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MEDICATION ERRORS

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Medication Safety – How to Identify and Improve Medication Errors

SARAH GARCIA PHARMD

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Disclosure

Sarah Garcia declares no conflicts of interest, real or apparent, and no financial interests in any company, product, or services mentioned in this program including grants, employment, gifts, stock holdings, and honoraria.

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Learning Objectives

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Upon completion of this activity Pharmacists will be able to …

Define the terms adverse drug event, adverse drug reaction, medication error, and near miss.

Compare human error, at risk behavior, and reckless behavior.

Define how inattentional blindness and confirmation bias can cause one to miss important information.

Outline 5 common at risk behaviors in healthcare and explain why they happen.

Differentiate between first order and second order problem solving.

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Technician Learning Objectives

Pharmacy Technicians will be able to:

Define the terms adverse drug event, adverse drug reaction, medication error, and near miss.

Compare human error, at risk behavior, and reckless behavior.

Define how inattentional blindness and confirmation bias can cause one to miss important information.

Describe how 83% of errors are caught and corrected before the patient leaves.

Describe the types of questions you should be asking of patients.

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Terminology

Adverse Drug Event: an injury from a medicine or from the lack of an intended medicine[1]

Adverse drug events can occur as the result of either an adverse reaction to a medication or a medication error.

Adverse reaction: these are reactions that occur with a correct medication, at the correct dose, and the correct indication (for example nausea and vomiting)

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What is a Medication Error?

A medication error can be defined as, 'a failure in the treatment process that leads to, or has the potential to lead to, harm to the patient'[2]

A study across two Harvard teaching hospitals showed serious injury producing medication errors occurred in nearly 2% of the patients, and an additional 5.5% of patients had near misses.[3]

Near miss is defined by ISMP as, "an event, situation, or error that took place but was captured before reaching the patient."[4]

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Medication Errors

To Err is Human[5]

Human error consists of unintended and unpredictable behavior that causes or could have caused an undesirable outcome.

That is to say we all make slips, lapses or mistakes from time to time but it is important to recognize that we play a role in a medication process, most human errors result from a weakness in the process. Inadvertent behavior (human error) is not worthy of disciplinary sanction. Human error involves an error in a function of basic human behavior.

Example; inadvertently mistyping dose information into the computer system, or making a calculation error when calculating a dose.

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Human Error

Human Error Probabilities [6]

An unfamiliar task performed at speed with no idea of likely consequences **50%**

Tasks involving high stress 30%

Complex task requiring high comprehension/skill 15%

Failure to perform a check correctly 5%

Error in routine operation when care is required 1%

Errors during read back 0.5%

Well designed, familiar task in ideal conditions 0.04%

Human performance limit 0.01%

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Why do we make human errors?

We can think about the way we interact with our world as being Conscious or Automatic behavior.

And we move between a knowledge based, rule based, and skill based modes [7]

Knowledge based – unfamiliar environment, no rules to fall back on, operate almost completely conscious

Rule based- a prepackaged behavior is the response when a rule is applied if x then y, if y then do z

Skill based- once you have the skill we move into automated routines with little conscious attention- prone to slips and lapses

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Knowledge Based

Causes for errors in this mode:

Feeling overwhelmed

Lack of knowledge

Lack of awareness of consequences

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Rule based

Causes for errors	Pattern matching- locate or find something in our environment
Apply the wrong rule	
Forget the rule	Prone to confirmation bias

Examples can be found in mathematics

2 + 3 x 6 = ?

30

 or

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Confirmation Bias

Confirmation bias is the tendency of human being to search for information that confirms ones existing beliefs and reject information that does not.

This means we see what we think we should see instead of what is actually in front of us.

Scripts written for Sinequan (doxepin) were mistaken for Singulair (montelukast) reported in Pharmacy Times

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Change Blindness

The inability of our visual system to detect alterations to something in plain view.

