



Medication Safety: Protecting Patients from Avoidable Harm

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Note: All dosages given are for adults unless otherwise stated. The information on medications contained in this course is not meant to be prescriptive or all-encompassing. You are encouraged to consult with physicians and pharmacists about all medication issues for your patients.

Purpose

The purpose of this course is to provide information about safe prescription and transcription of medication dosages, instruction about safe administration practices, and guidance regarding medication safety based on The Joint Commission's National Patient Safety Goals.

Objectives

After successful completion of this course, you will be able to:

1. Define medication errors and adverse drug events
2. Describe risk reduction strategies to prevent transcription errors
3. Delineate risk reduction strategies to prevent medicine administration errors
4. Identify two potential benefits from using a bar coding system for medication administration
5. Describe methods to improve the reconciliation of medications across the continuum (ROMAC) at your work place
6. Identify the importance of assessing allergies and patient's rights to medication administration
7. Identify and contrast symptoms and treatments for allergic reactions
8. Describe the influence of pH and osmolality on the patency of peripheral veins

Introduction

Medication safety is everyone's responsibility, provider, pharmacist, nurse, and patient as errors can and do occur at any point in the process (prescribing, order transcription, dispensing, distribution, and administration). Several national organizations have joined together to help reduce the risk of

medication errors, the Joint Commission (TJC), the Institute for Safe Medication Practices (ISMP), the Federal Food and Drug Administration (FDA), the Centers for Medicare and Medicaid Services (CMS), along with many state organizations and medical facilities. This effort has helped reduce the risk of medication errors throughout the country.

However, there is still much that needs to be done to eradicate medication errors. This includes eliminating the common causes of these errors: poor communication, ambiguities in product names, ambiguities in directions for use, use of abbreviations, poor penmanship, poor policies and procedures, poor techniques, similar packaging or labeling, and job stress (Food and Drug Administration (FDA), 2016).

How Safe Are Our Medication Practices?

- Medication errors injure approximately 1.3 million people annually
- Medication errors cause at least one death every day across the nation
- Medication errors cost approximately \$3.5 billion annually
- Adverse drug reactions affect approximately 2 million hospital stays
- Adverse drug reactions increase hospital length of stay by 1.7-4.6 days
- Preventable medication errors impact more than 7 million patients

(FDA, 2016, Lahue, Pyenson, Blumen, Foray, Rothschild, 2012, & US Department of Health and Human Services (DHHS), 2014)

What is Being Done to Reduce Errors?

1975: ISMP was implemented; incorporating as a nonprofit, volunteer organization. In 1996, the ISMP becomes the founding member for the National Coordinating Council for Medication Error Reporting and Prevention. In 2000, the first ISMP Medication Safety Self-Assessment for Hospitals is conducted. In 2016, celebrated the 20th anniversary of the ISMP Medication Safety Alert! (Institute for Safe Medication Practices (ISMP), 2017)

1992: The Center for Drug Evaluation and Research, a division of the FDA, took on the responsibility to evaluate and recommend appropriate action for medical errors. One of its priorities is identifying, reviewing, and approval of new drug names to avoid potential confusing proprietary drug names (FDA, 2016).

2001: The National Patient Safety Goal Program was started by TJC to help accredited hospitals address patient safety issues. In 2007, medication safety was addressed; the NPSG continues to include medication safety to this day (The Joint Commission (TJC), 2016).

2014: CMS updates its Conditions of Participation to include that nurses are related only to some components of the hospital medication process and that as part of a comprehensive approach to the medication process; the participation of pharmacy and quality assessment departments are vital (Perrott & Bartleson, 2014).

Other processes implemented:

- Sound alike, Look alike medications

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- Bar-coding
- TALLman lettering
- Computerized physician order entry
- Electronic medical records
- Medication reconciliation
- Two unique patient identifiers
- Patients medication rights
- Read back verbal orders
- Do not use abbreviations
- Correct use of decimal points
- Automated medication dispensing cabinets

Many processes have been put into place to help eliminate medication errors. To date, these efforts have reduced the rate of medication errors, but more effort on the part of healthcare workers and patients are needed to eradicate medication errors.

Following the Medication Process

It is important to follow the medication process from patient admission to discharge because it will illuminate all the areas where an error can occur as well as indicate processes currently recommended to reduce errors at each level of the process.

Medication Reconciliation

Medication reconciliation is the process of creating the most accurate list possible of all medications a patient is taking and comparing that list against the physician's admission, transfer, and/or discharge orders, with the goal of providing correct medications to the patient at all transition points within the hospital. Medication reconciliation should include:

- Drug name
- Dosage
- Frequency
- Route

Medication reconciliation should be implemented at all transitions in care - at admission, transfer, and discharge.

Medication reconciliation can be done by providers, nurses, and pharmacists.

Prescribing

Processes to reduce errors during prescribing are helping to eliminate some of the common causes of these errors. The following list of processes address: poor communication, ambiguities in product names, ambiguities in directions for use, use of abbreviations, poor penmanship, job stress, and poor policies and procedures.

