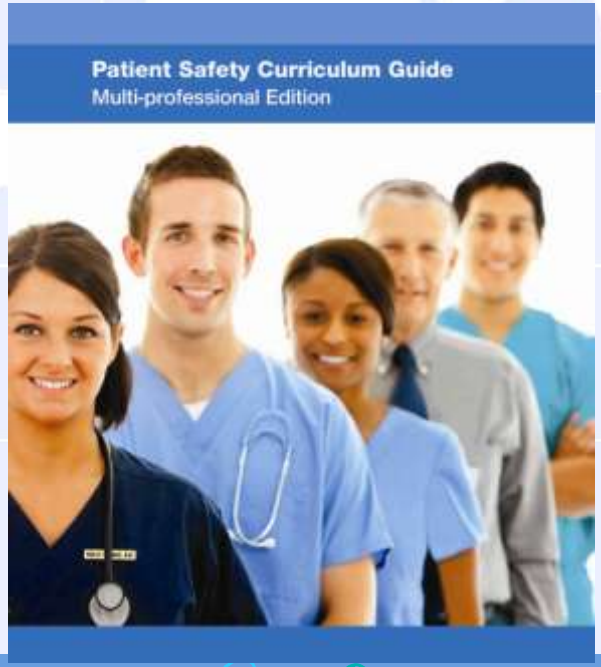
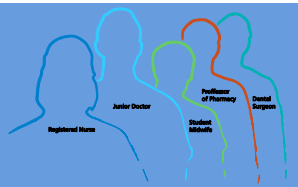
Topic 11

Improving medication safety



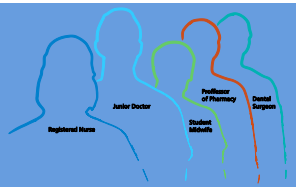
Rationale

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



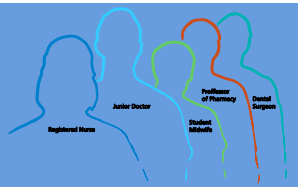
Learning objectives

- To provide an overview of medication safety
- To encourage students to continue to learn and practise ways to improve the safety of medication use



Knowledge requirements

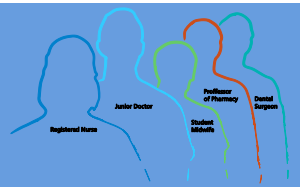
- Understand the scale of medication error
- Understand the steps involved in a patient using medication
- Identify factors that contribute to medication error
- Learn how to make medication use safer
- Understand the benefits of a multidisciplinary approach to medication safety



Performance requirements

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



Definitions (1)

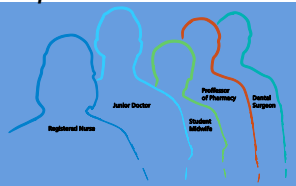
- **Side-effect:** a known effect, other than that primarily intended, relating to the pharmacological properties of a medication
  - e.g. opiate analgesia often causes nausea

- **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 in which a patient is harmed

Source: Conceptual Framework for the International Classification for patient safety



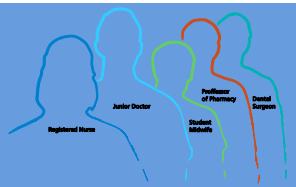
Definitions (2)

- 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

Steps in using medication

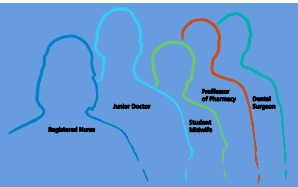
- Prescribing
- Administering
- Monitoring

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



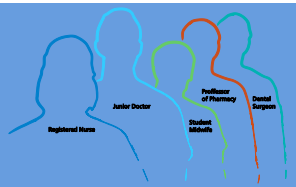
Prescribing involves …

- 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?

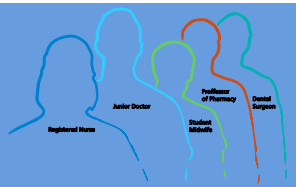
- Inadequate knowledge about drug indications and contraindications
- Not considering individual patient factors, such as allergies, pregnancy, co-morbidities, other medications
- Wrong patient, wrong dose, wrong time, wrong drug, wrong route
- Inadequate communication (written, verbal)
- Documentation - 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

2 examples :

- Avanza (mirtazapine, antidepressant); Avandia (rosiglitazone, diabetes medicine)
- Celebrex (celecoxib, anti-inflammatory); Cerebryx (fosphenytoin, anticonvulsant); Celexa (Citalpram, antidepressant)



