbreviation for *ante*, meaning *before*, or *aura*, meaning ear.

*d* can mean *die*, for day, or *dextro*, meaning right.

*h* stands for *hora* or hour.

*b*, *t*, and *q* usually refer to how many times a day to give a medicine, standing for two times, three times, and four times daily, respectively.

*q* stands for *quaque*, meaning every.

*o* stands for *oculo*, meaning eye.

Common Pharmaceutical Abbreviations Used on a Prescription

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>before</td>
</tr>
<tr>
<td>ac</td>
<td>before meals</td>
</tr>
<tr>
<td>ad</td>
<td>right ear</td>
</tr>
<tr>
<td>as</td>
<td>left ear</td>
</tr>
<tr>
<td>au</td>
<td>both ears</td>
</tr>
<tr>
<td>bid</td>
<td>two times a day</td>
</tr>
<tr>
<td>c</td>
<td>with</td>
</tr>
<tr>
<td>dtd</td>
<td>dispense such doses</td>
</tr>
<tr>
<td>gtt, gtts</td>
<td>drop or drops</td>
</tr>
<tr>
<td>h, hr</td>
<td>hour</td>
</tr>
<tr>
<td>hs</td>
<td>at bedtime (at the hour of sleep)</td>
</tr>
<tr>
<td>non rep</td>
<td>do not repeat, no refills</td>
</tr>
<tr>
<td>p</td>
<td>after</td>
</tr>
<tr>
<td>po</td>
<td>by mouth</td>
</tr>
<tr>
<td>prn</td>
<td>as needed</td>
</tr>
<tr>
<td>q</td>
<td>every</td>
</tr>
<tr>
<td>qd</td>
<td>every day</td>
</tr>
<tr>
<td>q am</td>
<td>every morning</td>
</tr>
<tr>
<td>q pm</td>
<td>every evening</td>
</tr>
<tr>
<td>q hs</td>
<td>every bedtime</td>
</tr>
<tr>
<td>qod</td>
<td>every other day (every second day)</td>
</tr>
<tr>
<td>q 4 h</td>
<td>every 4 hours (or 3, 6, 8, 12, 24, other intervals)</td>
</tr>
<tr>
<td>qid</td>
<td>four times a day</td>
</tr>
<tr>
<td>tid</td>
<td>three times a day</td>
</tr>
<tr>
<td>os</td>
<td>left eye</td>
</tr>
</tbody>
</table>
### Common Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>od</td>
<td>right eye</td>
</tr>
<tr>
<td>ou</td>
<td>both eyes or each eye</td>
</tr>
<tr>
<td>ut, dict, ud</td>
<td>as directed</td>
</tr>
<tr>
<td>stat</td>
<td>at once, now</td>
</tr>
<tr>
<td>APAP</td>
<td>acetaminophen</td>
</tr>
<tr>
<td>ASA</td>
<td>aspirin</td>
</tr>
<tr>
<td>DAW</td>
<td>dispense as written</td>
</tr>
<tr>
<td>IM</td>
<td>intramuscular</td>
</tr>
<tr>
<td>IV</td>
<td>intravenous</td>
</tr>
<tr>
<td>MOM</td>
<td>milk of magnesia</td>
</tr>
<tr>
<td>NSAID</td>
<td>nonsteroidal anti-inflammatory drug</td>
</tr>
<tr>
<td>OTC</td>
<td>over-the-counter (as in nonprescription)</td>
</tr>
<tr>
<td>PCN</td>
<td>penicillin</td>
</tr>
<tr>
<td>SC</td>
<td>subcutaneous</td>
</tr>
<tr>
<td>TCN</td>
<td>tetracycline</td>
</tr>
</tbody>
</table>
## Steps For Filling and Labeling Medications

### Inpatient Setting

1. **Enter the patient’s name or medical record number and verify them.** Compare the patient profile to the medication order to make sure the patient represented in the profile is the same as the one on the medication order.

2. **Compare the order with the patient profile in detail.** Make sure the order is appropriate for the patient profile. It should make sense when compared to the patient’s age, allergy profile, and other drugs being taken.