- Computerized physician order entry has reduced the number of errors caused by illegible penmanship, reduced ambiguous product names, and increased clearer communication
- The use of standardized order sets reduces order omission and job stress
- The implementation of "Do Not Use Abbreviation" lists have reduced ambiguous directions for use

- Limiting verbal orders and verbal order read-back with spelling of drug names reduces the number of communication errors and the omission of written orders
- Accurate patient weights and allergy identification reduce dosing and prescribing errors

Order transcription

Computer order entry has almost eliminated the need for order transcription; thus, reducing the number of errors caused by poor communication, poor penmanship, unapproved abbreviations, and job stress.

Dispensing

Pharmacist participation in the development and use of policies and procedures, standardized order sets, smart pump medication lists with minimum and maximum doses and rates, and use of computerized order entry is essential to reducing medication errors. Pharmacists have the responsibility of maintaining the automated medication dispensing cabinets; ensuring the over-ride medication list is minimal but complete, look-a-like medications are in separate drawers, medication discrepancies are reconciled and tracked. These processes are helping to reduce medication errors and medication misuse. The use of TALLman lettering when labeling medications is helping reduce ambiguous product names. Barcoding is helping to reduce medication errors by ensuring the right medication is dispensed to the right patient.

Distribution

The use of automated medication dispensing cabinets are helping to reduce the number of drugs that are transported to the patient care units. This process is helping to eliminate drugs that arrive after the scheduled medication time, missing doses, wrong medication in patient's drawers, among others. It is also helping to reduce drug misuse.

Administration

Many processes have been implemented to help the nurse reduce the risk of medication errors during administration. These processes include:

- No interruption zones where nurses can review the orders, medications, route, dose, etc. for accuracy and complete dosing calculation without interruptions that may lead to error
- High-risk medication policy and procedures, including independent double checks to ensure the right drug is administered at the right dose
- Barcoding to ensure that the correct patient is getting the correct drug. However, it is important to be sure that the barcode label is on the medication and not in the container the drug was transported in. Errors have been made when the label on the container does not correspond to the medication in the container.
- Unique patient identifiers help the nurse make sure that the right patient is getting the medication
- Patient rights surrounding medication administration have increased over the years, helping ensure that the medication is administered correctly.
- The number of patient medication rights in each organization may be different, be sure to know and follow the patient's rights for medication administration in your organization.

What Happens When Errors Occur?

Each organization has a process for monitoring, assessing, resolving errors. Be sure to review these processes at the organization you are affiliated with. Most processes include:

- An electronic reporting system for documenting
 - Adverse Drug Events
 - Sentinel Events
 - Near Misses
- A quality program for reviewing errors
 - Root Cause Analysis
- A culture of safety
 - Non-punitive resolutions unless the error was caused by reckless behavior
- A reporting system to national agencies for serious errors
 - The Joint Commission
 - State Health Departments
 - USP Medication Error Reporting Program
 - US Food and Drug Administration's MedWatch Reporting System
 - Centers for Medicare and Medicaid Services

What Does This Mean to Me?

Every healthcare worker needs to understand and follow the processes set in place by the organization, state, and national agencies. These processes were set in place to protect the healthcare provider and the public.

Paying close attention to the policies and procedures and including in your practice, the evidence-based best practices outlined in this module, will help reduce the number of medication errors that affect millions each year.

Let's review some of the process currently available for use.

Can You Differentiate These Terms?

Harm

Impairment of the physical, emotional, or psychological function or structure of the body and pain or injury resulting therefrom.

Medication Error

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. Medication errors are reported, monitored, and resolved based on the level of harm. The National Coordinating Council for Medication Reporting and Prevention (MERP) developed the following index for categorizing medication errors:

- Category A: **No Error**- Circumstances or events have the capacity to cause error
- Category B: **Error, No Harm** – An error occurred by did not reach the patient (an error of omission does reach the patient)
- Category C: **Error, No Harm** – An error occurred that reached the patient but did not cause patient harm

- Category D: **Error, No Harm** - An error occurred that reached the patient and required monitoring to confirm that it resulted in no harm to the patient and/or required intervention to preclude harm
- Category E: **Error, Harm**- An error occurred that may have contributed to or resulted in temporary harm to the patient and required intervention
- Category F: **Error, Harm** - An error occurred that may have contributed to or resulted in temporary harm to the patient and required initial or prolonged hospitalization
- Category G: **Error, Harm** - An error occurred that may have contributed to or resulted in permanent patient harm
- Category H: **Error, Harm** - An error occurred that required intervention necessary to sustain life
- Category I: **Error, Death** - An error occurred that may have contributed to or resulted in the patient's death
(National Coordinating Council for Medication Error Reporting & Prevention (NCCMERP), 2001)

Adverse Drug Event

An injury resulting from medical intervention related to a drug.

Adverse Drug Reaction

Any response to a drug which is noxious and unintended which occurs at doses normally used in man for prophylaxis, diagnosis, or therapy of disease, or for the modifications of physiological function.

