

Topic 11: Improving medication safety

Why focus on medications?

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Medicines have proven to be very beneficial for treating illness and preventing disease. This success has resulted in a dramatic increase in medication use in recent times. Unfortunately, this increase in use and expansion of the pharmaceutical industry has also brought with it an increase in hazards, error and adverse events associated with medication use.

Medication has also become increasingly complex:

- There has been a massive increase in the number and variety of medications available. These may have different routes of delivery, variable actions (long acting, short acting) and there are drugs with the same action and formulation but with different trade names.
- Although there are better treatments for chronic disease, more patients take multiple medications and there are more patients with multiple co-morbidities. This increases the likelihood of drug interactions, side-effects and mistakes in administration.
- The process of delivering medications to patients is often shared by a number of health-care professionals. Communication failures can lead to gaps in the continuity of the process.
- Doctors are prescribing a larger range of medications so there are more medicines they need to be familiar with. There is just too much information for a doctor to be able to remember in a reliable way.
- Doctors look after patients who are taking medications prescribed by other doctors (often specialized doctors) and hence may not be familiar with the effects of all the medications a patient is taking.

Doctors have a major role in the use of medicine. Their role includes prescribing, administration, monitoring for side-effects, working in a team

and potentially a leadership role in the workplace in relation to medication use and improving patient care.

As future doctors, medical students need to understand the nature of medication error, learn what the hazards are in relation to using medication and what can be done to make medication use safer. All staff involved in the use of medication have a responsibility to work together to minimize patient harm caused by medication use.

Keywords

Side-effect, adverse reaction, error, adverse event, adverse drug event, medication error, prescribing, administration and monitoring.

Learning objectives:

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

Learning outcomes: knowledge and performance

What a student needs to know (knowledge requirements):

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- understand the scale of medication error;
- understand that using medications has associated risks;
- understand common sources of error;
- understand where in the process errors can occur;
- understand a doctors' responsibilities when prescribing and administering medication;
- recognize common hazardous situations;
- learn ways to make medication use safer;
- understand the benefits of a multidisciplinary approach to medication safety.

What a student needs to do (performance requirements)

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Acknowledge that medication safety is a vast topic and an understanding of the area will affect how a clinician performs in the following tasks:

- use generic names;
- tailor prescribing for each patient;
- learn and practise thorough medication history taking;
- know the high-risk medications;
- be very familiar with the medications you prescribe;
- use memory aids;
- communicate clearly;
- develop checking habits;
- encourage patients to be actively involved in the medication process;
- report and learn from errors;
- learn and practise drug calculations.

WHAT STUDENTS NEED TO KNOW (KNOWLEDGE REQUIREMENTS)

Definitions:

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Side-effect

A known effect, other than that primarily intended, relating to the pharmacological properties of the medication [1]. For example, a common side effect of opiate analgesia is nausea.

Adverse reaction

Unexpected harm arising from a justified action where the correct process was followed for the context in which the process occurred [1]. For example, 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.[1]

Adverse event

An incident that results in harm to a patient.[1]

Adverse drug event

An incident that may be preventable (usually the result of an error) or not preventable.

Medication error

May result in:

- an adverse event if a patient is harmed;
- a near miss if a patient is nearly harmed;
- neither harm nor potential for harm.

Understand the scale of medication error

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Medication error is a common cause of preventable patient harm.

The Institute of Medicine in the United States estimates:

- 1 medication error per hospitalized patient per day in the United States; [2]
- 1.5 million preventable adverse drug events per year in the United States; [2]
- 7000 deaths per year from medication error in US hospitals. [3]

Other countries around the world that have researched the incidence of medication error and adverse drug events have similarly worrying statistics [4].

Steps in using medication

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There are a number of discrete steps in using medication: prescribing, administration and monitoring are the main three. Doctors, patients and other health professionals can all have a role in these steps. For example, a patient may self-prescribe over-the-counter medication, administer their own medication and monitor themselves to see if there has been any therapeutic effect. Alternatively, for example, in the hospital setting,

one doctor may prescribe a medication, a nurse will administer the medication and a different doctor may end up monitoring the patient's progress and make decisions about the ongoing drug regimen.

The main components of each step are outlined below.

