Recognition and Prevention of Hospital Medication Errors

Eric J. Renker, Pharm.D.
Director of Pharmacy Services
Florida Hospital Tampa

Program Objectives: Pharmacists

• Explain the differences between Adverse Drug Reactions, Adverse Drug Events, and Medication Errors.
• Discuss the impact, financial and physical, of medication errors on patients and institutions.
• Discover ways to recognize medication errors as they develop.
• Gain tools to help develop ways to prevent future medication errors.
• Explain what a root cause analysis is and how to actively and effectively participate in one.

Program Objectives: Technicians

• Explain the differences between Adverse Drug Reactions, Adverse Drug Events, and Medication Errors.
• Discuss the impact, financial and physical, of medication errors on patients and institutions.
• Discover ways to recognize medication errors as they develop.
• Gain tools to help develop ways to prevent future medication errors.
• Explain the importance of voicing concern when a medication error is forming and effecting “Just in Time” prevention.

Program Outline

• Part 1:
  • What is the impact of medication errors on the health of America?
  • What does a medication error look like?
  • What are the causes of medication errors?
  • Who is looking at our errors?

• Part 2:
  • How can we prevent medication errors?
  • How do we respond to medication errors?
  • Summary
  • Discussion questions

What is the impact of medication errors?

• Avoidable costs in US healthcare due to irresponsible use of medicine totaled $213 billion (or 8%) of the $2.7 trillion spent on healthcare in 2013
  — $105 billion for Nonadherence
  — $ 39 billion for Delayed evidence-based treatment practice
  — $ 35 billion for Antibiotic Misuse
  — $ 20 billion for Medication Errors
  — $ 12 billion for Suboptimal generics use
  — $ 1.5 billion for Mismanaged polypharmacy in the elderly
• Includes unnecessary healthcare utilization and prescriptions
  — 10 million hospital admissions $140 billion
  — 78 million outpatient visits $ 45 billion
  — 246 million prescriptions $ 22 billion
  — 4 million emergency room visits $ 6 billion
• Estimated 7,000 deaths due to medication errors annually

Disclosure

• The presenter has no conflicts of interest or economic concerns to disclose regarding Medication Errors
• There are no external sponsors of this presentation
• No research referenced was done by the presenter and no fees received for their promotion
**What Are Medication Errors?**

- **Adverse Drug Event**
  - When something goes wrong and there’s an injury due to a medication
  - Risk factors for adverse drug events:
    - Patient’s age, gender, how many medications the patient takes, and concomitant disease states
  - **Adverse Reactions are not always preventable**
    - If the drug was prescribed, dispensed, and administered appropriately, a patient may still experience an allergic reaction when no previous drug allergy was known
  - **Medication Errors**
    - The injury could have been prevented with some safety checks

---

**Definition of an Error (continued)**

- **A medication error** is defined 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.”
  - NCC MERP

---

**Definition of an Error (continued)**

- **Errors of omission**
  - Failing to do something correctly
  - Examples: failing to administer a dose of medication, failing to include strength of a medication on a prescription
- **Errors of commission**
  - Doing something incorrectly
  - Examples: prescribing the wrong antibiotic, dispensing an incorrect dose of an appropriate drug, ignoring drug interactions
- **System error**
  - An error that is not the result of an individual's actions, but the predictable outcome of a series of actions and factors that comprise a diagnostic or treatment process

---

**Where Do Medication Errors Occur?**

- Errors can occur at any step in the process
  - Prescribing
  - Order communication
  - Administration
  - Preparation
    - Labeling, compounding, dispensing
  - 80% of medication errors occur during the **prescribing or administration** steps
  - Several studies have found that prescribing errors come about because of insufficient drug knowledge on the part of the prescriber
  - Another contributing factor to prescribing errors is a lack of knowledge about the patient, including current status or lab values

---

**Prescribing Errors**

- **The paper-based prescribing system in the U.S. is responsible for at least 1.5 million preventable injuries every year**
  - Institute of Medicine report, 2006
- **Missing information** on prescriptions is the most common type of prescribing error
  - One way to prevent this from happening is for prescribers to be provided with prompts on exactly what information is necessary
- **Recommendations for written prescriptions:**
  - Legible
  - Include a brief indication
  - Use the metric system
  - Include relevant patient information such as age and weight
  - Include leading zeros and exclude trailing zeros
  - Should contain specific directions for use, not "use as directed"
  - Prescriptions should not contain abbreviations.