Near Misses

An event with the potential to cause harm to a patient but does not result in an injury.

Sentinel Event

Any unexpected occurrence involving death or serious physical or psychological injury, or the risk thereof.

- Unexplained death (because of errors of commission or omission)
- Major permanent loss of function (because of errors of commission or omission)

Test Your Knowledge

You are working in the Quality Management Department and receive the following occurrence report: Mrs. Jones was to receive an enteric coated aspirin at 0900, she instead received a regular aspirin tab. The patient did not state any gastrointestinal discomfort. You designate this occurrence report as which medication error category?

- A. Category A
- B. Category B
- C. Category C**
- D. Category D

Rationale:

- Category A: **No Error**- Circumstances or events have the capacity to cause error
- Category B: **Error, No Harm** – An error occurred by did not reach the patient (an error of omission does reach the patient)

- Category C: **Error, No Harm** – An error occurred that reached the patient but did not cause patient harm
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Test Your Knowledge

Would you call this incidence an adverse drug event?

- A. Yes, it is a medication error and medications errors are adverse drug events
- B. No, it is a medication error with no injury to the patient**

Rationale: Adverse Drug Event: An injury resulting from medical intervention related to a drug

Abbreviations

The use of “Do Not Use” abbreviation lists was implemented by TJC in 2004. Accepted abbreviations are no part of the computerized order entry process and standardized order sets. Review the table below, does your organization have any additional “Do Not Use” abbreviations?

**List of commonly used (and optional)
“Do Not Use” abbreviations**

Abbreviation	Potential Problem	Preferred Term
µg (for microgram)	Mistaken for mg (milligrams) resulting in one thousand-fold dosing overdose	Write "mcg"
c.c. (for cubic centimeter)	Mistaken for U (units) when poorly written	Write "ml" or "mL" for milliliters
AD, AS, AU (right ear, left ear, each ear)	Mistaken as OD, OS, OU (right eye, left eye, each eye)	Use "right ear," "left ear," or "each ear"
OD, OS, OU (right eye, left eye, each eye)	Mistaken as AD, AS, AU (right ear, left ear, each ear)	Use "right eye," "left eye," or "each eye"
S.C. or S.Q. (for subcutaneous)	Mistaken as SL for sublingual, or "5 every"	Write "subcut" or "subcutaneously"
D/C (for discharge)	Interpreted as discontinue whatever medications follow (typically discharge meds)	Write "discharge"
Q hs (nightly at bedtime)	Mistaken as Q hour (every hour)	Use "nightly"
SSRI (sliding scale regular insulin)	Mistaken as selective –serotonin reuptake inhibitor	Spell out "sliding scale"

Decimal Points and Zeros

Despite the implementation of computerized order entry, errors based on decimal points and zeros continue to happen. Help ensure you give the right dose by reminding providers to use decimals and zeros correctly.

	Correct	Incorrect
Whole numbers	2 (no decimal point)	2.0 (the decimal point may not be seen and interpreted as 20)
Leading Zeros	0.2 (clarifies that there is a decimal point)	.2 (the decimal point may not be seen and interpreted as 2)

What is Wrong?

The order reads: 20mg Valium now for agitation

Every order needs to have:

- Drug name
- Drug dose
- Time/frequency
- Route
- Reason (especially if the medication is an as needed medication)

Which of the following orders would you follow?

- A. Valium 20mg po now for agitation
- B. Valium 20mg po now and every 6 hours prn for agitation

If you chose both, you would be correct.

What about these orders?

- A. Morphine 0.2 mg IV every 3-4 hours prn pain
- B. Morphine 0.2 mg IV every 3-4 hours prn for pain score greater than 5

If you chose B you would be correct.

Item A is not complete enough, would you give this patient Morphine if the score was 2? Maybe, but if the patient tolerates pain less than 5 on the scale there would be no reason to give medication. Item B gives you the necessary information to give the medication correctly, and allows you to give the next dose earlier, if the pain had not subsided.

What about this order?

Give 1-2 tabs Tylenol every 3-4 hours pain or fever

This is a range order and is not allowed by regulatory agencies. How do you know which dose to give and how frequently to give it and what for?

The correct order should read:

Give Tylenol 350mg tab every 3-4 hours prn pain score of 4 or less or fever greater than 38.5

Give Tylenol 350 mg 2 tabs every 4 hours prn pain score 5 or greater or fever greater than 39.5

Do you feel like you know what the provider wants you to do?

Sound Alike/Look Alike Medications

Many drugs have similar sounding names and can be easily confused when transcribing a verbal order.

In 2010, the sound-alike/look-alike requirement (NPSG.02.02.01) was moved to the Medication Management standard MM.01.02.01. According to this standard, hospitals are required to develop a list of look-alike/sound-alike medications that are commonly stored, dispensed and administered.

The best source of information on look-alike/sound-alike medications is The Institute for Safe Medication Practices (ISMP).

(The Institute for Safe Medication Practices (ISMP), 2013).

