WHAT?
A MEDICATION ERROR?
HOW DID THAT HAPPEN?

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Disclosures

I declare that I have no conflict of interest, real or apparent, and no financial interests in any company, product, or service mentioned in this program, including grants, employment, gifts, stock holdings, and honoraria.
Accreditation

The University of Florida College of Pharmacy is accredited by the Accreditation Council for Pharmacy Education as a provider of continuing pharmacy education.

Learning Objectives

- Describe how and why an error might occur
- Estimate the negative effects of the most common causes and types of medication errors
- Predict the significance of medication errors
- Illustrate how root-cause analysis might identify causes of medication errors
- Describe methods to improve patient safety in pharmacy practice
What is your accuracy rate?

- What is the accuracy rate for a pharmacist filling prescriptions?
  - 99.8%
  - 100%
  - 98.8
  - 96.0

What if...

Airlines expected 1 or 2 jets to crash every day?

That would mean over 1000 deaths each week.
Would you fly?

Would you put yourself or your family at that risk?

Definition of Medication Error

“Any preventable event which 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.”

The National Coordinating Council for Medication Error and Prevention (NCC MERP)
ADE vs ADR

- Adverse Drug Event (ADE)
  - Injury resulting from the use of a drug and directly related to a drug

- Adverse Drug Reaction (ADR)
  - Response to a drug which is noxious and unintended. An ADE is causally related to the medication


Medication Errors

- Adverse Drug Events (all gray areas)
- Adverse Drug Reactions (dark gray area only)
Interesting Facts

- 4 out of 5 people that visit their doctor receive a prescription
- The total number of annual prescriptions in the United States is about 3 Billion per year
- The average patient is given 12 prescriptions every year
## Interesting Facts

- There are 106,000 pharmacists in the United States today
- Each will fill up to 200-300 prescriptions each day
- There are estimated to be 1.5 million prescription errors that cause harm to people each year in the United States

## Interesting Facts

- 2 out of every 5 people will be harmed by prescriptions at some point in time during their lives
- A pharmacist who is 99% accurate, practices for 40 years, dispenses 480,000 Rxs, will likely cause the death of six patients.

Is a Hospital Better?

- On any given day, there are 539,000 hospital inpatients in this country, not counting newborns.
- Average hospital stay = about five days.
- IOM Report - between 44,000 and 98,000 hospitalized Americans die each year as a result of preventable medical errors.
- Hospital drug administration errors (excluding wrong-time errors) are frequent, with error rates per dose ranging from 2.4 to 11.1%.

Dean, et al., 1995; Taxis et al., 1999; Barker et al., 2002; Tissot et al., 2003; Lisby et al., 2005

Is a Hospital Better?

- ...assuming a patient in a hospital receives 10 doses of medication per day, a typical patient would be subject to one administration medication error per day.
- Which means...during an average stay of 5 days, a patient is likely exposed to 5 medication errors.

Preventing Medication Errors, Institute of Medicine, July, 2001
Is a Hospital Better?

- Medication errors in hospitals alone cause harm to 400,000 people every year
- 3000 people died in the September 11, 2001 attacks
- 4000 lives have been lost since then in the war on Terror
- Total – 7,000

Is a Hospital Better?

- More than 7,000 lose their lives due to medication errors every year – more than 19 people each day
- That’s a higher rate than Americans who died in combat during the Vietnam War
- Remember the definition? “Preventable events…while in the care of professionals”
SELF ASSESSMENT

Self Assessment

1. At which point in the medication use system do medication errors occur?
   a. Dispensing
   b. Administration
   c. Monitoring
   d. Prescribing
   e. All of the above
Self Assessment

2. External factors can influence internal focus on patient safety and medication error reduction

- True
- False

Self Assessment

3. A “near miss” in terms of a medication error is defined as which of the following?

a. Any injury resulting from medical intervention related to a drug
b. Any preventable event that may cause or lead to inappropriate medication use or patient harm
c. Unexpected occurrence involving death or serious physical injury
d. Error that was detected and corrected before it reached the patient
<table>
<thead>
<tr>
<th>Self Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. A root cause analysis can evaluate a program that will be implemented for potential failure points.</td>
</tr>
<tr>
<td>- True</td>
</tr>
<tr>
<td>- False</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Self Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Human beings can work harder and be more careful, thus preventing medication errors from occurring.</td>
</tr>
<tr>
<td>- True</td>
</tr>
<tr>
<td>- False</td>
</tr>
</tbody>
</table>
**Self Assessment**

6. Are these the five rights of safe medication use?
   1. the right patient
   2. the right drug
   3. the right time
   4. the right dose
   5. the right route of administration.

