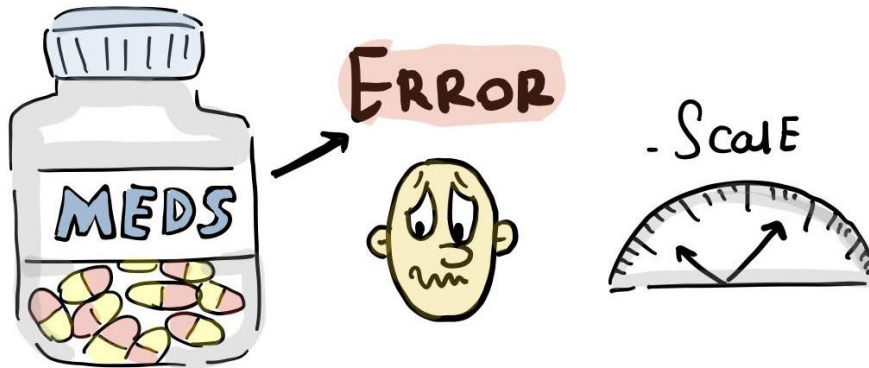# 10. Improving Medication Safety

Objectives:

- To Provide An Overview Of Medication Safety

- Describe The Scale Of Medication Error

- List The Steps Involved In A Patient Using Medication

- Define The 5 Rs When Prescribing And Administering Medication

- Identify Which Medications Are High-risk And Describe How To Take Precautions

- Identify Factors That Contribute To Medication Error

- Explain How To Make Medication Use Safer

- Discuss The Benefits Of A Multidisciplinary Approach To Medication Safety

Important | **Doctors' notes** | **Extra** | *New terminology*

Editing file | **Feedback form** | Lecture Handout 📄

✉ PatientSafety.436@gmail.com   🐦 @PatieSafe436

ERROR

. ScalE

MEDS

- STEPS Involved in Using medication

- 5 R's

- WHICH medications are High Risk ⚠️

- Factors that Contribute to medication ERROR

- How to make medication Safer ✓

- Benefits of multi-disciplinary approach

Definitions

Side effect of a drug:

a known effect, other than that primarily intended, relating to the pharmacological properties of a medication

It means that you are dealing with a pharmacological properties of the medication, something expected.

- 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

It is the unexpected harm effect which can be produce by a therapeutic dose of the drug.

- e.g. An unexpected allergic reaction in a patient taking a medication for the first time.

Error:

Failure to carry out a planned action as intended or application of an incorrect plan.