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Additionally, TJC requires each hospital to select a minimum of 10 combinations of look-alike/sound-alike medications for focused efforts. Five of these combination meds must come from their master list of high risk meds. The other five can be selected by each hospital. Remember that these names may not sound just exactly alike as you read them or look at them in print, but when handwritten or communicated verbally, these names can cause a potential mix-up.

High-Risk Insulins	
Humalog Insulin	Humulin Insulin
Lispro Insulin	Lente Insulin
Novolog Insulin	Novolin Insulin
Other High-Risk Meds	
Dilaudid (Hydromorphone)	Morphine Sulfate
Diflucan	Diprivan
Advair	Advicor
Ambisome	Amphotericin B
Celebrex	Celexa
Ephedrine	Epinephrine
Folic Acid	Folinic Acid
Taxol	Taxotere
Zyprexa	Zyrtec

Don't be fooled! When taking a verbal order from a healthcare provider, always ask them to spell-out the medication for you! It's also acceptable to ask for the rationale of why the drug is being started. With the correct spelling and knowledge of drug rationale, you are off to a solid start in the prevention of a sound-alike drug error.

For a comprehensive List of Confused Drug Names compiled by the ISMP log on to www.ismp.org.

Suggestions!

- **Ask about posting a list of "do not use" abbreviations at the nurses' station**
- **Carry a pocket reference or name-badge reference card**
- **Always ask the provider to spell unfamiliar drugs when writing verbal orders!**

Tallman Lettering

As part of a campaign to decrease errors of sound-alike/look-alike drugs (SALAD), the ISMP recommends that hospitals take measures to address the issue of these medications. The institute has developed a concept of TALLman lettering or the capitalization of a few letters within a drug name, to differentiate a standard set of SALAD name pairs.

When two medications have very similar names, using capital (or TALLman) letters in the middle of the drug name, has been shown to decrease the risk of error (ISMP, 2013). For example:

ALPRAZolam - LORazepam
PARoxetine - FLUoxetine
buPROPion - busPIRone
predniSONE – PrednisoLONE

Copy and paste this link to your browser to view drug-name sets with TALLman letters:

<http://www.ismp.org/tools/tallmanletters.pdf>

High-Alert Medications

ISMP creates and periodically updates a list of high-alert medications. The list is lengthy and includes categories of medications that are used in specialized settings, such as anesthetics, chemotherapeutic agents, dialysis solutions, neuromuscular blocking agents, and radiocontrast agents. Some of the specific medications listed are for the most part limited to use in specialties, such as magnesium sulfate and oxytocin in Labor & Delivery. The most common drug classes which constitute high-alert medications outside of specialty areas are:

- Anticoagulants
- Insulin
- Narcotics and opiates
- Sedatives

Know the list of high-alert medications which your organization has developed. Pay attention to policies and procedures related to the high-alert medications used in your practice area. You may be very familiar with the specific medications, but your organization may have established more stringent safety-oriented policies and procedures than you have used in the past. Policies may include independent double-checks or the use of specialized supplies.

Independent Double-Checks

An independent double-check is a series of steps that help ensure that the high-risk medication is given correctly. It is more than having a colleague sign the medical record that it is the right drug. The steps to an independent double-check are:

- Ask a colleague to independently:
 - Review the order
 - Review the MAR
 - Check the medication label looking for correct drug, dose, route, patient, time
 - Double check the dose calculation if weight based or not unit dose
 - Double check the rate calculation if an IV infusion
 - Double check the settings on the infusion pump

This may seem like a lot of extra work, after all, the pharmacist has already checked these items, you as the nurse are checking, and you are using a bar code system; however, you are administering a medication that potentially harm the patient if given incorrectly. It is prudent to be sure everything is accurate before you administer the medication.

Copy and paste this link to your browser to view the complete list of ISMP High-Alert Medications
<http://www.ismp.org/Tools/highalertmedications.pdf>

Using Technology to Your Advantage

Computerized Physician Order Entry (CPOE)

The CPOE system allows real-time patient identification, drug dose recommendations, adverse drug reaction reviews, and checks on allergies and test or treatment conflicts. Physicians and nurses can review orders immediately for confirmation.

- CPOE/e-Prescribing systems can provide:
 - Automatic dosing alerts
 - Interaction monitoring
 - Drug use monitoring
 - Standardized order entry with age-specific drug dosing
 - Order writing compliance monitoring

Bar Code Scanning

We all use bar code technology when going about our daily lives, it only makes sense that this technology can assist the healthcare community to improve patient safety in the hospital setting by reducing medication errors. Bar codes allow healthcare professionals to use bar code scanning equipment to verify:

- The right drug (in the right dose and right route of administration) is being given to the right patient at the right time
- The right blood product is being given to the right patient
- Inventory control
- Documentation of medications and blood products

Global Medication Administration Guidelines

Here are some generally recognized medication administration guidelines that may help reduce the risk of medication error.

