Improving Medication Safety

Learning objectives

- To provide an overview of Medication Safety
- To encourage students to learn and practice ways to improve the safety of medication use

Introduction

- The Institute of Medicine's 1999 report suggested that medical errors accounted for 44,000-98,000 deaths each year.These deaths exceed the eighth leading cause of death in the United States.
- It is estimated that the total cost of medical errors is $17 billion-$29 billion annually.
- The drugs errors are the most common cause of medical errors in hospitals, affecting 3.7% of patients.
- Clearly, medication errors are a significant component of medical errors in U.S. hospitals.

- Institute of Medicine. To err is human: building a safer health care system. Washington, D.C.: National Academy Press, 1999.
- Brennan TA, Leape LL, Laird NM, et al. Incidence of adverse events and negligence in hospitalized patients. N Engl J Med 1991;324:370-6.
- Johnson WG, Brennan TA, Newhouse JP, et al. The economic consequences of medical injuries. JAMA 1992;267:2487-92.
- Leape LL, Brennan TA, Laird NM, et al. The nature of adverse events in hospitalized patients. N Engl J Med 1991;324:377-84.

Introduction

- Hospital medication errors occur in 3-6.9% of inpatients.
- One analysis determined that 11% of medication errors in hospitals were pharmacy dispensing errors related to the wrong drug or strength.

- Nelson KM, Talbert RL. Drug-related hospital admissions. Pharmacotherapy 1996:16(4):701-7.
- Bates DW, Boyle DL, Vander VM, et al. Incidence of adverse drug events and potential adverse drug events: implications for prevention. JAMA 1995;274:29-34.

Introduction

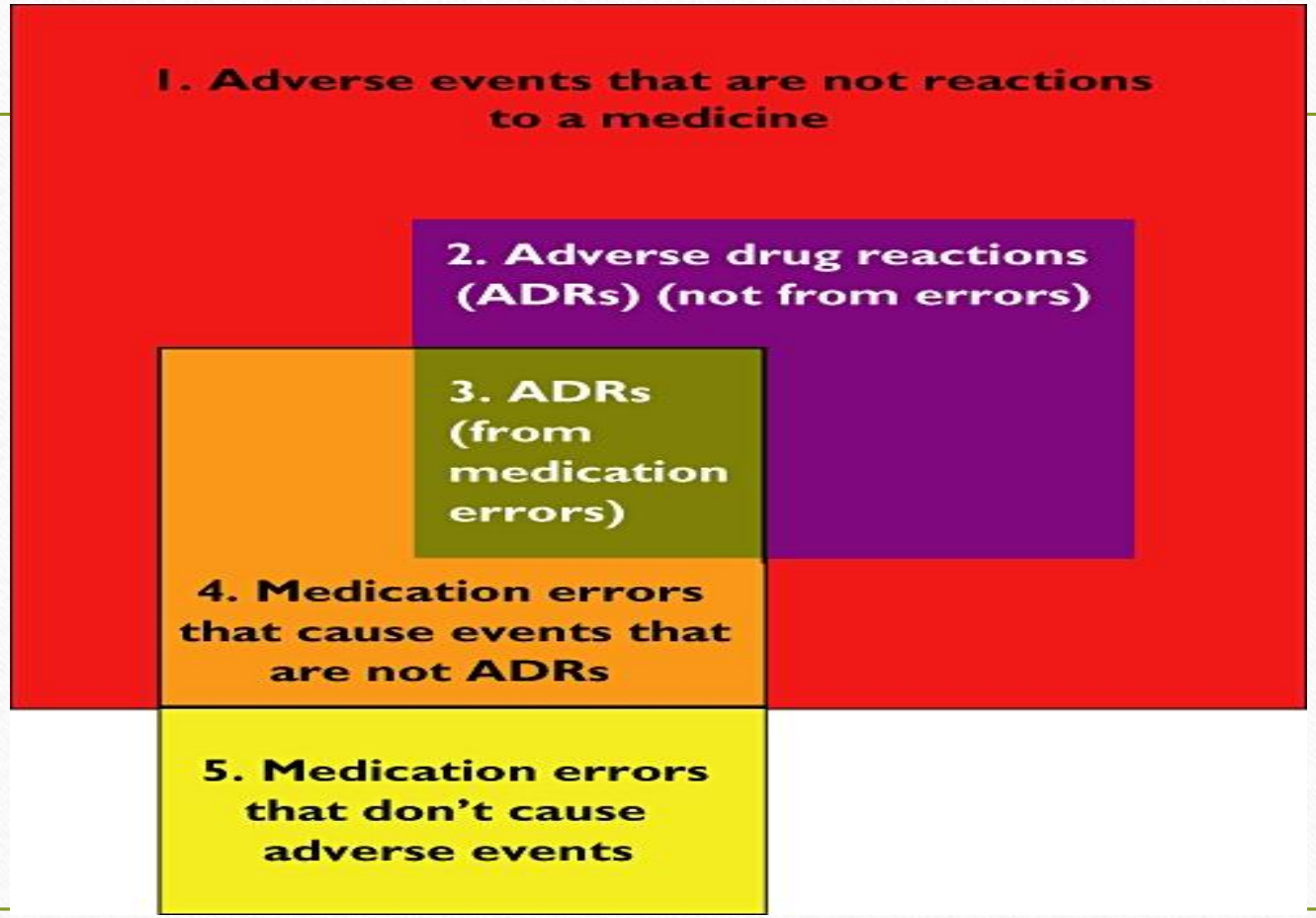
- The study population consisted of 1116 hospitals that reported information on medication errors shows :
  - Medication errors occurred in 5.07% of the patients admitted each year to these hospitals
  - Each hospital experienced a medication error every 22.7 hours (every 19.73 admissions).