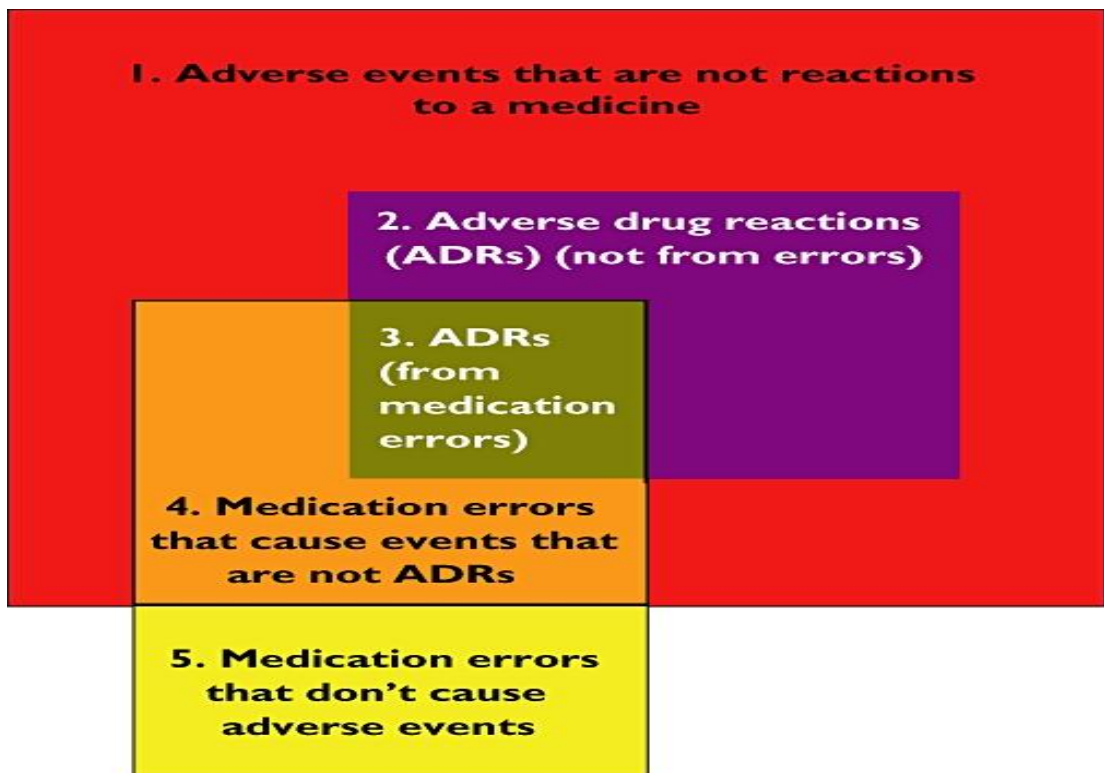**Adverse event:**

an incident in which a patient is harmed.

In ADRs, the dose is correct, but harm occurred. In Errors, the dose isn't correct.
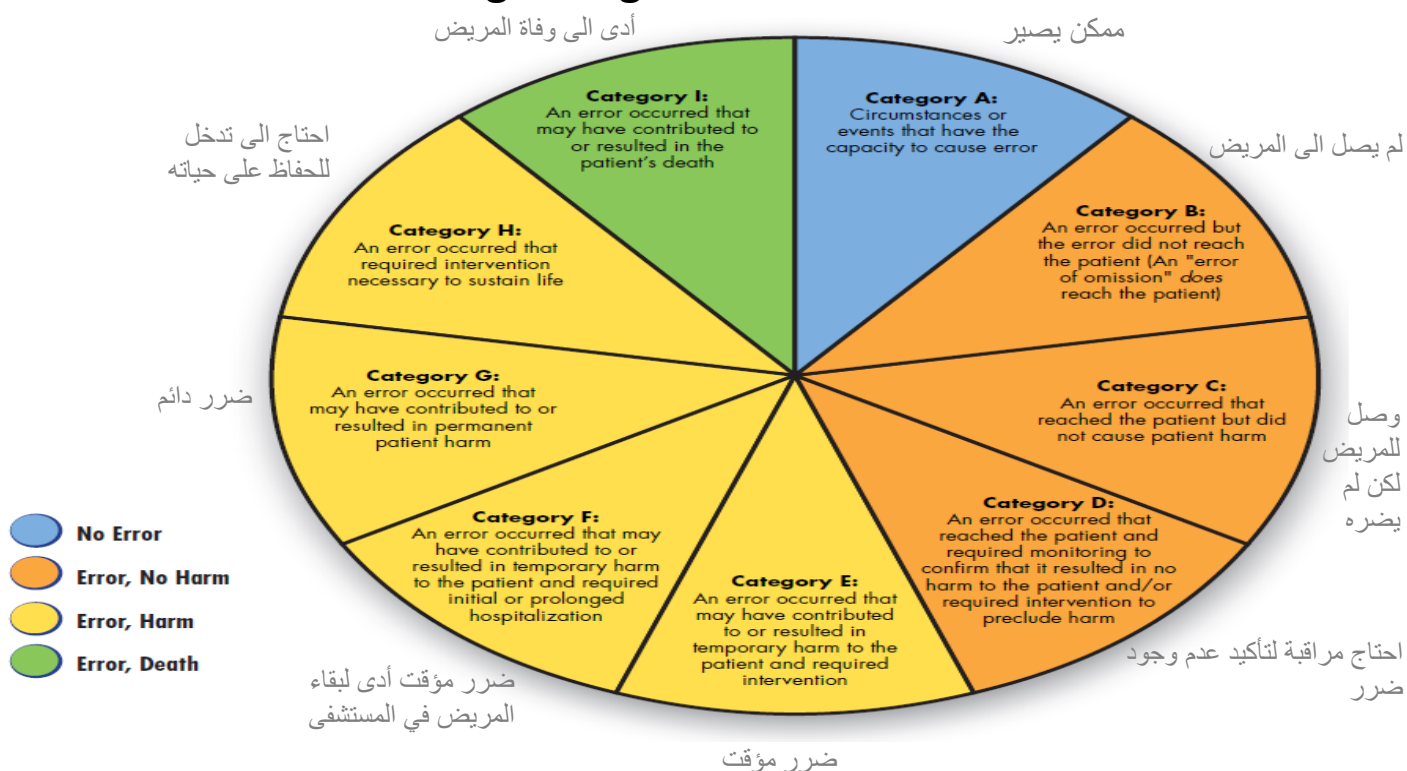
Definitions (Cont..)

