Whose Job Is It to Prevent Medication Errors?

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Learning Objectives

1. Understand the extent of medication errors and their effects on patient health and safety.
2. List examples of common medication errors.
3. Apply a systematic approach to search for medication error potential.
4. Define strategies for preventing medication errors.

Definition of Medication Error

A medical error is any circumstance, action, inaction, or decision related to healthcare that contributes to an unintended health result.

A medication error is a medical error in which the source of error or harm includes a medication.

A medication error is "any error occurring in the medication use process."
(Bates DW, Boyle DL, Vander Vliet MB, Schneider J, Leape L. 1995. Relationship between medication errors and adverse drug events. *Journal of General Internal Medicine* 10(4): 100–205.)

The National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) defines medication error 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. Such events may be related to professional practice, health care products, procedures, and systems, including prescribing; order communication; product labeling, packaging, and nomenclature; compounding; dispensing; distribution; administration; education; monitoring; and use."

Extent of the problem

- An article published in the **September 2013 issue of the Journal of Patient Safety** estimates that there are between 210,000 and 400,000 deaths per year associated with medical errors in hospitals. That would make medical errors the third-leading cause of death in the United States, behind heart disease and cancer.
- The new estimates were developed by **John T . James, a NASA toxicologist who runs a patient advocacy organization called Patient Safety America.** He dedicates the Patient Safety America website to his 19-year old son, John Alexander James, who died as a result of preventable adverse events in the summer of 2002.
- Estimates of the number of deaths attributed to medical errors each year have been varied, but this article concludes that in a sense, the actual number of deaths attributed to medical errors each year doesn't matter. James claims that, "Any of the estimates demands assertive action on the part of providers, legislators, and people who will one day become patients."
- Estimates vary but anywhere between 30% and 50% of medical errors can be attributed to medication errors.
- Medication errors are among the most common medical errors, harming at least 1.5 million people every year according to a 2006 report from the Institute of Medicine called Preventing Medication Errors. The extra medical costs of treating drug-related injuries occurring in hospitals alone conservatively amount to $3.5 billion a year, and this estimate does not take into account lost wages and productivity or additional health care costs (could add up to $17 to $29 billion per year) .
- It is estimated that on average, there is at least one medication error per hospital patient per day.

Effects on patient health and safety

- At least 7,000 deaths per year from errors occurring either in or out of the hospital
- Dollars spent on having to repeat diagnostic tests or counteract adverse drug events are dollars unavailable for other purposes.
- Errors are also costly in terms of loss of trust in the system by patients and diminished satisfaction by both patients and health professionals.
- Patients who experience a longer hospital stay or disability as a result of errors pay with physical and psychological discomfort.
- Health care professionals pay with loss of morale and frustration at not being able to provide the best care possible.
- Employers and society, in general, pay in terms of lost worker productivity, reduced school attendance by children, and lower levels of population health status.

Can you give an example of a medication error that occurred in your practice setting?

Question 1

If a medication error does not reach the patient is it still defined as a medication error?

Answer to Question 1

Near **M**iss**:** An error that took place at any point during the medication use process but was caught before reaching the patient. Near misses are just as serious as actual medication errors and should be treated as such.

1. For example, penicillin was ordered for a patient allergic to the drug; however, the pharmacist was alerted to the allergy during computer order entry, the prescriber was called, and the penicillin was not dispensed or administered to the patient.
2. The wrong drug was dispensed by a pharmacy, and a nurse caught the error before it was administered to the patient.

Categorizing Medication Errors – Error types

1. Omission error – dose not given
2. Wrong dose error
3. Extra dose error
4. Wrong dose form error
5. Wrong time error

Categorizing Medication Errors – Causes of Error

1. Human failure – i.e. pulling wrong bottle from shelf based on memory
2. Technical failure – failure to properly operate/maintain automated equipment
3. Organizational failure – i.e. policies and procedures that require admixing parenteral drugs in an inappropriate setting

Categorizing Medication Errors – Causes of Error

1. Assumption error – an essential piece of information can't be verified so an assumption is made
2. Selection error – mistakenly using a look-alike or sound-alike drug instead of the prescribed drug
3. Capture error – Focus on a task is diverted elsewhere

Physiological Causes of Medication Errors

Remember that each patient is unique in their response to medications

a. liver function

b. kidney function

c. enzyme deficiencies

d. comorbid conditions

Social Causes of Medication Errors

Failure to follow medication therapy instructions due to:

1. Cost
2. Noncompliance – not getting a prescription filled or refilled in a timely manner
3. Patient doesn't take it as the physician instructs- forgetting to take a dose, taking too many doses, terminating the drug regimen too soon
4. Misunderstanding the directions – dosing at the wrong time, not following directions on dose administration

Question 2

Can patients cause medication errors to occur?

