

MEDICATION ERRORS

SUSAN DEPASQUALE, MSN, FPMHNP-BC

Susan DePasquale is a board certified Family Psychiatric Mental Health Nurse Practitioner. Her current practice is with youth and adults who have mental illnesses in both inpatient and outpatient settings, including telepsychiatry for Montana and Wisconsin communities. She completed her Masters of Art in Political Science at the University of Victoria, British Columbia, Masters of Science in Nursing at Seattle Pacific University in Seattle, Washington with a focus in neurogastroenterology and the Post-Masters of Science in Nursing at the Montana State University in Bozeman, Montana with a focus in psychiatry. She has worked with small and rural healthcare teams in British Columbia and the Northwest Territories, Canada, and in teaching and research hospitals such as Providence Health and Virginia Mason Medical Center Digestive and Liver Disease Departments in Seattle. Since 2012, she has been actively involved in online continuing education program development for nurses and health teams.

Topic Overview

According to the National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP), a medication error is “any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer.” The identification and prevention of medication errors requires an understanding of the root causes of medication errors. Root causes may be individual or systemic. A systemic root cause of medication errors includes the fragmentation of medication information, which is the failure of a patient’s medication information to follow the patient as the patient moves from one provider, service or levels of care to another within the healthcare system. Once root causes are identified, the pharmacist may implement procedures and protocols that reduce and prevent medication errors and that promote patient safety.

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How to Earn Credit: From June 28, 2021, through June 27, 2024, participants must:

- 1) Read the "learning objectives" and "author and planning team disclosures;"
- 2) Study the section entitled "educational activity;" and
- 3) Complete the Course Test and Evaluation form. The Course Test will be graded automatically. Following successful completion of the Course Test with a score of 70% or higher, a statement of participation will be made available immediately. (No partial credit will be given.)

Educational Objectives: Upon completion of this educational activity, participants should be able to:

1. **Identify** and define medication errors
2. **Identify** the root causes of medication errors
3. **Describe** and know how to reduce and prevent medication errors

4. **Identify and Describe** the pharmacist's role in educating patients to help patients participate in preventing medication errors

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Introduction

Medical errors are a significant problem in the healthcare system. Medical errors are a significant problem in the healthcare system. One of the most pervasive errors is the medication error. Medication errors are responsible for considerable patient harm. A medication error may occur at any point from prescription, administration and through monitoring of a drug. There are root causes of medication errors. One root cause is the fragmentation of medication information, which is the failure of a patient's medication information to follow the patient as the patient moves between providers, services and levels of care. Medication errors may be reduced or prevented with an understanding of the root causes of medication errors, followed by the implementation of policies, procedures or systemic changes that can address these root causes and create a safer health care system for patients.

Medication Errors: Definition and Scope

Medication errors fall within the broader concept of medical errors. Medical errors were highlighted by the Institute of Medicine (IOM) over 20 years ago in its seminal monograph, *To Err is Human: Building a Safer Health System*.¹ The Institute of Medicine (IOM) reported that 7% of all hospital admissions experience a serious medication error.¹ In the United States, 7,000 to 9,000 people die annually from medication errors.² The scope of the problem related to medication errors is further highlighted by the fact that the U.S. Food and Drug Administration (FDA) receives over 100,000 reports of suspected medication errors annually.³ In addition to the human harm, medication errors exact an economic cost of about \$42 billion globally on an annual basis.²

A medication error is defined by the National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) as "any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer."⁴ This means that a medication error does not necessarily result

in patient harm.⁴ This point is emphasized in an alternative definition of medication error that describes it as “any error in the process of ordering or delivering a medication regardless of whether an injury occurred or the potential for injury was present.”⁵ When a medication error results in patient harm, it is then categorized as an adverse drug event (ADE).⁶

An ADE is a broad term that refers to medication *errors* that result in harm, and to harm caused by an adverse drug reaction (ADR) when a drug is used as *intended*.⁶ Historically, “ADR” was limited to events that arose from an appropriate use of a medication but since 2010, the term ADR has been expanded to include medication errors and appropriate uses of a drug.⁷

Medication errors can be inconsequential or they may have mild outcomes for a patient; medication errors may also have serious consequences. Serious outcomes can include a life-threatening medical condition, hospitalization, and possibly disability or death.³ When a medication error occurs with a pregnant patient, it may result in a birth defect to the baby.³

Given the potential serious, negative outcomes that may result from medication errors, the healthcare industry has worked to reduce medication errors and thereby create a safer health care system for patients and the public at large. This effort includes identifying the common types of medication errors, the root causes of medication errors, and systemic changes that can be used to address these root causes.

Types of Medication Errors

The NCC MERP states that medication errors may arise within a professional practice, with the use of health care products, and from health care procedures and systems. Medication errors may occur during prescribing, order communication and transcribing, preparation and administration, dispensing and monitoring.⁴ Additional events that may lead to medication errors are product labeling, packaging, and nomenclature, compounding,

distribution, education, and patient use.⁴ All of these events should be considered by a pharmacist.