- Medication errors in United States hospitals. Bond CA[1], Raehl CL, Franke T. Pharmacotherapy. 2001 Sep;21(9):1023-36.

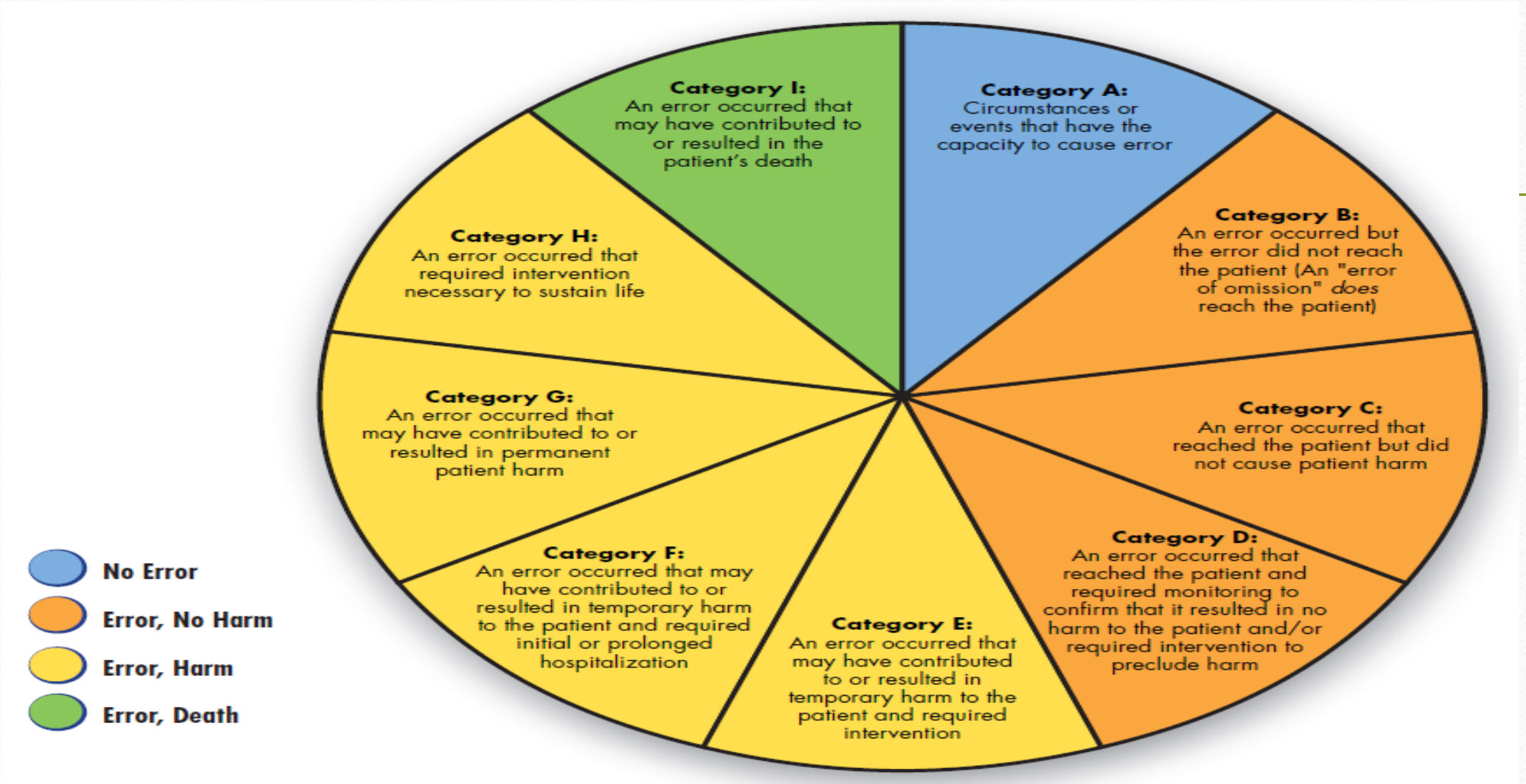
Definitions

- **Medication Error**: is any preventable event that may cause or lead to inappropriate medication use or patient harm.
- **Adverse Drug Event**: harm experience by a patient as a result of medication it includes both errors & side effect of the medication.
- **Adverse reaction**: unexpected harm arising from a justified action where the correct process was followed forth context in which the event occurred
- • e.g. an unexpected allergic reaction in a patient taking a medication for the first time
- **Near Miss**: incidence about to happen but by chance didn't occur.