   - Yes
   - No

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**ELEMENTS OF THE MEDICATION SYSTEM**
The Medication System

Most of this presentation is related to the medication system and its elements. We, as pharmacists, are part of that system, but only a part.

In his book *Medication Errors*, Michael Cohen wrote that the five "rights" focus on individual performance and can overlook system errors.

Examples of system errors are:
- poor lighting
- inadequate staffing
- handwritten orders
- doses with trailing zeros
- ambiguous drug labels.

Elements of the Medication System

1. Patient information
2. Drug information
3. Communication related to medications
4. Drug labeling, packaging, and nomenclature
5. Drug standardization, storage, and distribution
6. Medication delivery device acquisition, use, and monitoring
7. Environmental factors and staffing patterns
8. Staff competency and education
9. Patient education
10. Quality processes and risk management

Leape LL. JAMA 1995;274:35-43
Causes of Medication Errors

1. Lack of or inadequate patient information (age, weight, allergies, diagnoses, and pregnancy status);
2. Lack of or inadequate knowledge about the drug (up-to-date information (references) readily available);
3. Communication and teamwork failures (collaborative teamwork between all healthcare members and the patient);
4. Unclear, absent, or look-alike drug labels and packages; confusing or look-alike or sound-alike drug names;
5. Unsafe drug standardization, storage, and distribution;

6. Non-standard, flawed, or unsafe medication delivery devices or errors in monitoring;
7. Environmental factors and staffing patterns that do not support safety; Staff competency and education;
8. Inadequate staff orientation, ongoing education, supervision, and competency validation
9. Inadequate patient education about medications and errors;
10. Lack of a supportive culture of safety, failure to learn from mistakes, and failed or absent error-reduction strategies (redundancies)
1. Patient Information

- 18% of serious preventable adverse drug events (ADEs) attributable to insufficient information before prescribing, dispensing, and administering
- 29% of prescribing errors alone attributable to a lack of patient information

Leape LL. JAMA 1995;274:35–43

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Patient Information

- Ideally, essential information is obtained, readily available in useful form, and considered when prescribing, dispensing, and administering medications
2. Drug Information

- 35% of preventable ADEs attributable to inadequate dissemination of drug information
- One in six ADEs caused by a combination of:
  - Insufficient knowledge of drug doses
  - Miscalculations
  - Incorrect expression of measurement or drug concentration

Drug Information

- Ideally, essential drug information is readily available in useful form to those ordering, dispensing, and administering medications
3. Communications & Teamwork

- Barriers that lead to ineffective communication dynamics
- Unclear order communication
  - Ambiguous or incomplete prescriptions or orders
- Illegible handwriting
- Look-alike and sound-alike drug names
- Verbal orders misspoken or misheard

Communications

- Failure to question ambiguous or unclear orders or pursue safety concerns because of intimidation by prescriber
- Illegible handwritten orders
- Incomplete medication orders (missing dose or route, orders to resume same medication upon transfer or to take at-home medications upon admission)
- **Abbreviations** misunderstood (e.g., U misread as a zero)
- Spoken orders misheard
- Zeroes and decimal points
  - *Always* use a “leading zero” (a zero before the decimal point)
  - *Never* use a “trailing zero” (a whole number followed by a decimal point and a zero)
- Use of apothecary system instead of metric system
- Dangerous abbreviations and dose designations
Misinterpreted Prescriptions

...medication errors consequential to misinterpreted physician’s prescriptions were the second most prevalent and expensive claims listed on 90,000 malpractice claims filed over a 7-year period

American Pharmacist Association (www.pharmacist.com)

An error just waiting...

- Our prescription process is an error just waiting to happen. He scratches out a prescription on a little piece of paper, usually when in a hurry, that even he cannot read when it gets cold. He uses abbreviations, known only to himself, of words in a language that nobody uses any longer. The prescription is taken to a pharmacy where the workers have to deal with drugs in packages that look alike and names that sound alike in chemical names that haven’t been used in ages.
Suboxone film 8/2
1 daily #4

Melphalan 2 mg.
Sig: 4 tablets daily for seven days.
Prescription intended to be
Levitra 20 mg #10. Use as directed
(written as Levaquin)

