Improving Medication Safety

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Learning objectives

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

Knowledge requirements

- Understand the scale of medication error
- Understand the steps involved in a patient using medication
- Identify factors that contribute to medication error
- Learn how to make medication use safer
- Understand the benefits of a multidisciplinary approach to medication safety

Medication Error

- Medication use has become increasingly complex in recent times
- **Medication errors** are a major cause of preventable patient harm
- As future health-care workers, you will have an important role in making medication use safe.

Medication Errors

- **The drugs errors** are the most common cause of medical errors in hospitals, affecting 3.7% of patients.

Definitions

Medication Error:

is any preventable event that may cause or led to inappropriate medication use or patient harm.

Medication error may result in …

- An adverse event if a patient is harmed
- A near miss if a patient is nearly harmed.

Definitions

Side effect of a drug:

a known effect, other than that primarily intended, relating to the pharmacological properties of a medication e.g. opiate analgesia often causes nausea.

Adverse reaction of a drug:

unexpected harm arising from a justified action where the correct Process was followed for the context in which the event occurred e.g. An unexpected allergic reaction in a patient taking a medication for the First time.

Definitions

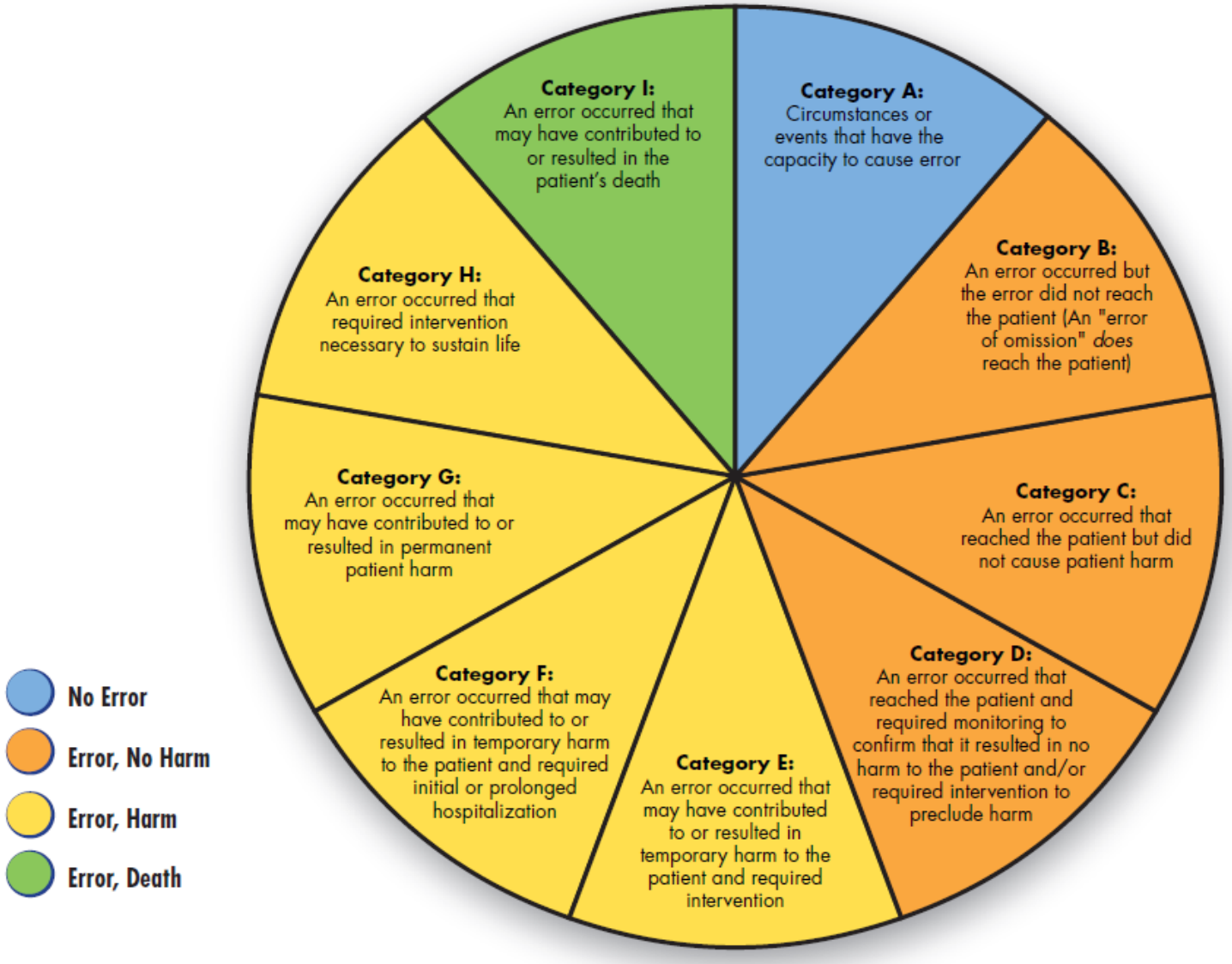
Adverse drug event:

an incident in which a patient is harmed. It includes both errors & side effects of the medication.

