Pharmaceutical care planning and drug monitoring

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1

Aim:

- To demonstrate the role of pharmaceutical care planning and drug monitoring in the pharmaceutical care of individual patients

2

2

Objectives:

- Identify potential pharmaceutical care problems for an individual patient to enable the development of a pharmaceutical care plan
- List therapeutic and toxic drug monitoring parameters for the drugs taken by an individual patient

3

3

PHARMACEUTICAL CARE

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What is Pharmaceutical Care?

- Aspect of medicines management involving direct contact with an individual patient in order to maximise the benefits / outcomes and minimise the risks associated with their drug therapy

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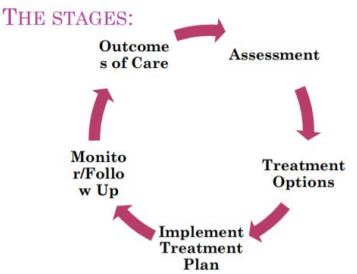

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- **Assessment**
  - To ensure all drug therapy is indicated , effective, safe and convenient **(Treatment options?)** and to ID any pharmaceutical care problems/issues
  - Monitoring of therapeutic & toxic monitoring parameters
  - To develop a pharmaceutical care plan to resolve and prevent drug therapy problems and to achieve therapeutic goals

7

7

- **Implement treatment plan**
- **Monitor/Follow-up**
  - To evaluate progress in meeting therapeutic goals
- **Outcomes of Care**
  - To record patient outcomes, and to reassess new/ongoing problems

Assessment

8

8

PHARMACEUTICAL CARE PROBLEMS/ISSUES

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4 steps:

Indicated?

⇩

Effective?

⇩

Safe?

⇩

Convenient?

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10

Pharmaceutical Care problems:

1.Appropriate indication

- Additional/alternative drug therapy required:
  - Untreated condition
  - Missed off drug history
  - Preventative/prophylactic
- Unnecessary drug therapy:
  - No medical indication
  - Duplicate drug therapy
  - Treating side-effect of another drug
  - Non-drug therapy indicated

2.Effectiveness

- Wrong drug:
  - Contraindications present
  - Patient not responding to drug
  - Not indicated for condition
  - More effective drug available (EBM)
- Subtherapeutic dose:
  - Wrong dose
  - Wrong frequency
  - Incorrect administration
  - Drug interaction
  - Duration too short

11

11

Pharmaceutical Care problems:

3.Safety

- Adverse drug reaction
  - Unsafe drug for patient/contraindications
  - Allergic reaction
  - Incorrect administration
  - Dosage change too rapid
  - Side-effect
- Toxic dose:
  - Wrong dose
  - Wrong frequency
  - Duration too long
  - Drug interaction
  - Renal / hepatic function

4.Appropriate adherence

- Instructions not understood
- Complex regime
- Special needs (eyesight, dexterity etc)
- Cannot swallow/ administer
- Drug not available
- Cannot afford prescription charge
- Patient prefers not to take

[Adapted from Pharmaceutical Care Practice, R. Cipolle et al 1998]

12

12

Example 1:

- 46 year old lady with chest infection. Previous medical history of asthma.
  - Co-amoxiclav 375mg tds 7 days
  - Salbutamol inhaler 2 puffs prn
  - Fostair® 200/6 inhaler 2 puffs bd
  - Allergies: Penicillin

13

13

- Potential pharmaceutical care problems:
  - Appropriate indication:
    - Co-amoxiclav ► OK for chest infection
    - Salbutamol & Fostair® inhalers ► OK for asthma
    - Query need short course of steroids?
  - Effectiveness:
    - Co-amoxiclav 375mg tds 7 days ► OK dose/route/duration
    - Inhalers ► Appropriate according to NICE/BTS guidelines
    - (assume effective – check with patient about normal control of asthma)

14

14

- Safety:
  - Allergy to penicillin ► check nature of allergy ► contact prescriber and suggest alternative e.g. Clarithromycin 500mg bd 7 days
- Appropriate adherence:
  - Counselling on antibiotic – directions, completion of course, side-effects etc
  - Check inhaler technique including rinsing mouth after steroid inhaler

15

15

Further examples:

- See separate document:

"Identification of Pharmaceutical Care Problems – Further examples"

16

16

DRUG MONITORING

17

17

What is drug monitoring?

- The use of both subjective and objective patient data to ensure patient's drug therapy is both:
  - EFFECTIVE (therapeutic drug monitoring parameters)

    and
  - SAFE (toxic drug monitoring parameters)

18

18

What is subjective data?

- What the patient is complaining of (symptoms) or what a health professional can observe (signs):
- E.g:

Cough	Swelling of ankles
Chest pain	Itching
Shortness of breath	Polyuria
Sweating	Confusion
Tremor	Pain

19

19

What is objective data?

- Measurable data & test results:
- E.g:

Bp	X-rays
Pulse	ECG's
Temperature	PEFR
Respiratory rate	Fluid balance
Blood glucose	Urine analysis

Blood test results (renal function, liver function, thyroid function, electrolytes, blood counts)

[U&E's = urea & electrolytes, FBC = full blood count]

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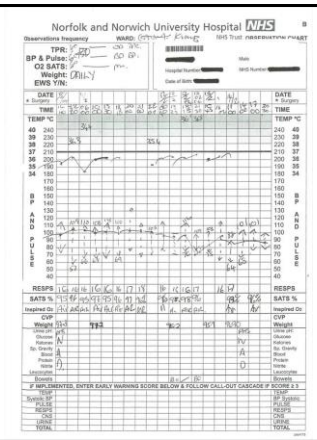

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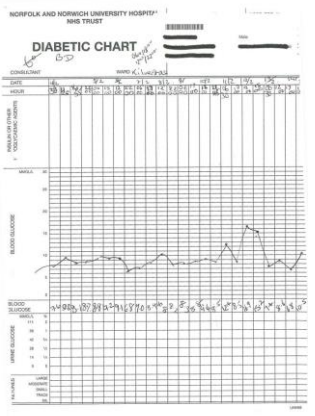

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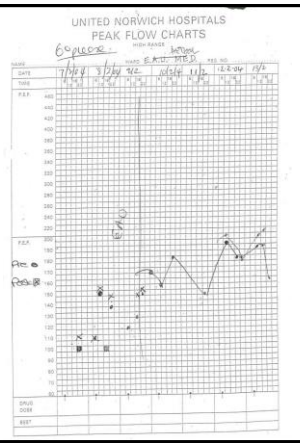

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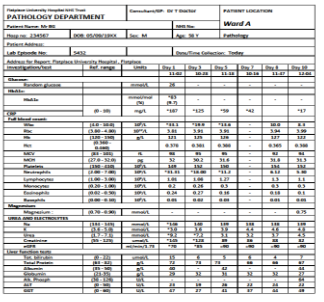


24

24

Drug monitoring parameters

All drugs will have a number of:

- Therapeutic drug monitoring parameters:
  - depending on what condition drug is being used for
  - therefore may vary from patient to patient
- Toxic monitoring parameters:
  - depending on what side-effects/ ADR's/cautions/ contraindications the drug has
  - generally the same for all patients

25

25

ATENOLOL for hypertension:

- Therapeutic monitoring parameters:
  - Bp
- Toxic monitoring parameters:
  - Bp
  - Pulse
  - Respiratory rate /PEFR
  - Blood glucose

26

26

ATENOLOL for angina:

- Therapeutic monitoring parameters:
  - Patient's symptoms of chest pain
  - Patient's use of GTN under the tongue
- Toxic monitoring parameters:
  - Bp
  - Pulse
  - Respiratory rate /PEFR
  - Blood glucose

27

27

RAMIPRIL for hypertension:

- Therapeutic monitoring parameters:
  - Bp
- Toxic monitoring parameters:
  - Bp
  - K^+
  - Renal function (Ur, Cr)
  - Liver function tests
  - FBC
  - Subjective: Dry cough, loss of taste

