MEDICATION ERRORS: A SYSTEMATIC APPROACH TO EVALUATION AND PREVENTION

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2016 ANNUAL MEETING

DISCLOSURE

• Josephine Jean-Postell has a vested interest in or affiliation with the following company who may have offered financial support or grant monies for this continuing education activity
  - Merck

• Ira Schatten has no actual or potential conflict of interest in relation to this continuing education activity

2016 ANNUAL MEETING

PHARMACIST OBJECTIVES

• By the end of this discussion the participants will be able to:
  1. Define the relationship between medication errors and adverse drug events
  2. Describe the impact medication errors have on patient safety and health care systems
  3. Categorize medication errors by common causes and severity
  4. Compare and contrast how Continuous Quality Improvement, Failure Mode and Effects Analysis (FMEA) and Root Cause Analysis (RCA) impact medication errors
  5. Identify strategies and technologies to enhance patient safety and prevent medication errors in pharmacy practice
  6. Apply ‘Just Culture’ principles to evaluate systems, people, and behavioral motives involved in a medication error

2016 ANNUAL MEETING

TECHNICIAN OBJECTIVES

• By the end of this discussion the participants will be able to:
  1. Define the relationship between medication errors and adverse drug events
  2. Describe the impact medication errors have on patient safety and health care systems
  3. Recognize common causes and types of medication errors
  4. Explain how Continuous Quality Improvement, Failure Mode and Effects Analysis (FMEA) and Root Cause Analysis (RCA) impact medication errors
  5. Identify strategies and technologies to enhance patient safety and prevent medication errors in pharmacy practice
  6. Understand the ‘Just Culture’ principles and how they are used to evaluate systems, people, and behavioral motives involved in a medication error

2016 ANNUAL MEETING

THE IMPACT OF MEDICATION ERRORS

• Medical error is now the third leading cause of death
  - Approximately 251,000 deaths per year

• National Patient Safety Foundation
  - 1/3 of Americans have been affected by a serious medication mistake
  - 28% of these are related to a medication error
WHAT IS A MEDICATION ERROR?

• 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:
    • Health care professional
    • Patient
    • Consumer

A medication error is “any error occurring in the medication use process.”

MEDICATION USE PROCESS

• SODAM
  • Selection
  • Ordering
  • Dispensing
  • Administering
  • Monitoring

Errors can occur at any point in the Medication Use Process

They occur most frequently in the Ordering (56%) and Administration (34%) phase.
**DEFINITIONS**

- **Adverse Drug Event (ADE):** An injury resulting from medical intervention related to a drug
  - Source: Institute of Medicine (IOM)
- **Adverse Drug Reaction (ADR):** Any response to a drug which is:
  - noxious and unintended
  - occurs at doses normally used in man for prophylaxis, diagnosis, or therapy of disease, or for the modifications of physiological function
  - Source: World Health Organization (WHO)

**MEDICATION ERRORS VS. ADE**

<table>
<thead>
<tr>
<th>Medication Errors</th>
<th>ADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Harm</td>
<td>Non-preventable Harm</td>
</tr>
<tr>
<td>Preventable Harm</td>
<td>ADR</td>
</tr>
</tbody>
</table>

**NCC MERP INDEX FOR CATEGORIZING MEDICATION ERRORS**

- **Category H**
  - An error occurred that required intervention necessary to sustain life
THE 7 RIGHTS OF MEDICATION ADMINISTRATION

<table>
<thead>
<tr>
<th>Right</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right Drug</td>
<td>Diltiazem CD vs. SR or Metoprolol daily product vs. BID product</td>
</tr>
<tr>
<td>Right Dose</td>
<td>Giving Metoprolol 25mg instead of ordered ½ tab of the 25mg for 12.5mg</td>
</tr>
<tr>
<td>Right Patient</td>
<td>Medication given to Smith, John instead of Smith, Jane</td>
</tr>
<tr>
<td>Right Route</td>
<td>Rectal suppository inserted vaginally - Dulcolax / Anusol HC</td>
</tr>
<tr>
<td>Right Time</td>
<td>Pt took Warfarin at home before admission and scheduled for same day of admission</td>
</tr>
<tr>
<td>Right Technique</td>
<td>Not using spacer for inhalation, breathing in too rapidly/slowly</td>
</tr>
<tr>
<td>Right Documentation</td>
<td>Medication patch applied to one area but documented as another, 2 tabs indicated and given but documented as 1 tab given (i.e. Percocet)</td>
</tr>
</tbody>
</table>