Adverse drug event:

- May be preventable (e.g. the result of an error) or
- May not be preventable (e.g. the result of an adverse drug reaction or side-effect)

Categorizing Medication Errors



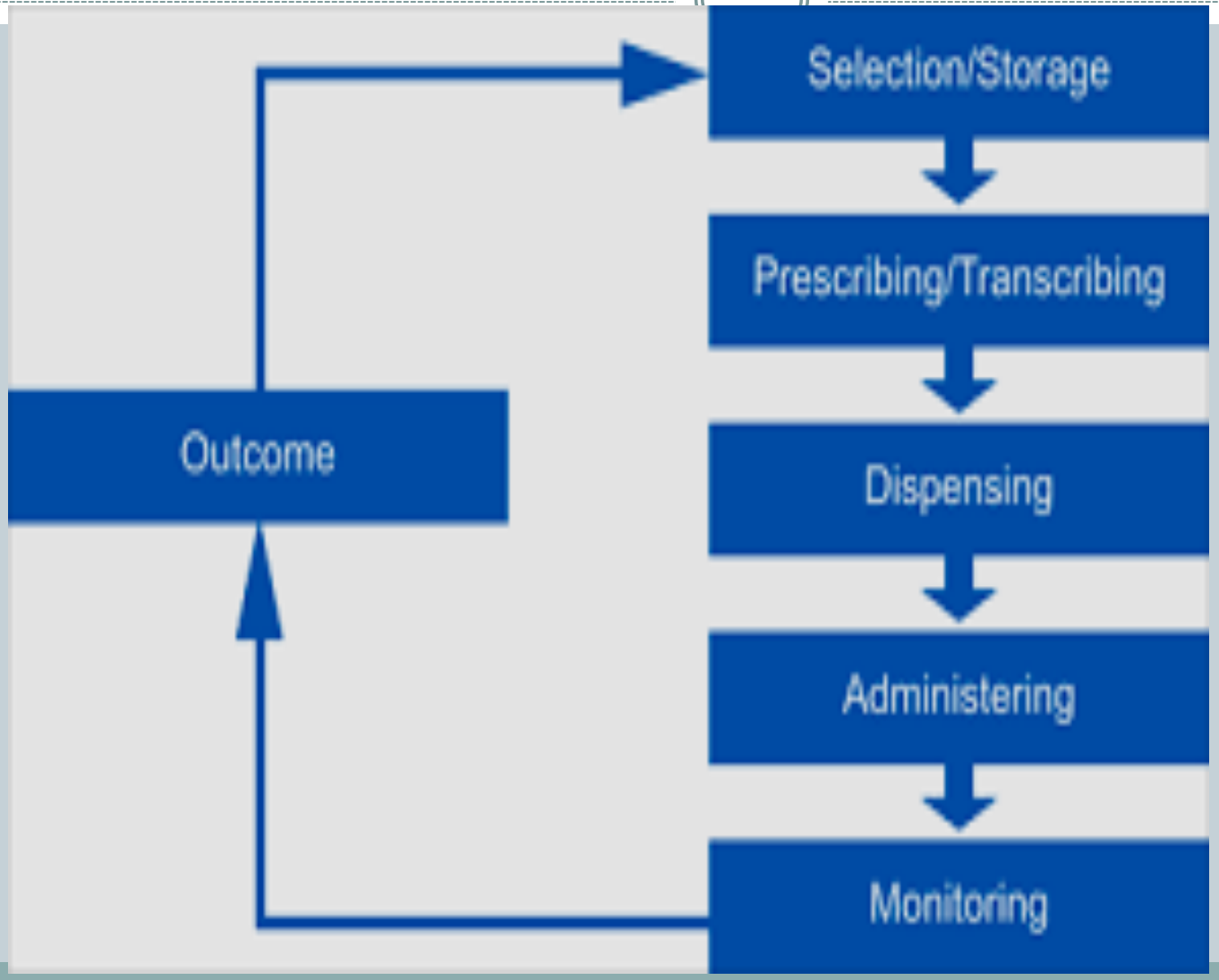
2001 National Coordinating Council for Medication Error Reporting and Prevention.