ISMP Five-pronged error analysis for facilities

1. analysis of facility-specific errors that have caused some degree of patient harm
2. analysis of aggregate medication error data (e.g., trends by drugs or location of drugs involved in errors)
3. analysis of "near misses" (errors that have the *potential* to cause patient harm)
4. analysis of errors that have occurred in other organizations
5. Identification of potential risk points using proactive risk assessment tools (such as the ISMP Self-Assessment, Failure Mode and Effects Analysis, or staff surveys)

Root Cause Analysis

1. Up to present day most facilities only document and apply Steps 1 and 2 of the 5-pronged error analysis which is why error numbers are still very high.
2. Steps 3 and 4 are rarely done
3. Step 4 would include a thorough review of the pertinent medical and pharmacy literature regarding how other pharmacies and institutions have dealt with a specific error situation.
4. Steps 1-4 are reactive, employed after an error or near miss has occurred, to identify its underlying causes and are part of Root Cause Analysis (RCA)

Questions to ask during RCA

1. What exactly happened?
2. Why did it happen?
3. What happened immediately before the error occurred?
4. At what step did the medication use process breakdown or did a failure occur?
5. What processes or systems contributed to the error happening?
6. Have there been previous "near misses" similar to the identified medication error?
7. What action plan will be put in place to prevent this type of error from happening again?
8. What kind of follow-up and measurement strategy will be employed to monitor the effectiveness of the action plan?

Failure Mode and Effects Analysis

Failure Mode and Effects Analysis (FMEA) is a process that attempts to anticipate future errors and design a process or system that minimizes the impact. It is an attempt to determine points of potential failure and what their effect would be before any error actually happens. In this regard, FMEA differs from Root Cause Analysis (RCA). FMEA is a proactive process used to look more carefully and systematically at vulnerable areas or processes. FMEA can be employed before purchase and implementation of new services, processes or products. (Step 5 in the 5-pronged error analysis).

Question 3 – True or False

Root Cause Analysis differs from Failure Mode and Effects Analysis in that it is proactive rather than reactive.

A pharmacy is going to conduct FMEA for the medications ropinirole (Requip) and risperidone (Risperdal) because the FDA put out a safety alert

What will happen if a technician and/or pharmacist:

1. Mistakes ropinirole for risperidone because it sits close to it on the shelf ?
2. Dispenses the wrong drug because of similarities of the container labels and carton packaging?
3. Dispenses the wrong drug because of overlapping product characteristics, such as the drug strengths, dosage forms, and dosing intervals.
4. Has a problem reading the prescription due to poor handwriting?

FMEA analysis should result in specific steps that should be put in place to address potential errors with significant impacts

1. If inventory is stocked by generic name, make sure that all strengths of risperidone are stored physically separate from the ropinirole.
2. Place a caution label on both bottles to alert the pharmacist to always check prescriptions for either of these medications more carefully
3. Train technicians to always check and verify the label on prescription stock bottles three times and make this part of their normal routine
4. Be sure to spell out the drug name when prescriptions are taken over the telephone.
5. Pharmacists are advised to confirm the drug name with prescribers if the prescription is not legible or the drug name is not clearly stated.
6. Make sure the pharmacist counsels the patient getting one of these medications to verify who it is for, how they were told to take it by the doctor and what the doctor said it was for.