Door Study [8]

Pedestrian with a map stopped another person to ask for directions while mid conversation someone carrying a door walked between them and a new person replaced the one asking for directions, 50% of people did not notice that the person asking for directions had changed.

According to the Insurance Institute of Highway safety when people drive and talk on their phones they often fail to notice unexpected events, for example motorcycles.

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https://www.youtube.com/watch?v=pqgwZEdoH5w

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Inattentional Blindness

We see only what the brain tells us to see

Human factors calls this the Grand Illusion

Brain fills in gaps with what we think should be there

Why might this happen?

Conspicuity [9]

Mental workload

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Skill based

Automatic pilot

Mental slips and lapses when our attention is diverted even for a moment

Slip is not doing what you are supposed to do

Lapse forgetting to do something

Use checklists, write procedures, try to ensure distractions are minimized

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Human Error

Remember NOT a behavioral choice

The best way to manage human error is to examine the system and console the individual.

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Medication Error

At risk behavior is a <u>choice or set of choices</u> made by an employee that increases risk, however employee believes risk is justified, or risk is not recognized. This often happens when employees are trying to do more with less. [10]

Incentives for unsafe behaviors should be sought out and removed, and staff coached on making better decisions

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How to identify at risk behaviors

What shortcuts to we take to get the work done?

What work around do we utilize to achieve our goal?

How do we get the work done when short staffed?

What system issues are causing frustration ?

Examples: technology work arounds, carrying medication in pockets, not labeling syringes, unnecessary verbal orders, borrowing medications, estimated weight, disregarding patient concerns

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Managing At Risk Behavior

One thing to recognize is at risk behavior is often a work around for a problem so it is considered a sign of critical thinking, resourcefulness, productive- First order problem solving rarely reported

Promote resiliency and reporting of at risk behaviors

Conduct an investigation
◦ How prevalent is the behavior?
◦ What are system based causes?
◦ Are there any personal factors causing the behavior?
◦ Are you rewarding the unsafe behavior?

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First Order Problem Solving

First order problem solving merely transfers the problem to another time, person, or place; a temporary work around.

Hewitt et al.[11] describes this as "fixing and forgetting". The research team found this was a choice for how to address problems chosen predominantly by physicians, nurses, pharmacists and other healthcare practitioners when faced with problems they could resolve temporarily or work around, even with problems that threatened safety.

A similar study by Tucker et al.[12] found 92% of nurses responded to obstacles in their work with first order problem solving and failed to report the problem for system wide learning and resolution.

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Second Order Problem Solving

Second Order Problem solving is an attempt to understand why the problem exists and aiming to correct the problem.

Reporting errors, reporting near misses, looking at cause analysis,

Near misses: occur more frequently than adverse events and have very similar causes as adverse events helping to shed light on system vulnerabilities

Cause Analysis; a critical step in learning about the errors and how to improve the process

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Medication Error

Reckless behavior is a blame worthy behavior.

Conscious disregard of what is known to be a substantial and unjustifiable risk.

Behave intentionally, do not believe risk is justified, putting themselves first, not the norm.

Do not have to wait for harm to result to address this

With remedial action or disciplinary action

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Which of the following is NOT an example of at risk behavior?

A. Making a calculation error

B. Not labeling a syringe that leaves the hands of the preparer

C. Utilizing a workaround for a system that is too slow

D. Overriding an alert without fully considering its importance

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Human Error, At Risk, or Reckless

When determining the behavior keep in mind the adverse outcome can be the same for all three.

Important to know not just what happened but how it happened.

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Human Error, At Risk, or Reckless

Sarah is leaving for work and although she is in a hurry as she is backing out of the driveway, she carefully checks her mirrors and looks both ways but she does not see the bicycle left on the driveway by her daughter and she runs it over.

Sarah is leaving for work and she is in a hurry so she backs up into her driveway after barely a glance at the mirrors and runs over a bike her daughter left in the driveway.