1. Question any order that you consider incorrect. Healthcare professionals are responsible for their own actions.
2. Be knowledgeable about the medications you are going to administer. Understand the rationale for the specific drug as it relates to either the patient's past medical history or treatment of current illness. Ask yourself - does this drug make sense for this patient?
3. Know your patient's drug allergies and ask questions when unsure about potential incompatibilities.
4. Use only medications that are in a clearly labeled container.
5. Do not use liquid medications that are cloudy (excluding select insulins) or medications which have changed color from baseline.
6. Do not leave medications at the bedside. Check your hospital's policy for a list of medication exceptions such as cough syrup or skin creams.
7. If a patient vomits after taking an oral medication (especially a first-time medication), report this to the pharmacist, and healthcare provider.

8. Take special precautions when administering high-risk medications. Independent double checks should be performed prior to administering high-risk medications.
9. When a medication is omitted for any reason, clearly record the rationale for holding the medication.
10. When a medication error is made, report it immediately to the shift supervisor, the healthcare provider, and the pharmacist.

Patient Medication Rights

As our practice changes and new technologies are implemented, the basic rights of the patient remain applicable. Although, each organization may have all these rights listed in the policies and procedures, this is a list that should include most of what organizations are using. Be sure to follow your institutions policies.

1. Right patient
 - a. Check the name on the order and the patient
 - b. Use 2 identifiers
 - c. Ask patient to identify himself/herself
 - d. When available, use technology (for example, bar-code system)
 2. Right medication
 - a. Check the medication label
 - b. Check the order
 3. Right dose
 - a. Check the order
 - b. Confirm appropriateness of the dose using a current drug reference
 - c. If necessary, calculate the dose and have another nurse calculate the dose as well
 4. Right route
 - a. Again, check the order and appropriateness of the route ordered
 - b. Confirm that the patient can take or receive the medication by the ordered route
 5. Right time
 - a. Check the frequency of the ordered medication
 - b. Double-check that you are giving the ordered dose at the correct time
 - c. Confirm when the last dose was given
 6. Right documentation
 - a. Document administration AFTER giving the ordered medication
 - b. Chart the time, route, and any other specific information as necessary
 - i. For example, the site of an injection or any laboratory value or vital sign that needed to be checked before giving the drug
 7. Right reason
 - a. Confirm the rationale for the ordered medication. What is the patient's history? Why is he/she taking this medication?
 - b. Revisit the reasons for long-term medication use
 8. Right response
 - a. Make sure that the drug led to the desired effect. If an antihypertensive was given, has his/her blood pressure improved? Does the patient verbalize improvement in depression while on an antidepressant?
 - b. Be sure to document your monitoring of the patient and any other nursing interventions that are applicable
- (Lippincott Nursing Center, 2011)

Calculations

Many nurses feel that with the advent of smart infusion pumps, calculating the dose and rate of infusion is a thing of the past. However, errors continue to happen. The confusion lies with how the order is written, how the guardrails in the smart pump are programmed, which profile is being used, and where the medication is being administered.

How is the drug ordered?

- Units per kilogram
- Units per pound
- Units per hour
- Milligrams per minute
- Milligrams per kilogram per hour
- Milligrams per hour
- Volume per time (50mL over an hour)
- Is the concentration different than the standard concentration?

All the above factor in to giving the drug correctly and open the door for error. Double-checking the calculations for dose, concentration, and rate help ensure accuracy.

What about smart infusion pumps?

These pumps are only as good as the data programmed into them. Does your organization have different medication profiles for different units? Different medication concentrations and rate limits depending on the unit the pump is used in?

If you answered yes, then you can see where the errors may arise.

For example:

Your organization has two profiles:

- Critical Care
- Non-critical Care

The pumps are identified as to the profile they carry so that the risk of the wrong pump profile in the wrong area can be avoided. However, today, a patient was transferred out of the critical care unit to a medical floor. Because this patient has continuous fluids running, the nurse does not remove the pump in critical care; nor does the floor nurse change out the pump on transfer. Later in the day, the patient is ordered a change in concentration in his continuous medication. The floor nurse, checks the order, bar codes the medication and patient, and programs the pump for the rate ordered. When the shift changes, the on-coming nurse performs an independent double check of the infusion, and finds that the patient is receiving a greater dose than ordered. What happened? The infusion pump had the critical care profile which allows for a greater concentration of medication to be given; however, out on the medical unit, a lower concentration must be used. By not changing out the pumps, the incorrect profile was used and the medication was administered in error. Additionally, an error could have occurred because the nurse could not find the correct guardrail medication and decided to just program the rate without using the guardrails.

Weight-Based Drugs

While most weight-based IV infusions are given in specialty areas, hematology/oncology, critical care, and pediatrics; some oral and IM medications are also based on weight and given outside the specialty units.

Act prudently: If the drug is weight-based, perform the calculations necessary to verify the dose, rate, and concentration.

Peripheral Lines versus Central Lines

According to the Infusion Nurse Society Infusion Therapy Standards of Practice, care should be taken to administer the correct medication/infusion in the correct type of vascular access device.

Patients may benefit from a central line when receiving medications that are acidic, alkaline, hypo or hypertonic, have high or low osmolarity.