28

28

METFORMIN for Type II DM:

- Therapeutic monitoring parameters:
  - Blood glucose
  - HbA_{1C}
  - Patient symptoms (polyuria, thirst etc)
- Toxic monitoring parameters:
  - Blood glucose
  - Renal function
  - Gastrointestinal disturbance

29

29

AMOXICILLIN for chest infection:

- Therapeutic monitoring parameters:
  - Symptoms: e.g. cough, green sputum
  - Temperature
  - WBC
  - Blood cultures & sensitivities
  - Duration of course
- Toxic monitoring parameters:
  - Allergy status and allergic reactions
  - Gastrointestinal disturbance

30

30

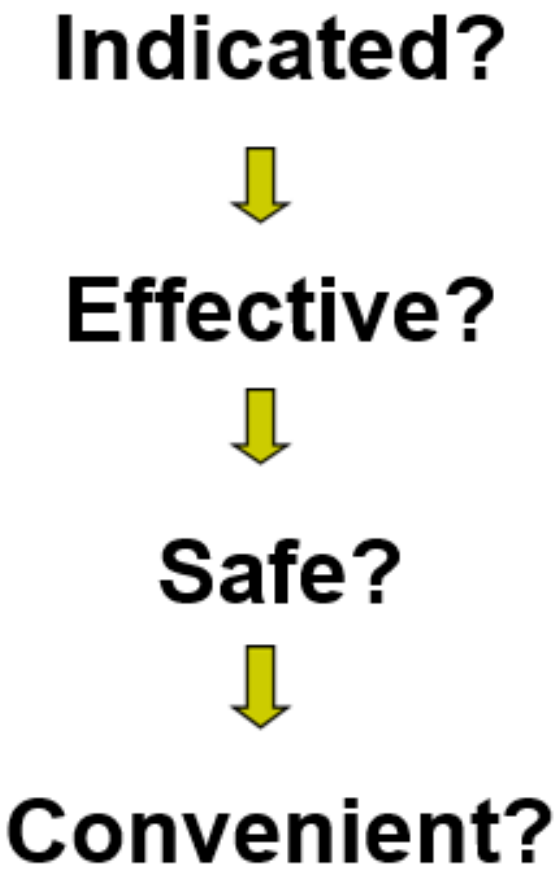
Further examples and help:

- See separate documents:
  - “Drug Monitoring Parameters – Further Examples”
  - “Drug Monitoring Parameters”

31

IDENTIFICATION OF PHARMACEUTICAL CARE PROBLEMS

Potential pharmaceutical care problems/issues can be identified using the step-wise approach:



EXAMPLE 1

22 year old female student prescribed Rifampicin 600mg bd for 2 days for prevention of meningococcal meningitis (there has been a case in her halls of residence). Normally uses Salbutamol inhaler prn for asthma and takes the COC pill, Microgynon 30®

Using the flow diagram as a step-wise approach to identification of problems/ issues:

Appropriate indication:

- Rifampicin ⇒ OK for prevention of secondary case of meningococcal meningitis
- Salbutamol ⇒OK for asthma
- COC ⇒Ok for contraception

- **ISSUE**: Possibly consider need for steroid inhaler &/or short course of oral steroids for asthma if poor control

Effectiveness:

- Rifampicin 600mg bd 2 days ⇒ appropriate choice / dose/ route/ duration
- [salbutamol & COC assumed to be effective – cannot assess – possibly ask patient about asthma symptoms]

- **ISSUE**: Rifampicin + COC interaction ⇒↓effectiveness of COC (consider alternative antibiotic e.g ciprofloxacin)

Safety:

- **ISSUE**: Unknown allergy status ⇒need to check
- **ISSUE**: Rifampicin + COC interaction ⇒↓effectiveness of COC (consider alternative antibiotic e.g ciprofloxacin)

Adherence:

- **ISSUE**: Counselling on interaction (if do not change to ciprofloxacin) – continuous use of COC (no pill free week) into next cycle plus additional contraception for 28 days after course
- **ISSUE**: Counselling on antibiotic (if rifampicin) – directions, completion of course, side-effects etc
- **ISSUE**: Check inhaler technique

EXAMPLE 2

70 year old obese woman with Type II diabetes, suffering from repeated episodes of hypoglycaemia. On glibenclamide 5mg od. Also has hypertension and takes bendroflumethiazide 2.5mg om.

Using the flow diagram as a step-wise approach to identification of problems/ issues:

Appropriate indication:

- Glibenclamide ⇒indicated for Type II DM [but see below]
- Bendroflumethiazide ⇒indicated for HT [but see below]

- **ISSUE:** Need for statin (e.g. atorvastatin 20mg on)

Effectiveness:

- **ISSUE:** Glibenclamide ⇒ indicated for Type II DM, but alternative drugs more appropriate ⇒ first line choice in Type II obese diabetic is Metformin
- **ISSUE:** Bendroflumethiazide ⇒ indicated for HT, but alternative drugs more appropriate ⇒ ACEI indicated in Type II diabetic for bp control & prevention of nephropathy

Safety:

- **ISSUE:** Glibenclamide causing hypoglycaemia ⇒ change to metformin
- **ISSUE:** Bendroflumethiazide can affect diabetic control ⇒ change to ACEI
- **ISSUE:** Elderly patient may have renal/ liver impairment (⇒ check toxic monitoring parameters)

Adherence:

- **ISSUE:** Counselling & adherence issues for all new medications

EXAMPLES OF DRUG MONITORING PARAMETERS

Therapeutic monitoring parameters are used to check if a drug is working and will depend on what indication the drug is being used for. Toxic monitoring parameters are used to check that a drug is not causing harm; they will relate to side-effects and cautions/contraindications of the drug and will be the same whatever the drug is being used for. They may sometimes be the same as the therapeutic monitoring parameters where excessive effect of the drug therapy is monitored with the same parameter.

1. Novorapid® insulin for Type I diabetes

Therapeutic:	**Toxic:**
Blood glucose(hyperglycaemia) HbA1c Lack of complications: renal function/eyes/feet Lack of symptoms: polyuria, polydipsia etc	Blood glucose (hypoglycaemia) Lipohypertrophy

2. Ibuprofen for muculoskeletal pain

Therapeutic:	**Toxic:**
Control of symptoms (pain/inflammation)	History of allergy/GI bleed/asthma Signs of bleeding Haemoglobin (Hb) Renal function Bp Liver function

3. Methotrexate for rheumatoid arthritis

Therapeutic:	**Toxic:**
Control of symptoms (stiffness/swelling/pain) CRP/ESR	Full Blood count Liver function Lung function Renal function Once weekly dose Interactions (especially Trimethoprim)

4. Levothyroxine for hypothyroidism

Therapeutic:	**Toxic:**
TFT's (T3, T4, TSH) Improvement in symptoms eg lethargy etc	TFT's (T3, T4, TSH) Signs of excessive dosage: e.g. Pulse (fast), weight loss

DRUG MONITORING PARAMETERS

The following is a list of the drug monitoring parameters for the common groups of drugs. It is not exhaustive and should be used in conjunction with other available information resources including the BNF, eMC etc.

