The Good, The Bad and The Ugly

Medication Error Prevention

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Objectives

- Define medication error
- Review the elements of medication safety
- Develop strategies for error prevention
- Identify the root causes of common errors and techniques for identifying potential error situations
- Use available resources to prevent errors

Medication Error

ASCP defines a 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 healthcare 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."
How BIG is the Problem?

- The National Patient Safety Foundation found that 1 in 3 Americans have been affected by serious medical mistakes.
- 1.5 million Americans are harmed by medication errors each year, costing upwards of $3.5 billion in extra medical costs.
- One research study suggested that errors occurred more frequently at the beginning of each month.

Frequency of Medication Errors

The IOM estimated in ‘To Err is Human’ that:
- 44,000-98,000 unnecessary deaths occur annually.
- >1 million excess injuries.

Statistics:
- <1 death/100,000 encounters: railroads, airlines.
- >1 death/1000 encounters: healthcare.

Stages of Medication Administration

- **Ordering**: wrong dose, wrong choice of drug.
- **Transcribing**: wrong frequency of drug administration, missed dose because medication is not transcribed.
- **Dispensing**: drug not sent in time to be administered at the time ordered, wrong drug, wrong dose.
- **Administering**: wrong dose of drug administered, wrong technique used to administer the drug.
- **Monitoring**: not noting the effects of the given medication or checking on its effectiveness.
Medication Errors in Studies of Hospitalized Patients

Physician Ordering
- 30% - 49% (#1)

Transcription
- 11-12% (#2)

Pharmacy Dispensing
- 11-14% (#3)

Nursing Administration
- 26-38% (#2)

The Reality

Medication Order 86
Possibilities for ERROR Medication Administration

Medication Safety
### Elements of Medication Administration Safety

- Is the order appropriate?
- Has the order been accurately transcribed?
- Has the medication been administered correctly?
- What populations require special considerations?

### Appropriate Orders

**Whose responsibility is it to determine if an order is appropriate?**

- Doctor?
- Nurse?
- Pharmacist?
- Pharmacy Tech?

### Two Basic Types of Errors

<table>
<thead>
<tr>
<th>“Slips”</th>
<th>“Mistakes”</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Automatic mode</td>
<td>• Problem-solving mode</td>
</tr>
<tr>
<td>• Often a result of distractions or rushing</td>
<td>• Knowledge-based mistakes</td>
</tr>
<tr>
<td>• Example: Toradol as Tramadol</td>
<td>• Example: Writing a 720mg dose for Plavix, not knowing the usual dose of Plavix is 75mg</td>
</tr>
</tbody>
</table>
The Nine Rights of Medication Administration

• Right patient
• Right drug
• Right route
• Right time
• Right dose
• Right documentation
• Right action
• Right form
• Right response

Labeling- Marketing Overpowers Sense

Similar Packaging
Can YOU read these?

Transcribing Accurately

Can YOU read these?

Transcribing Accurately

Can YOU read these?

Transcribing Accurately

Can YOU read these?
Transcribing Accurately

Can YOU read these?

Root Cause Analysis
Models of Error

- Two models of human error:
  - Person approach
  - System approach
- Each has its model of error causation, and each model gives rise to different philosophies of error management
- Understanding these differences has important practical implications for coping with the ever-present risk of mishaps in clinical practice

Person Approach

- Blames the individual person
- Bad things happen to bad people
- Focuses on unsafe acts
  - Forgetfulness
  - Inattention
  - Poor motivation
  - Negligence or recklessness
- The solutions are designed to reduce unwanted behaviors
  - Writing another procedure
  - Threat of litigation
Person Approach

What does the person approach look like?

Shortcomings of the Person Approach

- "Good" Points
  - Blaming individuals is emotionally more satisfying than targeting institutions
  - People are viewed as free agents capable of choosing between safe and unsafe modes of behavior. If something goes wrong, a person (or group) must have been responsible.
  - It is also legally more convenient

- Effective Risk Management
  - Dependence of culture of reporting
  - Without reporting there is no way of uncovering recurrent error traps

System Approach

- Errors are made by people but often arise from error-prone systems, processes and tasks
- Requires a "safe" environment where people can openly discuss their errors and causes
- Use past errors to identify and implement changes to prevent future errors
- Strategies include:
  - Standardization
  - Simplification
  - Systemization (use of computers)
System Approach

What does the system approach look like?

- Create a medication safety committee to study errors and implement changes in medication management processes
- Clearly communicate changes to the entire team
- Focus on patient safety and systems analysis and redesign when reviewing medication errors
- Avoid blaming an individual when a medication error is analyzed
- Provide an annual refresher on policies and procedures related to medication errors

Root Causes for Errors

Root cause analysis (RCA) is a structured method used to analyze serious adverse events.

RCA identifies underlying problems that increase the likelihood of errors while avoiding the trap of focusing on mistakes by individuals.