Prescribing Errors

Prescribing errors represent a majority of medication errors.^{2,8,9} A prescribing error pertains to the choice of a drug, which involves a drug's indications, contraindications, and known allergies.¹⁰ A patient's personal characteristics must also be considered. Additional factors involve "dose, concentration, drug regimen, pharmaceutical form, route of administration, duration of treatment, and instructions of use."¹⁰ A medication prescription error may also include the failure to prescribe a drug for a patient who needs the treatment for a medical condition, or for a patient who needs the drug as a treatment of another drug's adverse effects.¹⁰

Prescribing Potentially Inappropriate Medications in the Elderly

A prescribing error may include prescribing a medication that is potentially inappropriate for a certain patient population, specifically, the elderly.¹¹ In these situations, a medication may have adverse risks that exceed the health benefits to an elderly patient. There may also be safer or equally effective alternative medications that could be prescribed in its place.¹¹

In 1991, Dr. Mark H. Beers developed the Beers Criteria.¹² The Beers Criteria provided guidance on the appropriate or inappropriate use of medication in geriatric patients.¹² The American Geriatric Society (AGS) is currently responsible for the regular updates of the Beers Criteria.¹¹

The AGS criteria deal with prescribing drugs within the context of "consideration of diagnosis, use of caution, simultaneous prescription of drugs that could interact, and avoidance/or reduction of dosage according to individual kidney function."¹¹ The updated Beers criteria, supported with a discussion of the quality of evidence and strength of each recommendation are available directly from the AGS.¹³

Drug Not Indicated

A prescribing error includes drugs prescribed for a patient that are not indicated for the patient's medical condition. One study found that an average of 2.7 medications per patient were not indicated for the patient given the patient's diagnosis.¹⁰

Drug-disease Contraindications

A medication error may result when a drug is contraindicated for a patient with a particular disease.¹⁰

Drug-drug Interactions

A medication error may result when a patient is prescribed multiple drugs that may interact negatively.¹⁰

Transcription Errors

Transcription errors occur because of poor communication. They typically do not occur because of a lack of knowledge.¹⁴ With these errors, an order from a prescriber fails to be properly communicated to the individual dispensing or administering the medication.¹⁴

A transcription error may arise with handwritten orders.¹⁴ Handwritten prescriptions are a problem since they may be illegible.^{9,10} "The process of transcribing a drug order manually from one sheet to another appears to be a significant source of error." More than one-half of handwritten prescriptions have been reported to be "poorly readable or unreadable."¹⁰

Electronic prescriptions have helped in this regard but have introduced their own issues regarding prescription errors.¹⁵ Prescription errors that persist even with electronic prescriptions are "wrong drug, wrong dose, wrong route, wrong duration, and wrong formulation."²

Transcription errors are not limited to handwritten orders. They can also result from orders that are unclear or misinterpreted.¹⁴ Orders are more likely to be unclear or misinterpreted when the prescription is given verbally.¹⁴

Preparation and Administration Errors

Preparation errors typically occur when a drug is improperly constituted or incorrectly concentrated.² Administration errors involve mistakes when giving medication to a patient. Examples of administration errors include missed, untimely or incorrect doses, unlicensed staff administering medication, wrong administration technique and rate, double dosing, and the administration of an expired medication or the medication was administered longer than recommended or not long enough.^{2,16,17}

An administration error happens when clinicians fail to document or incorrectly document medication, and/or fail to follow medication administration policies.¹⁸ Also, questions are being raised about the lack of patient education, and informed consent of patients on medication risks and benefits.¹⁸

Dispensing and Monitoring Errors

A dispensing error is multifactorial. It can pertain to dispensing medication to the wrong patient, the wrong medication to a patient, or at the wrong time. Monitoring medication establishes the effectiveness of treatment and the need to adjust doses.^{10,18} Medication tolerance is an important part of monitoring treatment, and is often a standard requirement of treatment with medications like lithium, warfarin, and cardiac medications.¹⁹ Some medications require routine laboratory monitoring of drug levels and of the drug's effect on bodily functions.¹⁹

High Risk Medications

Certain medications carry a higher risk of harm in the event a medication error occurs. These medications require greater vigilance in monitoring the

patient as described above. The Institute for Safe Medication Practices (ISMP) is a nonprofit organization that focuses on the prevention of medication errors.²⁰ The ISMP identifies medications that pose a high risk of patient harm or death should a medication error occur.²⁰ These drugs are identified in a list entitled "High-Alert Medications in Acute Care Settings."²⁰ This list may be accessed at the ISMP website.²⁰

Root Causes of Medication Errors

Human factors and systemic factors are root causes of medication errors. Root causes of medication errors include a lack of training or education of providers, unavailability of guidelines for medication administration, fragmentation of medication information, interruption during medication administration, poor communication between providers, and a failure to follow the rights of medication administration.¹⁸ Many errors arise because of the time constraints often present when providing healthcare services.²¹ Each of these can lead to medication errors that increase the risk of harm to patients, that may extend a patient's hospital stay, and that may result in other negative outcomes.

