Objectives

- Recognise the importance of clinical pharmacology as the scientific discipline that underpins a rational approach to prescribing medicines

- Understand the knowledge and skills required to:
  - Take a medication history
  - Prescribe drugs safely, effectively and economically
  - Write prescriptions that take into account the needs of individual patients

- Describe the factors that influence the choice of medicine and dose

- Explain the importance of monitoring the impact of drug therapy and describe the ways in which therapy can be monitored

Why learn about “Clinical Pharmacology” and “Therapeutics”?

- Pharmacological knowledge is essential to appropriate prescribing, and has been identified by junior doctors as an area to be strengthened in their training.

- Safe prescribing is not just about writing a prescription, but involves many cognitive and decision-making steps.
Prescribing

• Prescribing is a complex task requiring:
  • diagnostic skills
  • knowledge of medicines
  • an understanding of the principles of clinical pharmacology
  • communication skills (patient-centred approach)
  • appreciation of risk and uncertainty


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Prescribing

**Is something you will do every day**

• As newly qualified doctors you will be called upon to prescribe drugs many times every day.

• You need to be able to do it safely and effectively.

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Rational Prescribing

• Rational prescribers should attempt to:
  • maximise clinical effectiveness
  • minimise harms
  • avoid wasting scarce healthcare resources
  • respect patient choice.

Multiple steps are involved in rational prescribing

Prior to writing a prescription

Make a diagnosis

Patients come with symptoms not diagnoses

“Please give me stronger pain relief for a severe headache.”

Migraine
Medications
Sinusitis
Stroke
Giant cell arteritis
Brain tumour
Meningitis

“Please give me stronger pain relief for a severe headache.”

Postnasal drip
Asthma
Reflex
Post-infectious cough
Lung cancer
Tuberculosis
Psychogenic

“Please give me stronger pain relief for a severe headache.”

Medicine induced
Hypothyroidism
Hypercalcaemia
Colon cancer
Parkinson’s disease
Diabetes
In order to make a treatment decision you need to know…

What your treatment goals are

- Identify key management issues with the patient
  - e.g. patient’s ideas/expectations/goals, diagnosis, symptom control, disease modification (long-term consequences)

- Are current symptoms modifiable by symptomatic treatment or disease modifying treatment
In order to choose a medicine you need to consider...

- **Efficacy**
- **Safety**
- **Appropriateness**
- **Adherence**

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**Efficacy of a medicine**

- How effective are the treatment alternatives?
  - What is the evidence to support these treatment alternatives?

- There may be patient-related factors that affect efficacy
  - Age
  - Disease states
  - Pregnancy
  - Genetics
  - Other medicines
  - Other substances
  - Adherence

**Sources of information include**
- Colleagues
- Conferences
- Review articles
- Guidelines

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**Safety of a medicine**

- What are contraindications for using this drug in general and specifically in this patient?
  - Allergies
  - Concomitant disease including major organ failure

- What are common and potentially serious adverse effects that can occur with this drug?
  - Will these side effects affect my choice for this patient?

- What drug interactions need to be considered?
  - Drug-drug, drug-food, drug-disease

- Is the patient pregnant or lactating?
Determine the risks and benefits of each treatment

https://www.youtube.com/watch?v=F94QUszmwV4

Slide 17

**Appropriateness of a medicine**

- Can the patient afford it?

- Are there any considerations that need to be made for adherence?
  - Patient’s perspective, health beliefs
  - Dosing factors – timing, empty stomach etc
  - Needs blood tests and dose adjustments

- Consider non-pharmacological options

More than once a day
Empty stomach
Needs blood tests and dose adjustments

Slide 18

**Prior to writing a prescription**

- Make a diagnosis
- Make a therapeutic decision
- Choose a medicine
- Choose a dosing regimen
**Choose a “route of delivery”**

- **IV injection**
  - High concentrations in the blood rapidly
  - Instant and complete absorption
  - Potentially more dangerous

- **Depot preparations**
  - Release contents slowly over hours - months
  - May improve compliance
  - Require a deep injection

- **Skin patches and gels**
  - Lower peak concentration and extended duration of effect
  - Can bypass first pass metabolism
  - Skin reaction is potential adverse effect

- **Local delivery**
  - Site of action can be targeted
  - Reduces systemic effects

- **Oral tablets**
  - Slower rise to a later peak concentration
  - May be less complete absorption
  - May be subject to first pass metabolism

**Choose the dose**

- **Population**
  - The same dose for everyone

- **Group**
  - The same dose for similar group (e.g. weight, renal function)

- **Individual**
  - The dose is determined by the individual response

- The dose response relationship
- Therapeutic index
- Disease states that influence the response
- Potential drug interactions

**Diagnosis**

**Therapy**

**Medicine**

**Dosing regimen**

**Prescribe**
There is certain information that is essential for a legal prescription

- Doctor’s Name (name and initials)
- Signature
- Physical Address
- MCNZ registration number
- Contact phone number

It is essential that the prescription is legible
Each prescription has three parts

First Part - Rx or Recipe (translates as Take thou)
- Name of medicine
- Formulation e.g. caps, tabs, syrup, injection
- Strength of medicine

For amoxicillin this part of the prescription may read as:

\[ \text{Rx} \quad \text{Amoxicillin 500mg tabs} \]

Second Part – Sig or Signa (translates as ‘mark’ or ‘write’)
- These are the instructions for the patient.