Tizanidine 2 mg #60 1 to 2 at bedtime
Will you marry me?
She said yes

Communications: Dangerous Abbreviations
(JCAHO 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 (Unit)</td>
<td>Mistaken for 0 (zero), the number 4, or “cc”</td>
<td>Write “unit”</td>
</tr>
<tr>
<td>IU (International Unit)</td>
<td>Mistaken for IV (Intravenous) or the number 10</td>
<td>Write “International Unit”</td>
</tr>
<tr>
<td>Q.D., QD, q.d., qd (daily)</td>
<td>Mistaken for each other</td>
<td>Write “daily”</td>
</tr>
<tr>
<td>Q.O.D., QOD, q.o.d., qod (every other day)</td>
<td>Period after Q mistaken for “I” and the “O” mistaken for “I”</td>
<td>Write “every other day”</td>
</tr>
<tr>
<td>Trailing zero (X.0 mg)</td>
<td>Decimal point may be missed</td>
<td>Write “X” mg</td>
</tr>
<tr>
<td>Lack of leading zero (.X mg)</td>
<td>Decimal point may be missed</td>
<td>Write “0.X”</td>
</tr>
<tr>
<td>MS</td>
<td>Can mean morphine sulfate or magnesium sulfate</td>
<td>Write “morphine sulfate”</td>
</tr>
<tr>
<td>MSO₄ and MgSO₄</td>
<td>Confused for one another</td>
<td>Write “magnesium sulfate”</td>
</tr>
<tr>
<td>Others for possible inclusion</td>
<td>&gt; and &lt;, drug name abbreviations, Apothecary units, @, cc, ug</td>
<td>Write it out fully</td>
</tr>
</tbody>
</table>
Confusing Drug Names

The Institute for Safe Medication Practices (ISMP) has reported over 1,000 drug pairs of confusing drug names. Confusion related to product names is one of the most common causes of errors reported to the U.S. Pharmacopeia (USP), Food and Drug Administration (FDA), and ISMP.

Confusing Drug Names Examples

- **Daptomycin and Dactinomycin**
  - Generic names are similar, both are once daily administration, both are lyophilized powders, both are yellowish in color
  - Error detected prior to reaching patient attributable to differences in dosing

- **Purinethol and Propylthiouracil**
  - A child missed 6 months of chemotherapy because propylthiouracil, an antithyroid drug, was dispensed instead of purinethol

Confusing Drug Names

- Name Changes
  - Levoxine and Lanoxin
    - Similar brand names, both are tablet forms, both available as 0.125 mg tablets, both once daily administration
  - Losec (omeprazole) and Lasix
    - Similar brand names, both dosed at 20 mg, names look similar when written in cursive
  - After reports of errors arose, FDA and ISMP advocated name changes
    - Levoxine changed to Levoxyl
    - Losec changed to Prilosec

Confusing Drug Names

- Tall-Man Letters
  - Use of mixed-case or enlarged letters to emphasize the differing portions of two drug names:
    - zyPREXA, zyRTEC
    - hydrOXYzine, hydrALAZINE
    - DOBUTamine, DOPamine
  - Use required by the FDA in 16 generic name pairs
Confusing Drug Names

- Ideally, methods of communicating drug orders and other drug information are standardized and automated to minimize the risk of error

5. Unsafe Drug Standardization, Storage and Standardization

- Multiple concentrations of IV solutions leading to potential use of the wrong concentration
- Nurse preparation of IV solutions
- Failure to properly dilute concentrated medications and electrolytes before administration
- Storage of hazardous chemicals, fixatives, and developers with medications, leading to mix-ups
- Delay in therapy or missing medications because of problems with pharmacy distribution or nursing transmission of orders

Leape LL. JAMA 1995;274:35–43
Drug Labels and Packaging

- Look-Alike Packaging and Sound-Alike Drug Names

Carvedilol

3.125 mg  6.25 mg  12.5 mg  25 mg
Heparin Sodium

Don't know

Doxapram – for breathing problems after surgery or drug overdose

Digoxin

Labetalol HCl – adrenergic receptor blocking agent – used to treat hypertension
Case #5

Metronidazole  Metformin

Gentamycin  Polymyxin  Ciprofloxin  Trifluridine
Drug Labels and Packaging

- Ideally, strategies are undertaken to minimize the possibility of errors with products that have similar or confusing labels, packages, or drug names.