---

**Dispensing Errors**

- **A majority of the legal claims against pharmacists involve dispensing errors**
  - 50% of dispensing error claims involve **dispensing the wrong drug**
  - 27% are due to dispensing the **right drug in the wrong strength**
  - 8% are due to **incorrect labeling**
- **Other reasons include:**
  - Failure to review drug regimen-7%
    - Missed allergies or drug interactions
  - Failure to warn of potential adverse drug reactions-2%
    - Failure to counsel or warn of potential adverse drug reactions is the fastest growing segment of claims against pharmacists
What Are the Causes of Medication Errors?

• Errors happen because of weak points or flaws in the medication use system
• System includes every step from writing the prescription, to administering the medication, to the patient’s response to the medication
  – Many factors along the way can contribute to the failure of the medication use system and result in medication errors
  – ISMP and the Joint Commission, among others, collect data on medication errors, analyze the data to uncover the causes of errors, and then alert pharmacists and prescribers so that errors can be prevented

Causes (continued)

Abbreviations

• Abbreviations can be misinterpreted, misunderstood, and confusing
  – This is on top of any confusion caused by difficult-to-decipher handwriting
  – Patient safety is put at risk with abbreviations
• Used to save time initially, but can end up costing time
• Avoiding abbreviations goes a long way toward preventing medication errors
• Hospitals are required to have a list of prohibited abbreviations
  – “Do Not Use” list
  – These abbreviations must not be used in chart orders, progress notes
  – Originally Joint Commission National Patient Safety Goals and are now Standards

Medication Labels, Names, and Packaging

• Provide ample opportunity for error
• Drug names that:
  – Look alike when written
  – Sound alike when spoken
• Drug packaging that is strikingly similar between very different products
• Be aware of the potential for mistakes and safeguards that can be used to prevent them

Trade Dress Issues

• Dr. Michael Cohen, RPh, MS, ScD, began column in Hospital Pharmacy in 1975
• Evolved into ISMP
• Successes include:
  – Changes in federal laws and regulations
  – Inclusion in Joint Commission standards
  – Redesigned packaging to avoid errors
  – Work referenced in numerous studies and protocols

Causes (continued)

Offical “Do Not Use” List

<table>
<thead>
<tr>
<th>Do Not Use</th>
<th>Potential Problem</th>
<th>Use instead</th>
</tr>
</thead>
<tbody>
<tr>
<td>U, u (unit)</td>
<td>Misread for “0” (zero), the number “4” (four), or “00”</td>
<td>Write “unit”</td>
</tr>
<tr>
<td>IQ (International Unit)</td>
<td>Misread for IV (intravenous) or the number 5 (five)</td>
<td>Write “International Unit”</td>
</tr>
<tr>
<td>Q.O.D., q.d., q(daily)</td>
<td>Misread for each other</td>
<td>Write “daily”</td>
</tr>
<tr>
<td>Q.D.D., Q.D., q.d.d, q.d (every other day)</td>
<td>Period after the Q mistaken for “O” and the “O” mistaken for “I”</td>
<td>Write “every other day”</td>
</tr>
<tr>
<td>Trade zero (0.0 mg)</td>
<td>Decimal point is missed</td>
<td>Write “0” X mg</td>
</tr>
<tr>
<td>V.S. Can mean morpina sulfate or magnesium sulfate</td>
<td>Write “morphine sulfate” or “magnesium sulfate”</td>
<td></td>
</tr>
<tr>
<td>TI or T.I. or T.I. Confused for one another</td>
<td>Write “TI”</td>
<td></td>
</tr>
</tbody>
</table>

*Exemption: A “trade zero” may be used only when required to demonstrate the level of precision of the dose being prescribed, such as for laboratory results, imaging studies that report scale of millimeters, or catheter tube sizes. It may not be used in medication orders or other medication-related documentation.
**Causes (continued)**

### The Heparin Story
- Dennis Quaid’s newborn twins almost died after 1000X error (10,000 units vs 10 units) (2007)
  - Established the Quaid Foundation to minimize the impact of human error in patient medical care
- 17 incidents in Corpus Christi (2008)
  - At least two deaths
  - Attorney for parents: “Both [products] are blue—the 10,000 units is the same color as the 10 units”

### Look-a-like and Sound-alike Medications
- Omacor (the original name of Rx omega-3 fatty acids) and Amicar (aminocaproic acid)
  - Changed to Lovaza
- Reminyl (galantamine) and the diabetes drug, Amaryl (glimepiride)
  - Look AND sound alike, both come in 4 mg doses
  - Name changed to Razadyne
- Kapidex (proton pump inhibitor dexlansoprazole)
  - Confused with Casodex (bicalutamide) and Kadian (morphine sulfate)
  - Changed to Devlant
- Losec (omeprazole) and Lasix (furosemide)
  - Both available as 20mg doses
  - Became Prilosec