For amoxicillin this may be written as:

\[ \text{Sig: i t.d.s. p.o} \]
• These can be more detailed.

• For warfarin this may be written as:
  Sig: 2mg nocte p.o.
  Take the dose as prescribed. You need regular INR tests to make sure this dose is safe for you

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Third Part – M or Mitte (translates as ‘send to a total of’)

• These are the instructions for the pharmacist.
• Specifies the quantity to be dispensed.

• For Amoxicillin may specify seven days supply:
  M: 7 days supply

• The maximum period of supply is 3 months except for oral contraceptive which is 6 months supply.

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Commonly used abbreviations

| Administration |  |  |
|----------------|  |  |
| ec             | before food |
| cc             | with food   |
| pc             | after food  |

| Frequency  |  |  |
|------------|  |  |
| tid        | twice daily |
| mane       | morning    |
| mid        | midday     |
| nocte      | night      |
| pm         | when required (as needed) |
| q4h        | every four hours |
| q6h        | every six hours |
| q8h        | every eight hours |
| q12h       | every twelve hours |
| QID        | four times a day |
| STAT       | immediately |
| TDS        | three times a day |

**Commonly used abbreviations**

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<th>Route</th>
<th>Description</th>
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<tr>
<td>buc</td>
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<td>sublingual</td>
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<tr>
<td>top</td>
<td>topical</td>
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<tr>
<td>PEG</td>
<td>percutaneous endoscopic gastrostomy</td>
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**Abbreviations to avoid**

- **mg or mg**: microgram. Misread as mg (milligram). Write microgram.
- **U or IU**: U = unit. Misread as U or IU. Write unit or international unit.
- **IU**: International unit. Misread as IU or I.U. Write international unit.
- **ng**: nanogram. Misread as milligram. Write nanogram.
- **Q.D., q.d., or Q.D.**: once a day, daily or every day. Misread as Q.D. (four times a day) or Q.D. (twice daily). Write daily or the intended time of administration (e.g., morning, night).
- **Q.D., q.d., or Q.D.**: every day (in USA only). Misread as Q.D. or BD. Write daily or the intended time of administration (e.g., morning, night).
- **Sc**: subcutaneous. Misread as SC (sublingual). Write subcutaneous or sublingual.
- **St. or S/I**: sublingual. Misread as SC (subcutaneous). Write sublingual or sublingual.

**After writing a prescription**

 Communicate with the patient

-after writing a prescription
You are the patient’s key source of information

- Medicine name and dose
- How and when to take it
- Reason(s) for prescribing medicine
- Benefits of treatment and when they should occur
- Possible adverse effects and how to manage them
- Possible interactions with food, drink and medicines
- Timing of follow-up

Don’t provide too much information when patient is not able to assimilate it (e.g. when worrying about other issues)


Health and Disability Code of Rights

- Right 5
  - The right to effective communication
- Right 6
  - The right to be fully informed
- Right 7
  - The right to make an informed choice and give informed consent

What else can you do?

- Provide sources of further information
- Discuss aids to adherence
e.g. medicine cards, adherence packs

http://www.douglas.co.nz/compliance-packaging/products/medico-pak/

Communicate with the patient
Monitor response

“Know the abnormality you are going to follow during treatment. Pick something you can monitor.”

What signs, symptoms and laboratory parameters should I monitor in this patient?

When and how often do I measure them?

Different monitoring strategies for different medicines –
Consider the goals of therapy

- **Clinical response**
  - If the clinical endpoint is easily measured.
  - Treatment of cancer
  - Cure of infection
  - Resolution of nausea

- **Biomarkers**
  - If biomarkers predict clinical response.
  - (cost, time, ease of measurement)
  - Prostate specific antigen
  - CD4 count
  - Full blood count

- **Drug concentration**
  - If there is no easily measured endpoint.
  - If the effects correlate better with drug conc. than dose.
  - Digoxin (arrhythmias, heart failure)
  - Phenytoin (epilepsy)
  - Lithium (mood disorders)

Indications for therapeutic drug monitoring

- An event is potentially serious but occurs infrequently.
  - Epileptic seizures, cardiac arrhythmias

- Narrow therapeutic index and a small increase in dose can lead to toxicity.
  - Phenytoin, digoxin

- Effects correlate better with blood concentrations than they do with dose.
  - Phenytoin, lithium

- Deciding whether or not a symptom is due to an adverse effect.
  - Detecting non-adherence.

After writing a prescription

1. Communicate with the patient
2. Monitor response
3. Review the medicine
Consider goals
- Consider the treatment goals and the patient's goals

Efficacy and safety
- Desired effects
- Adverse effects

Appropriateness
- Changes in the patient (clinical changes, age)
- Changes in medicines

Patient view
- Patient knowledge, understanding and concerns
- Adherence

Review a medicine after it has been started – Consider goals

Review medicines at regular intervals
- Offer repeat information and review to patients, especially when treating longterm conditions with multiple medicines
- Any plan should include the goal(s) of therapy and a date for a follow up review

Steps involved in prescribing
- Diagnosis
- Review
- Therapy
- Monitor
- Communicate
- Medicine
- Dosing regimen
- Prescribe
- Review