Generic name	Ropinirole	Risperidone
Brand name	Requip, Requip XL	Risperdal, Risperdal M-tab
Strengths	Oral tablet: 0.25 mg, 0.5 mg, 1 mg, 2 mg, 3 mg, 4 mg, 5 mg Extended-release tablet (XL): 2 mg, 4 mg, 6 mg, 8 mg, 12 mg	Oral tablet: 0.25 mg, 0.5 mg, 1 mg, 2 mg, 3 mg, 4 mg Orally disintegrating tablets (M-tab): 0.5 mg, 1 mg, 2 mg, 3 mg, 4 mg
Dosage form	Tablet	Tablet
Dosing intervals	Once daily, Twice daily, or Three times daily	Once daily or Twice daily

Sample Container Labels

www.fda.gov/Drugs/DrugSafety/ucm258805

Do not rely on technology to solve the problem of medication errors

Nearly 20% of the medication errors reported to a national database in 2003 pertained to problems with computerization and automation

Thompson, C., "Technology Hasn't Eliminated Medication Errors Yet, USP reports", American Journal of Health System Pharmacy, 62:243-245. 2005.

Utilize resources for prevention of medication errors

- ISMP List of Confused Drug Names
- ISMP Short List of Error–Prone Notations
- The Joint Commission (TJC) “Do Not Use” List of abbreviations

TJC Official “Do Not Use” List

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

http://www.jointcommission.org/assets/1/18/Do_Not_Use_List.pdf

The improper use of zeros and decimal points continues to be one of the leading causes of medication errors.

Never put a zero after a decimal point.

5 mg should never be written 5.0mg

Always put a zero before a decimal point.

.5mg should be written 0.5mg

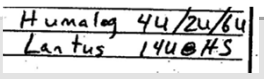
Short List of Error-Prone Notations from ISMP

Notation	Reason	Instead Use
@	Mistaken for 2	at
&	Mistaken for 2	and
cc	Mistaken for u	ml
➢ or <	Mistaken as opposite of intended	greater than or less than
µ	Mistaken for mg	mcg
/	Mistaken for 1	per rather than a slash mark
+	Mistaken for 4	and

Other Good Practices

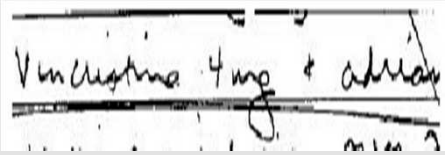
- **Drug name abbreviations can easily be confused. Always write out complete drug name.**
- **Apothecary units are unfamiliar to many practitioners. Always use metric units.**

Examples



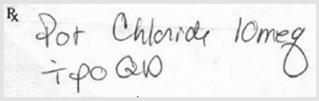
Intended dose of 4 units in patient history interpreted as 44 units
u should be written out as units

Examples



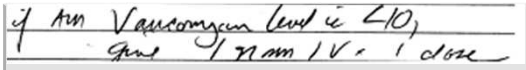
Intended dose of .4mg interpreted as 4mg from medication order.
Should be written as 0.4mg

Examples



Potassium chloride QD in medication order interpreted as QID. Should be written as daily.

Examples



Intended recommendation of less than 10 was interpreted as 40
< should be written out as less than

Culture Change: Prevention, Not Punishment

In the past the focus was on individuals and their mistakes, rather than on system level vulnerabilities and events that had combined in an unfortunate sequence to cause an incident to occur. Based on a "name and blame" culture, the emphasis of such investigations was not on prevention, but on individual correction or discipline.

The culture change that needs to be implemented in order to be successful with FMEA is to investigate system level vulnerabilities, rather than focusing on individuals and shifting the goal from eliminating errors to reducing or eliminating harm to patients.

Question 4

Whose Job Is It to Prevent Medication Errors?

1. Pharmacists
2. Pharmacy technicians
3. Caregivers
4. Patients
5. Physicians
6. All of the above

References

- **Institute for Safe Medication Practices**
  The National Medication Errors Reporting Program (ISMP MERP)
  National Vaccine Errors Reporting Program (ISMP VERP).
  www.ismp.org
- **MedWatch: The FDA Safety Information and Adverse Event Reporting Program**
  www.fda.gov/Safety/MedWatch
- **The National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP)**
  www.nccmerp.org
- **Division of Medication Error Prevention and Analysis (DMEPA)**
  www.fda.gov/Drugs/DrugSafety/MedicationErriors
- **The Joint Commission (TJC)**
  www.jointcommission.org