Lack of Training or Education

Health clinicians are required as professionals to maintain knowledge in their respective areas of practice and to complete continuing education for licensing, professional certification, which is often a requirement of employment.²² The lack of knowledge is a major cause of medication errors.²³ Lack of resources and/or time for increasing knowledge has been identified as a significant barrier to safe and appropriate healthcare.^{22,23}

Unavailability of Guidelines for Medication Administration

Guidelines for administration of medication are not always available.²⁴ For example, there are a number of medications that lack formal approval or dosing information for a specific patient population.²⁴ Off label uses may result in unguided drug administration that may result in administration errors.²⁴

Fragmentation of Medication Information

The use of multiple medical specialists or medical systems to care for a patient has its benefits but it can also increase the possibility that a medication error may occur. A patient's health information does not always follow the patient from one provider, service, or level of care to the next provider, service or level of care. Furthermore, fragmentation of medication information is implicated in other root causes of medication errors.²⁵ For example, fragmented medication information may result in poor communication. Poor communication, discussed below, inhibits the flow of information to the next provider, service and level of care. This may cause harmful medication errors.²⁵

Interruptions

Prescribing, transcribing, preparing, dispensing or administering drugs requires a provider's undivided attention. Interruptions during these events can lead to medication errors.¹⁸

Poor Communication

Communication is important to the delivery of safe and appropriate healthcare services. Communication takes place amongst the different providers who may be involved in a patient's treatment.²⁵ In many instances, a patient's care will be transferred from one provider to another. When executing a transfer of care, a patient's medical information, including medications, may become fragmented (as discussed above) and not flow efficiently or properly to the next provider, resulting in poor communication.²⁵

Poor communication may result because of the use of non-standard abbreviations or because of sound-alike medications.¹⁴ As mentioned above, this may lead to a transcription error.¹⁴ The above forms of poor communication create a greater risk that a medication error may occur, which may result in a poor outcome for the patient.²⁵

Failure to Follow the Rights of Medication Administration

The rights of medication administration are patient rights that are required for safe medication ordering and use.¹⁸ The rights of medication administration are enumerated and discussed below. At this point it is important to understand that a healthcare provider who does not utilize or follow these rights is more likely to make a medication error.¹⁸

Time Constraints

Healthcare may take place at a rapid pace. Each day, healthcare clinicians may see a high volume of patients and pharmacists may be filling a large number of prescriptions.²¹ When a pharmacist works under time constraints, the pharmacist is driven or impelled to work quickly, perhaps too quickly. This increases the risk for a medication error.²¹

Medication Error Reduction Strategies

There are a number of strategies that may be implemented by a pharmacist to reduce medication errors. Most healthcare facilities are computerized to help make the flow of information and the dispensing and administration of medications more timely and accurate. Pharmacists should play a role in developing standardized medication use protocols. This may include the pharmacist working actively with healthcare facilities the pharmacist works for; the pharmacist may help them identify risks of medication errors at the facility and then develop strategies to reduce these errors. Forms of active participation by a pharmacist may entail pharmacist-led educational interventions, and pharmacist-led reconciliation programs. Pharmacists may also reduce medication errors through continuing education to fill the pharmacist's knowledge gaps, implementing pharmacy workflow strategies, use of the High-Alert Medications in Acute Care Settings provided by IMSP, and use of the Medication Error Reporting Program (MERP). Finally, a pharmacist may help reduce medication errors by educating patients on medication errors. Patient education should also include a greater role for the pharmacist with a patient's over-the-counter (OTC) medications.

Standardized Medication Use Protocols

The American Society of Health-System Pharmacists (ASHP) provides guidelines for the prevention of medication errors.²⁶ These guidelines begin with the recommendation that healthcare facilities do a risk assessment and then, from the assessment, prepare a plan to reduce medication errors.²⁶ The ASHP guidelines focused on two factors: the identification of facility-specific, high-alert medications, and risk reduction strategies for medication errors.²⁶ A list of high-alert medications may be reviewed from the ISMP list of high-alert drugs, and considering the facilities medication use patterns and historical adverse events.²⁶ Pharmacists who work with a hospital or healthcare facility should take an active role in this process.²⁶

The ISMP has published the Key Elements of Medication Use.²⁷ This document provides important information on the protocols that should be followed when medication is prescribed and administered. This information includes patient and drug information, as well as recommendations regarding the communication of drug information, drug labeling, packaging and nomenclature, and drug storage.²⁷ The ISMP's full recommendation is available online.²⁷

Computerized Systems

Computerized systems have been incorporated into the modern healthcare industry. One of the intents of these systems is to help reduce medication errors at the various points in the process.¹⁴

Computerized Provider-order Entry Systems

Transcription errors occur because of poor communication between the prescriber and the provider who is dispensing or administering the drug. Handwriting errors, unclear or misinterpreted orders often interfere with the proper flow of information. Computerized provider-order entry (CPOE) systems were developed to eliminate these errors through direct entry of the prescribing information into the CPOE system.¹⁴ Utilizing these systems does

help reduce human error that may result from verbal orders or handwritten orders but problems may still persist because of soundalike medications and abbreviations.¹⁴

Automated Dispensing Cabinets

Automated dispensing cabinets (ADCs) are devices that store and dispense medications through a computerized system. These devices offer the pharmacist an opportunity to profile the patient and review medication orders prior to medication administration.¹⁴ As with other computer systems, medication errors may still occur without proper attention.¹⁴

Bar-code Medication-administration Systems

Bar-code medication-administration systems place an identification number on each medication and patient, that is unique to them.¹⁴ "This allows for patient, medication, and employee identification codes to be scanned automatically to ensure that the right patient, drug, dose, route, and time are correct prior to administration."¹⁴ Use of this technology has helped reduce administration errors.¹⁴