- Example – new heparin package

New Heparin Labeling

Baxter’s new enhanced label (right) features an increase of 20 percent font size, a unique color combination, and a large red cautionary tear-off label that requires clinician intervention prior to administration to a patient.
6. Non-standard, Flawed, or Unsafe Medication Delivery Device

- Pump programming errors (i.e., Medtronic's Synchromed II Implantable Infusion Pump - FDA files decree)
- Accidental administration of an oral solution by the IV route via devices with Luer connections
- Rapid free-flow of solution when tubing is removed from the pump
- Failure to notice incorrect default setting on pump
- Unfamiliarity with medication delivery devices, leading to misuse
- Insufficient supply of infusion pumps to meet patient needs
- Line mix-ups (e.g., connecting an IV solution to an epidural line)
- End users (often nurses) not involved in purchase decisions regarding medication delivery devices

Leape LL. JAMA 1995;274:35–43

Medication Delivery Devices

Examples of devices with problems
- Composix Kugel Mesh Hernia Repair Patch
- Medtronic's Synchromed II Implantable Infusion Pump – (FDA recently filed a decree against the company and 2 officers
- Vaginal Mesh Products – many law suits
- Medtronic Sprint Fidelis Defibrillator Leads
- Microneedle Patch
- Pain Pumps
- Nanosponges
7. Environmental factors and staffing patterns

![Image of a cluttered pharmacy]

7. Environment and Staff

- Drug mix-ups due to
  - Lack of space, crowded and disorganized storage
  - Cluttered workspace
  - Poor lighting, excessive noise
  - Deficient staffing, excessive workloads
  - Misinterpretation of spoken/telephone orders because of noise or distractions
  - Fatigue causing impaired judgment and flawed performance of job functions
  - Mental overload due to inadequate breaks

Leape LL. JAMA 1995;274:35-43
### Environment and Staff

- The complement of qualified, well-rested practitioners matches the clinical workload without compromising patient safety
- Get plenty or rest

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### Environment and Staff

- Ideally, medications are prescribed, transcribed, prepared, and administered in a physical environment that offers adequate space and lighting and allows practitioners to remain focused on medication use
8. Inadequate Staff Orientation, Ongoing Education, Supervision and Competency Validation

- Delays and errors due to misunderstanding between nurses and pharmacy or between pharmacist and technician
- Inappropriate medication doses or errors in patient assessment and monitoring due to lack of knowledge about particular patients or patient populations
- Errors related to task overload and rushed procedures for those with added responsibility of training new staff
- Medication errors by new or reassigned ("floated") staff who are required to perform unfamiliar tasks without proper orientation, education, or supervision
- Errors with new medications given to patients without full knowledge of the preparation, dose, route, action, or effects to anticipate
- Errors (including near misses) that are not reported, with consequent loss of knowledge about the causes of errors and their prevention

Leape LL. JAMA 1995;274:35-43

Staff Orientation & Education

- Ideally, practitioners receive sufficient orientation to medication use and undergo baseline and annual competency evaluation of knowledge and skills related to safe medication practices
9. Inadequate Patient Education About Medications and Errors

- Patients may be reluctant to ask questions about their medications
- Patients may feel uncomfortable
- Patients may not understand information given to them orally because of medical language or barriers
- Low health literacy or poor reading skills might prevent patients from understanding printed information
- Patients lack information about the causes of medication errors and how to prevent them

10. Lack of a Supportive Culture of Safety, Failure to Learn from Mistakes, and Failed or Absent Error-Reduction Strategies

- Lack of leadership and budgetary support for medication safety
- Disincentives (shame, blame, fear of disciplinary action, documentation of errors in personnel files) encourage underreporting of errors
- Culture of secrecy and blame prevents disclosure of errors to patients / families
- Inaccurate error rates determined by using error reports, with a counterproductive goal of reducing the number of error reports
- Ineffective error prevention strategies focused on individual performance improvement rather than system improvements
- Lack of automated or manual double checks for critical steps
Culture of Safety Concepts

- Acknowledgment of the high-risk nature of an organization's activities and the determination to achieve consistently safe operations
- A blame-free environment where individuals are able to report errors or near misses without fear of reprimand or punishment
- Encouragement of collaboration across ranks and disciplines to seek solutions to patient safety problems
- Organizational commitment of resources to address safety concerns
- Continuous professional and staff education

Culture of Safety

- Practitioners involved in medication use must participate in ongoing education about medication error prevention and the safe use of drugs that have the greatest potential to cause harm if misused
# ROOT CAUSE ANALYSIS (RCA)

## What is Root Cause Analysis

- Retrospective investigation of an event that has already occurred
- Information obtained is used to design changes that will prevent future error
- Should be conducted for every *sentinel event*.
Root Cause Analysis

- Focus is on prevention – not blame or punishment
- Focus on SYSTEM level vulnerabilities, not individual performances
- Targeting corrective measures at the identified root cause is considered the best way to prevent similar problems from reoccurring

Purpose of RCA

- Identify changes that can be made in the system through:
  - Re-design
  - Developing new process
  - Equipment
  - Approaches that will reduce the risk or the error/close call reoccurring
Steps in RCA

- Establish the RCA team
- Describe the event in detail
- Flowchart steps that led to the event
- Identify the Root Cause
- Develop an action plan
- Develop outcome measures

Steps in RCA

- Step 1: Team members
  - Team leader
  - Individuals with knowledge about the event
  - Frontline workers familiar with process
  - Optional: RCA expert
- Step 2: Determine what happened
  - When did the event occur?
  - What are the details of the event?
Steps in RCA

- Step 3: Flowchart of the event*
  - What was the actual sequence of events?
  - What events were involved or contributed to the event?
  - Ask why at each step to identify any contributing or root causes.