Medication Error VS Adverse Drug Event

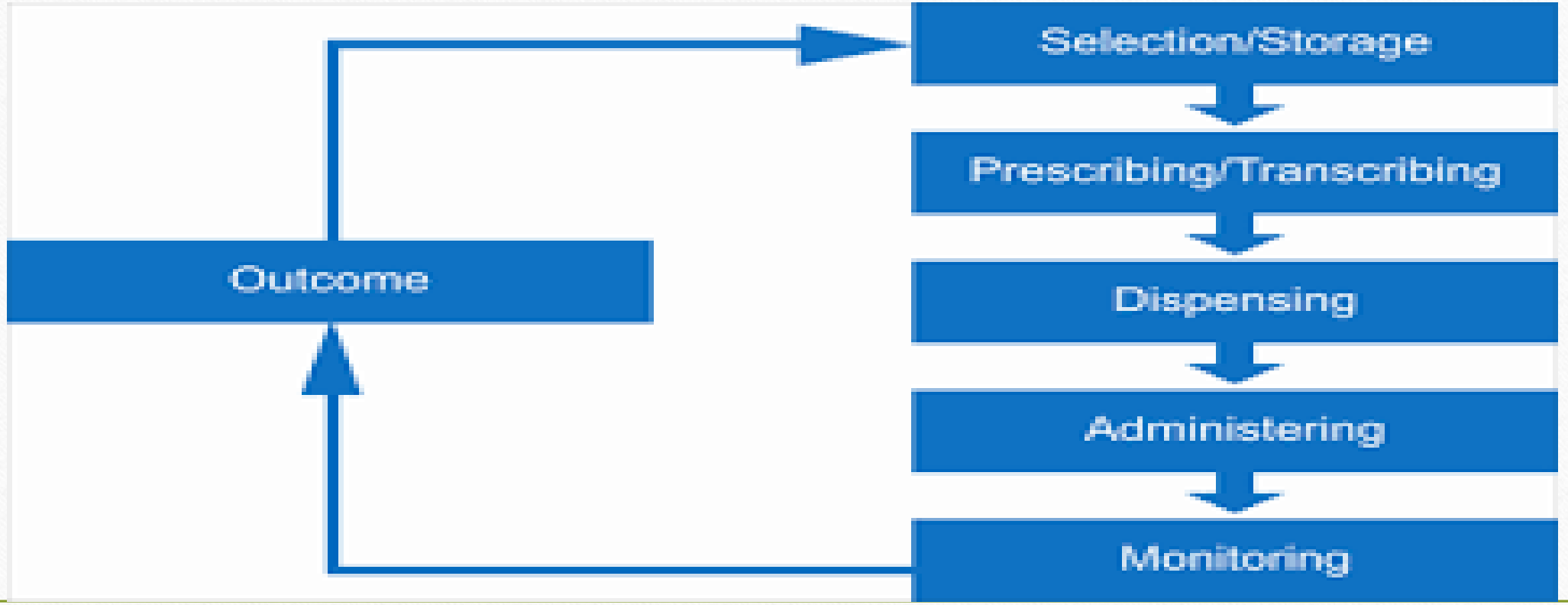


Categorizing Medication Errors



2001 National Coordinating Council for Medication Error Reporting and Prevention.