1. CARDIAC

Digoxin

Therapeutic:

- Apex pulse - controlled rate
- Subjective - symptom control (e.g. palpitations for AF etc)
- Levels - 0.9-2.6 nmol/l

Toxic:

- Apex Pulse - not less than 60 beats per minute
- Renal function - renally excreted
- K^+ - hypokalaemia predisposes to toxicity
- Ca^{2+} - hypercalcaemia predisposes to toxicity
- Levels - 0.9-2.6 nmol/l
  - when suspect toxicity/sub-therapeutic/interacting drugs
- Subjective - patient complaining of nausea, vomiting, anorexia, blurred vision may indicate toxic levels

Diuretics

Thiazides:

Therapeutic:

- Bp - target bp achieved
- Subjective - control of symptoms **if used for CCF only** (eg SOA, SOB)

Toxic:

- U&E's - hypokalaemia, hyponatraemia, hypomagnesaemia, hypercalcaemia, hyperuricaemia [gout], altered lipids
- Renal function
- Glucose - hyperglycaemia
- Bp - hypotension

Loop:

Therapeutic:

- Bp - target bp achieved
- Weight loss - aim for 1kg/day ↓ **in CCF**
- Fluid balance - aim for negative **in CCF**
- Subjective - control of symptoms **in CCF** (eg SOA, SOB)

Toxic:

- U&E's - hypokalaemia, hyponatraemia, hypomagnesaemia, hypocalcaemia,
- Renal function
- Glucose - hyperglycaemia (less common than thiazides)
- Bp - hypotension
- Weight loss - not > 1kg/day **in CCF**
- Administration - morning [+ lunchtime if bd]
  - furosemide **i/v rate** not > 4mg/min [ototoxicity - causes deafness & tinnitus]

Potassium-sparing:

Therapeutic:

- U&E's - K^+

Toxic:

- U&E's - hyperkalaemia, hyponatraemia
- Renal function
- Bp - hypotension
- Administration - morning

Aldosterone antagonists/mineralocorticoid receptor antagonists (MRAs):

Therapeutic:

- Bp - target bp achieved
- Weight - aim for 1kg/day ↓ **in CCF** (can be more in **ascites**)
- Fluid balance - aim for negative in **CCF/ascites**
- Girth - in **ascites**
- Subjective - control of symptoms (eg SOA, SOB, ascites)

Toxic:

- U&E's - hyperkalaemia, hyponatraemia
- Renal function
- Bp - hypotension
- Weight loss - not > 1kg/day
- Administration - morning [+ lunchtime if bd]

Amiodarone

Therapeutic:
- Apex pulse - controlled rate
- Subjective - symptom control (palpitations etc)

Toxic:
- Apex pulse - bradycardia
- TFT's - hypo/hyperthyroidism
- LFT's
- Respiratory function
- Counselling - phototoxicity, vision, slate-grey skin
- Interaction - digoxin [halve dose]

Beta-blockers

Therapeutic:
- Bp - target bp achieved
- Subjective - symptom control (angina pain, palpitations etc)
- Apex pulse - controlled rate to about 60 bpm
- Long term reduction in CV events (in secondary prevention of MI)

Toxic:
- Bp - hypotension
- Pulse - bradycardia
- Respiratory rate /PEFR
  - Bronchospasm (especially in asthmatics)*
- Glucose - hypoglycaemia & masked symptoms of hypos (especially in Type 1 DM)*
- Cautions
  - asthma*, uncontrolled heart failure

(* problems with asthma & diabetics less with cardioselective beta-blockers but require close monitoring)

ACEI's

Therapeutic:
- Bp - target bp achieved
- Renal function - prevention of diabetic nephropathy
- Subjective - symptom control in CCF
- Long term reduction in CV events (in secondary prevention of MI)

Toxic:
- U&E's - hyperkalaemia
- Renal function - cause renal impairment
- Bp - hypotension
- Subjective - dry cough, loss of taste etc.
- LFT's

- FBC
- Contraindications
  - renal artery stenosis

Angiotensin-II inhibitors

Therapeutic:
- Bp - target bp achieved
- Subjective - symptom control in CCF
- Long term reduction in CV events (in secondary prevention of MI)

Toxic:
- U&E's - hyperkalaemia
- Renal function - cause renal impairment
- Bp - hypotension

Nitrates

Therapeutic:
- GTN usage - lack of prn use
- Subjective - control of chest pain

Toxic:
- Bp - hypotension
- Pulse - tachycardia
- Tolerance - long acting only (not short acting GTN)
- Subjective - headache [counsel re: cause & tolerance after 2/3 days]

Calcium Channel Blockers

Therapeutic:
- Bp - target bp achieved
- GTN usage - lack of prn use for angina
- Subjective - control of chest pain for angina
- Apex pulse - controlled rate for arrythmias (Verapamil)

Toxic:

Dihydropyridines [eg.amlodipine]:

- Pulse - bradycardia
- Bp - hypotension
- S/E's - swelling of ankles [especially nifedipine]

Toxic:

Diltiazem:

- Pulse - bradycardia
- Bp - hypotension
- C/I's - heart failure
- Interactions - beta-blockers [bradycardia]

Toxic:

Verapamil:

- Pulse - bradycardia
- Bp - hypotension
- C/I's - heart failure
- Interactions - beta-blockers [bradycardia]
- S/E's - constipation

Potassium-channel activators

Therapeutic:
- GTN usage - lack of prn use
- Subjective - control of chest pain

Toxic:
- Pulse - tachycardia
- Bp - hypotension

Statins

Therapeutic:
- Lipid profile
- Long term reduction in CV events (in secondary prevention of MI)

Toxic:
- LFT's
- Creatine Kinase
- Counselling - Report unexplained muscle pain, tenderness, weakness

Antiplatelets (E.g. Aspirin, clopidogrel, ticagrelor)

Therapeutic:
- Long term reduction in CV events (in secondary prevention of **MI**)
- Longterm reduction in cerebrovascular events (in secondary prevention of **CVA/TIA**)

Toxic:
- Signs of bleeding
- G.I. irritation
- Hb

2. ANTICOAGULANTS

Heparin [unfractionated]

Therapeutic:
- APTT - ratio 1.5-2.5

Toxic:
- Platelets - thrombocytopaenia [> 5days]
- K+ - hyperkalaemia
- Signs of bleeding
  - bruising
  - haematuria
  - haematemesis

Low Molecular weight Heparin

Therapeutic:
- Weight - dosed according to weight
- [Anti-Xa assay - rarely done]

Toxic:
- Platelets - thrombocytopaenia [> 5days]
- K+ - hyperkalaemia
- Signs of bleeding
  - bruising
  - haematuria
  - haematemesis

Fondaparinux

Therapeutic:
- Lack of chest pain (when used for acute coronary syndrome)

Toxic:
- Renal function
- Hb
- Signs of bleeding
    - bruising
    - haematuria
    - haematemesis

Warfarin

Therapeutic:
- INR - see BNF for target ranges
- Lack of CVA in stroke/ lack of thrombus in DVT/PE

Toxic:
- INR - too high
- Signs of bleeding
    - bruising
    - haematuria
    - haematemesis
- Counselling + Yellow booklet
- Interactions

DOACs (previously called NOACs)

Therapeutic:
- Lack of CVA in stroke/ lack of thrombus in DVT/PE

Toxic:
- Signs of bleeding
    - bruising
    - haematuria
    - haematemesis

3. RESPIRATORY

General:

Therapeutic:
- Inhaler technique [order + rinse mouth for steroids]
- PEFR
- Respiratory rate
- Blood gases
- Nebuliser gas
- Symptom control & lack of use of prn Beta-2 agonist

Beta-2 agonists

Toxic:
- Pulse - tachycardia
- K^+ - hypokalaemia
- S/E's - tremor etc

Theophylline

Therapeutic:
- PEFR
- Levels - 10-20 mg/l or 56-112 micromol/l

Toxic:
- Levels - 10-20 mg/l or 56-112 micromol/l
  - when suspect toxicity/sub-therapeutic/interacting drugs
- Pulse - tachycardia
- Brand name - must be prescribed by brand name due to differing bioavailabilities

4. STEROIDS

Therapeutic:
- Depends on indication

Toxic:
- Bp - hypertension
- U&E's - hypernatraemia, hypokalaemia
- Weight - fluid retention
- Glucose - hyperglycaemia

- Side-effects - moon face, thin skin
- Signs of infection
  - temp, WBC etc. [NB response may be suppressed]
- Counselling - withdrawal [if > 3weeks]
  - steroid card
- Osteoporosis prophylaxis
- Gastric effects

5. ANTIBIOTICS

Therapeutic:
- Temperature
- Differential WBC
- Blood cultures & sensitivities
- Route & method of administration
- Duration
- Symptoms (e.g. cough for chest infection)