3. **Enter the medication.** If you are using an automated system, the computer may check for allergies, therapeutic duplications, or interactions. If any of these situations show up, you should bring it to the attention of the pharmacist in charge.

4. **Verify the dose.** Check the dose on the order with the drug entered; odd doses may indicate a prescribing error.

5. **Enter the schedule.** Verify that the administration schedule is appropriate for the patient.

6. **Enter comments.**

7. **Enter the prescriber’s name.**

8. **Fill and label the medication.** The right product in the right amount with the right label. This is the final opportunity to check the medication against the order.

### Outpatient Setting

1. **Enter the patient’s name or medical record number and verify them.** Check the prescription or speak to the patient directly to make sure the information is correct.

2. **Compare the order with the patient profile in detail.** Same as inpatient setting.

3. **Enter the medication.** Same as inpatient setting.

4. **Enter the label directions.** Verify the dose and enter the schedule as in the inpatient setting. Remember, the directions should be in a language that the patient can understand. Medical abbrev and Latin should be avoided.

5. **Enter comments.**

6. **Enter the prescriber’s name.** Same as the inpatient setting.

7. **Enter the dispensed amount and number of refills.** Unlike the inpatient setting where only one or two doses are dispensed, the quantity is specified by the prescription.

8. **Fill and label the prescription.** Again, this is the final opportunity for the technician to check the accuracy of the process against the prescription.
Some Final Notes About the Prescription Processing

The following is a closer look at some very important concepts to remember when you are involved in the dispensing process. These issues affect you no matter what practice setting you work in.

- Verifying the patient information.
- Creating/Updating the patient profile.
- Selecting the correct drug product.
- Conveying the directions for use to the patient.

Verifying the patient information

Most pharmacies keep records of the patients’ ages and weights because this information can be critical in checking medication dosages. In an institutional setting the information can be obtained from the patient’s medical records, but in a community pharmacy the information may not be readily available. The best way to obtain that information is using a written questionnaire. You may also need to collect the patient’s health coverage or insurance information. Remember, this is also confidential, take care to obtain it in an appropriate manner.

Verifying also involves comparing the patient identification on the prescription or medication order against the one chosen in the patient profile. While this seems elementary, the importance cannot be overestimated; an appropriate amount of attention must be paid to identification in order to avoid medication errors.

Creating/Updating the patient profile

Processing medication orders and prescriptions involves adding a medication to a patient’s regimen or modifying or deleting a previous ordered medication. The patient profile is fundamental to good patient care. It is vital that the technicians work with the pharmacist to build and maintain profiles while they process prescriptions. In addition to standard patient statistics, the profile may contain information that raises question as to whether the patient should receive the medication as prescribed. Information about allergies, drug interactions, or similar medications that the patient may already be taking is kept in the profile. Computerized systems facilitate the speed and accuracy of processing prescription, but there is no substitute for common sense. If a technician suspects that the prescribed medication is inappropriate, he or she should consult the pharmacist or follow the pharmacy’s standard procedure.

Selecting the correct drug product

Drugs may be prescribed by their generic and brand name. The generic name is the common name assigned to that chemical compound by the US Adopted Names Council; it may be used by any company that markets the drug. The brand name is a trademarked reference to the drug that only one company is entitled to use. This company is usually
the original creator of that drug. It is recommended for prescribers to order medication by the generic name, but drug products are ordered by either or both. Selecting the correct drug requires a working knowledge of both brand and generic names.

During this process, 100% accuracy is needed. A good rule of thumb is to check the product three times. Once when the product is taken from the shelf, again when the product is being measured, and finally when or before the label is affixed to the vial/bottle (in some states this step must be completed by a pharmacist). In the process of getting products from the storage shelves or bins, many mistakes are made by pharmacy personnel because they choose the drug from the color or shape of the package rather than reading the label. Medication errors must be taken seriously.

Conveying the directions for use to the patient

In all practice settings, the prescriber’s directions for proper use of the medication must be conveyed clearly and accurately. It is the responsibility of the pharmacy personnel to make sure that when a patient leaves the pharmacy with medication they have a clear understanding of how to safely and effectively use it. If a patient misunderstands the directions, a therapeutic failure is more likely. Not only is the pharmacist responsible for telling the patient what the medications are and what they are used for, they are also responsible for a full range of educational activities.