Medication Use Process in The Institutional Setting

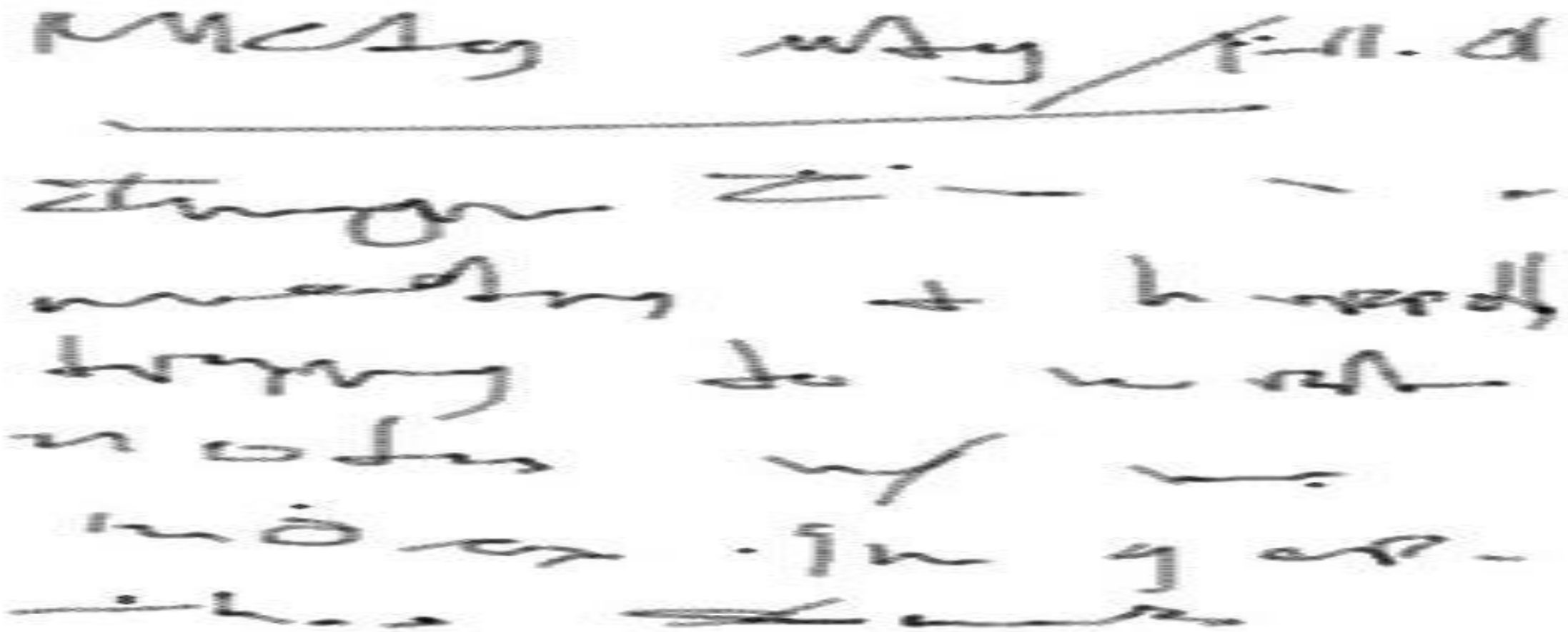


Medication Prescription

Sources of error in prescribing:

- Documentation - illegible, incomplete, ambiguous & dangerous abbreviation
- Inadequate knowledge about drug indications and contraindications
- Not considering individual patient factors, such as allergies ,pregnancy, co-morbidities, other medications
- Wrong patient, wrong dose, wrong time, wrong drug, wrong route
- Inadequate communication (written, verbal)
- Mathematical error when calculating dosage

Example for prescribing error-Illegible Handwriting



Strategies to Reduce Prescribing errors

- **Avoid Illegible Handwriting:**
  - Write/Print More Carefully
  - Use Computers
  - Verbal Communications

- **Write Complete Information:**
  - Patient's Name
  - Patient-Specific Data
  - Generic and Brand Name
  - Drug Strength
  - Dosage Form
  - Amount
  - Directions for Use
  - Purpose
  - Refills

Strategies to Reduce Prescribing errors

- **Look at Patient-Specific Information**
  - Age
  - Weight
  - Renal and Hepatic Function
  - Laboratory Test Results
  - Concurrent Medications
  - Allergies
  - Medical/Surgical/Family History
  - Pregnancy/Lactation Status

Do **Not** Use Abbreviations

- Drug names
- "QD" or "OD" for the word *daily*
- Letter "U" for *unit*
- "μg" for *microgram* (use mcg)
- "QOD" for *every other day*

Example for Error Prone Abbreviations

U (for units)	Mistaken for: "0" (zero), "4" Write "unit" (the number four), or "cc"	Write "unit"
Ug (for micrograms)	Mistaken for mg (milligrams) resulting in one thousand-fold overdose	Write "mcg" or "micrograms"
IU (for international units)	Mistaken for : "IV" (intravenous), "10" (the number ten)	Write "international unit(s)"
OD, O.D., od, or o.d. (for daily)	Mistaken as "right eye" (oculus dexter) which could lead to administration of liquid medication in the eye	Write "daily"
QD, Q.D., qd, q.d. (for daily) Q.O.D, q.o.d (for every other day)	Mistaken as "q.i.d." especially if the period after the "q", the letter "O", or the tail of the "q" is misinterpreted for the letter "I"	Write "daily" or "every other day" as appropriate
Trailing zero AFTER decimal point (ex: 2.0 mg)	Decimal point can be missed leading to a 10-fold increase in dose (ex: 20 mg)	Do not use (unless necessary for expressing the level of precision of a lab value, size of a lesion, etc.,)
No leading zero BEFORE decimal point (ex: .5 mg)	Decimal point can be missed (ex: 5 mg)	use a leading zero when a dose is less than a whole unit (ex : 0.5 mg)
Ms MSO, and MaSO.	Can mean morphine sulfate or magnesium sulfate Confused for one another	Write "morphine sulfate" Write " magnesium sulfate"
> (greater than) < (less than)	Misinterpreted as the number "7" (seven) or the letter "L" Confused for one another	Write "greater than" Write " less than"
Abbreviations for drug names	Misinterpreted due to similar Write full drug names abbreviations for multiple drugs	Write full drug names
Apothecary units	Unfamiliar to many practitioners Confused with metric units	Use metric units
@	Mistaken for number "2" (two)	Write "at"
cc	Mistaken for U (units) when poorly written	Write "mL" or "ml" or "milliliters" "mL' is preferred

Strategies to Reduce Prescribing errors

- **Decimals:**
- Avoid whenever possible
  - Use 500 mg for 0.5 g
  - Use 125 mcg for 0.125 mg
- Never leave a decimal point "naked"
- Haldol .5 mg → Haldol 0.5 mg
- Never use a terminal zero
  - Colchicine 1 mg not 1.0 mg
- Space between name and dose
  - Inderal40 mg → Inderal 40 mg

- **Be alert to Drug Name:** "Look-Alike" or "Sound-Alike" Drug Names
- Celebrex (celecoxib, anti-inflammatory); Cerebryx (fosphenytoin, anticonvulsant); Celexa (Citalpram,antidepressant)

Strategies to Reduce Prescribing errors

- **Write the Medication Reconciliation**
- Learn and practice thorough medication history taking:
  - Include name, dose, route, frequency and
  - duration of every drug the patient is taking;
  - Enquire about recently ceased medications;
  - Ask about over-the-counter medications,
  - dietary supplements and complimentary medicines;