Toxic:
- Allergies
- Side-effects (e.g. diarrhoea)

6. DIABETIC THERAPY

Therapeutic:
- Blood glucose
- Urine glucose
- HbAIC [long term control]

Toxic:
- Blood glucose [hypoglycaemia]
- Renal function [especially **Metformin**]
- LFT's [for **thiazolidinediones**]

7. THYROID

Levothyroxine

Therapeutic:
- TFT's - T_3, T_4, TSH
- Subjective - symptom control (e.g. lethargy, constipation)

Toxic:
- TFT's - T_3, T_4, TSH (hyper)
- Pulse - tachycardia
- Weight - reduction

Carbimazole

Therapeutic:
- TFT's - T_3, T_4, TSH
- Subjective - symptom control (e.g. tremor, dry skin)

Toxic:
- TFT's - T_3, T_4, TSH (hypo)
- Pulse - bradycardia
- Weight - gain
- Differential WBC - neutropenia & agranulocytosis
- Counselling - report signs of infection (fever, sore throat)

8. METHOTREXATE

Therapeutic:
- Subjective - symptom control (pain, stiffness)

Toxic:
- Differential WBC - neutropenia & agranulocytosis
- LFT's
- Renal function
- Pulmonary toxicity
- Interactions
- ONCE WEEKLY DOSING
- Counselling - report signs of infection (sore throat, fever), dyspnoea, cough

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PHA-6020Y

Patient centred medicine from bench to bedside

Workshop

PHARMACEUTICAL CARE

Learning Outcomes

After this workshop you will be able to:

- Describe the structured process used to identify pharmaceutical care issues for a patient
- Identify pharmaceutical care issues/problems associated with the treatment of an individual patient
- Identify the therapeutic and toxic monitoring parameters for the drugs used in the treatment of an individual patient
- Document pharmaceutical interventions and recommendations using the SBAR tool.

Resources

- On Bb:
  - Screencast (Pharmaceutical Care Planning and Drug Monitoring) + supporting documents
  - Screencast (Documentation of Interventions in Medical Notes using SBAR Tool)
  - Year 1: Workshops: Pharmaceutical care & Clinical Management of Hypertension
  - Year 2: Clinical workshops (Respiratory, Endocrinology, Antibiotics and Cancer)

TASK 1 – "Critiquing" a drug chart

As a pharmacist working on a hospital ward, you are required to clinically check and "critique" the patient's drug chart and identify any pharmaceutical care issues.

Develop a check list of **what you need to check** to complete this process in a structured way:

Patient demographics

1. Sex
2. Age
3. Weight
4. ***ALLERGIES***
5. Pregnancy/breastfeeding

Check whether these impact on any of the patient's drug treatments

Thromboprophylaxis risk assessment

1. Has it been completed?

If no, what do you need to do about it

2. If TRA has been completed, is thromboprophylaxis indicated and has it been prescribed appropriately?

If no, what do you need to do about it

Patient's DHx

1. Are these all currently prescribed?
2. Are they correctly prescribed (strength, dose, formulation, administration instructions)?
    a. If no, is this an intentional discrepancy? (from new diagnosis)
    b. If no, is this an unintentional discrepancy?
        What do you need to do about it
3. Are all the drugs indicated?
        If no, what do you need to do about it
4. Does the patient take all medicines as prescribed?
    a. If no, is this intentional non-adherence?
    b. If no, is this un-intentional adherence?
        What do you need to do about it

PC, HPC and diagnosis

1. Do the symptoms/diagnosis need drug treatment?
2. According to evidence-based-medicine, is that drug treatment prescribed?
        If no, what do you need to do about it

PMH

1. Do all of the conditions need drug treatment?
2. According to evidence-based-medicine, is that drug treatment prescribed?
        If no, what do you need to do about it
3. Does the diagnosis impact on the appropriate, safe and effective treatment of the patients' other conditions?
        If yes, what do you need to do about it

OE

1. Are there any findings from the examination that impact on the safe provision of the patients' drugs?

If yes, what do you need to do about it

Social/family history

1. Do they drink alcohol? Is it within the recommended daily/weekly limits?
2. Do they smoke? What do they smoke? How many? When?
3. Do they use any recreational drugs? What do they use? How often?

If yes, what do you need to do about it

4. Is there any relevant family history that could impact on a patient's medication requirement?

If yes, what do you need to do about it

Special needs

1. Does the patient have any of the following, and if yes, are they taken into account with respect to their medication/devices?
    a. Swallowing issues
    b. Manual dexterity issues
    c. Visual impairment
    d. Auditory impairment
    e. Speech impairment
    f. Language issues

If no, what do you need to do about it

Interactions

1. Are there any drug-disease (cautions/contraindications), drug-food or drug-drug interactions?

How do you manage these

Near patient monitoring (Temp, pulse, RR etc) – TPR chart / Blood results

1. Are there results which affect the current prescribed medication?

How do you manage these

How to decide on appropriate course of action:

- Is it something that you can resolve, or do you require input from another HCP?
- If you require another HCP, who and how would you contact them?
- Provide a concise description of the issue and your recommended way to resolve it.
    - When recommending additional drug treatment, you should provide full information – name, strength, formulation, dose/frequency and titration/cessation information as appropriate.
    - Use SBAR tool to structure your written/verbal recommendation(s).

- What is right and why?
- What is wrong and why?
- What interventions/changes would you want to make and why?

Medicines, Ethics and Practice Edition 45, July 2022 page 42 (Clinical Check):

Patient characteristics	Patient type	Establish whether the patient falls into a group where treatment is contraindicated or cautioned. Specific groups of patients to be aware of include: - Children - Women who are pregnant or breastfeeding - The elderly - Certain ethnic groups – a patient's ethnic origin can affect the choice of medicine or dose (e.g. the initial and maximum dose of rosuvastatin is lower for patients of Asian origin) - For some medicines, the gender of the patient should be considered. For example, finasteride is contraindicated for women.
	Co-morbidities	Patient co-morbidities, such as renal or hepatic impairment or heart failure, can exclude the use of a particular treatment or necessitate dose adjustments.
	Patient intolerances and preferences	Other patient factors that can affect the choice of treatment include known medication adverse events (e.g. allergies), dietary intolerances (e.g. to lactose containing products), patient preferences (e.g. vegan patients may refuse products of porcine origin), religious beliefs, and patients' knowledge and understanding of medicines and why they are being taken (patient beliefs about medicines).
Medication regimen factors	Indication	Ascertain the indication for treatment to check whether the medicine prescribed is appropriate for the indication and compatible with recommended guidelines.
	Changes in regular treatment	Where there are changes in regular therapy (e.g. strength or dose), you should confirm that these are deliberate and not an error.
	Dose, frequency and strength	You should check that the dose, frequency and strength of the prescribed medicine are appropriate – having considered the patient's age, renal and hepatic function, weight (and surface area where appropriate), co-morbidities, concomitant drug treatments and lifestyle pattern.
	Formulation	Check that, for the formulation prescribed, the dose and frequency are appropriate.
	Drug compatibility	Regular and new therapies should be evaluated for any clinically significant interactions, duplications and antagonistic activity.
	Monitoring requirements	For medication or conditions that require monitoring, you should check for the latest test results and ascertain whether any dose adjustments are required.
Administration and monitoring	Route of administration	Check whether the prescribed route of administration is suitable for the patient and whether a preparation is available for the route prescribed. Also, check for compatibility issues that may arise from administering via that route (e.g. due to co-administration of food or other medicines). For example, phenytoin can interact with enteral feeds so administration via an enteral feeding tube would need to be managed accordingly.
	Aids to administration	Check whether any aids are required to support administration. For example, spacer devices, eye drop devices, Braille or large type or pictogram labels, additional information sheets or verbal information and multi-compartment compliance aids (MCAs).