  *important because it can help uncover unknown gaps.

Steps in RCA

- Step 4: Identify Root Causes
  - Each root cause should be considered for an action and addressed in the action plan

- Step 5: Develop an action plan
  - Formulate improvement actions for each identified root cause

- Step 6: Establish measures
  - Methods to measure effectiveness of the action plan over time
AN EXERCISE

Swiss Cheese Model

Some holes due to active failures
Other holes due to latent conditions
SUCCESSIVE LAYERS OF DEFENSES
HAZARDS
The Swiss cheese model of accident causation illustrates that, although many layers of defense lie between hazards and accidents, there are flaws in each layer that, if aligned, can allow the accident to occur.

**MOUSE IN CHEESE**

**Problem:** You have a piece of cheese on the table. You run outside to get the newspaper but run into your neighbor and chat for a few minutes. When you come back you find the screen door open and a mouse on the table eating the cheese. That’s a problem.
Mouse in Cheese

What’s the solution?

- Blame the mouse, scream at him, kick him out the door then throw the cheese away.
- Blame the cat. He’s not here anyway.
- Put a note on the door asking, “Did you latch me?”
- Tell yourself, “Be sure to close the screen door.” each time you leave

These are all punitive measures

Why was the mouse in the cheese?

Well, the mouse was in the house.
Why was the mouse in the house?

The screen door was open.
Why was the screen door open?

I put the cat out.
I must have left the screen door open.

Solution

FIT SCREEN DOOR WITH SPRING LATCH
ROOT CAUSE ANALYSIS

- The exercise with the mouse is a very simplified version of Root Cause Analysis.
- The root problem was not the mouse, it was the open screen door.
- Once identified it was fixable

The RCA Team

- Volunteers
  - Moderator Team Leader
  - A person who knows about the event
  - A pharmacist
  - Administrator
A Case for You

- Mr. CT is a 62 year old man with type I diabetes who his right foot amputated two days ago. The nurse administered his insulin injection this morning 20 minutes before his breakfast.
- Pharmacist filled Pyxis MedStation last evening with 500U insulin rather than 100U
- Nurse didn’t check strength upon removing It from Pyxis MedStation
- Nurse administered insulin injection SQ
- Patient went into severe hypoglycemia
- Two hours later CT remains in severe Hypoglycemia
- BJ gets phone call telling him something is wrong and to return to the pharmacy
Another Case for You

The Scenario

One of your patients has been in an automobile accident and has multiple injuries, including a broken tibia. After he is released from the hospital his physician prescribes 40 dicloxacillin, 500 mg orally q 6 h and 24 oxycodone with acetaminophen 5/325, one or two tablets q 4-6 h prn pain. Your technician counts the appropriate doses and puts them in the vials. You check the vials and see they are filled correctly by your technician and put the labels on the bottles.

A few days later the wife returns and wants a refill on the oxycodone with acetaminophen. When you look at the bottle she gives you, you tell her that it can’t be refilled without a new prescription. She tells you she called the doctor who said he prescribed enough to last for nearly two weeks. You look again at the bottle and realize that you put the wrong labels on the vials – it has happened – you made a mistake. The patient has taken oxycodone every 6 hours and, because he didn’t feel any pain, has taken none of the other medication, his antibiotic.

TYPES OF MEDICATION ERRORS
**Physician**

**Medication Management Process**
- Prescribing
  - Drug
  - Concentration/strength
  - Dosage form
  - Route
  - Frequency
  - Rate
  - Time
  - Duration
  - Allergy
  - Drug Interactions

**Pharmacist**

**Transcribing**
- Patient
- Drug
- Concentration/strength
- Time
- Route
- Allergy
- Drug Interactions

**Dispensing**
- Drug
- Concentration/strength
- Dosage form
- Time
- Route
- Allergy
- Drug Interactions

**Nurse**

**Administering**
- Patient
- Drug
- Concentration/strength
- Dosage form
- Time
- Rate
- Allergy
- Drug Interactions

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**Most Common Errors**

- Wrong Patient
- Wrong Route
- Wrong Time
- Wrong Strength
- Wrong Dose/Quantity
- Wrong drug
- Omission or Extra Dose
- Wrong Dosage Form
- Wrong Technique
- Unordered or Unauthorized Drug
- Prescribing Error