### FDA recommends “TALL man lettering” for similar sounding generics
- glipizide is printed as glipiZIDE to avoid confusion with glyBURIDE
- prednison e and prednisolONE
- Suggesti ons were originally from ISMP
- Covers at least 33 different drugs
- Some medications still have two brand names
  - Prozac and Sarafem for fluoxetine
  - The newer form of sildenafil (Viagra) called Revatio
  - Revatio treats pulmonary arterial hypertension and comes as a 20 mg white tablet


This list is nine pages long...and growing
Causes (continued)

- Failure to Comply with Policies and Procedures
  - Example: Skipping a final check is a common cause of dispensing errors
  - Checking from label instead of actual drug
- Workload
  - High workload can be an issue
  - Low workload has been found to contribute to reduced concentration
- Work Environment
  - Lighting, Noise Level, Temperature, Distractions
  - Keep conversations short and work related
- Communication
  - Ineffective communication is the most frequently cited cause of serious patient harm
  - “Verbal Order Read Back”
  - Patient Counseling
- Environment
- State
  - Board of Pharmacy
  - AHCHA
  - State law enforcement

Who’s looking at our errors?

- The “Feds”
  - FDA
  - CMS
- The State
  - Board of Pharmacy
  - AHCHA
  - State law enforcement

- The Surveyors
  - The Joint Commission
  - DNV
- The Profession
  - ISMP
  - ASHP
  - APHA
  - NCC MERP

Medication Error Prevention

- Individual pharmacists, pharmacy technicians, and organizations alike are responsible for improving patient safety
- National Patient Safety Goals and other guidelines from groups like ISMP, JCAHO, and NCC MERP are updated periodically based on the real-world reports and experiences of pharmacists and pharmacy technicians

Prevention (continued)

Individual Roles

- The “Five Rights”
- Education and Training
- Good Communication
- Involve Patients
- Watch for Weaknesses in the System

Prevention (continued)

Rights of Medication Administration

1. Right patient
   - Check the name on the label and the patient’s chart if necessary. Ask patient to identify himself/herself. When available, use technology (for example, bar code readers).
2. Right medication
   - Check the medication label. Check the order.
3. Right dose
   - Check the order. Confirm appropriateness of the dose using a current drug reference. If necessary, calculate the dose and round to the nearest acceptable dose next.
4. Right route
   - Check the order and appropriateness of the route ordered. Confirm that the patient can take or receive the medication by the appropriate route.
5. Right time
   - Check the frequency of the medication administration. Double-check that you are giving the ordered dose at the correct time. Confirm whether the drug was given.
6. Right documentation
   - Document administration with both the ordered medication. Check the time, route, and any other specific information necessary. For example, the time of an injection or any laboratory value or vital sign that needed to be checked before giving the drug.
7. Right reason
   - Confirm the rationale for the ordered medication. What is the patient’s history? Why is he/she taking this medication? Avoid the reason for longer-term medication use.
8. Right response
   - Make sure that the drug is the correct dose, (for an ordered dose not given, two written signatures are required). Does the patient understand empowerment in decision making when he or she administers? Be sure to document your recording of the patient and any other actions taken that are applicable.

References

Prevention (continued)

- Education and Training
- Good Communication
- Involve Patients
- Watch for Weaknesses in the System

Rank Order for Error Reduction Strategies
1) Forcing functions and constraints
2) Automation and computerization
3) Standardization and protocols
4) Checklists and double checks
5) Rules and policies
6) Education / information
7) Be more careful, vigilant

Prevention (continued)

Forcing functions and constraints

- Limit access
  - CII controlled tightly
  - Surgical techs do not have access
  - Impaired practitioners not able to access controlled substances
- Limit Options
  - not every strength purchased
- Time out
  - In surgical procedures, time outs serve as a safety net in which any team member can express any concerns before procedure begins

Forcing Functions and Constraints (Continued)

- Formulary Control
  - Not every drug available
  - New drugs on market are not added until at least 6 months of post marketing surveillance data available for review
  - Many points are considered
    - Safety profile
      - Propensity for medication errors
      - Abuse potential
      - Adverse effects

Forcing Functions and Constraints (Concluded)

- Restricted drugs from floorstock- pharmacy dispensed items
  - KCL vials
  - Hypertonic Saline
- Restricted prescribing
  - Tikosyn
    - Must be registered with company
  - Samsca, Vaprisol
  - Nephrologists, Intensivists, Cardiology
  - Sotalol initiation/dose increases
    - cardiologists