Prescribing:

- choosing an appropriate medication for a given clinical situation, taking individual patient factors into account such as allergies;
- selecting an administration route, dose, time and regimen;
- communicating the plan with whoever will administer the medication. This communication may be written, verbal or both;
- documentation.

Administration:

- obtaining the medication and having it in a ready-to-use form. This may involve counting, calculating, mixing, labelling 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.

Monitoring:

- observing the patient to determine if the medication is working, being used correctly and not harming the patient;
- documentation.

There is potential for error at every step of the process. There are a variety of ways that error can occur at each step.

Understand that using medications has associated risks

Prescribing



Sources of error in prescribing:

- Inadequate knowledge about drug indications, contraindications and drug interactions. This has become an increasing problem as the number of medicines in use has increased. It is not possible for a doctor to remember all the relevant details necessary for safe prescribing. Alternative ways of accessing drug information are required.
- Not considering individual patient factors that would alter prescribing such as allergies, pregnancy, co-morbidities like renal impairment and other medications the patient may be taking.
- Prescribing for the wrong patient, prescribing the wrong dose, prescribing the wrong drug, prescribing the wrong route or the wrong time. These errors can sometimes occur due to lack of knowledge, but more commonly are a result of a “silly mistake” or “simple mistake”, referred to as a slip or a lapse. These are the sorts of errors that are more likely to occur at 04:00, or if the doctor is rushing or bored and not concentrating on the task at hand.
- Inadequate communication can result in prescribing errors. Communication that is ambiguous can be misinterpreted. This may be a result of illegible writing or simple misunderstanding in verbal communication.
- Mathematical error when calculating doses can cause errors. This can be a result of carelessness, but could also be due to lack of training and unfamiliarity with how to manipulate volumes, amounts, concentrations and units. Calculation errors involving medications with narrow therapeutic window can cause major adverse events. Not

uncommonly, a calculation error can occur when transposing units (e.g. from micrograms to milligrams) and may result in a 1000 times error. Competence with dose calculations is particularly important in paediatrics where most doses are determined according to the weight of the child.

Administration

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Types of administration errors:

- Classic administration errors are a drug being given to the wrong patient, by the wrong route, at the wrong time, in the wrong dose or the wrong drug used. Not giving a prescribed drug is another form of administration error. These errors can result from inadequate communication, slips or lapses, lack of checking procedures, lack of vigilance, calculation errors and suboptimal workplace and medication packaging design. There is often a combination of contributory factors.
- Inadequate documentation. For example, if a medication is administered but has not been recorded as being given, another staff member may also give the patient the medication thinking that it had not yet been administered.

Monitoring

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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

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Adverse medication events are frequently multifactorial in nature. Often there is a combination of events that together result in patient harm. This is important to understand for a number of reasons. In trying to understand why an error occurred, it is important to look for *all* the contributing factors, rather than the most obvious reason or the final point of the process. Strategies to improve medication safety also need to be targeted at multiple points.

Patient factors:

- patient on multiple medications;
- patients with a number of medical problems;
- patients who cannot communicate well, e.g. unconscious, babies and young children, people who do not speak the same language as the staff;
- patients who have more than one doctor `prescribing medication;
- patients who do not take an active interest in being informed about their own health and medicines;
- children and babies (drug dose calculations required).

Staff factors:

- inexperience;
- rushing, emergency situations;
- multitasking;
- being interrupted mid-task;
- fatigue, boredom, lack of vigilance;
- lack of checking and double-checking habits;
- poor teamwork, poor communication between colleagues;
- reluctance to use memory aids.

Workplace design factors:

- absence of safety culture in the workplace. This may be evidenced by a lack of reporting systems and failure to learn from past near

- misses and adverse events;
- absence of readily available memory aids for staff;
- inadequate staff numbers;
- medicines not stored in an easy to use form.

Medication design factors:

- look-a-like, sound-a-like medication. For example, Celebrex (an anti-inflammatory), Cerebryx (an anticonvulsant) and Celexa (an antidepressant);
- ambiguous labelling—different preparations or dosages of similar medication may have similar names or packaging. For example, some slow release medications may differentiate themselves from the usual release form with a suffix. Unfortunately, there are many different suffixes in use to imply similar properties such as slow release, delayed release or long acting, e.g. LA, XL, XR, CC, CD, ER, SA, CR, XT,SR.