The goal of RCA is thus to identify both active errors (errors occurring at the point of interface between humans and a complex system) and latent errors (the hidden problems within health care systems that contribute to adverse events).
## Root Causes for Errors

### Factors That May Lead to Latent Errors

<table>
<thead>
<tr>
<th>Category</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institutional/regulatory</td>
<td>- Lacking the appropriate equipment to perform hysteroscopy, operating room staff improvised using equipment from other sets. During the procedure, the patient suffered an air emboli.</td>
</tr>
<tr>
<td>Organizational/management</td>
<td>- A patient on anticoagulants received an intramuscular pneumococcal vaccination, resulting in a hematoma and prolonged hospitalization. The hospital was under regulatory pressure to improve its pneumococcal vaccination rates.</td>
</tr>
<tr>
<td>Work environment</td>
<td>- A suction catheter tip was missing during surgery. Despite being informed by a nurse and the anesthesiologist that the suction catheter tip was missing, the tip was subsequently found inside the patient, requiring reoperation.</td>
</tr>
<tr>
<td>Team environment</td>
<td>- A nurse detected a medication error, but the physician discouraged her from reporting it.</td>
</tr>
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</table>

## Root Causes for Errors

### Factors That May Lead to Latent Errors

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<tr>
<td>Staffing</td>
<td>- The parents of a young boy misread the instructions on a bottle of acetaminophen, causing their child to experience liver damage.</td>
</tr>
<tr>
<td>Task-related</td>
<td>- An overworked nurse mistakenly administered insulin instead of an anti-nausea medication, resulting in hypoglycemic coma.</td>
</tr>
<tr>
<td>Patient characteristics</td>
<td>- An intern incorrectly calculated the equivalent dose of long-acting MS Contin for a patient who had been receiving Vicodin. The patient experienced an opiate overdose and aspiration pneumonia, resulting in a prolonged ICU course.</td>
</tr>
</tbody>
</table>

## Error Reduction Strategies
Preventing Medication Errors

- Have policy and procedures in place
- Follow appropriate procedures for taking a medication order
- Follow appropriate policy and procedures during medication pass
Methods for Detecting Errors

- Anonymous self-reports
- Incident reports (may be voluntary)
- Critical incident technique
- Chart review
- Computer-assisted monitoring
- Direct observation

Error Reduction Strategies

- Use improved communication practices
- Create a culture of safety
- Collect a medication history and reconcile the list with the resident's family or other providers during care transitions
- Employ special procedures and written protocols for high-risk medications
- Improve the work environment for medication preparation, dispensing, and administration
- Take steps to reduce workplace fatigue, such as careful scheduling
- Adopt a systems-oriented approach to medication error reduction
- Improve error detection and reporting, and promote a non-punitive atmosphere

Procedures for Taking Medication Orders

- Write down the order and read it back to the physician
- Make sure the order is complete with route of administration and ask for a diagnosis
- Ask MD or agent of MD to spell the medication if you are unsure
- If faxed, make sure the order is legible and clarify the order if you are unsure
  - If you can't read it, you're probably not the only one
Preventing Medication Errors

- Be familiar with:
  - Brand and generic names of medications
  - Dosage formulations
  - Combination products
  - Note major side effects and proper monitoring
  - Update your knowledge of pharmacology and new medications often

Commonly Seen Errors

- Decimal points
  - 0.1 mg not .1 mg
  - 1 mg not 1.0 mg → may be mistaken for 10 mg

- Administering a medication when there is a known drug allergy listed in the chart

- Crushing medications that should not be crushed

- QD vs. QOD
  - Better to state “daily” or “every other day”

Abbreviations

Use only **APPROVED** Abbreviations...

<table>
<thead>
<tr>
<th>Do NOT Use</th>
<th>Potential Problem</th>
<th>Use Instead</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;I&quot; (unit)</td>
<td>Misread for “0” (zero), the number “4” (four)</td>
<td>Write “i. unit”</td>
</tr>
<tr>
<td>&quot;IU&quot; (International Unit)</td>
<td>Misread for “IV” (intravenous) or the number “10” (ten)</td>
<td>Write “International Unit”</td>
</tr>
<tr>
<td>Q.D., QD, qd (daily)</td>
<td>Misread for each other</td>
<td>Write “daily” or “every other day”</td>
</tr>
<tr>
<td>Q.O.D., QOD, qod (every other day)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;MS&quot;</td>
<td>Can mean morphine sulfate or magnesium sulfate</td>
<td>Write “morphine sulfate” or “magnesium sulfate”</td>
</tr>
</tbody>
</table>

From the Joint Commission’s Official “Do Not Use” List
Medication Considerations

- Diagnosis for each medication
- 4 g/day of Acetaminophen maximum
- Serum drug levels
  - Potassium, digoxin, valproic acid, iron panel, vitamin D, B12, phenytoin, tacrolimus
- Vitamin supplements and antacids
  - Administer separately from Levothyroxine and many antibiotics supplements for better absorption
  - Administer iron separately from other supplements when practical
- Bisphosphonates
  - Alendronate, Actonel
  - Administer at least 30 minutes before first food or drink of the day
  - Separate antacids, calcium supplements, or iron supplements by at least 2 hours

Commonly Confused Medication Names

Difficult medication names should be spelled out. There are many look-alike sound-alike drugs...