Education to Fill Knowledge Gaps

Healthcare providers, including pharmacists, are sure to have knowledge gaps when it comes to their profession. This is due in part to the fact that knowledge is not static, information changes and grows. Provider education is important in filling knowledge gaps.^{22,23} Formal education can help narrow these deficits; however, there may be instances where there is an immediate need for information and quick-reference guides or brochures can be useful until more formal education can be completed.¹⁴

Pharmacy Workflow Strategies

Pharmacy workflow strategies should be implemented. This involves reducing office clutter, and limiting distractions when preparing prescriptions

(e.g., answering questions, receiving or making phone calls, watching television, accessing the internet).²⁸ There are systems available that assist a pharmacist with patient safety, such as “bar code scanning, drug utilization review for each prescription, a two-step verification process, prescription post fill auditing, and built in technologies that provide alerts when medication may be incorrect.”²⁸

Pharmacist-led Educational Interventions

Medication errors may be reduced by pharmacist-led educational interventions directed to healthcare providers.² Here the pharmacist takes on the role of educator and provides medication-information training. Examples of these educational programs include brochures or training activities presented by a pharmacist that are designed to improve the knowledge and skills of healthcare workers.² One study reported that a pharmacist-led educational program reduced the risk of a medication error by about 15.8%.^{16,29} In this study, the pharmacist observed staff members of a provider administering a drug to a patient, and then followed the observation with feedback and education regarding observed risks or errors.^{16,29}

Pharmacist-led Medication Reconciliation Programs

Medication reconciliation is a program where a healthcare provider reviews closed patient files to reconcile drug administration, and find drug discrepancies and medication errors.³⁰ Pharmacist-led medication reconciliation is useful within the pharmacist's business or employment.³⁰ Pharmacist-led medication reconciliation may be particularly useful in reducing medication discrepancies when a patient's care is transitioning from one provider to another: the pharmacist reviews the closed patient file from the prior provider and reconciles any drug discrepancies so they may be resolved and not repeated with the new provider.^{30,31} This strategy can help avoid medication errors and prevent harm to the patient.³⁰

One drawback from pharmacist-led medication reconciliation is that it may be time consuming and costly.³¹ One alternative would be to use computerized medication reconciliation to reduce prescribing errors but some

studies show that computerized medication reconciliation is not as effective as pharmacist-led educational interventions in reducing errors.³¹ Because it is more effective, Manias, *et al.* (2020) believe that the additional time and cost of pharmacist-led educational interventions are worth it.³¹

Rights of Medication Administration

The causes of medication errors are complex; however, there are some basic, effective methods to avoid medication errors. One of these methods is the rights of medication administration.^{18,32}

The rights of medication administration vary in the *number* of rights listed.^{18,32} The basic list provides “five rights” that are required for safe medication ordering and use. A provider double checks that the rights of medication administration have been met. The five rights are:³²

1. The drug is being administered to the **right patient**
2. The **right drug** is being administered
3. The **right dose** is being administered
4. The drug is being administered at the **right time**
5. The drug is being administered via the **right route**

This list has been supplemented with additional “rights of medication administration” in order to make it more sensitive and effective at preventing medication errors.³² In some settings, the list has expanded to 6 or even 10 rights.¹⁸ For example, Schiff, *et al.* (2016) stated a sixth right must be added to each prescription: the **right indication**.³³ This sixth right is of particular importance to pharmacists, especially with computerization of medical records. Schiff, *et al.*, pointed out that with the addition of an “indications-based computer prescribing system,” pharmacists could more easily catch drug–indication mismatches.³³

The rights of medication administration list is a useful tool but should not be viewed as sufficient by itself to address medication errors. Attention to the root causes of medication errors that are systemic should be continued,

and improvements should be made.³² In addition, cognitive and physical factors are not always solved with lists, especially in a fast-paced work environment.³²

High-Alert Medications in Acute Care Settings

As mentioned above, the ISMP has identified medications that pose a high risk of patient harm or death if a medication error occurs.²⁰ This list is entitled High-Alert Medications in Acute Care Settings.²⁰ This list was last updated in 2018.²⁰

High-Alert drugs must be understood in the context of drug use. Drugs are prescribed to prevent or treat an illness, and to provide a measurable effect. In order to avoid medication errors clinicians should be aware of look-alike and sound-alike drugs, and drug abbreviations. A significant number of medication errors that occur in the United States involve name confusion, and these errors have the potential to cause great harm.

Awareness of Error-Prone Abbreviations

Regarding proper use of abbreviations, each healthcare facility should have a list of acceptable abbreviations and clinicians should know where the list is and what it contains. The ISMP provides a List of Error-Prone Abbreviations on its website.³⁴ Commonly used abbreviations related to medication administration that can be used mistakenly or misidentified are ones, such as: U (or u) intended to mean unit but easily mistaken for an 0 or 4, SC intended to mean subcutaneous but easily mistaken for SL (sublingual), and QOD intended to mean every other day but easily mistaken as QD (every day) if it is written sloppily.³⁴

Medication Error Reporting Program (MERP)

Medication Error Reporting Program (MERP) is a program provided by the United States Pharmacopoeia (USP) and Institute of Safe Medication Practices. The MERP is a nationwide reporting system for actual or potential

medication errors.³⁵ The MERP includes reports of drug misinterpretations, miscalculations, misadministration, illegible handwritten orders, or misunderstood verbal orders.³⁵ These reports are reviewed by the USP and the information is sent to the FDA and to the drug or product manufacturer.³⁵ This provides an additional resource to providers to make them aware of actual or potential medication errors. Utilization of resources such as MERP can help reduce or prevent medication errors.