WHAT STUDENTS NEED TO DO (PERFORMANCE REQUIREMENTS)

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

Use generic names

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Medications have both a trade name (brand name) and a generic name (active ingredient). The same drug formulation can be produced by different companies and given multiple different trade names. Usually the trade name appears in large letters on the box/bottle and the generic name is in small print. It is difficult enough familiarizing oneself with all the generic medications in use and can be almost impossible to remember all the related trade names. To minimize confusion and simplify communication it is helpful if staff only use generic names. However, it is important to be aware that patients will often use trade names as this is what appears in large print on the packaging. This can be confusing for both staff and patients. For example, consider a patient being discharged from hospital on their usual medication but with a different trade name. The patient may not realize that the discharge medication is the same as their pre-admission medication and hence continue with this as well, since no one has told them to cease it or that it is the same as the “new” medication. It is important to explain to patients that some medications many have two names.

Commercial pharmacies will sell the brand of medication prescribed by the doctor. Often a doctor will prescribe using a trade name as a way of ensuring the patient is dispensed the cheapest version of the medication available. In this situation, patients can still be made aware of the generic name of the medication. Patients should be encouraged to keep a list of their medications including both the trade and generic name of each drug.

Tailor prescribing to individual patients

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Before prescribing a medication, always stop and think, “Is there anything about this patient that should alter my usual choice of medication?” The sorts of factors to consider are allergies, pregnancy, breastfeeding, co-morbidities, other medications the patient may be taking and size of the patient.

Learn and practise thorough medication history taking:

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- 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;
- Enquire if there are any medications they have been advised to take but do not actually take;
- Make sure what the patient actually takes matches your list. Be particularly careful about this across transitions of care. Practise medication reconciliation on admission to and on discharge from hospital, as these are high-risk times for errors [5] due to misunderstandings, inadequate history taking and poor communication systems;
- 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 a thorough allergy history. Remember, when taking an allergy history, if a patient has a potentially serious allergy *and* they have a condition where staff may want to prescribe that medication, this is a high-risk situation. Alert the patient and alert other staff.

Know which medications are high risk in your area and take precautions

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Some medications have a reputation for causing adverse drug events. This may be due to a narrow therapeutic window, particular pharmacodynamics or pharmacokinetics or the complexity of dosing and monitoring.

Examples include insulin, oral anticoagulants, neuromuscular blocking agents, digoxin, chemotherapeutic agents, IV potassium and aminoglycoside antibiotics. It may be useful finding out from the pharmacist or other relevant staff in your area what medications tend to be most often implicated in adverse medication events and invest time teaching about these agents.

Know the medications you prescribe well

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Never prescribe a medication you do not know much about. Encourage students to do homework on medications they are likely to use frequently in their practice. They should be familiar with the pharmacology, indications, contraindications, side-effects, special precautions, dosage and recommended regimen. If they have a need to prescribe a medication they are not familiar with they need to read up on the medication before prescribing. This will require having ready reference material available in the clinical setting. It is better to know a few drugs well than many superficially. For example, rather than learning about five different non-steroidal anti-inflammatory drugs, just know one in detail and prescribe this one.

Use memory aids

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Perhaps in the past it was possible to remember most of the required knowledge regarding the main medications in use. However, with the rapid growth in available medications and the increasing complexity of prescribing, relying on memory alone has become inadequate.

Students need to be encouraged to have a low threshold to look things up, they need to become familiar with using memory aids and they need to view relying on memory aids as a marker of safe practice rather than a sign that their knowledge level is inadequate. Examples of memory aids are textbooks, pocket sized pharmacopoeias and information technology such as computer software (decision support) packages and personal digital assistants. A simple example of a memory aid is a card with all the names and doses of medication that may be needed in the situation of a cardiac arrest. This card can be kept in the doctor's pocket and referred to in the event of an emergency when there may not be time to get to a textbook or computer to check the dose of a medication. Note that memory aids are also referred to as cognitive aids.

Remember the five Rs when prescribing and administering medication

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In many parts of the world, nursing education has emphasized the importance of checking the "five Rs" before administering a medication. The five Rs are: right drug, right route, right time, right dose and right patient. This is just as relevant for doctors, both when prescribing and administering medication. Two additions to the five Rs in use are right documentation and the right of a staff member, patient or carer to question the medication order.