Common Medication Errors
## Types of Medication Errors

- Prescribing Error
- Dispensing Error
- Administration Error
- Monitoring and/or Compliance Error

## Prescribing Error

- Incorrect drug selection
- Incorrect dose
- Incorrect dosage form
- Incorrect quantity
- Incorrect route
- Incorrect concentration
- Incorrect rate of administration
- Incorrect instructions
- Illegible prescriptions or medication orders that lead to errors that reach the patient

ASHP Guidelines on Preventing Medication Errors in Hospitals
Dispensing Error

- Can occur at any stage of the dispensing process, from receipt of prescription to handing medication to a patient
- Research indicates five percent of all drugs dispensed improperly
- Causes include confusing drug names, lack of knowledge, new medications, outdated references, unreasonable workloads, poor housekeeping, distractions, interruptions, transcription or typing

ASHP Guidelines on Preventing Medication Errors in Hospitals

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Administration Error

A discrepancy between the drug intended and the drug received by a patient. These include
- Omission of a dose
- Extra dose
- Wrong time for dose
- Wrong rate of administration
- Expired drugs
- Wrong preparation

ASHP Guidelines on Preventing Medication Errors in Hospitals
Administration Error

Administration errors include
- Failure to check patient's identity
- Look-alike drugs
- Noise
- Interruptions
- Distractions
- Poor lighting

Monitoring and Compliance Error

Monitoring and Compliance Errors Include
- Failure to review regimen
- Use of appropriate clinical or laboratory data to assess patient response
- Inappropriate patient behavior (patient doesn’t comply with instructions)
A CLOSER LOOK AT DISPENSING

Most Prevalent Dispensing Errors

- Dispensing incorrect medication, dosage strength, or dosage form
- Dosage miscalculations
- Failure to identify drug interactions or contraindications

ASHP Guidelines on Preventing Medication Errors in Hospitals
## Common Causes of Dispensing Errors

- Work environment
  - Workload
  - Distractions
  - Cluttered work area
- Use of outdated or incorrect references

## Dispensing Errors - Workload

- Ensure adequate staffing levels
- Dispense with time limits (quotas)
- Examples of ways to limit workload errors
  - Dispense ≤150 prescriptions per pharmacist per day
  - Require rest breaks every 2–3 hours
  - Brief warm-up period before restarting work tasks
  - Require 30-minute meal breaks
Dispensing Errors - Distractions

- Phones
  - Fax machines, auto refill, voice mail, priority processing, untrained support personnel
- Prohibit distractions during critical prescription-filling functions
- Train support personnel to answer the telephone

Dispensing Errors – Work Area

- Clutter (return used containers immediately)
  - Ensure adequate space
  - Store products with label facing forward
  - Choose high-use items on the basis of safety as well as convenience, use original containers
  - Telephone placement
- Poor ergonomics
- Lighting
- Heat, humidity
- Noise (TV, radio)
Dispensing Errors – Work Area

- Labels on bins and shelves
  - Failure mode: bin label may decrease chance that the actual product label will be checked when selected from bin; using bar codes will decrease chance of error

- Separate by route of administration (external/internal/injectable, etc.)

- Use auxiliary labels for externals
  - Amoxicillin oral suspension for ear infection thought by parents to be drops administered in child’s ear

- Review published safety alerts for look-alike/sound-alike drugs and frequent dispensing errors

10 Steps to Maximize Dispensing Accuracy

1. Lock up or sequester drugs that could cause disastrous errors
2. Develop and implement meticulous procedures for drug storage
3. Reduce distractions, design a safe dispensing environment, and maintain optimum workflow
4. Use reminders such as labels and computer notes to prevent mix-ups between look-alike and sound-alike drug names
5. Keep the original prescription order, label, and medication container together throughout the dispensing process
10 Steps to Maximize Dispensing Accuracy

6. Compare the contents of the medication container with the information on the prescription

7. Enter the drug's identification code (e.g., national drug code [NDC] number) into the computer and on the prescription label

8. Perform a final check on the prescription, the prescription label, and manufacturer’s container; when possible, use automation (e.g., bar coding)

9. Perform a final check on the contents of prescription containers

10. Provide **REAL** patient counseling

THE IMPACT
The Impact on Healthcare Institutions and the Economy

- Medical errors cost the U.S. Taxpayer $19.5 billion/year
  - $17 billion associated with additional medical costs
- $1.4 billion attributed to increased mortality rates
  - $1.1 billion or 10 million days of lost productivity
  - Loss of $735-980 billion/year in quality-adjusted life years