TASK 2 – CASE STUDY

BG, is 60-year-old man, with Type 1 DM. You are the pharmacist who is reviewing him on the admissions ward for the first time. His medical notes, blood tests and drug chart are below:

Patient:	BG
Hospital number:	051256
DoB:	5.6.1963
Gender:	M
Address:	9 White Grove, Flatplace
PC:	Weak, drowsy, gasping for breath and vomiting
HPC:	According to wife has been feeling unwell for several days – today very difficult to rouse and not able to take insulin
PMH:	Type 1 diabetes since childhood [poorly controlled – most recent clinic HbA1C 9.7% (83mmol/mol), hypertension 10 years
DH:	Bendroflumethiazide 2.5mg od Atenolol 100mg od Humulin M3® KwikPen® 18 IU bd Penicillin allergy => rash and swelling
SH:	Bus driver, lives with wife. Minimal alcohol. Smokes 20 cigarettes/day
FH:	Father died myocardial infarction age 48 years
OE	BP 60/40 mmHg Temp 38.6°C Pulse 98bpm Weight 78kg Confused, dehydrated, ketone breath, BP 60/40, black necrotic big toe and infected ulcer on right foot
Diagnosis:	DKA
Plan:	Insulin infusion, IV antibiotics and fluids
	Dr P Nair **Bleep 5893**

His blood test results on admission are as follows:

PATHOLOGY DEPARTMENT		Consultant/GP: Dr P Ross		PATIENT LOCATION
Patient Name: BG			NHS No:	***Admissions***
Hosp no: 051256		Sex: M	Age: 58 Yr	Pathology
Patient Address:				
Lab Episode No:	7564		Date/Time Collection: Today	
Address for Report: Flatplace Hospital				

BIOCHEMISTRY Collection LAB No Today 8904	**Random Glucose** **26*** mmol/L	**HbA1c** **74*** mmol/mol	**WBC** **18.9*** (4-11) x 10^9/l	**CRP** **125*** (0-10) mg/L	
	Urea **7.9*** (1.7-7.1) mmol/L	**Creatinine** **142*** (55-125) µmol/L	**eGFR** **65** ml/min/m^2	**Na** **146*** (134-145) mmol/L	**K** **3.0*** (3.6-5.0) mmol/L

UEA Training Prescription Chart

Number of drug charts in use: 1

Date	Surname	Forename	Sex	D/O/B	Hosptial No.	Weight (kg)	Height (cm)	Surface Area (m^2)	SAM?
Day 1	**G**	**B**	M	06/06/1963	51256	78 Estimate / **Actual**			Yes / **No**

Ward/ward change:	**Renal**	**Patient address:**	
Consultant(s)	**Dr P Ross**		

DRUG SENSITIVITIES/ALLERGIES MUST BE ENTERED. If no allergies/sensitivites you must write 'NKDA' and sign and date.

Medicine/Substance	Description of allergy/sensitivity	Signature	Date
Penicllin	Rash/swelling	***Dr P Nair***	***Day 1***

PRE-MEDICATION AND ONCE ONLY DRUGS

Pharm	Date	Drug (approved name)	Dose	Directions/ route/ other	Time to be given	Signature	Administered by	
							Initials	Date
			Thromboprophylaxis Risk Assessment					
Drug thromboprophyaxis recommended			**X**					
Drug thromboprophlaxis NOT recomm								

Prescribing

- Write clearly in black, indelible ink.
- Use approved drug names.
- All prescriptions must be signed and dated.
- If a drug is to be intentionally omitted by a prescriber or pharmacist, indicate this with an 'X' in the drug administration box.
- If a drug is being stopped, or a dose altered, draw a line through the whole prescription, sign and date.
- Doctors to re-write charts as required. Start dates should be transferred to new chart. Include cross-reference to drugs on other charts.

Drug omissions

If a drug is omitted, one of the below codes must be entered into the drug administration box.

1. Nil by mouth
2. Not required
3. Patient refused
4. Drug unavailable
5. Vomiting/nausea
6. Patient off ward
7. No IV access
9. Contra-indicated
8. Other - reason must be recorded in notes

Self administration of medicines (SAM)

If a patient is suitable for SAM they can initial in the relevant drug administration box or a nurse can write 'SAM' in the box.

Prescribers

Signature	***Dr P Nair***
Bleep no.	**5893**
Print name	**Doctor P NAIR**
Signature	
Bleep no.	
Print name	
Signature	
Bleep no.	
Print name	
Signature	
Bleep no.	
Print name	
Signature	
Bleep no.	
Print name	

Pharmacy codes

Pharm: Signature confirms checked/date

TTO ✔ = from locker; **H** = at home; **R** = relabel; ★ = new supply at discharge

Supply: S = ward stock; **T** = dispensing, see date and quantity; **P** = POD, see date and quantity

REGULAR MEDICINES 1

CHECK PAGE 1 FOR ALLERGY STATUS

Date → / Tick box to indicate time of admission or add other times ↓		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
1. Drug (approved name): Actrapid® — Start date: Day 1 — End date:	08:00										
	08:00	✓	JA								
Dose: See separate — Route: IV — Frequency:	12:00										
	14:00										
Indication: — Pharm check:	18:00										
	22:00										
Prescriber's signature: P Nair — Supply:	00:00										
2. Drug (approved name): IV fluids — Start date: Day 1 — End date:	08:00										
	08:00	✓	JA								
Dose: See separate — Route: IV — Frequency:	12:00										
	14:00										
Indication: — Pharm check:	18:00										
	22:00										
Prescriber's signature: P Nair — Supply:	00:00										
3. Drug (approved name): Tazocin® — Start date: Day 1 — End date:	08:00										
	08:00	✓	9								
Dose: 4.5g — Route: IV — Frequency: 8hrly	12:00										
	14:00	✓									
Indication: — Pharm check:	18:00										
	22:00	✓									
Prescriber's signature: P Nair — Supply:	00:00										
4. Drug (approved name): Bendroflumethiazide — Start date: Day 1 — End date:	08:00										
	08:00	✓	9								
Dose: 5mg — Route: PO — Frequency: OD	12:00										
	14:00										
Indication: — Pharm check:	18:00										
	22:00										
Prescriber's signature: P Nair — Supply:	00:00										
5. Drug (approved name): Atenolol — Start date: Day 1 — End date:	08:00										
	08:00	✓	9								
Dose: 100mg — Route: PO — Frequency: OD	12:00										
	14:00										
Indication: — Pharm check:	18:00										
	22:00										
Prescriber's signature: P Nair — Supply:	00:00										

CHECK PAGE 1 FOR ALLERGY STATUS

AS REQUIRED DRUGS

CHECK PAGE 1 FOR ALLERGY STATUS

1. Drug (approved name) *Paracetamol*		Start date *Day 1*	Date										
Dose *500mg-1g*	Route *po*	Max Frequency *6hrly*	Time										
Indication *Pain/pyrexia*		Pharm check	Dose										
			Route										
Prescriber's signature *P Nair*		Supply	Given by										
2. Drug (approved name)		Start date	Date										
Dose	Route	Max Frequency	Time										
Indication		Pharm check	Dose										
			Route										
Prescriber's signature		Supply	Given by										
3. Drug (approved name)		Start date	Date										
Dose	Route	Max Frequency	Time										
Indication		Pharm check	Dose										
			Route										
Prescriber's signature		Supply	Given by										
4. Drug (approved name)		Start date	Date										
Dose	Route	Max Frequency	Time										
Indication		Pharm check	Dose										
			Route										
Prescriber's signature		Supply	Given by										
5. Drug (approved name)		Start date	Date										
Dose	Route	Max Frequency	Time										
Indication		Pharm check	Dose										
			Route										
Prescriber's signature		Supply	Given by										