Patient Education

Patients must be educated about the medications they are prescribed. This is usually and properly conducted by pharmacists.^{26,27,31} This education should include “the brand and generic names of medications they are receiving, their indications, usual and actual doses, expected and possible adverse effects, drug or food interactions, and how to protect themselves from errors.”²⁷ With this education, a patient can play a vital role in preventing medication errors.²⁷

According to the FDA, patients, as consumers, should be educated by their physician or pharmacist on the following safety tips and questions consumers should ask their prescriber:³

- Know the various risks and causes for medication errors.
- Know the drug you are prescribed and what it is for. Ask your prescriber for the name of the drug and the purpose of the drug.
- Find out how to take the drug and make sure you understand the directions. Ask if the medicine needs to be kept in the refrigerator.
- Check the container's label every time you take a drug. This is especially important if you are taking several drugs because it will lower your risk of accidentally taking the wrong medicine.
- Keep drugs stored in their original containers. Many pills look alike, so keeping them in their original containers will help know the name of the drug and how to take them. If you are having trouble keeping multiple medications straight, ask your doctor or pharmacist about helpful aids.

- Keep an updated list of all medications taken for health reasons, including OTC drugs, supplements, medicinal herbs, and other substances. Give a copy of this list to your healthcare provider.
- Be aware of the risk of drug-drug and food-drug interactions.
- If in doubt or you have questions about your medication, ask your pharmacist or other healthcare provider.
- Report suspected medication errors to MedWatch (the FDA's "Safety Information and Adverse Event Reporting Program").

Pharmacist Involvement with Over-the-counter Medications

In the U.S., OTC medications are available to people without a prescription.³⁶ In elderly patients, this poses a significant risk of drug interactions and medication errors that may lead to harm.³⁶ The extent of this issue is great. An estimated one-third of older adults reportedly use OTC drugs, and this percentage increases to one-half with people 75 to 85 years-of-age.³⁶ Some older adults use 2 or more OTC drugs.³⁶ Gilson, *et al.* (2021) believes that "over one million older adults are in physical jeopardy from harms related to the use of 2 or more OTC medications."³⁶

There are 10 drugs that are most frequently used by the public and 4 of them are available OTC.³⁷ These four OTC drugs are ibuprofen, aspirin, acetaminophen, and diphenhydramine.³⁷ These drugs are also available in multiple-ingredient preparations, which increases the risk for a potentially dangerous overdose.³⁷ To address this serious problem, pharmacy aisles may be redesigned and pharmacists can become more interactive with older adults when it comes to OTC drug purchases.³⁶⁻³⁸ The redesign of store aisles and greater interaction with pharmacy staff are intended to decrease potential misuse of these drugs, and provide older adults with more information and awareness about the possible dangers from OTC medication. Pharmacy staff are able to observe older adults when they are purchasing OTC drugs and then engage in conversations with them and make recommendations.³⁷

Reporting Medication Errors

Under Federal law, there are voluntary reporting systems for medication errors. For example, the FDA receives voluntary reports at the FDA Adverse Event Reporting System (FAERS).³⁹ Some states mandate reporting of medication errors, and most hospitals have policies that require their pharmacists to report medication errors.⁴⁰

Florida requires reporting of medication errors by a licensed health care practitioner under specific circumstances.⁴¹ The reporting requirements apply whether the practitioner administers a drug, or supervises the patient self-administering a drug.⁴¹

The term “medication errors” is broadly defined under the Florida Administrative Code.⁴² If a medication error occurs, a licensed health care practitioner must notify a supervisor, if applicable, and for a wrong medication, wrong dosage, or wrong patient, a licensed health care practitioner must immediately notify the patient’s health care practitioner, and observe the patient closely for a minimum period of 60 minutes after the medication was administered, and immediately report any observed changes in the patient’s condition to the prescribing health care practitioner, and call 911 to request emergency services if the patient exhibits respiratory difficulty or other potentially life-threatening symptoms.⁴³

If the error occurs in a healthcare facility, a report must be submitted to the Regional Office within 24 hours of discovering the error.⁴⁴ A pharmacist should consult with their employer, supervisor, or legal advisor to determine their obligation to report a medication error.

Disclosing Medication Errors to the Patient

When a medication error does occur, the question arises when must or should a pharmacist disclose the error to the patient. Pharmacists who work within a hospital setting report that the number of weekly medication errors are significantly higher in that setting.⁴⁰ Most pharmacists work in a hospital

setting with mandatory error reporting but significantly less than half have a policy on error disclosure to the patient.⁴⁰ This may be due to the different reporting rules or policies that hospitals have implemented; namely, who is responsible for disclosure to the patient? According to Mazan, *et al.* (2020), most hospital pharmacists believe that they were not responsible for disclosing a medication error.⁴⁰ Pharmacists outside the hospital setting reported a “higher awareness of guidelines on disclosure to patients, as they are more likely to be involved in the process.”⁴⁰

Mazan, *et al.*, propose that medication errors should be disclosed to the patient, and to family members when appropriate. While this may be difficult to do, it is “vital for the patient’s physical and emotional wellbeing [and] the wellbeing of healthcare systems, as acknowledging errors is the first step in correcting them.”⁴⁰ A pharmacist should consult with their employer, supervisor, or legal advisor to determine their obligation to report a medication error to the patient.

