

Chapter 1

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DRUG ADMINISTRATION: GENERAL PRINCIPLES

Medicine Management Skills for Nurses, First Edition. Claire Boyd

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LEARNING OUTCOMES

By the end of this chapter you will have an understanding of the general principles of drug administration.



GLOSSARY

Professionalism in nursing

Nurses are expected to display competent and skilful behaviour.

PROFESSIONALISM

You may well worry about making mistakes. Everyone is human after all and prone to error. The key is to minimise where the faults can occur. As health carers we *always* put the patient first and apply our professionalism. As with any clinical skill we need to highlight the importance of vigilance, knowledge and professionalism when administering drugs, as many drug errors occur when staff fail to follow correct procedures or do not recognise the limitations of their own knowledge and skill.

So, why do drug errors occur? Well, research tells us that mistakes happen due to:

- 1 drugs that look or sound alike,
- 2 high staff workload,
- 3 low staffing levels,
- 4 inexperienced staff.

TIME-AND-MOTION STUDIES



QUESTION

Question 1.1 How much time do you think nurses spend during a shift dispensing and administering drugs?

The UK Department of Health informed us in 2007–2008 that 'Each hospital in England and Wales administers about 7,000 medicine doses each day, and this activity can take up a substantial amount of nurses' time.' (*Safety in Doses: Improving the Use of Medicines in the NHS, 2007–2008*, Department of Health)

The Department of Health report *A Spoonful of Sugar* (2001) estimated that 40% of nursing time is spent administering medicines.

However, there are more up-to-date studies and research suggesting that the nurse's time is broken down into these categories:

- documentation, 35.3%;
- medication administration, 17.2%;
- care co-ordination (handovers, etc.), 20.6%;
- patient care activities, 19.3%;
- patient assessment (observations), 7.2%.

Whichever time-and-motion study you wish to go by, it is obvious that a large proportion of the nurse's time is spent on drug administration.

LATIN ABBREVIATIONS

We have all seen the medic on the TV hospital soap opera shouting 'adrenaline stat!' in the emergency room but what does 'stat' actually mean? Well, it means we need to be conversant with Latin abbreviations, that's what it means.

Have a go at seeing how many of the Latin abbreviations you know in Activity 1.1.



Activity 1.1

Here is a list of Latin abbreviations used when prescribing. What do they mean?

STAT
AC
BD
OD

OM
ON
PC
PRN

QDS
QQH
TDS
TID



We tend to use specific accepted abbreviations in health care to do with medicines, such as mg, PRN, IV, etc., but not mcg as we write micrograms in full so as not to get confused with mg. Healthcare workers are told not to use abbreviations in their written care plans, medical records, etc., as mistakes can happen. Terms may have two meanings: for instance, DOA can be taken to mean dead on arrival *or* date of admission.

DRUG WASTAGE

Another area of investigation by the Audit Office concerns wastage of drugs: the Audit Office found that Primary Care Trusts could save almost £7 million each year if general practitioners (GPs) prescribed more efficiently. Wastage costs the National Health Service (NHS) approximately £200 million. I'm sure we have all met the elderly neighbour with bottles of pills dating back 10 years or more collecting dust in their bathroom cabinets. As health carers we all need to deliver better patient education, explaining why that course of antibiotics that the GP prescribed needs to be completed, even if the patient is feeling better.

Here's a question: what do you think about schemes to recycle drugs back to the pharmacist to be redistributed to other patients? What if the bottles have been opened and the drugs spilled over a dirty floor and put back in the bottle (perhaps even licked by the dog!). Would *you* like to take them? Only use sealed bottles and unopened blister packs, I hear you say, but what if these had been stored on top of a heater for the last 6 months and become unstable?

PROFESSIONAL JUDGEMENT

When administering medication, we need to be aware of the following.

- It is not solely a mechanistic task to be performed in strict compliance with the written prescription of a medical practitioner.
- It requires thought and the exercise of professional judgement (Dougherty and Lister, 2011).

What does this actually mean? Let's look at an example.



Question 1.2 If a patient has senna and lactulose prescribed and informs you that they have opened their bowels four times that day, do you administer their prescribed laxatives?

Also remember, it is very easy to get distracted, and lose concentration in the clinical area, so always concentrate on the job in hand.

MEDICATION PROCESS

The medication process is made up of four parts.

- *Prescribing*: it is often the nurse who notices that a doctor has prescribed something to which the patient is allergic, perhaps because the nurse knows the patient better.
- *Dispensing and preparation*: a nurse should not use trade names for drugs as confusion may occur, for example Voltarol instead of diclofenac sodium. Perhaps the pharmacist has reconstituted the medication with the wrong transport medium, for example sodium chloride instead of water for injection.