Communicate clearly

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It is important to remember that safe medication use is a team activity that also includes the patient. Clear unambiguous communication will help to minimize assumptions that can lead to error. A useful maxim to remember when communicating about medications is to "state the obvious" as often what is obvious to the doctor is not obvious to the patient or the nurse.

Remembering the 5 Rs is a useful way of remembering the important points about a medication that need to be communicated. For example, in an emergency situation a doctor may need to give a verbal drug order to a nurse, "Can you please give this patient 0.3mls of 1:1000 epinephrine intramuscularly as soon as possible?" is much better than saying, "Quick, get some adrenaline".

Another useful communication strategy is to "close the loop". This decreases the likelihood of misunderstanding. In our example, the nurse would close the loop by saying, "Okay, so I will give the patient 0.3mls of 1:1000 epinephrine intramuscularly as soon as possible".

Develop checking habits

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It is helpful to develop checking habits early. To do this they need to be taught at undergraduate level. An example of a checking habit is to always read the label on the ampoule before drawing up a medication. If checking becomes a habit, then it is more likely to occur even if the clinician is not actively thinking about being vigilant.

Checking needs to be part of prescribing and administration. You are responsible for every prescription you write and drug you administer. Check the 5 Rs for allergies. High-risk medications and situations require extra vigilance with checking and double-checking, for example, using very potent emergency drugs in a critically ill patient. Checking on colleagues' actions as well as your own actions contributes to effective teamwork and provides another safeguard.

Remember that computerized prescribing does not remove the need for checking. Computerized systems solve some problems (e.g. illegible handwriting, confusion around generic and trade names, recognizing drug interactions), but present

a new set of challenges. [6]

Some useful maxims regarding checking:

- Unlabelled medications belong in the bin.
- Never administer a medication unless you are 100% sure you know what it is.

Encourage patients to be actively involved in their own care and the medication use process:

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- Educate your patients about their medication and any associated hazards;
- Communicate plans clearly with patients. Remember that the patient and their family are highly motivated to avoid problems, so if they are made aware that they have an important role to play in the process, they can contribute significantly to improving the safety of medication use;
- Information can be both verbal and written and should cover the following aspects:
 - 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 the medications that they take and details of any allergies or problems with medications in the past. This list should be presented whenever they interact with the health-care system.

Report and learn from medication errors

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Discovering more about how and why medication errors occur is fundamental to improving medication safety. Whenever an adverse drug event or near miss occurs there is an opportunity for learning and improving care. It will be helpful for your students if they understand the importance of talking openly about errors and

are aware of what processes are in place in your area to maximize learning from error and progress in medication safety.

Safe practice skills for medical students to develop practice

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Although medical students are generally not permitted to prescribe or administer medication until after graduation, there are many aspects of medication safety that students can start practising and preparing for. It is hoped that the following list of activities can be expanded upon at multiple stages throughout a medical student's training. Each task on its own could form the basis of an important educational session (lecture, workshop, tutorial). Thorough coverage of these topics is beyond the scope of an introductory session to medication safety.

An understanding of the inherent hazards of using medicines will affect how a clinician performs many daily tasks. Below are examples of what a safety conscious clinician will do.

- **Prescribing:** Consider the 5 Rs, know the drugs you prescribe well, tailor your treatment decisions to individual patients, consider individual patient factors that may affect choice or dose of medication, avoid unnecessary use of medicines and consider risk benefit ratios;
- **Documentation :** Clear, legible, unambiguous documentation. Those who struggle to write neatly should print. Consider the use of electronic prescribing if available. Include patient, dose, drug, route, time and schedule as part of documentation;
- **Use of memory aids:** Have a low threshold to look things up, be familiar with available memory aids, look for and use technological solutions if available and effective;