Summary

The failure to communicate drug orders and illegible writing are amongst the more common failures related to medication errors. Name confusion over similarly named drugs or errors involving dosing units are also not uncommon reasons why a medication can occur. Medication errors can also be due to human errors; however, more typically a medication error results from a systemic failure, such as the fragmentation of medication information as a patient moves between providers, services and levels of care.

A medication error has been identified by the National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) as a preventable event involving inappropriate medication use and potentially may result in patient harm and an adverse drug event.

Strategies that may be implemented by a pharmacist to reduce medication errors may include the pharmacist working actively with healthcare facilities to help them identify risks of medication errors at the facility and then

develop strategies to reduce these errors. This may include pharmacist-led educational interventions and pharmacist-led reconciliation programs. These may help reduce medication errors through education for pharmacists and healthcare facilities, as well as with patients, on the risk and prevention of medication errors.

Course Test

1. A medication error is best defined as an event that

- a. causes patient harm.
- b. is preventable and may cause harm.
- c. is caused by a healthcare provider, not a patient.
- d. must be disclosed to the patient and patient's family.

2. A majority of medication errors are caused by

- a. the use of over-the-counter medications.
- b. monitoring errors.
- c. by the manufacturer's erroneous product labeling or packaging.
- d. prescription errors.

3. A medication error that results in harm to a patient is called

- a. a contraindication.
- b. an adverse drug event.
- c. a near miss.
- d. a monitoring error.

4. The list of "High-Alert Medications in Acute Care Settings" identifies drugs that

- a. carry a higher risk of harm when a medication error occurs.
- b. are more prone to medication errors.
- c. have the potential for medication errors.
- d. have actually caused medication errors.

5. One of the root causes of medication errors is the fragmentation of medication information that arises when a patient's medication information

- a. is mixed with another patient's medication information.
- b. is not given to the patient.
- c. does not follow the patient from one provider, service, or level of care to another.
- d. is computerized.

6. True or False: A prescribing error may include prescribing a medication that is potentially inappropriate for an elderly adult.

- a. True
- b. False

7. One strategy to reduce medication errors is a pharmacist-led medication reconciliation program in which the pharmacist

- a. sits down with the patient and discloses medication errors.
- b. trains healthcare staff on medication errors.
- c. reviews closed patient files to find drug use discrepancies.
- d. reviews a patient's medication bills for errors.

8. _____ typically occur when a drug is improperly constituted or incorrectly concentrated.

- a. Monitoring errors
- b. Transcribing errors
- c. Incorrect drug indications
- d. Preparation errors

9. Examples of _____ include missed, untimely or incorrect medication doses.

- a. administration errors
- b. transcribing errors
- c. monitoring errors
- d. prescribing errors

10. True or False: Florida law only requires reporting of medication errors by a licensed health care practitioner when a practitioner administers the drug.

- a. True
- b. False

- 11. Bar-code medication-administration systems place an identification number on each**
- a. medication error so it may be tracked.
 - b. medication and patient, that is unique to them.
 - c. prescription and any transcription to make sure they match.
 - d. over-the-counter drug purchase.
- 12. The sixth right in the list of rights of medication administration - the Right Indication - is of particular importance to pharmacists because it can help them**
- a. more easily catch drug-indication mismatches.
 - b. drug-drug interactions.
 - c. know if the drug dose was indicated correctly on the prescription.
 - d. identify the correct route of administration.
- 13. Pharmacy aisles may be redesigned and pharmacists can become more interactive with older adults when it comes to**
- a. the proper use of medication abbreviations.
 - b. the use of computer systems such as CPOE systems.
 - c. pharmacist-led educational interventions.
 - d. over-the-counter drug purchases.
- 14. In Florida, if a medication error that occurs is due to _____, the licensed health care practitioner involved must, among other things, immediately notify the patient's health care practitioner and thereafter observe the patient closely for a minimum period of 60 minutes.**
- a. the wrong route of administration
 - b. the medication being expired
 - c. the wrong dosage
 - d. All of the above
- 15. True or False: There are 4 over-the-counter drugs that are in the top 10 of drugs most frequently used by the public, and they are ibuprofen, aspirin, acetaminophen, and diphenhydramine.**
- a. True
 - b. False