- **Medication Error**: is any preventable event that may cause or led 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.

- **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)

- **Medication error may result in …**
  - An adverse event if a patient is harmed
  - A near miss if a patient is nearly harmed or
  - Neither harm nor potential for harm
  - Medication errors are preventable

Medication Error VS Adverse Drug Event

1. Adverse events that are not reactions to a medicine

2. Adverse drug reactions (ADRs) (not from errors)

3. ADRs (from medication errors)

4. Medication errors that cause events that are not ADRs

5. Medication errors that don't cause adverse events

2. Describe The Scale Of Medication Error

Categorizing Medication Errors

أدى الى وفاة المريض   ممكن يصير

احتاج الى تدخل
للحفاظ على حياته   لم يصل الى المريض

ضرر دائم   وصل للمريض لكن لم يضره

Category I:
An error occurred that may have contributed to or resulted in the patient's death

Category A:
Circumstances or events that have the capacity to cause error

Category H:
An error occurred that required intervention necessary to sustain life

Category B:
An error occurred but the error did not reach the patient (An "error of omission" *does* reach the patient)

Category G:
An error occurred that may have contributed to or resulted in permanent patient harm

Category C:
An error occurred that reached the patient but did not cause patient harm

Category F:
An error occurred that may have contributed to or resulted in temporary harm to the patient and required initial or prolonged hospitalization

Category E:
An error occurred that may have contributed to or resulted in temporary harm to the patient and required intervention

Category D:
An error occurred that reached the patient and required monitoring to confirm that it resulted in no harm to the patient and/or required intervention to preclude harm

- 🔵 No Error
- 🟠 Error, No Harm
- 🟡 Error, Harm
- 🟢 Error, Death

احتاج مراقبة لتأكيد عدم وجود ضرر

ضرر مؤقت أدى لبقاء المريض في المستشفى

ضرر مؤقت

2001 National Coordinating Council for Medication Error Reporting and Prevention.

3. List The Steps Involved In A Patient Using Medication

Steps In Using Medication

I.   Prescribing   Identify the patient and the situation then you prescribe the right drug and the right dose.

II.   Preparation and Dispensing   Pharmacists role.

III.   Administration   Patient or nurse role.

IV.   Monitoring   Doctors responsibility.

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.

In this lecture we will discuss **each step** and how the error can occur in it & ways to prevent it.