In an institutional setting, the physician’s order is input into the pharmacy’s patient profile. Then the technicians generate a Medication Administration Record (MAR) for use by the nursing staff. This information is primarily used by healthcare professionals and may contain medical terminology and Latin abbreviations.

In an outpatient setting, the burden to educate the patient can be more difficult to carry. Usually, all prescriptions are dispensed with written information about what the drug is, how it works, and possible side effects. When you prepare the prescription, place any necessary information with the completed prescription so that it can be given to the patient and many times explained by the pharmacist. This information will hopefully reinforce the labels you placed on the container.

Performing the Final Check

When you are sure that you have put the right drug in the right strength and dosage form in the right container for the right patient, you are ready to send the prescription to the pharmacist for the final check. Once the pharmacist is satisfied that everything is correct, he or she will dispense the prescription to the patient. Under pharmacy laws of all states, this act of dispensing the medication must be performed by a registered pharmacist.
Conclusion

We have considered in a simplistic way the process of preparing prescriptions for processing. There are two factors that make this process more complicated. One is the role the pharmacist plays in making sure the prescriber has requested the best choice for the patient. The other factor is the use of pharmacy computer systems and other types of automation in the process of dispensing and distribution.
Final Exam

1. If a pharmacy technician makes an error, there will be no consequences for the pharmacist who was supervising him or her.
   a. True
   b. False

2. Most errors occur when pharmacy technicians and pharmacists are too busy, distracted, and overworked.
   a. True
   b. False

3. ______ are types of errors that can occur during the medication use process.
   a. Prescribing
   b. Dispensing
   c. Administration
   d. All of the above

4. If a prescription or medication order is correctly filled but dispensed to a patient for whom it is not intended, it is not considered a medication error.
   a. True
   b. False

5. Medication errors only occur within the pharmacy.
   a. True
   b. False

6. Administering doses too early or too late is considered what type of error?
   a. Prescribing
   b. Omission
   c. Wrong time
   d. Improper dose

7. Failure to administer an ordered dose to a patient in a hospital, nursing home, or other facility before the next scheduled dose would be considered a _________.
   a. Prescribing error
   b. Omission error
   c. Wrong time error
   d. Improper dose error
Final Exam

8. Reconstituting a cephalexin oral suspension with an incorrect volume of water is considered a _________ error.
   a. Improper dose
   b. Wrong dosage form
   c. Wrong drug preparation
   d. Deteriorated drug

9. A ______ error may occur if there is a delay in documenting (or absence of documentation) a dose that results in an additional dose being administered.
   a. Improper dose
   b. Wrong dosage form
   c. Wrong drug preparation
   d. Deteriorated drug

10. Medications that are dispensed or administered beyond their expiration date could be considered a _________ error.
    a. Improper dose
    b. Wrong dosage form
    c. Wrong drug preparation
    d. Deteriorated drug

11. Medication errors are committed by patients too, when they fail to adhere to a prescribed drug regimen.
    a. True
    b. False

12. Because medication errors are not uncommon, it is simple to determine the actual numbers of medication errors.
    a. True
    b. False

13. Health care providers do not always submit incident reports because many personnel lack the knowledge to identify errors, the time required to document them, or they are afraid of negative consequences.
    a. True
    b. False
Final Exam

14. Significance of a medication error can be determined by:
   a. Type of medication error
   b. The health status of the patient
   c. Route of drug administration
   d. All of the above

15. It is apparent that medication errors occur in all practice settings on a daily basis.
   a. True
   b. False

16. The saying “better late, than never” is appropriate in a pharmacy practice.
   a. True
   b. False

17. It is fortunate that most medication errors are detected and corrected before the medication is dispensed to the patient or the patient care area.
   a. True
   b. False

18. With the invention of the calculator, mathematical medication errors are virtually nonexistent.
   a. True
   b. False

19. The pediatric population is particularly at risk for calculation errors since many drugs are not available in a pediatric formulation.
   a. True
   b. False