- **Teamwork and communication surrounding medication use:** Remember that drug use is a team activity, communicate with the other people involved in the process and make sure that false assumptions are not being made. Be on the look out for errors and encourage the rest of the team to be vigilant of their own and others actions;
- **Medication administration:** Be familiar with the hazards and the safety precautions of administering medication by different routes—oral, sublingual, buccal, inhaled, nebulized, transdermal, subcutaneous, intramuscular, intravenous, intrathecal, per rectum and per vaginam. Check the 5 Rs whenever administering a medication;
- **Involve and educate patients about their medications:** Look for opportunities and ways to help patients and carers help themselves to minimize errors;
- **Learn and practise drug calculations:** Be familiar with how to manipulate units, adjust volumes, concentrations and doses. In high-stress and or high-risk situations consider ways to decrease the chance of a calculation error such as using a calculator, avoiding doing sums in your head (use pen and paper), asking a colleague to also perform the calculation and see if you concur and use available technology;
- **Performing a medication history:** Always take a thorough medication history before prescribing and regularly review patients' medication lists, especially patients on multiple medications. Cease all unnecessary medications. Always consider medication as a possible cause of symptoms during the diagnostic process;
- **Performing an allergy history:** Always ask about allergies before prescribing a medication. If a patient has a serious allergy, stop and think if the patient is at risk of someone wanting to prescribe the medication

they are allergic to. For example, if a community doctor sends a patient to hospital with suspected appendicitis and the patient has a serious penicillin allergy, it is possible that there will be some momentum within the hospital to give the patient penicillin. In this situation, it is important to emphasize the allergy in communication with the hospital staff, warn the patient that the usual treatment for appendicitis involves penicillin-based antibiotics and encourage the patient to be alert to what medication they are being given and to speak up if someone tries to give them a penicillin;

- **Monitoring patients for side-effects:** Be familiar with the side-effects of the medications you prescribe and be proactive in looking for them. Educate patients about potential side-effects, how to recognize them and appropriate actions should they occur. Always consider medication side-effects as part of the differential diagnosis when assessing patients with undifferentiated clinical problems;
- **Learn from medication errors and near misses:** Learn from errors through investigation and problem solving. If an error can occur once it could occur again. Consider strategies to prevent recurrence of error at both an individual practitioner level and an organizational level. Be familiar with how to report errors, adverse reactions and adverse events involving medication.

Summary Slide

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Medications can greatly improve health when used wisely and correctly. Nevertheless, 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.

HOW TO TEACH THIS TOPIC

Teaching strategies/format

There are a variety of ways to teach medical students about medication safety and a combination of approaches is likely to be most effective.

Options include: interactive lectures, small group discussions, PBL, practical workshops, tutorials, project work including tasks to be undertaken in the clinical environment and at the bedside, online learning packages, reading and case analysis.

Lecture presentation and/or group discussion

The PowerPoint presentation included in this package is designed for use as an interactive introductory lecture to medication safety or a teacher-led small group discussion. It can be readily adjusted to be more or less interactive, and can potentially be adapted to your clinical setting if you include local examples, local issues and local systems. There are a series of questions interspersed throughout the presentation to encourage students to actively engage with the topic and also short cases with questions and answers that could be embedded in the lecture or provided for the students as a separate exercise.

Below are listed some other educational methods and ideas to consider using for teaching on medication safety.



Problem-based learning

Use cases that raise issues relevant to medication safety.

Online activities

Suggested activities include:

- responding to reflective questions after reading through a case;

- learning about high-risk medications;
- working through a drug calculations training package.

Teaching and learning activities

Practical workshops

Suggested topics include:

- drug administration;
- prescribing;
- drug calculations.



Project work:

Suggested topics include:

- interview a pharmacist to find out what errors they commonly see;
- accompany a nurse on a drug round;
- interview a nurse or doctor who administers a lot of medication (e.g. an anaesthetist) about their experience and knowledge of medication error and what strategies they use to minimize the chance of making a mistake;
- research a medication that has a reputation for being a common cause of adverse events and presenting what has been learnt to fellow students;
- prepare a personal formulary of medications likely to be commonly prescribed in the early postgraduate years;
- perform a thorough medication history on a patient on multiple medications—do some homework to learn more about each of the medications, then consider potential side-effects, drug interactions and if there are any medications that could be ceased for your patient; discuss your thoughts with a pharmacist or doctor and share what you have learnt with fellow students;
- find out what is meant by the term “medication reconciliation” and talk to hospital staff to find out how this is achieved at your hospital; observe and, if possible, participate in the process during admission

and discharge of a patient and consider how the process may prevent errors and also whether there are any gaps or problems with the process.

Role plays

Supplied by Amitai Ziv, The Israel Centre for Medical Simulation, Sheba Medical Centre, Tel Hashomer, Israel.