- **More Attention to Dosage Calculations:**
- Use patient-specific information
  - height
  - weight
  - age
  - body system function

Strategies to Reduce Prescribing errors

- **Verbal Orders:**
  - Avoid when possible
  - Enunciate slowly and distinctly
  - State numbers like pilots

    (i.e., “one-five mg” for 15 mg)
  - Spell out difficult drug names
  - Specify concentrations

- **Know the High Alert Medications:**
- Need double check
- Example **:**
  - Oral anticoagulants
  - Insulin
  - Chemotherapeutic agents
  - Neuromuscular blocking agents
  - Concentrated electrolytes
  - Emergency medications (potent and used in high pressure situations)

Strategies to Reduce Prescribing errors

- Institutional responsibilities:
  - Standardized dosing protocol (Vancomycin for Pediatric & Adult)
  - Use standard abbreviations
  - Use Computerized Physician Order Entry (CPOE) and decision support framework
  - Conduct Failure mode and effect analysis (FMEA).

Medication Dispensing

Dispensing Process Errors Prevention:

1. Standardized concentrations for all IV medication
2. Use commercially prepared solutions
3. Dispense a unit of use

Medication Administration

Administration Process Errors Prevention:

1. Be familiar with the institution policy
2. Preprinted & standardized infusion rate charts
3. Use programmable infusion device
4. Infusion tubing should be traced from the infusion bag to the point of delivery

Calculation errors

- **Can you answer the following question?**
- A patient needs 300 micrograms of a medication that comes in a 1 ml ampoule containing 1 mg of the drug. What volume do you draw up and inject?

Medication Monitoring

Types of errors in monitoring:

- Inadequate monitoring for side-effects;
- Medication not ceased once course is complete or clearly not helping the patient;
- Course of prescribed medication not completed;
- Drug levels not measured, or measured but not checked or acted upon;
- Communication failures—this is a risk if the care provider changes, for example, if the patient moves from the hospital setting to the Community setting or vice versa.

Contributory Factors for Medication Errors
Patient Factors

- Patients on multiple medications
- Patients with another condition, e.g. renal impairment, pregnancy
- Patients who cannot communicate well
- Patients who have more than one doctor
- Children and babies (dose calculations required?)

Contributory Factors for Medication Errors
Staff Factors

- Inexperience
- Rushing
- Doing two things at the same time
- Interruptions
- Fatigue, boredom, or stress (IMSAFE)
- Lack of checking and double checking habits
- Poor teamwork and/or communication between colleagues

What are some of the ways to make medication use safer?

- Use generic names where appropriate
- Tailor prescribing to individual patients
- Know which medications are high-risk/high alert and take precautions
- Be very familiar with the medication you prescribe and/or dispense
- Use memory aids
- Remember the 5 Rs when prescribing and administering
- Develop checking habits
- Encourage patients to be actively involved in the process
- Report and learn from medication errors

Remember the 5 Rs when prescribing and administering

- Can you remember what they are?

1. **Right Patient** (check the name in the order & the patient, use two identifier & ask the patient to identify himself/herself).
2. **Right Medication** (check the medication label & order).
3. **Right Route** (Confirm that the patient can take or receive the medication by the ordered route)
4. **Right Time** (Check the frequency of the ordered medication & Confirm when the last dose was given).
5. **Right Dose** (Confirm appropriateness of the dose using a current drug reference & correct calculation)

Case Study - 1

Medication Safety Alert!
Department of Pharmacy
Medication Safety Unit

جامعة الملك سعود
King Saud University

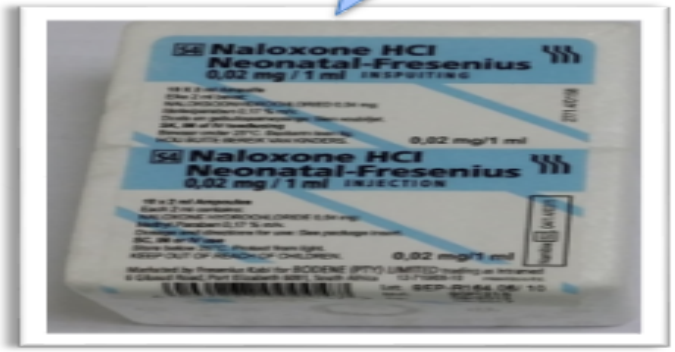
Medication Safety Alert!