CHECK PAGE 1 FOR ALLERGY STATUS

IV FLUIDS								
Date	**Fluid**	**Volume**	**Additive and dose**	**Duration of infusion**	**Prescriber's Signature**	**Given by**	**Start time**	**End time**
Day 1	1) 0.9% NaCl	500ml		15mins	P.Nair	JA	09:00	09:15
Day 1	2) 0.9% NaCl	1000ml	KCL 40mmol	60mins	P Nair	JA	10:00	
	3)							
	4)							
	5)							
	6)							
	7)							
	8)							
	9)							
	10)							
	11)							
	12)							
	13)							
	14)							
	15)							
	16)							
	17)							
	18)							
	19)							
	20)							

IV DRUG INFUSIONS

1. Drug (approved name) Actrapid®	**Amount or volume**	*Date*	Day 1						
Dilution fluid 0.9% NaCl / **Total vol.** 50ml	**Route** IV	*Time*	09:00						
Rate 0.1 unit/kg/hr	**Start Date** Day 1	*Route*	IV						
Indication/other instruction	**Pharmacy**	*Dose*	7.8 units						
Prescriber's Signature P. Nair / **Bleep no.** 5893		*Given by*	JA						
2. Drug (approved name)	**Amount or volume**	*Date*							
Dilution fluid / **Total vol.**	**Route**	*Time*							
Rate	**Start Date**	*Route*							
Indication/other instruction	**Pharmacy**	*Dose*							
Prescriber's Signature / **Bleep no.**		*Given by*							
3. Drug (approved name)	**Amount or volume**	*Date*							
Dilution fluid / **Total vol.**	**Route**	*Time*							
Rate	**Start Date**	*Route*							
Indication/other instruction	**Pharmacy**	*Dose*							
Prescriber's Signature / **Bleep no.**		*Given by*							
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Dilution fluid / **Total vol.**	**Route**	*Time*							
Rate	**Start Date**	*Route*							
Indication/other instruction	**Pharmacy**	*Dose*							
Prescriber's Signature / **Bleep no.**		*Given by*							
5. Drug (approved name)	**Amount or volume**	*Date*							
Dilution fluid / **Total vol.**	**Route**	*Time*							
Rate	**Start Date**	*Route*							
Indication/other instruction	**Pharmacy**	*Dose*							
Prescriber's Signature / **Bleep no.**		*Given by*							

1. For each of the drugs that is prescribed for BG, complete the following tables to detail the indication and the therapeutic and toxic monitoring parameters:

Drug: Bendroflumethiazide	**Indication:** Hypertension
Monitoring parameters	
Therapeutic	**Toxic**
BP (target <140/90 unless presence of renal impairment in which case it is <130/80 – see NICE guidance for T1DM for details)	BP, RF, U&Es (K+, Na+), BG, Urate, Lipids

Drug: Atenolol	**Indication:** Hypertension
Monitoring parameters	
Therapeutic	**Toxic**
BP (target <140/90 unless presence of renal impairment in which case it is <130/80 – see NICE guidance for T1DM for details)	BP, pulse, lack of awareness of hypoglycaemia

Drug: Tazocin	**Indication:** Infected diabetic foot ulcer
Monitoring parameters	
Therapeutic	**Toxic**
Symptoms (appearance of ulcer), WBC, CRP, C&S	Allergies, S/E e.g. GI

Drug: Actrapid	**Indication:** DKA/Type 1 DM
Monitoring parameters	
Therapeutic	**Toxic**
BG	BG

Drug: NaCl 0.9%+ KCl 40mmol	**Indication:** DKA/dehydration
Monitoring parameters	
Therapeutic	**Toxic**
Fluid balance, signs of dehydration, U&Es (Na/K+), RF, BP	Fluid balance, U&Es (Na/K+), RF, BP

2. Identify any actual and potential pharmaceutical care issues for your patient. Document the issue(s) and the action(s) in the following tables.
   Where you recommend the patient to start on any **NEW** medication, please also complete details of the monitoring parameters for the new drug, otherwise leave it blank. (the workshop template contains a standard number of boxes – this does NOT give any indication to the number of issues to be identified – could be more, could be less!!)

Issue	Action required
Patient allergic to penicillin – Tazocin contains piperacillin	Ask Dr to stop tazocin and change to alternative e.g. clindamycin IV 0.6-2.7g in 2-4 divided doses + ciprofloxacin IV 400mg 8-12hrs 12hrs (7 days + dependent on clinical review). Review 24-48 hours + ongoing.
Monitoring parameters	
Therapeutic	**Toxic**
Symptoms (appearance of ulcer), WBC, CRP, C&S	Clindamycin – severe diarrhoea, thrombophlebitis, rash, LFT, renal function, FBC Ciprofloxacin - GI disturbance (N, V, D), FBC, tendonitis, renal function, LFT, (QT).

Issue	Action required
VTE assessment states thromboprophylaxis needed but not prescribed	Ask doctor to prescribe thromboprophylaxis e.g. dalteparin 5000 international units s/c od
Monitoring parameters	
Therapeutic	**Toxic**
Lack of VTE, weight	Bleeding, Hb, Plt, RF

Issue	Action required
Wrong dose of bendroflumethiazide prescribed – drug history patient was on 2.5mg om not 5mg om	
Monitoring parameters	
Therapeutic	**Toxic**

Issue	Action required
Inappropriate choice of antihypertensive - Bendroflumethiazide & Atenolol affect diabetic control, atenolol may mask symptoms of hypoglycaemia. Not according to NICE guidelines	Once hypotension resolved (with treatment of DKA) discuss choice with Dr. Suggest ACEI as alternative (Eg Ramipril 2.5mg od & adjust) (Prevents progression to diabetic nephropathy and indicated as per NICE guidance for hypertension in diabetic patients as first-line)

Monitoring parameters	
Therapeutic	**Toxic**
BP (target <140/90 unless presence of renal impairment in which case it is <130/80 – see NICE guidance for T1DM for details), RF	BP, RF, K+, dry cough

Issue	Action required
Poor diabetic control (HbA1c 74mmol/mol)	Advise Dr on change of regime e.g. basal/bolus – multiple injection regime (od long acting + tds short acting with meals). Check adherence and seek advice from Diabetes Nurse Specialist/Endocrinology if needed.

Monitoring parameters	
Therapeutic	**Toxic**
BG, HbA1c	BG, HbA1c

Issue	Action required
Need for statin as □ CV risk (QRISK>10%)	Advise Dr to consider Atorvastatin 20mg on (NICE, primary prevention)

Monitoring parameters	
Therapeutic	**Toxic**
↓CV events, lipid profile	LFTs, myopathy, CK

Issue	Action required
Counselling & education	Need for counselling and education on all new drugs and any changes in regime) - DETAILS E.g. Ramipril – take at night, lowers BP but also helps prevent kidney problems S/E: dry cough

Monitoring parameters	
Therapeutic	**Toxic**

Issue	Action required
Life-style issues	RELEVANT DETAILS: Counsel on diet (low salt, 5 a day, low fat), exercise – ideally 30mins/day – according to ability, smoking cessation

Monitoring parameters	
Therapeutic	**Toxic**

3. Document your assessment of key pharmaceutical care issues, alongside your recommendations in patient's medical notes, using the SBAR tool.