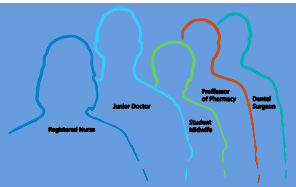
Ambiguous nomenclature

- 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 …

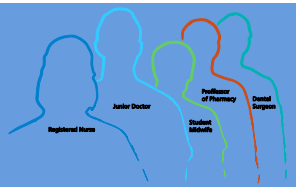
- Obtaining the medication in a ready-to-use form; may involve counting, calculating, mixing, labeling or preparing in some way
- Checking for allergies
- Giving the right medication to the right patient, in the right dose, via the right route, at the right time
- Documentation

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

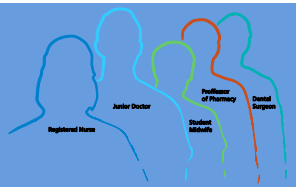
Can you answer the following question?

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

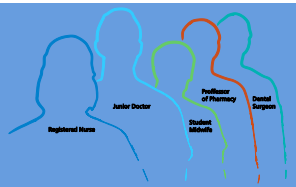
- Documentation



How can monitoring go wrong?

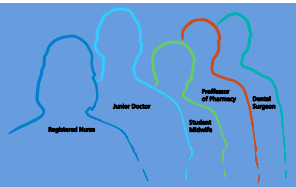
- Lack of monitoring for side-effects
- Drug not ceased if not working, or course completed
- Drug ceased before course completed
- Drug levels not measured, or not followed up
- Communication failures

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



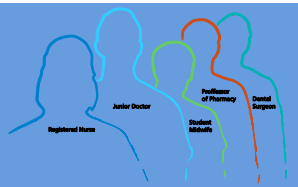
Which patients are most at risk of medication error?

- 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



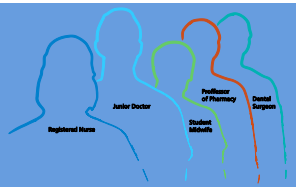
How can workplace design contribute to medication errors?

- Absence of a safety culture in the workplace

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

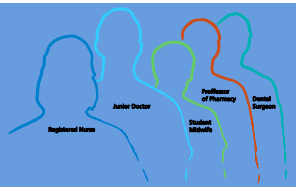
- Absence of memory aids for staff

- Inadequate staff numbers



How can medication presentation contribute to medication errors?

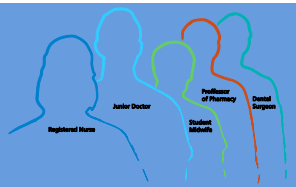
- Look-alike, sound-alike medications
- Ambiguous labeling



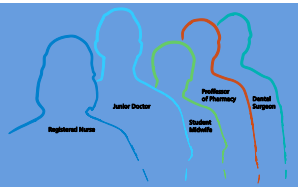
Ways to make medication use safer

What you can do to make medication use safer:

- Use generic names
- Tailor prescribing for individual patients
- Learn and practise 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
- Communicate clearly
- Develop checking habits
- Encourage patients to be actively involved
- Report and learn from errors



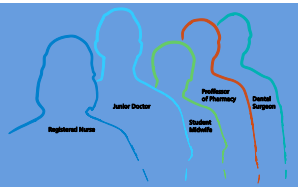
Use generic names rather than trade names



Tailor your prescribing for each individual patient

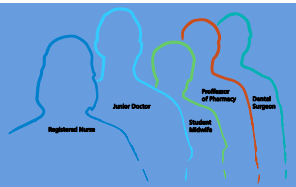
Consider:

- Allergies
- Co-morbidities (especially liver and renal impairment)
- Other medication
- Pregnancy and breastfeeding
- Size of patient



Learn and practise collecting complete medication histories

- Include name, dose, route, frequency, duration of every drug
- Ask about recently ceased medications
- Ask about over-the-counter medications, dietary supplements and complementary 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

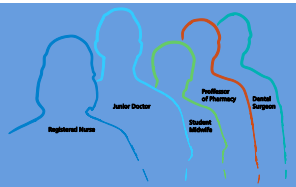


Know which medications are high risk and take precautions

- 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)

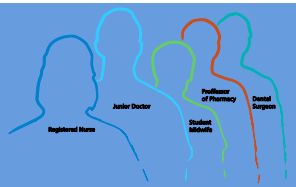
Be very familiar with the medications you prescribe

- Do some homework on every medication you prescribe
- Suggested framework
  - Pharmacology
  - Indications
  - Contraindications
  - Side-effects
  - Special precautions
  - Dose and administration
  - Regimen



Use memory aids

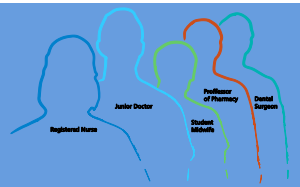
- Textbooks
- Personal digital assistant
- Computer programmes, computerized prescribing
- Protocols
- Free up your brain for problem solving rather than remembering facts and figures that can be stored elsewhere
- Looking things up if unsure is a marker of safe practice, not incompetence!