Scenario I

Erroneous administration of drugs

Description of event

During the early hours of the morning shift, the morning shift nurse administered subcutaneous regular insulin 100 units, instead of 10 units as was written in the physician's order. The error stemmed from the physician's illegible handwriting.

The patient suffered from dementia, was uncooperative and seemed to be asleep. During the nurse's regular checkup, she discovered the patient to be completely unresponsive. A blood test confirmed that the patient was in a state of hypoglycemic shock. The on-call physician was called, and the error was discovered.

The patient was treated with an infusion of glucose 50% IV. A crash cart was brought to the patient's room to be on hand. The patient recovered within a few minutes, woke up and began behaving normally.

Role playing actor

Later on in the morning shift, the patient's son, a lawyer, comes to visit his father. Looking agitated, he turns to the nurse asking, "What happened to my father?" His father's room-mate told him there was a problem and there were many people at his father's bedside at the beginning of the morning shift. The nurse responsible for the error and care

of the patient is called to speak with the patient's son.

If the nurse explains the chain of events, takes responsibility for and admits her error, the patient's son is not placated and retorts, "Is that the level of care my father has been receiving?", "What kind of nurses work in this ward?", "I won't have it, I will take action!", "I demand to speak to the chief or head physician immediately!", "I demand to see this event's report!". Needless to say, if the nurse does not explain the error and its details, the patient's son is upset and unwilling to accept any kind of explanation.

A physician passing by overhears the conversation and enters the room.

The physician will enter the room if the actor asks him to. If the actor does not request the physician, the physician will enter the room after approximately 8 minutes (12-minute scenario). The physician will enter the room and ask about last night. The nurse will update him as to this morning's events and her conversation with the patient's son (either in his presence or not, depending on the physician and nurse).

Role playing actor: description

RY, 45 years old, is a well-dressed lawyer. He visits with his father whenever possible. He does not attend to his father; rather, he hovers over him with unrest. He is interested in everything going on around him, but is having difficulty accepting his father's new medical state: confused, neglected and a bit sunken. He really wants to help, but does not know with what. A conversation with the social worker reveals that previously there was never a need for him to care for his father, but ever since his mother fell and broke her leg and his father's situation has deteriorated, the burden of their care rests on his shoulders alone.

Actor tips

The actor must intervene; complain to the head physician of a cover-up and omission of facts; threaten with negative publicity (going to the press) (i.e. “You almost killed him! You’re lucky it didn’t end that way!”)

Scenario II

Death due to erroneous medical care

Description of event

ST, 42 years old, was admitted for the re-section of a localized, non-metastatic malignant duodenal tumour.

ST was otherwise healthy, without any family history of malignancy. The patient had consented to surgery and any other treatment deemed necessary afterwards, according to pathology results.

On the morning of surgery, the patient said goodbye to her husband and two young children (ages 13 and 8). A small localized mass was resected in its entirety. The mass was sent to pathology for diagnosis. Two hours into surgery, the patient showed signs of decreased saturation, tachycardia and hypotension. The patient received IV fluids and young, while the surgeon re-checked the re-section site for signs of haemorrhage, a tear or an embolism. After finding nothing, the surgeon sutured the site according to protocol.

Upon return to the ward, the patient quickly developed a high fever, which remained unchanged for a week. A medical order for antibiotics was written:

IV. GARAMYCIN 80 MGR X 3 P/D

The nurse copied the following order:

IV. GARAMYCIN 80 MGR X 3 P/DOSE

The nurse who copied the order mistook the letter “D” to mean “dose”, while the physician who wrote the order actually meant “day”. Over the next 10 days, the patient received 240 mg of Garamycin, three times daily.

During that time, the patient began showing signs of renal failure and hearing impairment. On the tenth day of treatment, as the head nurse was taking stock of the drugs administered, the error was discovered. The treatment was stopped, but the patient’s general status deteriorated due to acute renal failure progression; 10 days later, the patient died of generalized organ failure.

The patient’s family was critical of the nursing staff throughout the hospitalization, blaming them for malpractice. They expressed their anger to the head nurse and the department chief.

After the patient died, her husband asks to speak to the head nurse. He blames the nurses for the error and malpractice that culminated in his wife’s death. He claims to have already discovered which nurse copied the order, and threatens to sue her.