Sarah is leaving for work in a hurry so she decides to speed as fast as she can out of her garage into the driveway then the street not looking in her mirrors or watching out for other vehicles, she feels a bump but does not look back to what she might have hit and takes off.

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Just Culture

An organization's commitment to safety and quality, where staff feel safe to report errors, near misses and adverse events, where there is quick and thorough investigation of patient safety events, communication of safety issues, and team working around safety issues.

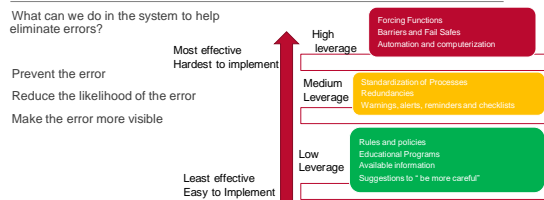Safety investigations look at WHAT went wrong in the process versus WHO

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To Improve the Process

Second Order Problem Solving

Voluntary reporting Procedures

Information from technology

Focused reporting and cause analysis

Looking to external information as well as internal

External sources

•ISMP newsletters

•The Joint Commission Sentinel Event Alert Newsletter

•US Food and Drug Administration (FDA) drug alerts and statements

•National Alert Network (NAN) alerts

•National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) recommendations and statements
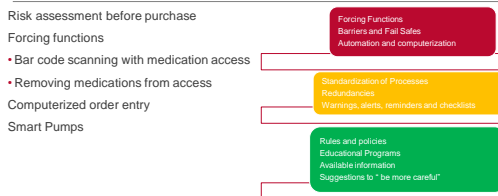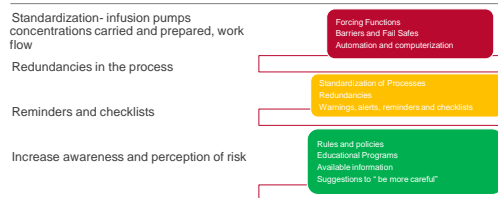
•American Society of Health System Pharmacists (ASHP)

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The System [13]

What can we do in the system to help eliminate errors?

Prevent the error

Reduce the likelihood of the error

Make the error more visible

Most effective
Hardest to implement

Least effective
Easy to Implement

High leverage
- Forcing Functions
- Barriers and Fail Safes
- Automation and computerization

Medium Leverage
- Standardization of Processes
- Redundancies
- Warnings, alerts, reminders and checklists

Low Leverage
- Rules and policies
- Educational Programs
- Available information
- Suggestions to " be more careful"

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Prevent the Error High Leverage

Risk assessment before purchase

Forcing functions
- Bar code scanning with medication access
- Removing medications from access

Computerized order entry

Smart Pumps

- Forcing Functions
- Barriers and Fail Safes
- Automation and computerization

- Standardization of Processes
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Reduce the Likelihood

Standardization- infusion pumps concentrations carried and prepared, work flow

Redundancies in the process

Reminders and checklists

Increase awareness and perception of risk

- Forcing Functions
- Barriers and Fail Safes
- Automation and computerization

- Standardization of Processes
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Lean Six Sigma [14]

Lean- drive out waste and promote work standardization and flow

Six Sigma- focuses on reducing process variation and enhancing process control

Employing lean six sigma principles in healthcare can help eliminate variations in processes and streamline procedures to help improve patient care.

5 phases of six sigma: Defining, measuring, analyzing, improving, and controlling

Combined with lean philosophy to eliminate waste of physical resources, time, effort, and talent.