Steps in using medication

- Prescribing
- Preparation and Dispensing
- Administration
- Monitoring

Note: these steps may be carried out by healthcare workers or the patient; e.g. self-prescribing over the counter medication and self Administering medication at home.

Medication Use Process in The Institutional Setting



Medication Prescription

- **Choosing an appropriate medication**

  for a given clinical situation, taking individual patient factors into account, such as allergies

- **Selecting the administration**

  route, dose, time and regimen

- **Documentation**

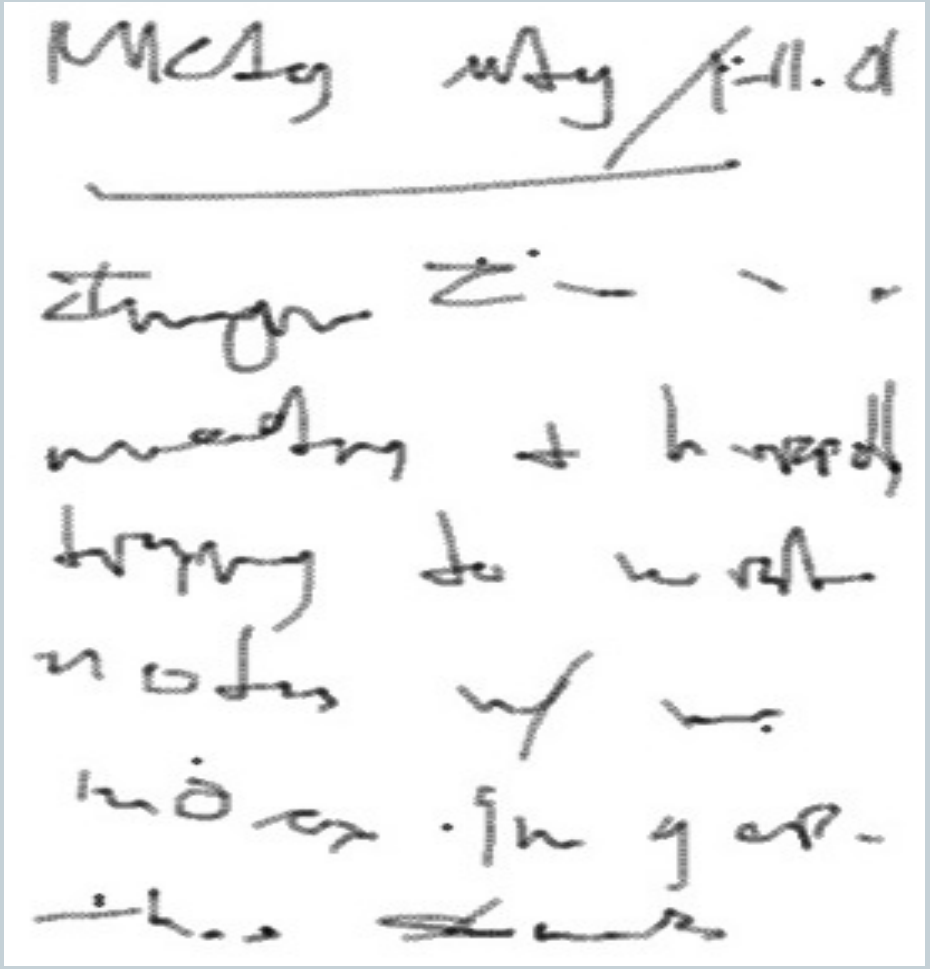
- **Communicating details of the plan with**:

  Whoever will administer the medication (written-transcribing and/or verbal) and the patient

Sources of error in prescribing:

- **Inadequate knowledge** about drug indications an contraindications
- **Not considering individual patient factors** such as allergies, pregnancy, co-morbidities, other medications
- **Wrong** patient, wrong dose, wrong time, wrong drug, wrong route
- **Mathematical error** when calculating dosage
- **Documentation:** incomplete, ambiguous & dangerous abbreviation
- **Inadequate communication** (written, verbal)
- **Incorrect data entry** when using computerized prescribing e.g. duplication, omission, wrong number

Example for prescribing error
Illegible Handwriting



Strategies to Reduce Prescribing errors

- Avoid illegible handwriting
- Write complete Information
- Look at Patient-Specific Information
- Do Not Use Abbreviations
- Decimals
- Be alert to drug name, use generic name rather than trade names
- Write the Medication reconciliation
- Know the high alert medications
- More attention to dosage calculations
- Verbal orders

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.)

Example for Error Prone Abbreviations

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)

How can medication presentation contribute to medication errors?

