Topic 11

Introduction to medication safety

Rationale

- medication use has become increasingly complex in recent times
- medication error is a major cause of preventable patient harm
- as future doctors, you will have an important role in making medication use safe

Learning objectives

To provide an overview of medication safety

To encourage you to continue to learn and practise 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 a doctor’s responsibilities when using medication

Performance requirements

Acknowledge that medication safety is a big topic and an understanding of the area will affect how you perform the following tasks:

- use generic names where appropriate
- tailor your prescribing for individual patients
- learn and practise thorough medication history taking
- know which medications are high risk and take precautions
- know the medication you prescribe well
- use memory aids
- remember the 5 Rs when prescribing and administering
- communicate clearly
- develop checking habits
- encourage patients to be actively involved in the process
- report and learn from medication errors

Definitions

- **side-effect:** 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:** 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
- **error:** failure to carry out a planned action as intended or application of an incorrect plan
- **adverse event:** an incident that results in harm to a patient

WHO: World alliance for patient safety taxonomy

Definitions

- an adverse drug event:
  - may be preventable (usually the result of an error) or
  - not preventable (usually the result of an adverse drug reaction or side-effect)
- a 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

Steps in using medication

- prescribing
- administering
- monitoring

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

Prescribing involves …

- 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
- communicating details of the plan with:
  - whoever will administer the medication (written-transcribing and/or verbal)
  - and the patient
- documentation

How can *prescribing* go wrong?

- 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)
- documentation - illegible, incomplete, ambiguous
- mathematical error when calculating dosage
- incorrect data entry when using computerized prescribing e.g. duplication, omission, wrong number

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

Administration involves …

- 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 drug
- right route
- right time
- right dose
- right patient

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?

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 complete
- drug ceased before course completed
- drug levels not measured, or not followed up on
- communication failures

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

Which patients are most at risk of medication error?

- 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
- patients who do not take an active role in their own medication use
- children and babies (dose calculations required)

In what situations are staff most likely to contribute to a medication error?

- inexperience
- rushing
- doing two things at once
- interruptions
- fatigue, boredom, being on “automatic pilot” leading to failure to check and double-check
- lack of checking and double checking habits
- poor teamwork and/or communication between colleagues
- reluctance to use memory aids

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
- absence of memory aids for staff
- inadequate staff numbers

How can medication presentation contribute to medication errors?

- look-alike, sound-a-like medications
- ambiguous labeling

Performance requirements

What you can do to make medication use safer:

- use generic names
- tailor prescribing for each patient
- learn and practise thorough medication history taking
- know the high-risk medications and take precautions
- know the medications you prescribe well
- use memory aids
- communicate clearly
- develop checking habits
- encourage patients to be actively involved
- report and learn from errors

Use generic names rather than trade names

Tailor your prescribing for each individual patient

Consider:

- allergies
- co-morbidities (especially liver and renal impairment)
- other medication
- pregnancy and breastfeeding
- size of patient

Learn and practise thorough medication history taking

- include name, dose, route, frequency, duration of every drug
- enquire about recently ceased medications
- ask about over-the-counter medications, dietary supplements and alternative medicines
- make sure what patient actually takes matches your list:
  - be particularly careful across transitions of care
  - practise medication reconciliation at admission to and discharge from hospital
- look up any medications you are unfamiliar with
- consider drug interactions, medications that can be ceased and medications that may be causing side-effects
- always include allergy history

Know which medications are high risk and take precautions

- narrow therapeutic window
- multiple interactions with other medications
- potent medications
- complex dosage and monitoring schedules
- examples:
  - oral anticoagulants
  - Insulin
  - chemotherapeutic agents
  - neuromuscular blocking agents
  - aminoglycoside antibiotics
  - intravenous potassium
  - emergency medications (potent and used in high pressure situations)

Know the medication you prescribe well

- do some homework on every medication you prescribe
- suggested framework
  - pharmacology
  - Indications
  - Contraindications
  - side-effects
  - special precautions
  - dose and administration
  - regimen

Use memory aids

- textbooks
- personal digital assistant
- computer programmes, computerized prescribing
- protocols
- free up your brain for problem solving rather than remembering facts and figures that can be stored elsewhere
- looking things up if unsure is a marker of safe practice, not incompetence!

Remember the 5 Rs when prescribing and administering

- Can you remember what they are?
- right drug
- right dose
- right route
- right time
- right patient

Communicate clearly

- the 5 Rs
- state the obvious
- close the loop

Develop checking habits

- when prescribing a medication
- when administering medication:
  - check for allergies
  - check the 5 Rs
- remember computerized systems still require checking
- always check and it will become a habit!

Develop checking habits

- some useful maxims …
- unlabelled medications belong in the bin
- never administer a medication unless you are 100% sure you know what it is
- practise makes permanent, perfect practice makes perfect
  - so start your checking habits now

Encourage patients to be actively involved in the process

- when prescribing a new medication provide patients with the following information:
  - name, purpose and action of the medication
  - dose, route and administration schedule
  - special instructions, directions and precautions
  - common side-effects and interactions
  - how the medication will be monitored
- encourage patients to keep a written record of their medications and allergies
- encourage patients to present this information whenever they consult a doctor

Report and learn from medication errors

Safe practice skills for medical students to develop and practise …

- whenever learning and practising skills that involve medication use, consider the potential hazards to the patient and what you can do to enhance patient safety
- knowledge of medication safety will impact the way you:
  - prescribe, document and administer medication
  - use memory aids and perform drug calculations
  - perform medication and allergy histories
  - communicate with colleagues
  - involve and educate patients about their medication
  - learn from medication errors and near misses

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

Introduction

- for discussion:
  - Are you aware of any incidents in which a patient was harmed by medication?
  - Describe what happened.
  - Was the situation a result of a side-effect, adverse drug reaction or medication error?

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 120 mg/5mls. How many mls do you prescribe?

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?

Example case

- 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

Example case

- 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

What factors contributed to this medication 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 situation 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

Case

- 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

Case

- 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 tachycardic 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
- 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 unlabelled syringes
- never use an unlabelled 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?”

Example case

- a patient is commenced on oral anticoagulants in hospital for treatment of a deep venous thrombosis following an ankle fracture
- the intended treatment course is 3-6 months though neither the patient nor community doctor are aware of the planned duration of treatment
- patient continues medication for several years, being unnecessarily exposed to the increased risk of bleeding associated with this medication

Example case

- the patient is prescribed a course of antibiotics for a dental infection
- 9 days later the patient becomes unwell with back pain and hypotension, a result of a spontaneous retroperitoneal haemorrhage, requiring hospitalization and a blood transfusion
- international normalized ratio (INR) reading is grossly elevated, anticoagulant effect has been potentiated by the antibiotics

Can you identify the contributing factors for this medication error?

- lack of communication and hence continuity of care between the hospital and the community
- patient not informed of the plan to cease medication
- the interaction between antibiotic and anticoagulant was not anticipated by the doctor who prescribed the antibiotic even though this is a known phenomenon
- lack of monitoring; blood tests would have detected the exaggerated anticoagulation effect in time to correct the problem

How could this error have been prevented?

- effective communication
  - e.g. discharge letter from hospital to community doctor
  - e.g. patient information
- memory aids and alerting systems to help doctors notice potential adverse drug interactions
- being aware of common pitfalls in medications you prescribe
- monitoring medication effects when indicated

How could the patient help prevent this error?

- by asking more questions:
  - “How long will I need this new medication for?”
  - “Will this antibiotic interact with my other medication?”

- How can the doctor encourage the patient to ask more questions?