Medication Use Process In The Institutional Setting
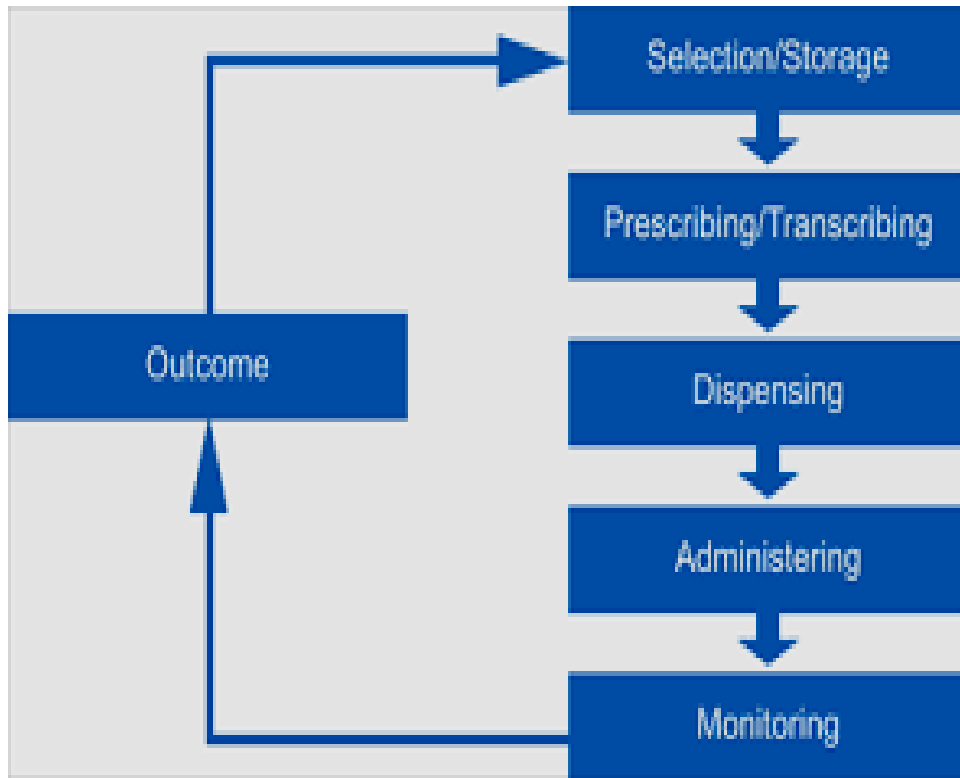
Outcome: is the patient improving?

I. Medication Prescription

- **Choosing an appropriate medication**

  for a given clinical situation, taking individual patient factors into account, such as allergies, And age – gender – weight – physiological changes (especially females).

- **Selecting the administration**

  route, dose, time and regimen

- **Communicating details of the plan with**: You need to communicate well with both patient and the pharmacist.

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

- **Documentation**

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

- **Inadequate communication** (written, verbal)

- **Documentation:** illegible**, incomplete, ambiguous & dangerous abbreviation***
  e.g. 2 mg instead of 2 mcg

- **Incorrect data entry** when using computerized prescribing e.g. duplication, omission, wrong number

*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?

300 microgram = 0.3 mg → draw up 0.3 ml
1 ml = 1 mg = 1000 microgram   so , the correct dose = 0.3 mg which is = 300 microgram " if there is preprinted chart , there is no need for calculation "
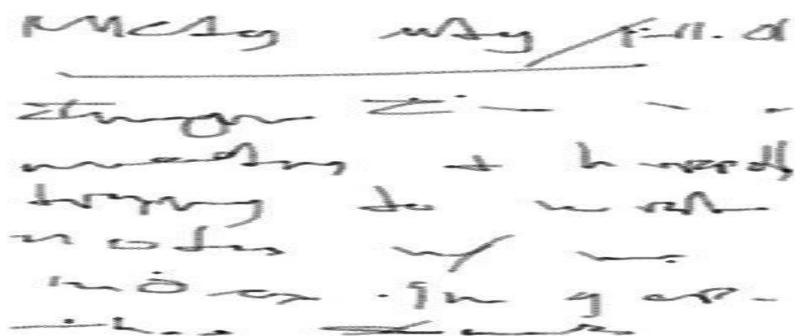
Can you answer the following question?