Accupril ≠ Accutane
Prilosec ≠ Plendil
Alprazolam ≠ Lorazepam
Cardene ≠ Cardura
Fosamax ≠ Flomax
Lamisil ≠ Lomotil
Nizoral ≠ Neoral
Zyrtec ≠ Zantac

Preventing Medication Errors

Have a QA Process

- Medication pass observation
- Report medication errors
- Analyze reports for trends and system flaws
Responsibility of Errors

Errors are much more commonly a result of system-related flaws, than negligence or misconduct.

Blaming individuals does not only not solve the problem or prevent future errors.

- Providers will start to hide the errors
- Providers may become the second victim

Swiss Cheese Model

- Developing Layers to improve prevention
  - Engineered – alarms, physical barriers
  - People – training
  - Procedures and administrative controls

Preventing Medication Errors

Swiss Cheese Model
Preventing Medication Errors

What is the most important thing you can do to prevent errors?

BE INVOLVED!

Interactive Summary (Scenarios)

Scenario 1

- Deadly Dose: Pharmacy Error Kills Infant - ABC News 2008
- The pharmacist received an order for 330 micrograms of zinc
- When the pharmacist entered the order, she entered 330 milligrams on the drop down menu
- "I put in the 330 and when I went to pick the units... grabbed 330 milligrams per deciliter instead of micrograms per deciliter," said the pharmacist
- The infant died a short time later from the overdose.
Scenario 2

Sebastian Ferrero Death
- Shands Hospital Gainesville, Florida - 2007
- 3 year old boy died of a medication overdose followed by a series of preventable medical errors.
- Routine test for growth hormone stimulation was ordered because the preschooler's growth rate was below average. Physician prescribed 5.75 grams of the amino acid arginine, but Sebastian received a 60 gram dose.
- The pharmacy did not stock the medication and had to order it. It came in two bottles of 30 grams each. The dose of 5.75 grams was labeled on the bottles, but bottles said 1 of 2 and 2 of 2, so the clinic staff thought both were needed.
- Sebastian's mom questioned the nurse who administered the medication, but the nurse thought the dose was correct. Sebastian began showing distress and complained of a severe headache, so his father requested the test be stopped and a physician to come in. The physician checked his chart and said the side effects were normal and resumed the test. He did not examine Sebastian or check the bottles of arginine. Afterwards, Sebastian's parents took him home.
- Later that night his condition worsened and he was rushed to the ER with severe dehydration. He died two days later.

Scenario 3

- 77-year-old woman given VICODIN for sciatic pain. She took about 4 doses daily for a week, but was still in pain
- She contacted physician who, by telephone, prescribed fentanyl 50 mcg per hour patches to be applied every 48-72 hours
- Woman's friend helped her place one of the patches on the site of her pain, the buttock
- When the woman went to bed she used a heating pad on her lower back/buttock area
- After 2 days of not hearing from the woman, friends found her dead in bed

Scenario 4

- The pharmacist arrived at work and learns his computer system is down and his IV technician is filling a chemo order that is needed immediately.
- The tragic error came when the pharmacist did not recognize that the pharmacy technician had made a chemotherapy solution with far too much sodium chloride (made with 23.4% sodium chloride instead of 0.9%)
- 2 year old patient received the chemotherapy solution, suffered head pain, thirst and lapsed into a coma and died
- Pharmacist receives 6 months in jail, 6 months of home confinement with an ankle bracelet, 3 years of probation, 400 hours of community service, a fine of $5000 and payment of court costs
Scenario 5

Washington D.C. 2013
- Patient calls pharmacy to refill a cyanocobalmin prescription
- She mistakenly received another patient’s prescription of atropine
- Her son realized the mistake at home later and no harm came to the patient

Scenario 6

- Chicago IL 2014
  - Pediatric patient mistakenly received a haloperidol suspension meant for an adult patient with the same name
  - No second identifier was used before giving the child the medication
  - After one dose the patient showed significant lethargy and was taken to the hospital
  - No long term harm
  - Lawsuit currently in progress

Scenario 7

- St. Mary’s Medical Center in West Palm Beach
  - 5 and a half month pregnant woman prescribed progesterone suppositories to prevent premature labor
  - Instead mistakenly given Prostin which induces labor and expels fetuses from the womb after a miscarriage
  - Gave birth in a commode after experiencing great abdominal pain which led to severe brain damage
  - Same mistake happened to a different woman hours earlier leading to the death of her twins
The only stupid question is the one left unasked.

References


- www.ismp.org/consult/rootcause.asp