COMMON CAUSES OF MEDICATION ERRORS

- Wrong time error
  - The failure to administer a medication within a predefined time
- Unauthorized drug error
  - Administration of a medication not authorized by a prescriber for the patient
- Deteriorated drug error
  - Administration of a drug that has expired
  - The physical or chemical dose-form integrity has been compromised

COMMON CAUSES OF MEDICATION ERRORS

- Improper dose error
  - Administration of a higher/lower dose than or ordered by prescriber
  - Administration of duplicate doses
- Wrong-dosage-form error
  - Administration of a drug product in a different dosage form than ordered by prescriber
- Wrong-drug-preparation error
  - Drug product incorrectly formulated or manipulated before administration

CONTINUOUS QUALITY IMPROVEMENT

<table>
<thead>
<tr>
<th>Right Drug</th>
</tr>
</thead>
<tbody>
<tr>
<td>A DIAGNOSIS, CONDITION, OR INDICATION FOR USE EXISTS FOR EACH MEDICATION ORDERED</td>
</tr>
</tbody>
</table>


http://www.ashp.org/s_ashp/index.asp

PROCESSES/PROCEDURES WHERE ERRORS MAY OCCUR

- Order Entry
- Medication Selection
- Drug Delivery
- Drug Preparation/Prepacking
- Pyxis Fills
- Outpatient Prescriptions
QUALITY IMPROVEMENT PROCESSES

• The way to prevent errors is to redesign the systems and processes that lead to errors rather than focus on correcting the individuals who make errors

• Effective strategies for reducing errors include making it difficult for staff to make an error and promoting the detection and correction of errors before they reach a patient and cause harm

SWISS CHEESE EFFECT

LAYERS OF SAFETY

WHY SYSTEMS ARE IMPORTANT

• Decrease likelihood of making errors
• Increase efficiency
• Create order
  • Step by Step Instruction – IV queue technology
• Standardization
  • Protocols
  • Order Forms

DEFINITIONS

• Failure Mode and Effects Analysis (FMEA):
  • Ongoing quality improvement process that is carried out in healthcare organizations by a multidisciplinary team
  • Conducted before any error actually happens.

• Root Cause Analysis (RCA):
  • A reactive process
  • Employed after an error occurs, to identify its underlying causes.

RCA VS. FMEA

<table>
<thead>
<tr>
<th></th>
<th>Root Cause Analysis (RCA)</th>
<th>Failure Modes and Effects Analysis (FMEA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timeframe</td>
<td>Retrospective</td>
<td>Prospective</td>
</tr>
<tr>
<td>Focus</td>
<td>Individual case</td>
<td>Process</td>
</tr>
<tr>
<td>TJC Requirements</td>
<td>On all sentinel event cases</td>
<td>Annually on a high-risk process</td>
</tr>
<tr>
<td>Advantages</td>
<td>Asks what happened and why</td>
<td>Broad impact on entire system, doesn’t require an event prior to study. Prevents adverse events before they happen.</td>
</tr>
<tr>
<td>Limitations</td>
<td>Hindsight bias, findings may apply only to a specific case and may or may not have broader implications for the entire system, labor intensive</td>
<td>Labor intensive</td>
</tr>
</tbody>
</table>
FMEA – PEANUT BUTTER & JELLY