Things to consider:

- Size of the catheter
- Size of the vessel
- Concentration of the drug
- Osmolarity
- pH
- Rate of infusion

When an acidotic medication is given in a small vessel at a rapid rate, the blood cannot adequately dilute the medication and the vein intima becomes traumatized. Therefore, careful consideration of the type of vascular access device to be used for the infusion is prudent.

A central line is a large catheter placed in a large vein, usually with the distal catheter tip located in the superior vena cava, allowing for high rate of blood flow to dilute the infused medication. When a central line is not practical or contraindicated, the peripheral vascular site and catheter size should be evaluated and changed to allow greater dilution. Additionally, slowing the rate and/or decreasing the concentration may help to decrease the damage to the vein.

Phlebitis and infiltrations are considered medication errors.

Allergies versus Side-effects

Allergy

A hypersensitivity caused by exposure to an antigen (allergen) resulting in a marked increase in reactivity to that antigen on subsequent exposure, sometimes resulting in harmful immunologic consequences. Allergies are acquired hypersensitivity to certain drugs and biologic materials.

Side-effect

The pharmacologic results of therapy unrelated to the usual objective, in addition to or an extension of the desired therapeutic effect; usually but not necessarily, connoting an undesirable effect.

Why are allergies versus side-effects in this module? Because, they can both be adverse medication events but not medication errors.

A patient is given a 10-day course of ampicillin and develops diarrhea. Is this an allergy or a side effect? A side-effect. Should you tell the patient not to take ampicillin again? No, it may be an adverse effect, but education and pre-medication if necessary will allow the patient to know what to expect the next time an antibiotic is ordered.

Should this adverse event be reported. You should check with your organization's policy and procedure to see what process needs to be followed. At the very least, complete documentation of the reaction, severity, treatment if any, and patient education should be performed.

A patient is to receive a 7-day course of gentamicin. With the second dose, he complains of shortness of breath, inability to swallow, and hives across his abdomen. Is this an allergy or side effect? An allergy. The patient was exposed to the allergen with the first dose, produced antibodies, and is having a severe reaction to the second dose of the medication. This adverse drug event needs to be treated as a medical emergency and reported. This patient should be advised not to take gentamicin again.

Elderly Population Considerations

The aging population presents with unique medication challenges, many of them related to the changes in the aging body. These changes may include decreased organ perfusion and potential drug toxicity.

Absorption and metabolism of medications are altered in elderly patients due to decreased gastrointestinal, renal, and liver function. Medications are not metabolized as quickly and blood levels of medications remain higher for a longer period. Elderly patients are more sensitive to medications and at increased risk of drug toxicity. In patients with hepatic or renal insufficiency, drugs metabolized by those organs may have a prolonged half-life, increasing their likelihood to produce side effects (American Geriatric Society [AGS], 2013).

Case Studies

In each of these case studies, you will be given the opportunity to decide what type of medication error category the event is and whether it is an adverse drug event, a near miss, or a sentinel event.

Case study 1:

A healthcare professional with approximately 9 months of work experience was caring for five patients. Each patient had routine 9 a.m. medications. Each patient was to receive an average of 7 medications. While standing at the noisy medication cart, the professional began by preparing meds on two of her patients. She opened each pill and put them into separate plastic medicine cups. She kept the medication wrappers in her other hand and went into the room to give the morning medications to patient X. As she gave each medication, she explained the name, dose, and rationale to the patient. About halfway through this process, the healthcare professional discovered she was giving medications to the wrong patient!

This medication error is categorized as:

- A. Category A
- B. Category C
- C. Category D
- D. Category E

You do not have enough information to decide between categories C, D, & E. You know it is not category A or B because the medication reached the patient. However; the difference between C, D, and E is:

- Did it cause harm? (C)
- Did the patient need to be monitored in case the medications may cause harm or did you have to treat the patient to ensure no harm results? (D)

- Was the patient harmed temporarily and required treatment? (E)

The healthcare provider reported the medication error to the appropriate entities. The patient, was in the hospital for a deep vein thrombosis and inadvertently received two cardiac medications. After care monitoring of his blood pressure and heart rate, it was determined no harm was done.

This case was reported as a category D medication error.

Was this error a:

- A. Sentinel event
- B. Near miss

Did you choose B! You are correct. Although the potential for permanent harm or death was monitored, the patient did not sustain any harm; however, this is a reportable near miss because of the potential for harm.

What would you do to change the outcome of this scenario?

Did you think about:

- Preparing one patient's medication at a time
- Leaving the medication in the original wrapper
- Bar coding the medication and patient
- Using two unique identifiers to identify the patient
- Comparing the patient, medications, and medication record at the bedside

All these steps may have helped avert this error.

Case study 2:

You are caring for a 78-year old woman who has just had her broken arm set in the emergency room. She is complaining of a pain level of 8/10. You have orders for oxycodone po and morphine IV. Because she looks so uncomfortable, you decide to give her the IV morphine. The order is for 1 mg. You give the dose and when you return 15 minutes later to assess her level of pain, she is deeply asleep and snoring.