Date and Time	Clinical Notes
Date Time	Pharmacist N. Surname I reviewed inpatient medicines prescribed for this patient (DoB: 05/06/1963; 051256) admitted with a suspected DKA. PMH: Type 1 diabetes, hypertension Dhx: Bendroflumethiazide 2.5mg od, Atenolol 100mg od, Humulin M3 KwikPen® 18 units bd Allergies: Penicillin (rash and swelling) BP 60/40 mmHg HR 98bpm BG 26 mmol/L HbA1c 74 mmol/mol (target < 53 mmol/mol) Cr 142 µmol/L (baseline unclear) Prescribed piperacillin/tazobactam despite penicillin allergy VTE prophylaxis recommended but not yet prescribed Bendroflumethiazide and atenolol held due to low BP (not in line with NICE guidance and risk of hyperglycaemia in diabetes) Currently on VRII + fluids – requires review of basal insulin regime. Based on my review, I would like to recommend the following: • Stop piperacillin/tazobactam. Start clindamycin IV 0.6-2.7g in 2-4 divided doses + ciprofloxacin IV 400mg 8-12hrs (7 days + dependent on clinical review). Monitor WBC/CRP/C&S and clinical improvement in 24-48 hours. Monitor CrCl/LFTs and QT. • Prescribe pharmacological VTE prophylaxis, e.g. dalteparin 5000 units OD. Monitor Plt & Hb 48-hourly in addition to CrCl/LFTs (report any bleeding). • Stop bendroflumethiazide and atenolol. Start ACEi, e.g. ramipril 2.5 mg OD and titrate dose up with monitoring of BP, CrCl, K+ and based on tolerability. • Change insulin regime to improve control of HbA1c. Consider multiple injection regime (OD long-acting + TDS short-acting with meals). Seek further advice from Diabetes Specialist Nurse. *Name Surname* (Contact Details)

CLINICAL SUPPORT SESSION

PHA6020Y
Semester 1

Nicky Moore and Catherine Heywood
Teacher Practitioners, CUH/NNUH

Formative MCQ exam feedback

- MCQ Type 1 – Single best answer
  - - 20 Clinical Therapeutics
  - - 4 Science
- MCQ Type 2 – Extended matching
  - 6 Clinical Therapeutics

1. Which **ONE** of the statements regarding sulfasalazine is **CORRECT**?

(A) Headache is a common side effect affecting up to one third of patients. It is less likely to occur if the dose is gradually increased
(B) Intensive monitoring is required between 12 and 24 months as haematological abnormalities are most likely to occur then
(C) It can be used safely in patients with Glucose-6-dehydrogenase deficiency
(D) Slow acetylator status protect patients from adverse drug reactions
(E) The contact lenses of patients may be stained red

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(E) The contact lenses of patients may be stained red

2. Which **ONE** of the following statements regarding interactions is **INCORRECT**?

(A) Bone marrow suppression with methotrexate is increased by the concomitant use with co-trimoxazole (trimethoprim and sulfamethoxazole)
(B) Doses of statins may need to be reduced to prevent serious myopathy when given with ciclosporin
(C) Macrolides and ketoconazole decrease ciclosporin levels
(D) When used with allopurinol, the dose of azathioprine should be reduced to one quarter of the usual dose
(E) Yellow fever and Measles, Mumps and Rubella (live) vaccines should not be administered to a patient on azathioprine

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3. Which **ONE** of the following statements regarding biologics for the treatment of inflammatory diseases is **INCORRECT**?

(A) Drugs should be prescribed by brand
(B) Homecare supplies direct to patients' homes allows self-administration of subcutaneous preparations
(C) Once stabilised patient should be monitored every 3-6 months
(D) Patients receiving biosimilars may receive either the originator or biosimilar agent
(E) Providing data to a drug registry is essential for pharmacovigilance

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4. Mr GT, 58 year old lorry driver visiting his GP. Weight: 99Kg. PMHx: Type 2 diabetes and dyspepsia. DHx: Metformin, dapagliflozin and atorvastatin.

Which **ONE** of the following is the **MOST** appropriate drug treatment of a strained shoulder?

(A) Diclofenac 50 mg TDS
(B) Diclofenac 50 mg TDS plus PPI
(C) Etoricoxib 30 mg OD
(D) Ibuprofen 400 mg TDS plus PPI
(E) Naproxen 250 mg BD

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5. Which **ONE** of the following conditions/situations is **LEAST** likely to increase the risk of NSAID induced renal side effects?

(A) Advanced age
(B) Co-prescribing with amlodipine
(C) Dehydration
(D) Heart failure
(E) Liver cirrhosis

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6. Mr HG, a 68-year-old who suffers from osteoarthritis, complains of worsening symptoms.

Which **ONE** of the following signs or symptoms is the most likely to suggest that his condition is not being adequately managed?

(A) Erythema
(B) Fever and malaise
(C) Morning stiffness that lasts no longer than 30 minutes
(D) Unilateral leg swelling
(E) Weight loss

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7. Which **ONE** of the following statements is **CORRECT** regarding corticosteroid bridging therapy for the treatment of rheumatoid arthritis?

(A) All patients with rheumatoid arthritis should be prescribed a corticosteroid
(B) Corticosteroids should be co-prescribed long-term with cDMARDs
(C) Evidence shows that patients are more likely to stop cDMARD therapy when co-prescribed with a corticosteroid
(D) PPI therapy should be stopped to prevent GI ulceration
(E) Repeated and high dose corticosteroids should be tapered to reduce the risk of adrenal insufficiency when being stopped

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8. A 25 year old female presents to your pharmacy and is concerned she may have IBS. She has made an appointment to see her GP but is concerned about what tests/scans are needed to diagnose IBS.

Which **ONE** of the following is the **MOST** appropriate response?

(A) Diagnosis of IBS is based on blood test results
(B) Diagnosis of IBS is based on colonoscopy findings
(C) Diagnosis of IBS is based on endoscopy findings
(D) Diagnosis of IBS is based on response to antispasmodic medications
(E) Diagnosis of IBS is based on symptoms only

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9. Mr FG is a 56-year-old man admitted with an acute myocardial infarction and a history of Type 2 DM and hypertension. He smokes 15 cigarettes a day. His drug history on admission is:

- Metformin MR 1 g BD
- Ramipril 5 mg ON

Which **ONE** of the following would **NOT** be an appropriate recommendation to reduce his CV risk?

(A) Atorvastatin 80 mg ON
(B) Blood pressure control to <140/90
(C) Dapagliflozin 10 mg OD
(D) Reduce non-HDL cholesterol by 25%
(E) Stop smoking

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(D) Reduce non-HDL cholesterol by 25%
(E) Stop smoking

10. Which **ONE** of the following statements concerning the tools used to assess CV risk is **CORRECT**?

(A) All CV risk assessment tools provide an accurate figure for 10 year CV risk
(B) ASSIGN recommended first-line by NICE for CV risk assessment
(C) Framingham based equations tend to overestimate risk in current UK population
(D) QRISK should be used to assess CV risk for patients with Type1 DM
(E) QRISK takes into account risk factors including ethnicity, family history of CVD, BMI and socioeconomic status, which the Framingham based equations do not

Oops!!! Sorry!!

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11. Mr DG is a 48-year-old man who presents to his GP with chest pain on exertion and is diagnosed with stable angina. Which **ONE** of the following would be appropriate first-line treatment for Mr DG?

(A) Amlodipine
(B) Aspirin
(C) Digoxin
(D) Ramipril
(E) Ranolazine

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12. Miss HJ is an 85-year-old lady admitted to hospital with uncontrolled atrial fibrillation (AF) with a ventricular rate of 130bpm. She has no signs of heart failure. Her drug history includes:

Bisoprolol 5 mg od
Warfarin – dose according to INR (most recent INR 1.5)

Which **ONE** of the following statements concerning the management of Miss HJ's AF is **INCORRECT**?

(A) Miss HJ's bisoprolol should be stopped and amiodarone started
(B) Miss HJ should be considered for direct current cardioversion (DCCV)
(C) Miss HJ should be prescribed a loading dose of digoxin 500 mcg STAT followed by another 500 mcg dose 6 hours later
(D) Miss HJ should have her TFTs (thyroid function tests checked)
(E) Miss HJ should have her warfarin reviewed and potentially changed to a DOAC due to her sub-therapeutic INR

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13. Mrs JK presents to her GP with a red, inflamed right calf. Which **ONE** of the following is **NOT** a potential risk factor for the development of a deep vein thrombosis (DVT) in Mrs JK?

(A) Combined oral contraceptive pill (COC)
(B) Drug history includes anaphylaxis due to penicillin
(C) Long haul flight
(D) Pregnancy
(E) Previous history of venous thromboembolism (VTE)

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14. Which **ONE** of the following is **NOT** an appropriate recommendation for VTE thromboprophylaxis?