Automation and computerization

- Access to information
  - Weight, Height
  - Allergies
  - BSA, CrCl, Labs
  - Dx
  - Clinical Note
  - EKG and other finding
  - Previous admission information
Prevention (continued)

- **Computerized Physician Order Entry (CPOE)**
  - CPOE is considered an answer to preventing medication errors
    - Reduction in error rates are reported between 17% and 81%
  - CPOE systems still require human intervention and checking
    - Current prediction is that overall errors will go down, but new types or causes of errors will show up
      * Illegible prescriptions will be replaced by prescribers clicking the wrong drug
      * Users might assume that dose options listed in the computer are based on minimum effective doses when they may be based on what stocked
      * Prescribers type the drug name in the comments field if they can't find the med they want on the dropdown list

Prevention (continued)

- **Safety information preprogrammed with drug**
  - Information for pharmacist and or nurses
- **Clinical Drug Categories in Remote Drug Cabinet Console**
  - Linked to problem prone medications
    * Neuromuscular blockers: You must confirm that the patient is intubated
    * Toradol – You must confirm patient is not allergic to aspirin or NSAIDs

Prevention (continued)

- **Standardization and protocols**
  - **Standardized Information**
    - Standard Online Drug Reference (eg: Lexicomp or Micromedex) accessible from PowerChart
    - Standard Online Drug Reference also available at Remote Cabinet Console
    - Medical Study Reference Resource (eg: Up-to Date) available on Intranet
  - **Standard order sets / powerplans**
    - Evidence based
    - Peer reviewed
    - Standardization of drip concentrations

Prevention (continued)

- **Checklists and double checks**
  - Reduce reliance on memory
  - Require redundancies
  - Independent double-checks
  - Common strategy with high risk procedures
    - Chemotherapy
    - Insulin administration
    - Heparin drip changes

Prevention (continued)

- **Barcoding**
  - There are a number of studies that show barcoding can dramatically reduce medication errors
    - In one study, barcoding reduced medication errors by 86%
  - Improve accuracy of the med use process in the pharmacy (eg: PARX)
    - Stocking, compounding, dispensing
  - Used on patient care units, prior to administration of meds (eg: mPPID)
  - FDA has rules requiring bar codes on medication packaging

Prevention (continued)

- **Institutional Policies and Procedures**
- **Patient Care Policies and Procedures**
- **Pharmacy Policies and Procedures**
- **High Alert Medications**
  - Chemotherapy, insulin, heparin, Epidurals and PCAs, Opiates, Neuromuscular blockers, Concentrated Electrolytes, TPN, Vasopressors
  - Complete list at www.ismp.org/Tools/highalertmedications.pdf
Prevention (continued)

Safeguards include:
- Restricted access
- Restricted prescribers
- Segregated storage
- Limited formulary
- Mandatory powerplans
- Double checks
- Tall man lettering

Tall man lettering assists with differentiating look alike medications:
- DOPamine
- DOBUTamine
- ceLEBREX
- celeXA


Prevention (continued)

Education/information

- In-services
- Skill fairs
- Newsletters
  - Internal
  - External e.g., Institute for Safe Medical Practice (ISMP)
- Educate the Patient/family
  - Include the patient/family in the process
  - Encourage them to Speak Up

Response to Medication Error

Building a Safer Healthcare System

- James Reason, *Human Error*
  - Principles
  - Policies
  - Procedures
  - Practices

- Fallibility is a part of the human condition
- We can’t change the human condition
- We can change the conditions under which people work

Swiss cheese model

Hazzards

Losses

Response (continued)

Reason’s Principles

- Safety is everybody’s business
- We must accept setbacks and anticipate errors
- Safety issues should be reviewed regularly
- Past events should be reviewed and changes implemented
- After a mishap, concentrate on fixing the system, not on blaming individuals
- Effective error reduction depends on the collection, analysis and dissemination of data
- Error reduction must be proactive
Response (continued)

**Reason’s Policies**
- Safety information has direct access to the top
- Everyone helps everyone else
- Meetings on safety are attended by staff at every level
- Messengers are rewarded, not shot
- **The culture of safety must be just**
- Reporting must include qualified indemnity, separation of discipline from data collection
- Discipline should involve peers and agree as to the difference between acceptable and unacceptable behavior

Response (continued)