References

1. Institute of Medicine (US) Committee on Quality of Health Care in America, Kohn LT, Corrigan JM, Donaldson MS, eds. *To Err is Human: Building a Safer Health System*. Washington (DC): National Academies Press (US); 2000.
2. Jaam M, Naserallah LM, Hussain TA, Pawluk SA. Pharmacist-led educational interventions provided to healthcare providers to reduce medication errors: A systematic review and meta-analysis. *PLoS One*. 2021 Jun 23;16(6):e0253588. doi: 10.1371/journal.pone.0253588. PMID: 34161388.
3. Food and Drug Administration. Working to reduce medication errors. Retrieved from <https://www.fda.gov/drugs/drug-information-consumers/working-reduce-medication-errors>
4. National Coordinating Council for Medication Error Reporting and Preventing About Medication Errors. About Medication Errors. What is a Medication Error? 2021. Accessed June 23, 2021 at <http://www.nccmerp.org/about-medication-errors>
5. Bates DW, Boyle DL, Vander Vliet MB, Schneider J, Leape L. Relationship between medication errors and adverse drug events. *J Gen Intern Med*. 1995 Apr;10(4):199-205. doi: 10.1007/BF02600255. PMID: 7790981.
6. Falconer N, Barras M, Cottrell N. Systematic review of predictive risk models for adverse drug events in hospitalized patients. *Br J Clin Pharmacol*. 2018;84(5):846-864. doi:10.1111/bcp.13514
7. Insani WN, Whittlesea C, Alwafi H, Man KKC, Chapman S, Wei L. Prevalence of adverse drug reactions in the primary care setting: A systematic review and meta-analysis. *PLoS One*. 2021;16(5):e0252161. Published 2021 May 26. doi:10.1371/journal.pone.0252161
8. Velo GP, Minuz P. Medication errors: prescribing faults and prescription errors. *Br J Clin Pharmacol*. 2009;67(6):624-628. doi:10.1111/j.1365-2125.2009.03425.x
9. Hartel MJ, Staub LP, Röder C, Egli S. High incidence of medication documentation errors in a Swiss university hospital due to the handwritten prescription process. *BMC Health Serv Res*. 2011;11:199. Published 2011 Aug 18. doi:10.1186/1472-6963-11-199
10. Assiri GA, Shebl NA, Mahmoud MA, et al. What is the epidemiology of medication errors, error-related adverse events and risk factors for errors in adults managed in community care contexts? A systematic review of the international literature [published correction appears in *BMJ Open*. 2019 May 27;9(5):e019101corr1]. *BMJ Open*. 2018;8(5):e019101. Published 2018 May 5. doi:10.1136/bmjopen-2017-019101
11. Sharma R, Bansal P, Garg R, Ranjan R, Kumar R, Arora M. Prevalence

- of potentially inappropriate medication and its correlates in elderly hospitalized patients: A cross-sectional study based on Beers criteria. *J Family Community Med.* 2020;27(3):200-207. doi:10.4103/jfcm.JFCM_175_20
12. Beers MH, Ouslander JG, Rollinger I, Reuben DB, Brooks J, Beck JC. Explicit criteria for determining inappropriate medication use in nursing home residents. UCLA Division of Geriatric Medicine. *Arch Intern Med.* 1991 Sep;151(9):1825-32. PMID: 1888249.
 13. By the 2019 American Geriatrics Society Beers Criteria® Update Expert Panel. American Geriatrics Society 2019 Updated AGS Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults. *J Am Geriatr Soc.* 2019 Apr;67(4):674-694. doi: 10.1111/jgs.15767. Epub 2019 Jan 29. PMID: 30693946.
 14. Weant KA, Bailey AM, Baker SN. Strategies for reducing medication errors in the emergency department. *Open Access Emerg Med.* 2014;6:45-55. Published 2014 Jul 23. doi:10.2147/OAEM.S64174
 15. Palchuk MB, Fang EA, Cygielnik JM, et al. An unintended consequence of electronic prescriptions: prevalence and impact of internal discrepancies. *J Am Med Inform Assoc.* 2010;17(4):472-476. doi:10.1136/jamia.2010.003335
 16. Koeck JA, Young NJ, Kontny U, Orlikowsky T, Bassler D, Eisert A. Interventions to Reduce Medication Dispensing, Administration, and Monitoring Errors in Pediatric Professional Healthcare Settings: A Systematic Review. *Front Pediatr.* 2021;9:633064. Published 2021 May 26. doi:10.3389/fped.2021.633064
 17. Dhawan I, Tewari A, Sehgal S, Sinha AC. Medication errors in anesthesia: unacceptable or unavoidable? *Braz J Anesthesiol.* 2017 Mar-Apr;67(2):184-192. doi: 10.1016/j.bjane.2015.09.006. Epub 2016 May 16. PMID: 28236867.
 18. Tsegaye D, Alem G, Tessema Z, Alebachew W. Medication Administration Errors and Associated Factors Among Nurses. *Int J Gen Med.* 2020;13:1621-1632. Published 2020 Dec 22. doi:10.2147/IJGM.S289452
 19. Härkänen M, Paananen J, Murrells T, Rafferty AM, Franklin BD. Identifying risks areas related to medication administrations - text mining analysis using free-text descriptions of incident reports. *BMC Health Serv Res.* 2019;19(1):791. Published 2019 Nov 4. doi:10.1186/s12913-019-4597-9
 20. Institute for Safe Medication Practices. High-Alert Medications in Acute Care Settings. *ISMP.* August 23, 2018. Retrieved on June 25, 2021 at <https://www.ismp.org/recommendations/high-alert-medications-acute-list>
 21. Shao SC, Chan YY, Lin SJ, et al. Workload of pharmacists and the performance of pharmacy services. *PLoS One.* 2020;15(4):e0231482.