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Ways to Address the System

Standardization- use commercially available products, use standard order sets, standardize concentrations (pumps)

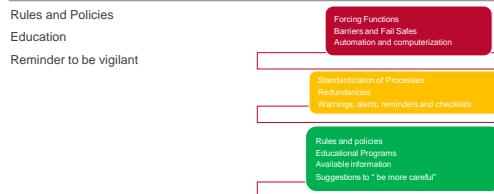Reduce inventory-reduces opportunity for error to occur

Poka yokes

Continuous improvement culture

Visual controls- auxillary labels, color to show warning, Tall Man letters- Make the error more visible

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The Human Side of a Process

Rules and Policies

Education

Reminder to be vigilant

- Forcing Functions
- Barriers and Fail Safes
- Automation and computerization

- Standardization of Processes
- Redundancies
- Warnings, alerts, reminders and checklists

- Rules and policies
- Educational Programs
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Survey Question

What medication safety practices do you plan to incorporate into your practice setting?

A. Implement a reporting procedure

B. Implement external data to help detect/prevent errors before they occur

C. Implement the highest leverage error reduction strategies

D. Discuss errors as a team sharing information about root causes

E. all of the above

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Survey Question

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Medication Errors and Processes

Errors can occur at any step in the medication use process:

Prescribing

Order communication

Preparation

Administration

Monitoring

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Prescribing

Causes of prescribing errors include lack of knowledge about the patient, or insufficient drug knowledge

A study looked at nearly 10,000 prescriptions written by community based prescribers and found over a 15 month period that 1 in 4 prescriptions contained at least one prescribing error (not counting poor handwriting)[15]

Antibiotics had the most prescribing errors in this study. Followed by cholesterol medications, narcotic analgesics, and blood pressure drugs.[15]

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Prescribing Error

In studies with antibiotics most frequently the error is an inappropriate indication most of those examples are antibiotics for viral infections [16]

The wrong dose

The wrong frequency

Duplicate therapy

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Duplicate therapy error

Transitions of care

Both warfarin and rivaroxaban were being administered concurrently

Patient admitted to hospital from a SNF and medication listed both rivaroxaban and warfarin. Appears from review that patient was prescribed rivaroxaban after a provoked DVT plan was to treat for 3 months however the medication continued to be refilled well past 3 months

Patient had been admitted to hospital and found to be in afib warfarin was started, med rec was not completed to show rivaroxaban and patient was discharged back to snf without discontinuing the rivaroxaban with new orders for warfarin

Both anticoagulants were continued at the SNF until the patient was readmitted with a bleed and error was caught

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Prescribing

With all prescribing try and minimize verbal orders.

Written prescriptions should be legible.

Include pertinent information, allergies, weight, indications.

Provide indications

Use the metric system, no trailing zeros, but use leading zeros; 0.5mg not .5mg 5mg not 5.0mg

Avoid error prone abbreviations

ISMP Error prone Abbreviations: some examples include: IU, ml, U, Q.D, HS, MSO4 this is a great document to reference [17]

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Verbal Orders

What is the correct way to use verbal order read back?

A. repeat the order back only if you are unsure what you heard

B. Repeat the order back to another member of the pharmacy to be sure you did not miss anything

C. read back only the parts of the order you want to

D. Read all verbal orders back and obtain confirmation that each step of the order is correct

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E-Prescribing

E-prescribing has reduced many types of prescribing errors.

In 2000, ISMP called for the elimination of handwritten prescriptions.

As of Jan 2022 35 states mandate e-prescribing controlled substances (75% of the US population[18]

With e-prescribing we can still see errors.

Be on alert for similarly spelled medications

Use second identifiers for patients, DOB

Watch out for suffixes IR, ER, SR, XR, XL, CD formulations.

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E- prescribing

How does e-prescribing improve safety?

A. It eliminates errors in the prescribing step

B. It eliminates errors due to illegible handwriting

C. Dose defaults assure correct dose and frequency every time

D. Correct medication is always chosen

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Dispensing Errors

Dispensing error can be defined as inconsistency between the dispensing of medication and the prescribing of a medication.[19]

Incorrect drug

Incorrect dose strength and /or frequency

Failure to identify drug interactions or contraindications

Drug dispensed to the wrong patient

Causes of dispensing errors include; not updating patients history, not questioning the provider if script is unusual, doses are too high or strengths seem incorrect, not reviewing the order, failure to counsel the patient, technicians acting out of their scope of practice.