- *Administration:* you need to be very clear which route a medication should be given through and that the dose has been calculated correctly.
- *Monitoring:* you need to check the administration and effect of a medicine on the patient. For example, a patient prescribed diclofenac sodium must be checked to see whether they are asthmatic. Patients with hypertension or heart failure must be monitored carefully if they are given diuretics. Blood pressure, fluid input and output, and sodium and potassium, etc., must be checked.

Any one of these categories could be the weak link where a mistake can occur.

The Department of Health reports that the wrong dose, strength or frequency of a drug accounts for over a quarter of all medication incident reports.

COMPLEMENTARY MEDICATION

What about complementary medication? Anticoagulants may react with ginseng, ginkgo Biloba (for improved memory and brain circulation) and should be discontinued 36 hours prior to surgery, and the contraceptive pill can be affected by antibiotics. If in any doubt speak to a pharmacist who can give advice. Never give a drug if you are unsure. Seek advice.



GLOSSARY

Complementary medicine

A broad term used to describe medicines used in *conjunction* with conventional medicine.

MEDICATION ERRORS

Let's look at some facts and figures around drug administration. According to the Department of Health:

- 40 000 mistakes a year are made in NHS hospitals,
- 2000 errors cause moderate to severe harm,

- 36 patients die per year,
- costs are estimated to be £2 billion per year to the NHS,
- the reporting rate is poor: 39% of near misses go unreported,
- poor mathematics skills have been indicated in medication errors, such as the misplacement of a decimal point.

These figures are meant to be conservative, as we know that the reporting rate of medication errors is poor (39% of near misses go unreported). This is known as the iceberg effect.



Question 1.3 What is a near miss? Think of an example.

What is a drug error? Well, the Department of Health informs us that:

A medication error is any *preventable* event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of health professional, patient or consumer.

Because nurses predominately administer drugs, they are often the last potential barrier between a medication error and serious harm to a patient, with drug errors frequently featuring in professional misconduct cases.



Question 1.4 Apart from killing the patient, what is the worst thing you can do when you have made a drug error?

Drug Administration Routes

When administering medications, we also need to be completely conversant with the mode of administration, or route. A very sad case involved a young boy called Wayne

Jowett who died as a result of being given his medication 'ITH' instead of intravenously (which is written as 'IV').

If you saw the route written as 'ITH' on a prescription chart, what do you think this would mean? Let's look at this and other abbreviations that you may encounter.



Activity 1.2

Here is a list of abbreviations for routes of drug administration. Can you work out what they mean?

- | | | | | | |
|---|-----------|---|----|---|-----|
| 1 | ITH | 4 | IV | 7 | INH |
| 2 | SC | 5 | IM | 8 | NEB |
| 3 | INTERDERM | 6 | O | 9 | TOP |



In the North Bristol NHS Trust, very few abbreviations are permitted to be used on a drug chart: SC, IM, IV, O, NEB, TOP and INH. Everything else has to be written out in full so that mistakes don't get made.

Keeping Updated

As well as being conversant with the route abbreviations, if we are administering drugs we need to keep ourselves updated about changes to drug names, as well as contraindications.

Paracetamol (derived from coal tar; also known as acetaminophen) can now be given by the intravenous route, but is obviously much more expensive than oral paracetamol and has a shorter half-life. This means that it is less effective over a longer time span and, as pain is considered to be the fifth vital sign, we need to be aware of this when keeping our patients comfortable and pain free.

Drug Errors and Adverse Reactions

The NHS has graded drug errors and adverse reactions, as follows.

- 1 Medication errors that do not result in patient harm, i.e. near misses (example: a dose of 500 mg amoxycillin is prepared instead of 250 mg, but corrected before reaching the patient).
- 2 Medication errors that result in patient harm (example: giving an antibiotic to a patient with a known allergy to that drug).
- 3 An adverse drug reaction that is not the result of a medication error (example: giving antibiotics to a patient with no previous history of drug reactions, but who then reacts: this is the only non-preventable type of mistake).

Single-Nurse Administration

In most adult hospital settings it is one nurse who administers the medications to the patients. This is considered to be the safest option as it is thought that the lone nurse will take extra care due to their sole responsibility. The exception to this is often injected drugs and controlled drugs, whereby two nurses check and sign for the drug and go to the patient's bedside together to administer the drug.

When there are any calculations or working out to do, two nurses should also check their workings out to agree on the correct answer and dose that the patient requires.