- Published 2020 Apr 21. doi:10.1371/journal.pone.0231482
22. Frenzel JE, Skoy ET, Eukel HN. Use of Simulations to Improve Pharmacy Students' Knowledge, Skills, and Attitudes About Medication Errors and Patient Safety. *Am J Pharm Educ.* 2018;82(8):6644. doi:10.5688/ajpe6644
 23. Escrivá Gracia J, Brage Serrano R, Fernández Garrido J. Medication errors and drug knowledge gaps among critical-care nurses: a mixed multi-method study. *BMC Health Serv Res.* 2019;19(1):640. Published 2019 Sep 6. doi:10.1186/s12913-019-4481-7
 24. Tolley CL, Forde NE, Coffey KL, et al. Factors contributing to medication errors made when using computerized order entry in pediatrics: a systematic review. *J Am Med Inform Assoc.* 2018;25(5):575-584. doi:10.1093/jamia/ocx124
 25. Manskow US, Kristiansen TT. Challenges Faced by Health Professionals in Obtaining Correct Medication Information in the Absence of a Shared Digital Medication List. *Pharmacy (Basel).* 2021;9(1):46. Published 2021 Feb 22. doi:10.3390/pharmacy9010046
 26. Billstein-Leber M, Carrillo CJD, Cassano AT, Moline K, Robertson JJ. ASHP Guidelines on Preventing Medication Errors in Hospitals. *Am J Health Syst Pharm.* 2018 Oct 1;75(19):1493-1517. doi:10.2146/ajhp170811. PMID: 30257844.
 27. Institute for Safe Medication Practices. Key Elements of Medication Use. *ISMP.* Undated. Retrieved on June 25, 2021 at <https://www.ismp.org/key-elements-medication-use>
 28. Grant M, Remines J, Nadpara P, Goode JKR. Impact of Live Training on Medication Errors in a Community-Based Pharmacy Setting. *Innov Pharm.* 2020;11(3):10.24926/iip.v11i3.3291. Published 2020 Jul 31. doi:10.24926/iip.v11i3.3291
 29. Chua SS, Choo SM, Sulaiman CZ, Omar A, Thong MK. Effects of sharing information on drug administration errors in pediatric wards: a pre-post intervention study. *Ther Clin Risk Manag.* 2017;13:345-353. Published 2017 Mar 23. doi:10.2147/TCRM.S128504
 30. Mekonnen AB, McLachlan AJ, Brien JA. Effectiveness of pharmacist-led medication reconciliation programmes on clinical outcomes at hospital transitions: a systematic review and meta-analysis. *BMJ Open.* 2016;6(2):e010003. Published 2016 Feb 23. doi:10.1136/bmjopen-2015-010003
 31. Manias E, Kusljic S, Wu A. Interventions to reduce medication errors in adult medical and surgical settings: a systematic review. *Ther Adv Drug Saf.* 2020;11:2042098620968309. Published 2020 Nov 12. doi:10.1177/2042098620968309
 32. Misasi P, Keebler JR. Medication safety in emergency medical services: approaching an evidence-based method of verification to reduce errors. *Ther Adv Drug Saf.* 2019;10:2042098618821916. Published 2019 Jan

21. doi:10.1177/2042098618821916
33. Schiff GD, Seoane-Vazquez E, Wright A. Incorporating Indications into Medication Ordering--Time to Enter the Age of Reason. *N Engl J Med*. 2016 Jul 28;375(4):306-9. doi: 10.1056/NEJMp1603964. PMID: 27464201.
34. Institute for Safe Medication Practices. List of Error-Prone Abbreviations. *ISMP*. February 5, 2021. Retrieved on June 26, 2021 at <https://www.ismp.org/recommendations/high-alert-medications-acute-list>
35. Patel I, Balkrishnan R. Medication Error Management around the Globe: An Overview. *Indian J Pharm Sci*. 2010;72(5):539-545. doi:10.4103/0250-474X.78518
36. Gilson AM, Xiong KZ, Stone JA, Jacobson N, Chui MA. A pharmacy-based intervention to improve safe over-the-counter medication use in older adults. *Res Social Adm Pharm*. 2021;17(3):578-587. doi:10.1016/j.sapharm.2020.05.008
37. Chui MA, Stone JA, Holden RJ. Improving over-the-counter medication safety for older adults: A study protocol for a demonstration and dissemination study. *Res Social Adm Pharm*. 2017;13(5):930-937. doi:10.1016/j.sapharm.2016.11.006
38. Gilson AM, Xiong KZ, Stone JA, et al. Improving Patient-Pharmacist Encounters with Over-The-Counter Medications: A Mixed-Methods Pilot Study. *Innov Pharm*. 2020;11(1):10.24926/iip.v11i1.2295. Published 2020 Feb 14. doi:10.24926/iip.v11i1.2295
39. Zhou S, Kang H, Yao B, Gong Y. Analyzing Medication Error Reports in Clinical Settings: An Automated Pipeline Approach. *AMIA Annu Symp Proc*. 2018;2018:1611-1620. Published 2018 Dec 5.
40. Mazan JL, Lee MK, Quiñones-Boex AC. American Pharmacists Attitudes and Behaviors Regarding Medication Error Disclosure. *Innov Pharm*. 2020;11(4):10.24926/iip.v11i4.3373. Published 2020 Dec 15. doi:10.24926/iip.v11i4.3373
41. Florida Administrative Code, Rule 65G-7.006 (2)
42. Florida Administrative Code, Rule 65G-7.006 (1)
43. Florida Administrative Code, Rule 65G-7.006 (2)(b)
44. Florida Administrative Code, Rule 65G-7.006 (3)(a)

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