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. " it is preferable to use calculator "

How many mls do you prescribe?

12 (weight) * 15 (the dose / kg) = 180 mg $\frac{180}{X} = \frac{120}{5}$, $\frac{180*5}{120} = X$, X = 7.5 ml

**Example For Prescribing Error-illegible Handwriting:

***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 <u>Prescribing</u> Errors

1. **Avoid illegible handwriting**
2. **Write complete Information**
3. **Look at Patient-Specific Information**
4. **Do Not Use Abbreviations**
5. **Decimals** 2 mg not 2.0 mg, 0.5 mg not .5 mg
6. **Be alert to drug name, use generic name rather than trade names**
7. **Write the Medication reconciliation**
8. **Know the high alert medications**
9. **More attention to dosage calculations**
10. **Verbal orders**

1. Avoid illegible handwriting

- Write/Print More Carefully
- Use Computers
- Verbal Communications

2. Write complete Information

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

3. Look at Patient-Specific Information

- Age
- Weight
- Renal and Hepatic Function
- Laboratory Test Results
- Concurrent Medications
- Allergies
- Medical/Surgical/Family History
- Pregnancy/Lactation Status

4. 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

Strategies To Reduce <u>Prescribing</u> Errors (cont..)

5. Decimals:

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

6. Be alert to Drug Name:

- "Look-Alike" or "Sound-Alike" Drug Names
  - o Celebrex (celecoxib, anti-inflammatory)
  - o Cerebryx (fosphenytoin, anticonvulsant)
  - o Celexa (Citalpram, antidepressant)

7. Write the Medication reconciliation

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

8. Know the high alert medications

(that is important because we have to know what we are dealing with " those drugs need monitoring and they are measured by IU")

- Need double check
- Example :
  - o Oral anticoagulants (EX: warfarin ↓ thrombosis and ↑hemorrhage)
  - o Insulin
  - o Chemotherapeutic agents
  - o Neuromuscular blocking agents (muscular relaxant in over dose may lead to respiratory failure)
  - o Concentrated electrolytes (electrolyte imbalance may cause nausea , vomiting and diarrhea)
  - o Emergency medications (potent and used in high pressure situations)

* We have to develop double chick habit for dose , potency and ROA, especially when we are dealing with low therapeutic index drugs .

Strategies To Reduce <u>Prescribing</u> Errors (cont..)

9. More Attention to dosage calculations:

- Use patient specific information:
  - height
  - weight
  - age
  - body system function

10. 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

8. Discuss The Benefits Of A Multidisciplinary Approach To Medication Safety

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)

7. Explain How To Make Medication Use Safer

II. Medication Preparation & Dispensing

Strategies To Reduce <u>Dispensing</u> Errors

(It Is The Responsibility Of The The Pharmacist)

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

III.   Medication Administration

- Obtaining the medication in a ready-to-use form; may involve counting, calculating, mixing, labeling or preparing in some way " most of the drugs are in ready preparation but sometimes nurse has to prepare the drug " .

- 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 " if the patient did not take the drug in the proper way or the nurse did not give him in the proper way "
- Inadequate documentation (EX: if I did not report the complete the info about frequency → the patient did not know how many time he should take the drug) " also pragmatics have a role in explanation about the drug to the patient "

The **5** Rs

1. **R**ight Drug
2. **R**ight Dose
3. **R**ight Route
4. **R**ight Time
5. **R**ight Patient

Strategies To Reduce <u>Administration</u> Errors

- Be familiar with the institution policy (an example of policy : computerized system)

- Preprinted & standardized infusion rate charts so, there is no need to calculate the dose

- Use programmable infusion device

- Infusion tubing should be traced from the infusion bag to the point of delivery أتأكد إن العملية تتم

IV.   Medication Monitoring

Monitoring involves …

- Observing the patient to determine if the medication is working, being used appropriately and not harming the Patient. Ex : hypoglycemic agent → we ask for blood glucose for monitoring

- Documentation up and inject?