GLOSSARY

Paediatric patients

These patients are infants, children and adolescents.

PAEDIATRIC PATIENTS

When medication errors occur, paediatric patients have a higher risk of death than adults due to the fact that most drugs are developed in concentrations for adults, necessitating often complex weight-based calculations for paediatric doses and dilutions.

One of the special safeguards the paediatric clinical areas often have in place is that two nurses have to check and sign the prescription chart. One of these should be a Registered Paediatric Nurse.



Question 1.5 Other than paediatric patients, who may be considered as another high-risk group?

ADMINISTERING DRUGS SAFELY

Drug Administration Competence

Many hospitals have drug administration competencies for staff to 'prove' that they are competent in the clinical skill of drug administration (see Appendix 1). Only when these competencies have been signed off can a nurse in adult nursing administer medications alone.

Calculations Competence

Also, in order to be able to administer intravenous medications, staff are required to pass a drug calculations test to prove mathematical ability, as poor mathematical skills have been indicated in medication errors with the misplacement of the decimal point leading to a tenfold error overdosing or under-dosing.

Activity 1.3 shows a sample question of the sort that you may be expected to answer in one of these tests.

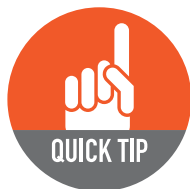


Activity 1.3

Drug calculations sample question.

A drug is presented as 5 g in 500 mL. A patient weighing 70 kg is prescribed 10 mg/kg/h of the drug.

- 1** How many milligrams per hour of the drug does the patient need?
- 2** How many millilitres per hour do you set the infusion pump?



Remember to first work out how much of the drug the patient requires according to their body weight by using the formula $\text{weight (kg)} \times \text{dose}$, and then using the formula:

Volume of drug to be given = $\frac{\text{what you want}}{\text{what you've got}} \times \text{volume}$

But remember to keep the decimal units the same throughout the formula.

The Prescription Chart

Now let's look at the prescription chart (see Appendix 2), which is used in the hospital setting. This is a typical prescription chart. The first page of this chart has a section for drug allergies or sensitivities but also includes *anything* to which the patient considers themselves sensitive or allergic.

Certain foodstuffs are linked to latex proteins, so if a patient informs us that they are allergic to kiwi fruit, bananas or avocado, they are probably allergic to latex because these food items have the same protein chains as latex. The patient must then be considered as latex sensitive. Any equipment used with this patient must be latex-free. This is why it is vital that a good, robust admission procedure is performed on each patient so that their medical history is fully known. Details can then be written on the prescription chart to alert colleagues; this goes on the front of the chart where it says Drug allergies/sensitivities. In this case you would write 'allergic to bananas.'



Question 1.6 Why do you think it is important that we know not just what medications the patients are allergic to, but also what foodstuffs?

The second page of the prescription chart gives the recommended times of antibiotic therapy. Page 3 of the chart gives us code numbers for why a drug was omitted, and page 4 is where we document the rationale for a drug not being administered; that is, why it was omitted. It is classed as neglect if a drug has been omitted for no good reason, and an accident/incident form will need to be completed.

Improving Medication Safety

The National Safety Patient Agency (NPSA) has produced seven key actions to improve medication safety in its report, *Safety in Doses* (Table 1.1).

Table 1.1 Seven key actions to improve medication safety

Increase reporting	Increase reporting and identify actions against local risks by way of an annual medication report: clinical risk.
Implement NPSA safer medication practice recommendations	Implement NPSA recommendations – audit safer medication practice – includes alerts on anticoagulants, injectable medications and wrong-route errors.
Improve staff skills and competencies	Improve skills: preceptorship competencies will help nurses to work towards the required level of competence.
Minimise dosing errors	Minimise errors: information, training and tools to make calculations easier.
Ensure medicines are not omitted	It also can be linked with neglect when medications are not given. The NPSA reviews medicine storage and medication supply chains.
Ensure medicines are given to the correct patient	Ensure correct medications with correct patient – improve packaging and labelling of medicines – support local systems that make it harder for staff to select the wrong medicine.
Document patient’s medicine allergy status	Document: improve recording of patient’s allergy status.

Data from Department of Health (2007).

Worldwide Facts and Figures

Some facts and figures concerning drug errors worldwide:

- worldwide: 17% of medication errors involve errors in calculations;
- almost 50% of all intravenous injections feature a mistake, and the number of patients requiring intravenous therapy is increasing.

As stated previously, this is considered to be only the tip of the iceberg, meaning only those that have been reported.