Role playing actor: description

The patient’s husband is a hard-working man, working in a store. He has difficulty providing for his family and is struggling to make ends meet. He is an angry and restless man who has not yet come to terms with his wife’s cancer diagnosis. He is angry with everyone and especially with the nursing staff, after his wife told him she received too many antibiotics because “the nurse couldn’t do math”. He wants to know what killed his wife, who is at fault and who is going to pay for it. He wants top hospital management involved, and wants help for his children. He is very upset, and shouts a lot.

Scenario III

Patient–caregiver communication

Description of event

KL, 54 years old, has been admitted due to transient chest pain complaints. He has been previously hospitalized in the ICU due to acute coronary events. This time, preliminary test results have been inconclusive, and his pain is not as severe. The physician has ordered complete rest and continuous 48 hour cardiac monitoring. KL is a heavy smoker, and is overweight. He has not been taking his prescribed medication for high blood pressure and high cholesterol.

The patient demands to be released immediately. He is afraid his hospitalization may cause him to lose his job at an automobile factory.

His anger is directed at the nurse-in-charge of the evening shift. He claims he was promised he would be discharged and that there is no need for him to be monitored or for complete rest. He is uncooperative. He has already convinced a young nurse that he is right, and she has let him leave the ward. Now, he demands to leave the ward again and refuses to remain in his room. He demands to smoke and wants to be discharged. He is angry and shouting by the nurses' station.

Assuming the nurse-in-charge insists he stay in the ward, the patient will accuse her of being insensitive, and will claim the younger nurse was nicer, more empathetic and understanding compared to the older nurse, who is more conservative and strictly adheres to protocol and bureaucracy.

The on-call physician is in the vicinity, but does not intervene and continues caring for other patients (some of which are near the nurses' station where the event is taking place).

Role playing actor: description

Irresponsible man, overweight, heavy smoker, shouts. Enjoys getting attention by shouting. He is very concerned that he will not be able to work as much and may be fired. He is very afraid of surgery, as his best friend died on the operating table two years ago at the same hospital.

Scenario IV

In-patient fall

Description of event

ED, 76 years old, was admitted to the ward due to recurrent falls, reporting continuous dizziness and instability. During his first night, he was helped out of bed several times in order to use the restroom. At 07:30, the patient's wife found him lying on the floor, with facial contusions and in pain. The patient does not remember what happened.

The nurses helped the patient back into his bed and treated his lacerations. Three hours later, he was examined by a physician, who ordered X-rays of the head, spine and limbs. The X-rays showed a fracture of the neck of the femur, as well as fractures in both hands. The patient underwent surgery. During his recovery, the patient was diagnosed with right-side hemiplegia and slight aphasia.

The patient is in pain, angry and suffering. His entire family has been called in. Most of the patient's anger is directed towards the nursing staff, which "didn't watch over him" and "didn't supervise" him. The family attributes the patient's further complications to the surgery.

In a heated discussion, the patient's son accuses the nurses of malpractice, "You're killing my father. You do not care about him because he's old. You were drinking coffee and didn't answer my father's calls..." His anger is directed towards the nurse-

in-charge of the shift and the nurse in charge of ED's care.

Role playing actor: description

GD, the patient's son, is a 34-year-old taxi driver living with his parents. He was not close to home when he learnt what had happened and, therefore, was only able to reach the hospital five to six hours after the event. He enters the ward and immediately asks to see his father and the nurse responsible for his fall. He has already been updated by other members of his family as to his father's complications after surgery.

Actor tips

You and your father are very close. You are a very uptight man. Your taxi driver friends usually think that medicine is not to be trusted.

TOOLS AND RESOURCES

Activities that can be included as part of the PowerPoint presentation, to help make the presentation more interesting, engaging and effective.



Case 1 with questions for discussion: a prescribing error

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. But the medication is actually a beta-blocker which he takes every day for migraine. A different doctor prescribed this medication. 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.

Case 2 with questions for discussion: an administration error

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 IV 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 IV 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 woman received 1 mg IV.

Case 3 with questions for discussion: a monitoring error

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 three to six months. However, neither 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. The patient is prescribed a course of antibiotics for a dental infection. Nine days later the patient becomes unwell with back pain and hypotension, a result of a spontaneous retroperitoneal haemorrhage, requiring hospitalization and a blood transfusion. Blood coagulation test reveals a grossly elevated result; the antibiotics have potentiated the therapeutic anticoagulant effect.