Impact on Healthcare Practitioners

- Punitive Consequences
  - Probation
  - Suspension
  - Termination
  - Criminal Prosecution
- Emotional Consequences
  - Sleep Loss
  - Lack of Job Confidence
  - Anxiety
  - Embarassment
  - Guilt
  - Remorse
Impact on Patients

- More than 1 in 5 people in the US have been affected by a medical error in some way
- 1.5 million patients experience preventable medical errors: 200,000 deaths per year

Let’s look closer at the impact of medication errors
Let’s Meet Eric Cropp

- **Eric Cropp**

  *Eric Cropp seems just like any other normal pharmacist. He had hopes and aspirations – just like you and me. He attended pharmacy school – just like you and me. He passed his pharmacy boards, including the jurisprudence exam – just like you and me. Eric was involved in an error that changed his life forever. It has even changed yours.*
Emily Jerry

- Two-Year-Old Emily Jerry was diagnosed with an abdominal tumor – a highly curable one
- Undergoing treatment at Rainbow Babies and Children’s Hospital in Cleveland, Ohio

On February 28, 2006 Emily was scheduled to receive the last of her treatments
- The latest MRI showed no further trace of the tumor
- Bound for home after the treatment

Instead…
Emily Jerry

- On March 1st – 3 days later
- Woke up with severe headache – grabbing head & crying.
- Craving thirst
- Listless & weak
- Started vomiting profusely
- Instead of going home, she was taken to the morgue

Emily Jerry

- What happened?
  - Pharmacy technician was to prepare a solution of normal saline to be use in the therapy (0.9%)
  - Instead, she prepared a solution containing 23.4% hypertonic saline
  - She told pharmacist that something didn’t seem right
  - In his haste, he brushed off her comments
Emily Jerry

- Emily’s last few days
  - Remained on life support for several days
  - Brain had swollen so badly that her eyes bulged
  - Kelly Jerry (mother) gave her daughter one last sponge bath before she was removed from life support
  - By the time nurses pulled Emily’s body from her mother’s arms she was rigid and cold

Emily Jerry

- Keep in mind that in a pharmacy setting the pharmacist bears the responsibility for all pharmaceuticals in the pharmacy
- Eric was convicted on involuntary manslaughter for failing to properly supervise the technicians under his management
- Eric was convicted and served 6 months in prison, 6 months of house arrest, 3 years of probation, payment of $5,000 fines, 400 hours of community service, and he lost his license to practice pharmacy forever.
- Stated many times that the weight of this terrible tragedy will haunt him forever.
- Currently, along with Emily’s father, Christopher Jerry, travels to pharmacy groups around the country pleading with them not to become another “me”
What really caused this tragic error?

- The pharmacy computer system was down in the morning, leading to a backlog of physician orders
- The pharmacy was short-staffed on the day of the event
- Pharmacy workload did not allow for normal work or meal breaks
- The pharmacy technician assigned to the IV area was planning her wedding on the day of the event and, thus, highly distracted
- A nurse called the pharmacy to request the chemotherapy early, so Eric felt rushed to check the solution so it could be dispensed (although, in reality, the chemotherapy was not needed for several hours).

What happened?

- Technician compounded 23.4% NaCl solution in a batch
- 23.4% NaCl solution was used to make Emily’s chemotherapy
- The compound SHOULD have contained 0.9% NaCl

**Pharmacy Board Investigators found:**
- Technician did not know why she made the error
- Technician claimed that she knew that something was not right but she was not sure
- When asked if she knew that an overdose of sodium chloride would result in death, the technician claimed that she was not aware of that fact
- Clutter on workstation may have contributed
The rest of the story

- Eric spent 6 months behind bars
- Lost his license to practice pharmacy
- Speaks as a representative of the Emily Jerry Foundation to pharmacy meetings advising pharmacists not be “him”

Pam Goff

At the time of this photo, Pam Goff was 31 years old, married and had a 3-year old daughter. She, like Eric Cropp, graduated from her College of Pharmacy with a BS degree and passed her Boards. She worked at Walgreens Pharmacy but left there to work at Summerlin Hospital in Las Vegas for better hours. Pam found the pace frenetic, procedures sloppy, and a staggering turnover. She had been accepted into a Working Professional PharmD program. Just your normal pharmacist working to better herself. She, like Eric, was involved in a medication error with drastic consequences.
The Case of Alyssa Shinn