- LOOK-ALIKE, SOUND-ALIKE MEDICATIONS
- AMBIGUOUS LABELING

Look-a-like and sound-a-like medications

- Celebrex (an anti-inflammatory)
- Cerebryx (an anticonvulsant)
- Celexa (an antidepressant)

Ambiguous nomenclature

- Tegretol 100mg
- S/C
- 1.0 mg
- .1 mg

- Tegreto 1100 mg
- S/L
- 10 mg
- 1 mg

Avoiding ambiguous nomenclature

- avoid trailing zeros
  - e.g. write 1 not 1.0
- use leading zeros
  - e.g. write 0.1 not .1

- know accepted local terminology
- write neatly, print if necessary

Strategies to Reduce Prescribing errors

Write the Medication reconciliation

Learn and practice thorough medication history taking:

- Include name, dose, route, frequency
- 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
- Pronounce 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 Dispensing Errors

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

Administration

- Obtaining the medication in a ready-to-use form; may involve counting, calculating, mixing, labeling or preparing in some way.
- Checking for allergies
- Giving the right medication to the right patient, in the right dose, via the right route, at the right time.
- Documentation

How can drug administration go wrong?

- Wrong patient
- Wrong route
- Wrong time
- Wrong dose
- Wrong drug
- Omission, failure to administer
- Inadequate documentation

The 5 Rs

- Right Patient
- Right Drug
- Right Dose
- Right Route
- Right Time

Remember the 5 Rs when prescribing and administering

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)

Strategies to Reduce Administration Errors

- Be familiar with the institution policy
- Preprinted & standardized infusion rate charts
- Use programmable infusion device
- 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?

Calculation errors

Can you answer the following question?

A 12 kg, 2-year-old boy requires 15 mg/kg of a medication that comes as a syrup with a concentration of 120mg/5mls.

How many mls do you prescribe?

Medication monitoring

Monitoring involves …

- Observing the patient to determine if the medication is working, being used appropriately and not harming the Patient.

- Documentation

How can monitoring go wrong?

- Lack of monitoring for side-effects
- Drug not ceased if not working, or course completed
- Drug ceased before course 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

Do you know which drugs need blood tests to monitor levels?

?

Which patients are most at risk of medication errors ?

- 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?)

Factors for Medication Errors
Staff Factors

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

How can workplace design contribute to medication errors?

- Absence of a safety culture in the workplace

  e.g. poor reporting systems and failure to learn from past near misses and adverse events

- Inadequate staff numbers
- Absence of memory aids for staff

Ways to make medication use safer

- Use generic names where appropriate
- Tailor prescribing for individual patients
- Learn and practice collecting complete medication histories
- Know the high-risk medications and take precautions
- Be very familiar with the medications you prescribe
- Use memory aids
- Remember the 5 Rs when **prescribing and administering**
- Communicate clearly
- Develop checking habits
- Encourage patients to be actively involved
- Report and learn from errors

Case Study - 1

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.

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

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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

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?

Answer

- 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?

- 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 Rs e.g doctor: “What is in this syringe?”

Case Study - 3

- A 74-year-old man sees a community doctor for treatment of new onset stable angina
- The doctor has not met this patient before and takes a full past history and medication history
- He discovers the patient has been healthy and only takes medication for headaches
- The patient cannot recall the name of the headache medication
- The doctor assumes it is an analgesic that the patient takes whenever he develops a headache

Continue

- But the medication is actually a beta-blocker that he takes every day for migraine; this medication was prescribed by a different doctor
- The doctor commences the patient on aspirin and another beta-blocker for the angina
- After commencing the new medication, the patient develops bradycardia and postural hypotension
- Unfortunately the patient has a fall three days later due to dizziness on standing; he fractures his hip in the fall

Can you identify the contributing factors to this error?

- Two drugs of the same class prescribed unknowingly with potentiation of side-effects
- Patient not well informed about his medications
- Patient did not bring medication list with him when consulting the doctor
- Doctor did not do a thorough enough medication history
- Two doctors prescribing for one patient
- Patient may not have been warned of potential side-effects and of what to do if side-effects occur

How could this error have been prevented?

- Patient education regarding:
  - Regular medication
  - Potential side-effects
  - The importance of being actively involved in their own care

  e.g. having a medication list

- More thorough medication history

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.

Recommendations

- Acknowledge that medication safety is a topic and an understanding of the area will affect how you perform the following tasks:
- Use generic names where appropriate
- Tailor your prescribing for each patient
- Learn and practice thorough medication history taking
- Know which medications are high-risk 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

Recommendations

- Communicate clearly
- Develop checking habits
- Encourage patients to be actively involved in the process
- Report and learn from medication errors.

THANK YOU