WWW TOOLS AND RESOURCES

WHO patient safety solutions

These are summary documents detailing solutions for patient safety problems. A number of them concern medication issues:

Solution 1 – look-alike, sound-alike medication names

Solution 5 – control of concentrated electrolyte solution

Solution 6 – assuring medication accuracy at transitions in care

Solution 7 – avoiding catheter and tubing misconnection

Solution 8 – single use of injection devices

These documents can be found at www.who.int/patientsafety/solutions/en/.

The web site www.webmm.ahrq.gov has case archives that can be used for potential case studies that may be helpful in your teaching.

Institute for Safe Medication Practices at www.ismp.org.

National Patient Safety Agency at www.npsa.nhs.uk.



Educational DVDs

Beyond Blame documentary. This DVD runs for 10 minutes and is a powerful way to engage students in the issue of medication safety.

It consists of a doctor, a nurse and a pharmacist talking about serious medication errors they have been involved in. This DVD is available for purchase through the Institute for Safe Medication Practices—Preventing Medication Errors at www.ismp.org

WHO *Learning from error* workshop includes a DVD depiction of a medication error – the administration of intrathecal vincristine. The DVD illustrates the multifactorial nature of error.



Books

Vicente K. *The human factor*. London, Routledge, 2004:195–229.

Cooper N, Forrest K, Cramp P. *Essential guide to generic skills*. Blackwell Publishing, 2006.

Institute of Medicine. *Preventing medication errors: quality chasm series*. Washington, DC, National Academy Press, 2006 (<http://www.iom.edu/?id=35961>).

HOW TO ASSESS THIS TOPIC

Assessment strategies/formats

A variety of assessment methods can be used to assess medication safety knowledge and performance elements including:

- MCQs;
- drug calculation quiz;
- short answer questions;
- written reflection on a case study involving a medication error, identifying the contributing factors and considering strategies to prevent recurrence;
- project work with accompanying reflection on learning outcomes of the activity;
- OSCE—potential stations include:
 - perform a medication and allergy history;
 - administer a medication checking the 5 Rs

- and for allergies;
- prescribing exercises;
- educate a patient about a new medication.

Note that several of these potential assessment topics are not covered in detail in the accompanying PowerPoint presentation on introduction to medication safety. They are included here as ideas for assessment in the area of medication safety on the assumption that students would have additional teaching on these particular aspects of medication safety.

HOW TO EVALUATE THIS TOPIC

Evaluation is important in reviewing how a teaching session went and how improvements can be made. See the Teacher's Guide (Part A) for a summary of important evaluation principles.

References

1. World Health Organization. *The conceptual framework for the international classification for patient safety*. Geneva, World Health Organization, World Alliance for Patient Safety, 2007.
2. Institute of Medicine. *Preventing medication errors*. Report brief. Washington, DC, Institute of Medicine, National Academy Press, July 2006.
3. Kohn LT, Corrigan JM, Donaldson MS, eds. *To err is human; building a safer health system*. Washington, DC, Committee on Quality of Health Care in America, Institute of Medicine, National Academy Press, 1999.
4. Runciman WB et al. Adverse drug events and medication errors in Australia. *International Journal for Quality in Health Care*, 2003, 15(Suppl. 1):49–59.
5. Vira T, Colquhoun M, Etchells E. Reconcilable differences: correcting medication errors at hospital admission and discharge. *Quality & Safety in Health Care*, 2006, 15(2):122–126.
6. Koppel R, Metlay JP, Cohen A. Role of computerised physician order entry systems in facilitating medication errors. *Journal of the American Medical Association*, 2005, 293(10):1197–1203.

SLIDES FOR TOPIC 11: IMPROVING MEDICATION SAFETY

Didactic lectures are not usually the best way to teach students about patient safety. If a lecture is being considered, it is a good idea to plan for student interaction and discussion during the lecture. Using a case study is one way to generate group discussion. Another way is to ask the students questions about different aspects of health care that will bring out the issues contained in this topic such as the blame culture, nature of error and how errors are managed in other industries.

The slides for topic 11 are designed to assist the teacher deliver the content of this topic. The slides can be changed to fit the local environment and culture. Teachers do not have to use all of the slides and it is best to tailor the slides to the areas being covered in the teaching session.