How Can Monitoring Go Wrong?

- Lack of monitoring for side-effects "we have to follow up the side effects "

- Drug not ceased if not working, or course completed " ex : the drug for one week but the patient did cease the drug after week "

- Drug ceased before course completed , it is a patient responsibility (especially in antibiotics which lead to resistance)

- Drug levels not measured, or measured but not checked or acted upon . the therapeutic drug monitoring (routine check up) to know the plasma level of the drug is important with low therapeutic index drugs

- Communication failures: it is important with the patients and with other health providers

  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

5. Identify Which Medications Are High-risk And Describe How To Take Precautions

Do You Know Which Drugs Need Blood Tests To Monitor Levels?

Warfarin , Antiepileptic Agents, Lithium , Aminoglycosides

Which Patients Are Most At Risk Of Medication Errors?
* The Condition Of The Patient Determine How I Have To Monitor What I Have Written To Him

- Patients on multiple medications

- Patients with another condition e.g. renal impairment Ex: old patients   , pregnancy

- Patients who cannot communicate well due to mental retardation , autism and neurological disorder – needs someone to help -

- Patients who have more than one doctor (we can avoid this problem by checking the system)

- Children and babies (dose calculations required? (We have to reduce the dose)

- Previous history of medication allergy .

Factors For Medication Errors <u>Staff</u> Factors

- Inexperience

- Rushing *" there is no time to check the system or communicate with the patient "*

- Doing two things at the same time *" clear mind is very important "*

- Interruptions

- Fatigue, boredom, or stress

- Lack of checking and double checking habits

- Poor teamwork and/or communication between colleagues

How Can <u>Workplace</u> 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 *" we have to report near misses to guide the physicians in the future"*

- Absence of memory aids for staff

- Inadequate staff numbers *" to cover the duty "*

How Can Medication <u>Presentation</u> Contribute To Medication Errors?

- Look-alike, sound-alike medications

- Ambiguous labeling

Ways to make medication use safer

- Use generic names where appropriate
- Tailor prescribing for individual patients " ex: patient physiological condition : pregnancy , childhood , lactation "
- 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 " the patient should know the use , frequency , side effects of the drug , ex : some drugs have delayed onset action (antidepressant agents) so, the patient should be aware "
- Report and learn from errors

Remember the 5 Rs when prescribing and administering

Can you remember what they are?

1. **R**ight Patient
   (check the name in the order & the patient, use two identifier & ask the patient to identify himself/herself).

2. **R**ight Medication
   (check the medication label & order).

3. **R**ight Route
   (Confirm that the patient can take or receive the medication by the ordered route)

4. **R**ight Time
   (Check the frequency of the ordered medication & Confirm when the last dose was given).

5. **R**ight Dose
   (Confirm appropriateness of the dose using a current drug reference & correct calculation)

Summary

- Medications " chemicals " can greatly improve health when used wisely and correctly.

- Yet, medication error is common and is causing preventable human suffering and financial cost. (We can prevent those errors by only paying attention)

- 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.

YAAAY

NP: This lecture is the last uploaded team work lecture in our basic science years. Be proud.