- Kathleen and Richard Shinn had trouble conceiving – went to fertility specialist for 3 years
- Finally, at Summerlin Hospital in Las Vegas, Alyssa was born -14 weeks premature
- Days turned to weeks – At 3 weeks Alyssa was gaining weight
- Started on total parenteral nutrition for nutritional support
- At 11:30 PM Kathleen and Richard went home for some rest but would return again the next morning as usual

But something happened during the night.
- When Kathleen and Richard arrived at the nursery they were met by a host of doctors.
- Something wrong with the TPN solution given to Alyssa during the night
- Alyssa was short of breath, lethargic and pale
- She died soon after
The Fatal Error

- Pam Goff, had received the order to add 330 micrograms of zinc into the TPN
- Pam placed the order but mistakenly selected milligrams as the unit of measure on the drop down menu when compounding the TPN
- Alyssa received 1000 X the prescribed dose

The Investigation

- A series of safeguards simply failed
- 2 other pharmacists neglected to double check the calculations
- A safety stop on the mixing machine had not been set
- The technician reading the order had replenished the machine 11 times with zinc, using 48 vials of zinc to fill the baby’s TPN bag – 1 vial usually lasts all day
- Neither the pharmacist who checked the bag nor the nurses who administered the bag noticed that the TPN bag was much larger than normal - even larger than the infant
The aftermath

- Pam Goff returned to work the next day, only to find out Alyssa was “crashing”
- Finally admitted to the Emergency Room with total breakdown
- Board of Pharmacy found Goff, Cornelius, Yu, and the hospital responsible
- Substantial fines levied, Goff was fired
- Three months after Alyssa’s death the Kathleen and Richard Shinn separated
- Summerlin Hospital has never apologized for Alyssa’s death but settled with family out-of-court

Analysis

- No recent Policy & Procedures Manual because of rapid turnover
- Asia Cornelius fired by Goff at Walgreens
- New pharmacy manager, Gretta Woodington – 6th in 6 years
- TPN orders were late – supposed to arrive by 5:00 and completed by 7:00
Analysis

- Alyssa’s Rx written in more dangerous way
- Goff’s original labels correct but changed when system switched to comply with Gretta’s order
- Passed to another pharmacist to ensure accuracy
- Baxa machine safeguard not programmed with safety stop.

Testimony

- “I stood there, and I had it, and the order was in perfect, the order was right, and then—”
- “Earlier that day, I had been yelled at by Gretta and told that I had to stop being confrontational and doing things my own way … because by doing things my own way I was creating turmoil, and I didn’t want to get in trouble…. I didn’t want to get fired, and I went back”— here she lost all composure—”and I changed it,” and in doing so made the clerical error that would prove fatal. “I’ll never forget it.”
Pam Goff

- Technician was not punished, Neither was Gretta
- Pam was humiliated, paid significant fine but Board allowed Pam to keep her license
- Went back to Walgreens
- She and Alyssa’s mother are considering discussing the story with groups
- Pam has a tattoo of Alyssa on her wrist so she will never forget

The Point...

- Errors don’t just happen to someone else. They happen to ordinary people – ordinary people like Eric Cropp and Pam Goff. They happen at hospitals and pharmacies just like yours. They happen to good people – just like us.
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<th>Take Home Pearls</th>
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<tr>
<td>- Prescriptions must be legible, verbal orders must be minimized</td>
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<td>- Always check allergies, review patients’ drug profiles for potential interactions, and when appropriate, ask about liver and renal function</td>
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<td>- Prescriptions for PRN medications should include a brief indication</td>
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<td>- Prescriptions should be written using the metric system</td>
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<td>- Prescriptions should include relevant patient information (age, weight, etc). This is important for accurate pediatric and geriatric dosing.</td>
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<td>- Prescriptions should include leading zeros, used before a decimal quantity less than one. Trailing zeros should NOT be used after a decimal.</td>
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<td>- Prescriptions should contain specific directions for use, not &quot;use as directed&quot;</td>
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<td>- Prescriptions should not contain abbreviations.</td>
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<td>- Patient profiles should be current and contain enough information for pharmacists to assess appropriateness</td>
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<td>- Work areas should be well designed to help prevent errors...adequate lighting...low noise...few distractions</td>
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Take Home Pearls

- Drugs should be organized to reduce confusion between similar names, labels, or strengths
- Pharmacists should counsel patients when dispensing medications
  - This is an important safety check for dispensing and patient comprehension
- Pharmacies should have and follow dispensing policies and procedures. This creates a standard of practice for all to follow. These can also be reviewed if an error occurs, then procedures can be improved to prevent future errors.

Comments or Questions?