Would you report this? If so, what type of event would you say it was?

- A. Adverse drug event
- B. Adverse drug reaction
- C. Medical error

It is reportable as an adverse drug event. It is not an error; the correct amount of drug was given. However, the patient reacted in an untoward manner, respiratory depression, so it is also an adverse drug reaction.

What would you do to change the outcome of this scenario?

Did you think about:

- The patient's age
- Was the patient opioid naïve?
- Should you have tried the oral medication first?

Asking about her experience with narcotics may have helped avert this event.

What category of medication error would you put this event in?

- A. Category A
- B. Category C
- C. Category D
- D. Category E

Did you select category A? Correct, no error was made, but the events have the capacity to cause error.

Case study 3:

You are reviewing the admission orders for a pre-operative patient scheduled for gall bladder removal. The orders are:

NPO after 2pm
Morphine .2 mg IV prior to surgery
Start IV, infuse NS at 150 mL/hour
Zofran 4 mg IV now and Q 8 hours for complaint of nausea

What if anything is wrong with these orders?

- There is a decimal point in front of the 2, is this a mistake? Did the provider want 0.2 mg or 2 mg? Hard to tell, you must ask the physician for clarification
- What does prior to surgery mean? Now? When the patient is being transferred to the operating room? Before the surgeon makes his incision? The order is not clear, provider clarification is needed.

What would make this order clearer?

Morphine 2mg IV at 6pm

Conclusion

Medication safety is everyone's responsibility, provider, pharmacist, nurse, and patient as errors can and do occur at any point in the process (prescribing, order transcription, dispensing, distribution, and administration).

The effort of national health organizations, regulatory agencies, and hospitals have helped reduce the risk of medication errors throughout the country. However, there is still much that needs to be done to eradicate medication errors. This includes eliminating the common causes of these errors: poor communication, ambiguities in product names, ambiguities in directions for use, use of abbreviations, poor penmanship, poor policies and procedures, poor techniques, similar packaging or labeling, and job stress (Food and Drug Administration (FDA), 2016).

Despite all best efforts, medication errors and adverse drug events will occur. Prevention is the key to minimizing these errors. Using the information provided in this course will help you to become a safer nurse with medication administration.

Web Resources

Center for Drug Evaluation and Research (CDER)

<http://www.fda.gov/AboutFDA/CentersOffices/OfficeofMedicalProductsandTobacco/CDER/>

Provides information on recently approved labeling changes for Reference Listed Drug (RLD) products. The supplements are grouped by month and year of approval.

FDA Drug Approvals List

<http://www.fda.gov/Drugs/DevelopmentApprovalProcess/HowDrugsareDevelopedandApproved/DrugandBiologicApprovalReports/ANDAGenericDrugApprovals/default.htm>

Updated weekly, this site provides the FDA Drug Approvals list.

MedWatch

<http://www.fda.gov/medwatch>

Important safety information — Provides “Dear Health Professional” letters and other safety notifications by year. Labeling changes related to drug safety are provided by month and year.

General Drug Websites

Agency for Healthcare Policy

<http://www.ahrq.gov/>

The Healthcare Research and Quality Act of 1999 reauthorized and renamed the Agency for Healthcare Policy and Research as the Agency for Healthcare Research and Quality (AHRQ). AHRQ is the lead agency charged with supporting research designed to improve the quality of healthcare. Site topics include: research findings, quality assessment, clinical information, consumer health information, and links to other related sites.

Centers for Disease Control and Prevention

<http://www.cdc.gov/>

CDCP is a Federal public health agency charged with health promotion and quality of life by preventing and controlling disease, injury, and disability. This site offers information on health topics from A-Z.

Infusion Nurses Society

<http://www.ins1.org/>

The Intravenous Nurses Society (INS) promotes excellence in infusion nursing through standards, education, advocacy, and outcome research. This site offers information on standards, certification, meetings and education, and related industry links.

Institute for Safe Medication Practices

<http://www.ismp.org/>

The Institute for Safe Medication Practices (ISMP) is a nonprofit organization that works closely with healthcare practitioners and institutions, regulatory agencies, professional organizations and the pharmaceutical industry to provide education about adverse drug events and their prevention. This site includes medication safety alerts, error reporting, alerts for patients, drug product safety testing, links to other pertinent sites, and more.

Joint Commission on the Accreditation of Healthcare Organizations

<http://www.jcaho.org/>

General information on JCAHO as well as information targeted for specific groups such as Healthcare Organizations and Professionals.

Medication Errors Reporting (MER) Program

<http://www.usp.org/frameset.htm?http://www.usp.org/reporting/>

The Medications Errors Reporting (MER) Program site within the U.S. Pharmacopeia site enables healthcare professionals who encounter actual or potential medication errors to report confidentially to USP online, by fax, or by phone. "By sharing these experiences, pharmacists, nurses, physicians, and students can contribute to improved patient safety and to the development of valuable educational services for the prevention of future errors."