20. Misplacing a decimal point by one point results in errors:
   a. 10 – fold
   b. 100 – fold
   c. Both A&B
   d. None of the above
Final Exam

21. Decimal point errors can occur as a result of:
   a. Miscalculation
   b. Failure to write a leading zero
   c. Unnecessary trailing zeros
   d. Medication order sheets with lines
   e. All of the above

22. Use of abbreviations can be efficient if everyone understands and agrees on the definitions.
   a. True
   b. False

23. Technicians should become familiar with the list of abbreviations approved for their particular pharmacy.
   a. True
   b. False

24. Verbal orders should be reserved for situations when it is impossible or impractical for the prescriber to write the order or enter the order via computer.
   a. True
   b. False

25. _________ can make taking a verbal order difficult.
   a. Cell phones
   b. Foreign terminology
   c. Accents
   d. All of the above

26. Which is not a way to minimize errors due to illegible handwriting?
   a. Verbal orders
   b. Preprinted forms
   c. Typewritten labeling
   d. Upper and lower case lettering
Final Exam

27. Medical information is important because dose usually depends on indication and severity of the conditions.
   a. True
   b. False

28. A patient profile should include:
   a. Age
   b. Weight
   c. Prescription drugs
   d. Nonprescription drugs
   e. All of the above

29. Which is NOT a characteristic of drug products that may contribute to medication errors?
   a. Look-alike
   b. Sound-alike
   c. Foreign manufacturing
   d. Use of number or letters as part of the drug name

30. The likelihood of confusing two drugs with similar names is increased when the dosages of both drugs are the same.
   a. True
   b. False

31. Numbers in the drug name may be misinterpreted as the dose.
   a. True
   b. False

32. Relying on the color of product packaging is a safe practice.
   a. True
   b. False

33. Which of the following is a component of a system to prevent medication errors?
   a. Adhering to legal requirements
   b. Policies and procedures
   c. Multiple checks
   d. All of the above
Final Exam

34. The law requires that a knowledgeable individual be available to double check the prescribing process and oversee the use of medications.
   a. True
   b. False

35. It is estimated that ___% of errors discovered were due to noncompliance with pharmacy policies and procedures.
   a. 5%
   b. 25%
   c. 55%
   d. 33%

36. Multiple check systems include:
   a. A nurse inspecting the dose from the pharmacy
   b. A patient asking questions
   c. Both A&B
   d. Neither A or B

37. An ancillary benefit of standardized order forms is they informally educate the prescriber about which medications are on the hospital formulary.
   a. True
   b. False

38. Pharmacy technicians should be familiar with:
   a. Classes of medications
   b. The generic and trade names of drugs
   c. Drug forms and dosage
   d. All of the above

39. Because of the many ways to prevent an error, there are certain practices where errors do not occur.
   a. True
   b. False
Final Exam

40. It is the technician’s responsibility to inform the pharmacist and be forthcoming with all details.
   a. True
   b. False

41. It is not necessary to document all medication errors.
   a. True
   b. False

42. In most cases, medication errors have more to do with the people involved than the systems in place.
   a. True
   b. False

43. Two of the best ways to educate the staff on medication errors is to post a summary of the errors that have occurred within the pharmacy and to make medication errors a regular topic during staff meetings.
   a. True
   b. False

44. The process of checking injectable products or compound prescriptions is much more difficult, if not impossible, through visual inspection alone.
   a. True
   b. False

45. _________ is the process of comparing the urgency of new orders against the urgency of existing orders.
   a. Clarity
   b. Completeness
   c. Prioritization
   d. All of the above

46. What is the abbreviation for every day?
   a. Qid
   b. Qd
   c. Tid
   d. Os
Final Exam

47. What is the abbreviation for acetaminophen?
   a. ASA
   b. TYL
   c. ACE
   d. APAP

48. Verifying also involves comparing the patient identification on the prescription or medication order against the one chosen in the patient profile.
   a. True
   b. False

49. It is recommended for prescribers to order medication by the brand name.
   a. True
   b. False

50. In an outpatient setting, the burden to educate the patient can be more difficult to carry.
   a. True
   b. False