Summary

Steps In Using Medication
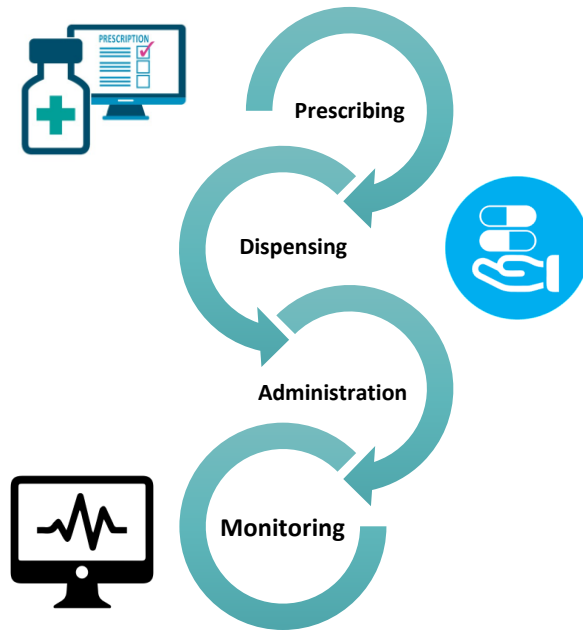
Prescribing
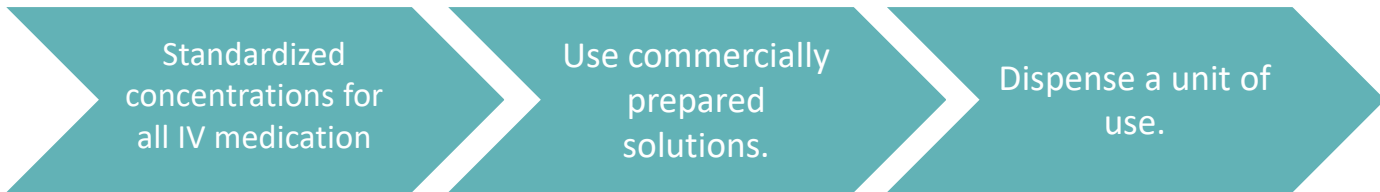
Dispensing