National Cancer Institute

<http://www.nci.nih.gov/>

The National Cancer Institute (NCI) provides the latest information on types of cancer, treatments, clinical trials, statistics, and more. Information is provided in Spanish and English.

National Home Infusion Association

<http://www.nhianet.org/>

NHIA is a multi-disciplinary organization dedicated to providing education, information, and legislative and regulatory representation to support clinicians and organizations providing intravenous drug and nutritional therapies to patients in non-hospital settings.

National Library of Medicine

<http://www.nlm.nih.gov/>

This site offers health information through Medline, MedlinePlus, and other resources.

Pharmaceutical Research and Manufacturers of America

<http://www.phrma.org/>

The Pharmaceutical Research and Manufacturers of America is a group of U.S. companies committed to pharmaceutical research. The website includes a database of new drugs currently in development and information about the drug development process. It also includes links to member companies.

PharmWeb

<http://www.pharmweb.net/>

PharmWeb provides information for healthcare professionals and patients, including information on medications, a directory of pharmaceutical information on the Internet, and a collection of related links.

U.S. FDA Center for Drug Evaluation and Research

<http://www.fda.gov/cder/>

This site offers drug information about existing and new products, approvals, alerts, and regulatory guidance from the Food and Drug Administration Center for Drug Evaluation and Research.

U.S. Food and Drug Administration

<http://www.fda.gov/>

This site provides information on drugs and new drug approvals, regulatory guidance, and more.

References

- Agency for Healthcare Research and Quality (AHRQ). (ND). Bar-coded Medication Administration. Retrieved from: <https://healthit.ahrq.gov/ahrq-funded-projects/emerging-lessons/bar-coded-medication-administration>
- American Geriatric Society [AGS], (2013). Updated Beers Criteria for Potentially Inappropriate Medication Use in Older Adults. Retrieved June 11, 2013 from: http://www.americangeriatrics.org/files/documents/beers/2012BeersCriteria_JAGS.pdf
- American Sentinel (2013). Do Barcodes Really Improve Patient Safety? Nurse Together. Retrieved June 6, 2013 from: <http://nursetogether.com/do-barcodes-really-improve-patient-safety>
- FDA. (2016). Medication Error Reports. Retrieved from: <https://www.fda.gov/Drugs/DrugSafety/MedicationErrors/ucm080629.htm>
- Institute for Safe Medication Practices (ISMP). (2013). ISMPs List of Confused Drug Names. Retrieved May 30, 2013 from: <http://www.ismp.org/Tools/confuseddrugnames.pdf>
- ISMP. (2016). "2016-17 targeted medication safety best practices for hospitals" Retrieved from <http://www.ismp.org/tools/bestpractices/TMSBP-for-Hospitals.pdf>
- ISMP. (2017). Historical timeline. Retrieved from: <http://www.ismp.org/about/timeline.aspx>
- Joint Commission (TJC). (2016). Facts about the national patient safety goals. Retrieved from: https://www.jointcommission.org/facts_about_the_national_patient_safety_goals/
- Lippincott, Williams & Wilkins (2012). Nursing 2012 Drug Handbook. Philadelphia, Pennsylvania.
- Lippincott Nursing Center. (2011). 8 rights of medication administration. Retrieved from: <http://www.nursingcenter.com/ncblog/may-2011/8-rights-of-medication-administration>
- Lahue BJ, Pyenson B, Iwasaki K, Blumen HE, Forray S, Rothschild JM. National burden of preventable adverse drug events associated with inpatient injectable medications: Healthcare and medical professional liability costs. Am Health Drug Benefits. 2012;5(7):1–10.
- National Coordinating Council for Medication Error Reporting & Prevention (NCCMERP). (2001). NCC MERP Index for categorizing medication errors. Retrieved from: <http://www.nccmerp.org/sites/default/files/indexColor2001-06-12.pdf>
- NCCMERP. (2013). About Medication Errors. Retrieved from: <http://www.nccmerp.org/aboutMedErrors.html>
- Perrott, D. & Bartleson, B.J. (2014). CMS issues new requirements for hospital medication administration. Retrieved from: <http://www.calhospital.org/cha-news-article/cms-issues-new-requirements-hospital-medication-administration>
- US. Department of Health and Human Services. Office of Disease Prevention and Health Promotion. Washington, DC: Plan for Adverse Drug Event Prevention; 2014. Available from: <http://health.gov/hcq/pdfs/ADE-Action-Plan-508c.pdf>

The Joint Commission [TJC], (2012). Facts About the Official "Do Not Use" List. Retrieved from:[http://www.jointcommission.org/assets/1/18/Do Not Use List.pdf](http://www.jointcommission.org/assets/1/18/Do_Not_Use_List.pdf)

The Joint Commission [TJC] National Patient Safety Goals (2013). Retrieved from:
http://www.jointcommission.org/standards_information/npsgs.aspx

The Joint Commission [TJC], (2013). Sentinel Events Data Summary: December 2012. Retrieved from:
http://www.jointcommission.org/assets/1/18/2004_4Q_2012_SE_Stats_Summary.pdf

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