(A) Alteplase IV injection 10 mg STAT
(B) Dalteparin SC injection 5000 IU od
(C) Enoxaparin SC injection 40 mg od
(D) Graduated compression stockings
(E) Mobilisation

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15. Which **ONE** of the following statements regarding ulcerative colitis (UC) is **INCORRECT**?

(A) Azathioprine or mercaptopurine can only be used for inducing remission
(B) For a first presentation or exacerbation of extensive mild to moderate UC, a topical and high dose oral aminosalicylate should be used
(C) Infliximab, adalimumab, golimumab, vedolizumab, ustekinumab, filgotinib and tofacitinib are treatment options for moderate to severe UC after conventional treatment has failed
(D) The Truelove and Witts criteria is used to categorise the severity of UC
(E) To induce remission in acute severe UC, IV corticosteroids should be used

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16. Mr Gavin suffers with chronic symptoms of epigastric pain immediately with or after food. Investigations reveal no underlying organic, systemic or metabolic disease.

Which of the following is the most likely diagnosis?

(A) Duodenal ulcer
(B) GORD
(C) Hiatus hernia
(D) Peptic ulcer
(E) Ulcer-like functional dyspepsia

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(B) GORD
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17. A 28 year old lady has visited your pharmacy requesting to purchase senna tablets. She is pregnant and has previously found them very successful. She uses no other medication and has no allergies.

What is the most appropriate response?

(A) Recommend an alternative medication, senna can induce premature labour
(B) Recommend an alternative medication, senna can cause foetal bradycardia
(C) Supply the smallest pack size and recommend she sees midwife as soon as possible
(D) Supply the senna liquid as this is known to be milder in pregnancy
(E) Recommend an alternative medication, senna can reduce foetal bowel development

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18. A 75 year old patient is suffering from acute diarrhoea. Their GP has advised them to stop taking one of their medications and to restart 2 days after normal eating and drinking. He cannot remember which medication the GP told him to stop.

Which **ONE** of the following would be the most likely answer?

(A) Clenil modulite 100 mcg inhaler
(B) Ramipril 10 mg capsules
(C) Salbutamol 100 mcg inhaler
(D) Sertraline 50 mg tablets
(E) Simvastatin 20 mg tablets

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(D) Sertraline 50 mg tablets
(E) Simvastatin 20 mg tablets

Type 2

The following list of options applies to **questions 25-26**.

(A) Atorvastatin 20 mg on
(B) Atorvastatin 80 mg on
(C) Bezafibrate MR 200 mg od
(D) Ezetimibe 10 mg od
(E) Omacor® 2 bd
(F) Pravastatin 10 mg on
(G) Simvastatin 20 mg on
(H) Simvastatin 40 mg on

For the patients described below in **questions 25 and 26** select the most suitable lipid modification treatment from the list. Each option may be used once, more than once, or not at all.

25. Mrs HJ, a 55-year-old lady with Type 1 DM and asthma

26. Mr FT, a 68-year-old man admitted to hospital with an ischaemic cerebral vascular accident (CVA) and a history of atrial fibrillation

25. Mrs HJ, a 55-year-old lady with Type 1 DM and asthma

Answer A

26. Mr FT, a 68-year-old man admitted to hospital with an ischaemic cerebral vascular accident (CVA) and a history of atrial fibrillation

Answer B

The following list of options applies to **questions 27-28**.

(A) Aspirin 300mg od for 14 days then clopidogrel 75mg od long-term
(B) Atorvastatin 20mg on
(C) Clopidogrel 75mg od for 12 months + long-term aspirin 75mg od
(D) Fondaparinux s/c injection 2.5mg od
(E) GTN spray PRN and atenolol 50mg od
(F) ISMN MR 60mg od
(G) Ivabradine 5mg bd
(H) Rivaroxaban 20mg od

For the patients described below in **questions 27 and 28** select the most suitable treatment for their CHD from the list. Each option may be used once, more than once, or not at all.

27. Mr TA admitted with a STEMI who undergoes PPCI and has a drug eluting stent inserted

28. Mrs FR who has developed nitrate tolerance whilst taking ISMN 20mg twice daily at 8am and 8pm

27. Mr TA admitted with a STEMI who undergoes PPCI and has a drug eluting stent inserted

Answer C

28. Mrs FR who has developed nitrate tolerance whilst taking ISMN 20mg twice daily at 8am and 8pm

Answer F

The following list of options applies to **questions 29-30**.

(A) Bisoprolol 1.25 mg od
(B) Bisoprolol 10 mg od
(C) Candesartan 8 mg od
(D) Furosemide i/v injection 80 mg bd
(E) Ibuprofen 400 mg tds prn
(F) Metolazone 5 mg od
(G) Paracetamol 500 mg-1000 mg qds prn
(H) Spironolactone 25 mg od

For the patients described below in **questions 29 and 30** select the most suitable treatment from the list. Each option may be used once, more than once, or not at all.

29. Patient with chronic heart failure already taking ramipril and spironolactone

30. Patient with chronic heart failure requiring pain relief for shoulder pain

29. Patient with chronic heart failure already taking ramipril and spironolactone

Answer A

30. Patient with chronic heart failure requiring pain relief for shoulder pain

Answer G

Monitoring parameters

- Induction Week:

⇒ Pharmaceutical care planning & monitoring

=> Drug monitoring parameters

Therapeutic Monitoring Parameters:

- What you check (as a pharmacist!) to check if drug working
- Will depend on what drug is being used for in individual patient

Toxic Monitoring Parameters:

- What you check to ensure drug is not causing harm (relates to side-effects, cautions, contraindications etc)
- Generally the same for all patients

1. Metformin for Type 2 DM

Drug: Metformin	Indication: Type 2 DM
Monitoring parameters	
Therapeutic	Toxic
BG, HbA1c	RF, S/E e.g. GI

2. Ramipril for hypertension

Drug: Ramipril	Indication: Hypertension
Monitoring parameters	
Therapeutic	Toxic
BP- target<140/90/<150/90/<130/8 (RF if DM)	BP, RF, K+, dry cough

3. Ramipril for secondary prevention of MI

Drug: Ramipril	Indication: 2° prevention of MI
Monitoring parameters	
Therapeutic	Toxic
↓CV events,	BP, RF, K+, dry cough

4. Ramipril for heart failure

Drug: Ramipril	Indication: Heart failure
Monitoring parameters	
Therapeutic	Toxic
Improvement long term in symptoms of heart failure	BP, RF, K+, dry cough

5. Furosemide (IV) for acute heart failure

Drug: Furosemide	Indication: Acute heart failure
Monitoring parameters	
Therapeutic	Toxic
Symptoms of heart failure (e.g. SOB), weight (aim 1kg/day loss), urine output (aim negative fluid balance)	BP, RF, U&Es (K+, Na+), rate of administration (max 4mg/min - ototoxicity)

6. Atorvastatin for secondary prevention of MI

Drug: Atorvastatin	Indication: 2° prevention MI
Monitoring parameters	
Therapeutic	Toxic
↓CV events, lipid profile (40% reduction)	LFTs, myopathy, CK

7. Clopidogrel for secondary prevention of CVA (stroke)

Drug: Clopidogrel	Indication: 2° prevention of CVA
Monitoring parameters	
Therapeutic	Toxic
↓CVA	Signs of bleeding, Hb, S/E:GI

8. Warfarin for AF

Drug: Warfarin	Indication: Prevention of CVA
Monitoring parameters	
Therapeutic	Toxic
↓CVA, INR (target 2-3)	INR, signs of bleeding, Hb

9. Aspirin for secondary prevention of MI

Drug: Aspirin	Indication: 2° prevention of MI
Monitoring parameters	
Therapeutic	Toxic
↓CV events	Signs of bleeding, Hb, S/E:GI

10. Amiodarone for AF

Drug: Amiodarone	Indication: AF
Monitoring parameters	
Therapeutic	Toxic
Apex pulse	TFTs (TSH & FT4), LFTs, lung function, S/E: skin (phototoxicity), taste, eyes (corneal microdeposits)