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Dispensing Errors

Follow the dispensing policies in your organization, don't overlook alerts and warnings, clarify information with provider and patient

Technicians:

• Alert pharmacist to any alerts received in dispensing system,

• Ask any questions you might have

• Ask open ended questions of patients versus yes or no questions.

Keep Look Alike Sound Alike meds labeled and separate

ISMP has a List of Commonly Confused Drug Names as well as Look Alike Sound Alike list with Tall man lettering recomendations[20]

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Dispensing Errors [21]

Double check the entry of the prescription

Use 2 patient identifiers, if there are any questions about the script contact the prescriber.

Organize your workplace to minimize distractions.

Balance workload. Adequate staffing will help reduce errors.

Store medications correctly

Always provide patient counseling, approximately 83% of errors are discovered during counseling, which should include discussion of how to take the medication and a chance for the patient to see the actual medicine.[22]

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Dispensing Errors

Recently made the headlines:

1. Vecuronium instead of Versed (midazolam)

2. Pegfilgtastim administered instead of fligrastim

3. Navane (thiothixene) instead of Norvasc (amlodipine)

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"Ve"

Error in Dec 2017

Nurse using an override feature entered Ve and got vecuronium when she was hoping for versed (midazolam)

This resulted in the patients death

The nurse was recently found guilty of reckless homicide

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Peg-

While both pegfilgatastim and filgrastim are admin by syringe and intended to stimulate WBC

Filgrastim is can be administered daily

And Pegfilgastim only once in a chemo cycle

This error took the life of an AirForce Veteran who died after developing pulmonary toxicity leading to severe acute lung injury.

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Anti-?

Case report in 2016 detailed a patient hospitalized for HTN and AKI discharge script included amlodipine 10mg BID

Over the next several months she experienced fatigue, slow movements, personality changes, and uncontrolled BP.

During this time she was hospitalized once for chest pain and visited her primary where she was diagnosed with anxiety and depression, and given additional medications.

Soon after she was hospitalized once again and this time a medication reconciliation determined she was taking Navane (thiothixene) in stead of Norvasc (amlodipine).

After review it was determined pharmacy made the error.

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Errors in Administration

These can occur in hospital or nursing home, SNF etc. settings or even at homes with patients.

Not discussing the drug name, drug appearance, the indication, when is the best time to administer and how often to take, what to do about a missed dose often communication or lack of communication contributes to these errors when patients are involved.

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Monitoring Errors

Labs, vitals, any monitoring parameters might be missed

Not being aware of kidney or liver function

Not knowing a drug level and continuing to dose

Not rechecking INR as often as needed but refilling warfarin

Not checking BP, or other vitals

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When the Error Occurs

Attempt detection

Order review

Patient monitoring

Counting surgical sponges

Documenting/Reporting the error

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When the Error Occurs

Begin second order problem solving with root cause analysis

Address every step of the process look for opportunities for error
◦ Look for contributing factors

How can you Prevent the Error?

Reduce the Likelihood of the Error?

Make the Error more visible?

Mitigate the effects of the error?

Look at human factors
◦ You may be consoling, educating, or reprimanding

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ISMP Best practices

Released Feb 2022 3 new best practices

1. Safeguard against errors with oxytocin
◦ Standard order sets
◦ Standardize concentrations
◦ Provide in ready to use bag

2. Maximize bar code verification prior to medication and vaccine administration by expanding use beyond inpatient care areas
◦ Target clinical areas

3. Layer numerous strategies throughout the medication use process to improve safety with high alert medications
◦ For each medication on facilities high alert list outline a robust set up for managing risk

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ISMP High Alert for Ambulatory/Community Settings

Specific medications to watch for:

CarBAMazepine

EPINEPHrine

Insulin U-500

LamoTRIgine

Methotrexate

Phenytoin

Valproic Acid

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Questions

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