Necessity | Problem | Effects | How bad is it? | Causes | How Likely? | Score | Steps to Prevent
---|---|---|---|---|---|---|---
Obtain Bread | No Bread | No Sandwich | 5/5 | Out of Stock | Moldy | 3/5 | 15 Check Pantry
Put PB on Bread | No PB | Jelly Sandwich | 3/5 | Out of Stock | Past Expiration | 2/5 | 6 Check Pantry
Spread PB&J with Knife | No Knife | Plain Bread | 4/5 | Dishes Not Cleaned | 3/5 | 20 Clean Dishes

RCA – THE TITANIC

1) Define the problem
2) Analyze the causes
3) Select the best solutions

Source: http://www.thinkreliability.com
2) Analyze the causes

3) Select the best solutions

<table>
<thead>
<tr>
<th>No.</th>
<th>Cause</th>
<th>Action Item</th>
<th>Owner</th>
<th>Due Date</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Insufficient Icebreakers</td>
<td>Alex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Speed</td>
<td>slow down with known carrier</td>
<td>John</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Crew</td>
<td>improve low-wake controls</td>
<td>Eric</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Steel</td>
<td>change hull design, materials</td>
<td>Mike</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: http://www.thinkreliability.com
NATIONAL PATIENT SAFETY GOALS

• Identify patients correctly
  • NPSG.01.01.01: Use at least two ways to identify patients
    • For example, use the patient’s name and date of birth
    • This is done to make sure that each patient gets the correct medicine and treatment

• Use medicines safely
  • NPSG.03.05.01: Take extra care with patients who take medicines to thin their blood
  • NPSG.03.06.01: Record and pass along correct information about a patient’s medicines
    • Find out what medicines the patient is taking
    • Compare those medicines to new medicines given to the patient
    • Make sure the patient knows which medicines to take when they are at home
    • Tell the patient it is important to bring their up-to-date list of medicines every time they visit a doctor

AHRQ PATIENT SAFETY TIPS

• Re-engineer hospital discharges
  • Reduce potentially preventable readmissions by:
    • Assigning a staff member to reconcile medications
    • Schedule necessary follow-up medical appointments
  • Create a simple, easy-to-understand discharge plan for each patient that contains:
    • A medication schedule
    • A record of all upcoming medical appointments
    • Names and phone numbers of whom to call if a problem arises
  • AHRQ-funded research shows that taking these steps can help reduce potentially preventable readmissions by 30 percent

ROLE OF TECHNOLOGY

• Dipensing Technologies – Automated Dispensing Cabinets (ADCs)
  • Pyxis®, Omnicell®, Baker Cell™

THE ROLE OF TECHNOLOGY
THE ROLE OF TECHNOLOGY
• Computerized Physician Order Entry (CPOE)

THE ROLE OF TECHNOLOGY
• Electronic Medical Record (EMR)

THE ROLE OF TECHNOLOGY
• Barcode Medication Administration (BCMA)

THE ROLE OF TECHNOLOGY
• IV Preparation Software
  • DoseEdge®, ScriptPro Telepharmacy®

THE ROLE OF TECHNOLOGY
• Carousel Technology
  • Pharmogistics®, Tallyst®

THE ROLE OF TECHNOLOGY
• RFID/Crash Cart Tray Software
  • Kit Check®, Tray Safe®
THE ROLE OF TECHNOLOGY

- Simulation

HIGH ALERT MEDICATIONS

Classes
- Insulins
- Opiates/Narcotics
- Cancer Chemotherapy
- Oral hypoglycemics
- Anticoagulants

Medications
- Warfarin
- U-500 insulin

HIGH ALERT MEDICATIONS - STRATEGIES

- Improving access to information about these drugs
- Limiting access to high-alert medications
- Using auxiliary labels
- Using automated alerts
- Standardizing the ordering, storage, preparation, and administration of these products
- Employing redundancies
  - Automated or independent double-checks when necessary
- Note: manual independent double-checks are not always the optimal error-reduction strategy and may not be practical for all of the medications on the list
- Providing mandatory patient education

HIGH ALERT MEDICATIONS

- High-alert medications are drugs that bear a heightened risk of causing significant patient harm when they are used in error
- Although mistakes may or may not be more common with these drugs, the consequences of an error are clearly more devastating to patients