Remember the 5 Rs when prescribing and administering

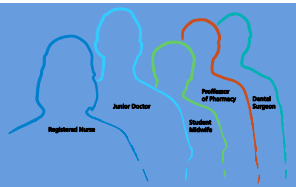
Can you remember what they are?

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



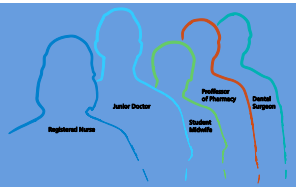
Communicate clearly

- State the obvious
- Write clearly and legibly
- The 5 Rs
- Close the loop



Develop checking habits (1)

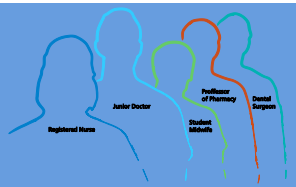
- When prescribing a medication
- When administering medication:
  - Check for allergies
  - Check the 5 Rs
- Remember computerized systems still require checking
- Always check and it will become a habit!



Develop checking habits (2)

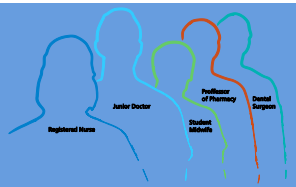
- Some useful maxims …
- Unlabelled medications belong in the bin
- Never administer a medication unless you are 100% sure you know what it is
- Practice makes permanent, perfect practice makes perfect

Start your checking habits now !

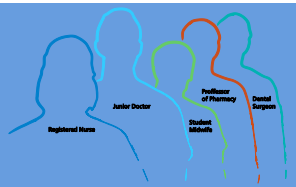


Encourage patients to be actively involved in the process

- 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

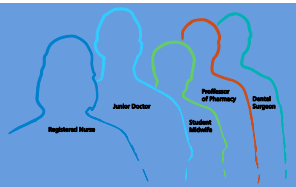


Report and learn from medication errors



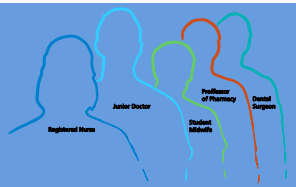
Safe practice skills for students to develop and practise …

- 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



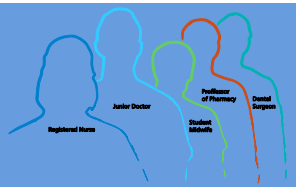
Summary

- 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



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 (1)

- 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?

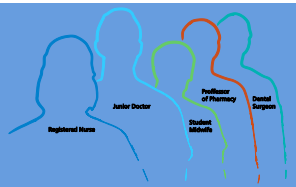
Calculation errors (2)

- 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 (1)

- 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

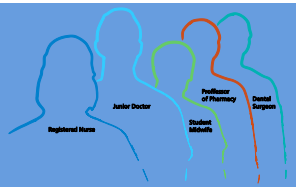


Example case (2)

- 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

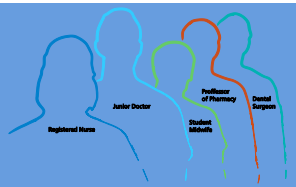
What factors contributed to this medication error?

- 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



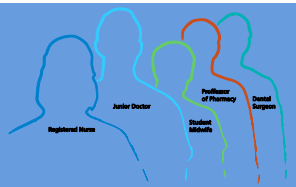
How could this situation have been prevented?

- 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



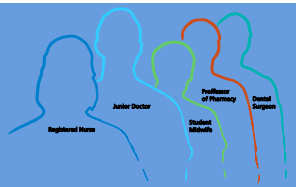
Case (1)

- 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 (2)

- 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?

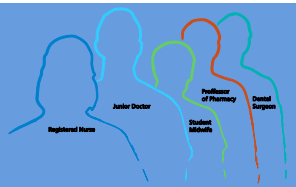
- Never give a medication unless you are sure you know what it is; be suspicious of unlabelled syringes
- Never use an unlabelled syringe unless you have drawn the medication up yourself
- Label all syringes
- Communication - nurse and doctor to keep each other informed of what they are doing

  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?”

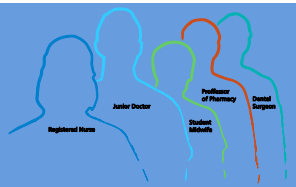
Example case (1)

- 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



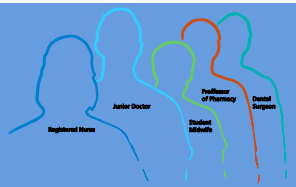
Example case (2)

- 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?

- 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?