**Reason’s Procedures**
- Training in the recognition and recording of errors
- Feedback on recurrent error patterns
- Awareness that procedures cannot cover all circumstances; on the spot training
- Protocols written with those doing the job
- Procedures must be workable, available, and supported

Response (continued)

**Reason’s Practices**
- Rapid, useful, and intelligible feedback on lessons learned and actions needed
- **Bottom up information listened to and acted on**
- When mishaps occur
  - Listen carefully
  - Apologize
  - Objectively explain what happened, if known
  - Assure patient lessons will be learned

Response (continued)

**Alternative Self-Regulatory Responses**
- Do Nothing
- Punishment
  - Advantages
    - Practical Appeal
    - Political Appeal
    - Emotional Appeal
  - Disadvantages
    - Ineffective
    - Too little
    - Too much
    - Unreliable
    - Unfair
- Centralized Data Reporting and Feedback
- Centralized QA Program
- Error Prevention Clinic
- Mandatory Error Prevention CE
- Mandatory CQI

Responses (concluded)

**Fixing the Process with Specific Techniques**
- Select and use techniques that put theory into practice
- Use the techniques to catch or absorb errors
- Recommit to existing policies
- Develop new techniques with consensus of all stakeholders

Just Culture as a part of Company Mission
- A Just Culture company has a mission
- People not only can, but will, make mistakes
- Just Culture concepts help to constantly improve its systems at the core
- Just Culture is a result as much as it is a set of management skills and tools that make it possible

This slide and next three copied from www.justculture.org
Just Culture Mission (continued)

- Three behaviors
  - Human Error
  - All-Risk Behavior
  - Reckless Behavior

- Three Duties
  1. The duty to avoid causing unjustifiable risk or harm.
  2. The duty to follow a procedural rule.
  3. The duty to produce an outcome.

Just Culture Mission (concluded)

- Five Skills
  1. Values and Expectations
  2. System Design
  3. Behavioral Choices
  4. Learning Systems
  5. Justice and Accountability

Root Cause Analysis

What is a Root Cause Analysis?

- Facilitated process
- After event: gather documents, assemble basic timeline
- Draw out the story from all perspectives
  - Group or individual process
- Work to identify contributing factors
  - Why, why, why, why, why?
- Develop plans of correction that address contributing factors

Root Cause Analysis (concluded)

Two Approaches

- Focus on individual errors
- Individual blame
- Punishing errors
- Expectation of perfect performance
- Solutions tend to be disciplinary or focused on training

Why Root Cause Analysis?

- The goal of the RCA process is to find out what happened, why it happened, and to determine what can be done to prevent it from happening again
- “People make errors, which lead to accidents. Accidents lead to deaths. The standard solution is to blame the people involved. If we find out who made the errors and punish them, we solve the problem, right? Wrong. The problem is seldom the fault of an individual; it is the fault of the system. Change the people without changing the system and the problems will continue.” — Don Norman, Apple Fellow
Root Cause Analysis (continued)

When is an RCA Done?

- For all issues that qualify as Joint Commission defined Sentinel Events
- A sentinel event is an unexpected occurrence involving death or serious physical or psychological injury, or the risk thereof
  - Serious injury specifically includes loss of limb or function
  - The phrase, "or the risk thereof" includes any process variation for which a recurrence would carry a significant chance of a serious adverse outcome
  - Such events are called "sentinel" because they signal the need for immediate investigation and response

Root Cause Analysis (concluded)

How does an RCA Proceed?

- An event or close call meriting an RCA occurs
- CEO/Facility Director signs the Charter Memo, initiating the RCA Team
- RCA Team completes the work (within 45 calendar days of when the facility became aware an RCA was needed)
- CEO is de-briefed by the Team and concurs or non-concurs with proposed actions, and signs-off on the RCA (CEO non-concurrence requires explanation and additional or revised actions by the RCA Team)
- RCA actions will be measured for effectiveness in preventing future adverse events or close calls

Medication Errors and Florida Law

- Public Health–Title XXIX
  - Chapter 395–Part I Hospitals and Other Licensed Facilities
- Regulation of Professions and Occupations–Title XXXII
  - Chapter 456–General Provisions
  - 64B16–26.103 Continuing Education Credits; Renewal (Pharmacists)
  - 64B16–26.355 Subject Matter for Registered Pharmacy Technician Continuing Education
  - 64B16–27.300 Standards of Practice–Continuous Quality Improvement Program

References

3. McClinton RL, Movenerative R, Reducing Pharmacy Technician Hospital Errors, J.S. Pharm. 2011;38(12):HS-12-09-29
7. https://www.justculture.org/getting-to-know-just-culture/