Administration
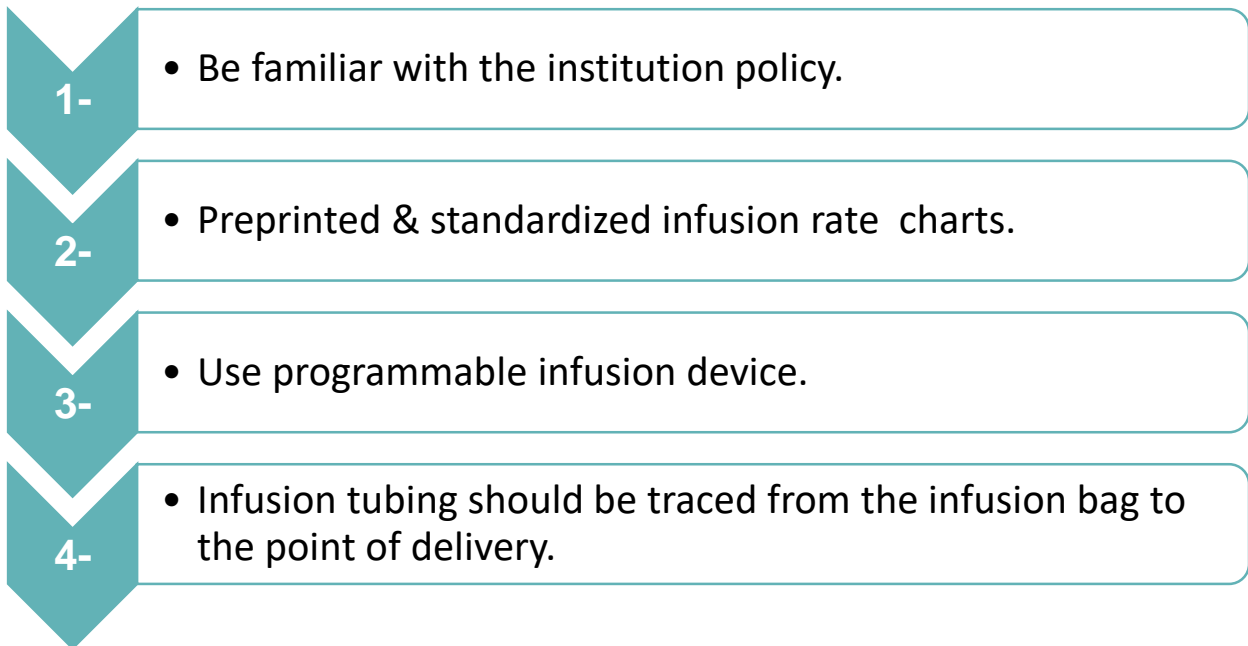
Monitoring

Strategies To Reduce Prescribing Errors

1- • Avoid illegible handwriting.

2- • Write complete Information.

3- • Look at Patient-Specific Information.

4- • Do Not Use Abbreviations.

5- • Decimals.

6- • generic name rather than trade names.

7- • Write the Medication reconciliation.

8- • Know the high alert medications.

9- • More attention to dosage calculations.

10- • Verbal orders.

Summary

Strategies To Reduce Dispensing Errors

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

Strategies To Reduce Administration Errors

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.

Remember the 5 Rs when prescribing and administering

- **R**ight Drug.
- **R**ight Dose.
- **R**ight Route.
- **R**ight Time.
- **R**ight Patient.

1. Case Study

Medication Safety Alert!
Department of Pharmacy
Medication Safety Unit

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
Addicted to morphine
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. → Antidote

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. Near miss

Recommended actions

- Pharmacists/Technician should **READ / CHECK** carefully the label of each medication they prepare.

- **DOUBLE CHECKING** is essential tool to avoid such mistakes " to ensure that the calculation is correct "

- 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

2. Case Study

- 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

- **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?

- Assumptions *" doctor mistake" (in medicine there is no assumptions)*

- Lack of communication

- Inadequate labeling of syringe *" nurse mistake "*

- Giving a substance without checking and double checking what it is

- Lack of care with a potent medication *" I have to be careful with epinephrine "*

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?"

3. Case Study

- A 74-year-old *" we have to be careful with old patient because they are usually polypharmacist (use more than 1 drug) → drug interaction"* 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

- But the medication is actually a beta-blocker that he takes every day for migraine; this medication was prescribed by a different doctor *"communication between the doctors by checking the system is very important "*

- 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

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

Can you identify the contributing factors to this error?

- Assumption
- Two drugs of the same class prescribed unknowingly with potentiation of side-effects
- Patient not well informed about his medications *"one of the patient rights is to know about his case and why he take this drug "*
- Patient did not bring medication list with him when consulting the doctor *"needs patients education "*
- Doctor did not do a thorough enough medication history *" by checking the file , system or scheduled another appointment and ask the patient to bring the drug "*
- Two doctors prescribing for one patient *" checking the system "*
- Patient may not have been warned of potential side-effects and of what to do if side-effects occur *" communication and clarify the side effects is important for the patient compliance, (ex : metformin can cause GI disturbance in first 2 weeks , if I did not tell the patient , he may stop the drug) "*

Questions

Q1: Which Patients Are Most At Risk Of Medication Errors ?
1. Patients on multiple medications
2. Patients who have one doctor
3. Patients who can not communicate well
4. 1+3

Q2: Give me 3 Strategies To Reduce <u>Prescribing</u> Errors

1. Avoid illegible handwriting

2. Write complete Information

3. Look at Patient-Specific Information

Q3: List 3 Ways to make medication use safer
Use generic names where appropriate
Tailor prescribing for individual patients
Learn and practice collecting complete medication histories

Q4: Example of Avoid illegible handwriting is Using Computers ?

1) True 2) False

Q5: Enumerate The 5Rs:

1. Right Drug

2. Right Dose

3. Right Route

4. Right Time

5. Right Patient

PATIENT SAFETY
436 TEAM

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