Reports and Safety Alerts

In order to alert health carers of the problems around drug administration, the Department of Health and NPSA issue reports and safety alerts, such as *Building a Safer NHS for Patients: Improving Medication Safety* (Department of Health, 2004), Patient Safety Alerts and Rapid Response reports:

- missed doses,
- venous thromboembolism – anticoagulant therapy (warfarin),
- promoting safer measurement & administration of liquid medicines,
- promoting safer use of injectable medicines,
- safer practice with epidural injections and infusions.



Department of Health

The government department responsible for health regulation and policy in the United Kingdom.

Venous thromboembolism (VTE)

A medical condition including deep-vein thrombosis (DVT), whereby a blood clot forms inside a vein, and pulmonary embolism (PE), whereby part of the DVT breaks off and travels to the lungs, blocking the blood flow.

Patient Self-Administration of Medication

Health carers often take over the medication care of in-patients with diabetes and mess up their blood sugars by not being able to deliver their insulin and other medications at the correct times. Patients with Parkinson's disease also have strict regimes and we may again fail to deliver their medications on time, with profound effects to their independence and well-being. Many hospitals now have secure boxes at the bedside for patients to store their medication and allow them to self-medicate.

Remember that not all patients have the ability to do this; for example, patients with dementia or those too ill to administer their own medication. But please remember, patients with dementia may have windows of opportunity whereby they can self-medicate. As with all health care, this aspect of their care must be monitored frequently.

Many patients in the community have their medication distributed by their pharmacist into 'dosset' boxes, boxes that have timed sections or partitioned by morning, afternoon or evening, in order for them to take their medication.

Focus on the Task in Hand: Do Not Get Distracted

Many wards and clinical areas have notices on drug trolleys stating Do Not Disturb While Administering Drugs. This enables the member of staff to concentrate on the task in hand. Some institutions have trialled the wearing of tabards in clinical areas for staff administering drugs, alerting others in the area not to disturb them.

Bar-Coding Medications

Many hospitals now have a system of computer prescriptions using a hand-held device. The nurse swipes their own authorisation identity badge and the patient's wristband, which contains a chip that stores the patient's prescription with all the correct dosages already calculated.

This system is used in some parts of the USA and is said to prevent medication errors.

In a drive to become 'paperless' prescription charts may become a thing of the past, with us all using computer devices to access patient drug charts. But what if we rely on a computer and the computer makes a mistake?

Vicarious Liability



Question 1.7 What does vicarious liability mean?

We all need to comply with our Policies and Procedures, whether we work in a hospital, clinic or the community setting.

Procedure for Administering Medication

So, when administering medications, what is the correct procedure? The person administering a drug before giving it will:

- check the identity of the patient,
- check for any recorded allergy/sensitivity,
- check the drug name, dose form, strength, date and time,
- the route of administration,
- check for any additional instructions, including safety considerations,
- check the drug has not already been administered,
- check the drug label against the prescription,
- check the expiry date of the drug on the label,
- calculate the dose if appropriate.

Prescriptions should be written in black pen, clearly, using no drug trade names, and the member of staff should not be distracted from the task in hand. Medical gases should also be prescribed (except in emergency situations).

When administering medications, we should adhere to the so-called five rights:

- right medicine,
- right dose,
- right route,
- right patient,
- right time.

Checking the patient's name, name band and prescription chart is referred to as the three-point check.

Finally

Before administering any drug to any patient:

- go through the procedural steps for administering medication in your mind,
- go through the five rights,
- know your patient,
- know the drug and its contraindications.

Lastly, do not cut corners. We all have time constraints, but we must always adhere to the Code of Conduct of the Nursing and Midwifery Council (2008) in order to achieve safe, effective and professional care for our patients.

TEST YOUR KNOWLEDGE

- 1 What does STAT mean?
- 2 What does PRN mean?
- 3 What are the four parts of the medication process?
- 4 What route of administration is referred to if you see INH on a prescription chart?
- 5 A drug is presented as 1 g in 100 mL. A patient weighing 90 kg is prescribed 20 mg/kg/h of the drug.
 - (a) How many milligrams per hour of the drug does the patient require?
 - (b) For how many millilitres per hour do you set the infusion pump?
- 6 What are the five rights in regard to drug administration?

KEY POINTS

- Latin abbreviations used in drug administration.
- Using your professional judgement.
- The medication process.
- The routes of drug administration.
- Examples of drug administration competencies to be signed off during placements.
- Looking at the front sheet of the prescription chart.
- The procedure for the administration of medicines.