The purpose of this alert is to educate health care professionals and administrators about incidents that have the potential to cause serious harm to the patients.

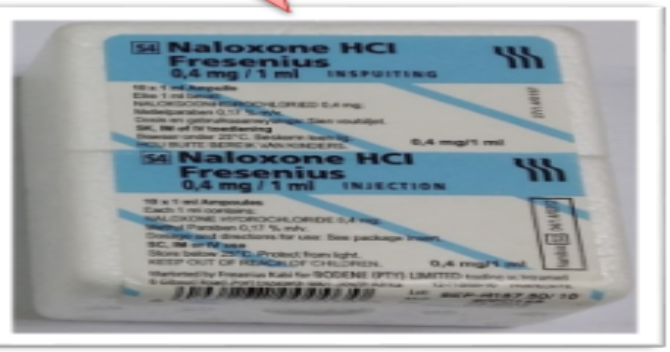
ATTENTION: Please make sure to read this and be able to answer the following questions!

- ☐ WHAT HAPPENED?
- ☐ WHY IT HAPPENED?
- ☐ HOW TO REDUCE THE LIKELIHOOD OF RECURRENCE?

0.02 mg / ml



0.4 mg / ml



CASE STORY

A 21 years old drug addict male patient was admitted to ER at the Resuscitation Area.

He was prescribed 20 mg of *Naloxone* diluted in One liter of Normal Saline.

In Pharmacy; Technician opened only one Ampoule of *Naloxone* 0.4 mg / ml and 49 Ampoules of *Naloxone* 0.02 mg / ml (by mistake).

Upon checking, this mistake was discovered and the whole preparation was discarded and new accurate preparation was prepared.

Recommended actions:

- Pharmacists / Technician should ***READ / CHECK*** carefully the label of each medication they prepare.
- ***DOUBLE CHECKING*** is essential tool to avoid such mistakes
- Look Alike medications should be stored separately with proper labeling to avoid such mistakes
- To change the brand the hospital purchases of either drugs if possible

Case Study - 2

- A 38-year-old woman comes to the hospital with 20 minutes of itchy red rash and facial swelling; she has a history of serious allergic reactions
- A nurse draws up 10 mls of 1:10,000 adrenaline (epinephrine) into a 10 ml syringe and leaves it at the bedside ready to use (1 mg in total) just in case the doctor requests it
- Meanwhile the doctor inserts an intravenous cannula
- The doctor sees the 10 ml syringe of clear fluid that the nurse has drawn up and assumes it is normal saline

Continue

- There is no communication between the doctor and the nurse at this time
- The doctor gives all 10 mls of adrenaline (epinephrine)through the intravenous cannula thinking he is using saline to flush the line.
- The patient suddenly feels terrible, anxious, becomes tachycardia and then becomes unconscious with no pulse
- She is discovered to be in ventricular tachycardia, is resuscitated and fortunately makes a good recovery
- Recommended dose of adrenaline (epinephrine) in anaphylaxis is 0.3 - 0.5 mg IM, this patient received 1mg IV

Can you identify the contributing factors to this error?

Can you identify the contributing factors to this error?

- Assumptions
- Lack of communication
- Inadequate labeling of syringe
- Giving a substance without checking and double checking what it is
- Lack of care with a potent medication

How could this error have been prevented?

How could this error have been prevented?

- Never give a medication unless you are sure you know what it is; be suspicious of unlabeled syringes
- Never use an unlabeled syringe unless you have drawn the medication up yourself
- Label all syringes
- Communication - nurse and doctor to keep each other informed of what they are doing e.g. nurse: “I’m drawing up some adrenaline”
- Develop checking habits before administering every medication … go through the 5 Rse.g doctor: “What is in this syringe?”

Summary

- Medications can greatly improve health when used wisely and correctly
- Yet, medication error is common and is causing preventable human suffering and financial cost
- Remember that using medications to help patients is not a risk-free activity
- Know your responsibilities and work hard to make medication use safe for your patients

- Thank You