LOOK-ALIKE/SOUND-ALIKE STRATEGIES

- Tall man lettering descriptions in pharmacy computer system, Pyxis formulary, and unit dose packaging system database (e.g., hydroxyzine, hydralazine)
- Brand/generic names on medication administration records and automated dispensing cabinet computer screen
- Storage of products with look or sound-alike names in different locations of the pharmacy and automated dispensing cabinets
- Report Errors related to LASA drugs
- Give consideration to name confusion when adding new products to the formulary
PRODUCT CHANGE

ERROR IN MEDICINE
• Much of mental functioning is automatic, rapid and effortless
  – Leape, L.L.

INATTENTIONAL BLINDNESS
• More likely to occur if attention is diverted to secondary tasks
• More complicated tasks require our full attention
• Low workload, carrying out highly practiced tasks
• Boredom and decreased mental attention
• Expectation – Confirmation Bias

SYSTEM DESIGN STRATEGIES
• Make no mistake
• Information
• Knowledge/Skill
• Perception of High Risk
• Barriers, Forcing Functions, Fail-safes
• Redundancy

SYSTEM REDUNDANCY
1:1,000,000,000 Odds of both pilots having a heart attack and autopilot failure
1:1,000 Odds of one pilot having a heart attack
1:1,000,000 Odds of both pilots having a heart attack
**ERROR PREVENTION STEPS**

- Do not bypass safety features
- Speak up when there is doubt about a situation
- Request training when indicated
- Visually review each item selected for Pyxis fill/carousel refill
  - Ensure correct expiration date is recorded
- Report errors/dangerous practices

**WORKLOAD**

- Long shifts
- Lack of breaks
- No backup plan for staffing shortage
- Agency staff
- Added clinical programs not communicated to staff

**ERROR PREVENTION STEPS**

- Steps to prevent Medication Errors
  - Use available technology
  - Follow steps for LA/SA Drugs
  - Do not use dangerous/unapproved abbreviations
  - Confirm the prescriber’s orders if unclear
  - Stay focused, alert, and collected at all times

**JUST CULTURE**

- A LEARNING culture versus PUNITIVE
- Encourages honesty
- Takes HUMAN ERROR into consideration

**PHYSICAL ENVIRONMENT**

- Inadequate lighting
- Disorderly, cluttered workspace
- Inadequate storage space
- Layout
- Workflow – poor traffic patterns
- Distractions

**JUST CULTURE**
JUST CULTURE
An evolution from Punitive to No Blame to Just Culture

- **Punitive**: work carefully, counseling, discipline, procedural violations unacceptable
- **Blame Free**: response to shortcomings of a punitive culture, workers who made honest errors were not truly blameworthy
- **Just Culture**: emphasis on learning and shared accountability, workers continually look for risk and are thoughtful about behavioral choices, managers look for system design features that are reliable

JUST CULTURE
- Good system design + good behavioral choices of staff = good results
- Accountability is not dependent on outcome but behavioral choices under worker’s control
- Shared accountability
- Four areas of focus:
  - learning/reporting culture
  - open/fair culture
  - design of safe systems
  - management of behavioral choices

BEHAVIORS
- **Human error**: inadvertent action; inadvertently doing other than what should have been done; slip, lapse, mistake
- **At-risk behavior**: behavioral choice that increases risk where risk is not recognized, or is mistakenly believed to be justified
- **Reckless behavior**: behavioral choice to consciously disregard a substantial and unjustifiable risk

JUST CULTURE ALGORITHM
- **Human Error (HE)**: Modify system performance shaping factors
  - Manage through changes in:
    - Choices
    - Responsibilities
    - Training
    - Environment
  - Console employee
  - Remedial action

- **At-Risk Behavior (ARB)**: Modify system performance shaping factors
  - Coach employee
  - Remedial action

- **Reckless Behavior (RB)**: Punitive action
  - Remedial action

MAKE A DIFFERENCE
CONCLUSIONS

- By the end of this discussion the participants will be able to:
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QUESTIONS?

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