

CVS – Clinical Workshop 1

HYPERTENSION – Revision

ANSWERS

Learning Outcomes

By the end of this workshop you will have refreshed your Year 1 learning on hypertension and will be able to:

- Apply the NICE 2019 NG136 Hypertension in adults: diagnosis and management guideline in order to recommend appropriate management for individual patients, including those with multiple comorbidities and pregnant/breastfeeding women
- List therapeutic and toxic drug monitoring parameters for drugs used to treat hypertension amongst other medicines taken by the patient
- Identify potential pharmaceutical care issues for patients with hypertension receiving concomitant treatments for other conditions and facilitate a safe transfer of their pharmaceutical care from hospital to primary care.

Pre-workshop tasks:

- Review learning on hypertension from year 1
- Watch the screencast ‘Pharmaceutical Discharge and Transfer of Care’
- In advance of this workshop please complete **CASE 1** – you will be asked to feedback the answers in your groups during the workshop.

Resources

- On Bb:
 - Year 1 Teaching:
 - o Year 1 lectures: Epidemiology & Aetiology of Hypertension and Introduction to Management of Hypertension
 - o Year 1 workshop: Clinical management of hypertension
 - Additional Support Materials folder:
 - o Hypertension Drug Information pack (updated)
 - o NICE Guideline for Hypertension in adults: diagnosis and management (published 2019; updated 2022)
 - o NICE Guideline for Hypertension in pregnancy: diagnosis and management (published 2019; updated 2023)

- o NICE Guideline for Type 1 diabetes in adults: diagnosis and

CASE 1

CASE 1 TO BE COMPLETED IN ADVANCE OF WORKSHOP

CASE 1 – Hypertension in Primary Care

You are a clinical pharmacist within a Primary Care Network leading the hypertension clinic. Mrs JT is a 43-year-old lady of Black British African ethnicity, who has been referred to you after a routine BP check by a healthcare assistant at her surgery.

PMH: Type 2 diabetes mellitus (2017), osteoarthritis (2020).

FH: Brother aged 52 suffers from hypertension, father died following a stroke aged 56 years.

SH: Lives with her husband and three children, works as a full-time an accountant (on average 45 hours/week).

Alcohol: two to three glasses of wine/week

Smoking: 15-20 cigarettes/day for the last 15
years

Activity level: moderately active (30-60 min exercise/week)

DH: Metformin MR tablets 1 g BD

Sitagliptin tablets 100 mg OD

Atorvastatin tablets 20 mg
OD

Co-codamol 8/500 mg tablets two tablets QDS

PRN Femodene® ED one tablet OD

NKDA

Investigations (6/11/23): Liver function tests: NAD

Full blood count: NAD

CT Head – NAD; 12-lead ECG - NAD

HbA1c 49 mmol/mol (target < 53 mmol/mol)

OE:

HR 92 bpm (regular)

BP 163/101 mmHg (first measurement)

BP 165/100 mmHg (second

measurement) Weight: 89 kg

Height: 167 cm.

Mrs JT is otherwise well and does not appear to have any signs or symptoms indicating acute illness or target organ damage.

1. What are Mrs JT's risk factors for developing hypertension?

Ethnicity (individuals of Black Afro-Caribbean origin are at an increased risk of hypertension) Obesity (BMI of 32 kg/m², i.e. $\geq 30 \text{ kg/m}^2$)

Smoking

Stress (working 45 hours/week a likely contributor)

Family history of hypertension and cardiovascular disease History of type 2 diabetes mellitus

Combined oral contraceptive.

Bonus: it is also unclear if Mrs JT buys any OTC medicines to help her osteoarthritis. NSAIDs, such as ibuprofen, may further increase her risk of developing hypertension due to increased sodium/water re-absorption and vasoconstriction.

2. What stage of hypertension is Mrs JT likely to be at based on her clinic BP readings and how would you confirm the diagnosis?

Stage 2 (clinic BP $\geq 160/100 \text{ mmHg}$ but $< 180/120 \text{ mmHg}$)

In order to confirm the diagnosis, Mrs JT should undergo ambulatory BP monitoring (ABPM), or if not possible, home BP monitoring (HBPM). When using ABPM, ensure that at least 2 measurements per hour are taken during her waking hours and use the average value of at least 14 measurements to confirm the diagnosis. If using HBPM, BP should be recorded twice daily (ideally morning and evening) for at least 4 days, preferably 7 days. ABPM daytime average or HBPM average of $\geq 135/85 \text{ mmHg}$ is diagnostic of Stage 1 hypertension whereas $\geq 150/95 \text{ mmHg}$ is diagnostic of Stage 2 hypertension.

N.b. When measuring BP in clinic or when initiating ABPM/HBPM, ensure that a correct technique is used and explained to the patient. For more information, see NICE guidance and advice from Blood Pressure UK: <https://www.bloodpressureuk.org/your-blood-pressure/how-to-lower-your-blood-pressure/monitoring-your-blood-pressure-at-home/how-to-measure-your-blood-pressure-at-home/>

3. Considering Mrs JT's past medical history and BP, what other investigations may you request pending her diagnosis of hypertension?

Considering the fact that Mrs JT had elevated clinic BP and a past medical history of type 2 diabetes mellitus, the following may be sensible:

- Investigations for other target organ damage:
 - o This includes testing for protein in the urine (i.e. the albumin:creatinine ratio) and may help detect an underlying chronic kidney disease, possibly secondary to her diabetes (more about this later in the module)
 - o She should also have the blood sample taken to measure her glycated haemoglobin (HbA1C), electrolytes, creatinine (and eGFR), total cholesterol and HDL cholesterol (in case any of these tests are deranged and require management). Note that some of these investigations have already been completed (e.g. HbA1c) – see above.
 - o Mrs JT should undergo an examination of the fundi to identify any undiagnosed hypertensive retinopathy.
 - o 12-lead electrocardiogram may help rule out some of the co-existence of cardiovascular conditions, such as atrial fibrillation or ischaemic heart disease (more about these later in the module).
- Formal assessment of cardiovascular risk (more about this in Workshop 2 and related learning).

4. You see Mrs JT one week later in your clinic to discuss her home BP monitoring results, which confirm the diagnosis of Stage 2 hypertension. Prior to initiating the treatment, you would like to provide Mrs JT with some information to emphasise the importance of adequate BP control and adherence to her medicines. What are the clinical consequences of uncontrolled hypertension you are likely to include in your consultation?

The inadequate control of BP may lead to an increased risk of:

Myocardial infarction (MI)

Cerebral vascular accident (CVA), i.e.

stroke

Heart failure

Renal (kidney) disease

Peripheral vascular

disease

Vascular

dementia

Ocular complications (primarily retinopathy).

The presence of type 2 diabetes mellitus and lifestyle factors (such as smoking) increase these risks further.

5. After the diagnosis of hypertension, Mrs JT's GP initiates her on indapamide 2.5 mg OD asking you to book her in for appropriate follow-up blood tests. Comment on the appropriateness of this therapy in light of NICE guidance and patient's comorbidities. What target BP would you aim for?

Indapamide is a thiazide-like diuretic and should not be used as the first-line option for the management of hypertension unless the patient could not tolerate ACEi/ARB/CCB or these options were contra-indicated. As some of its side-effects, indapamide may exacerbate hyperglycaemia, potentially worsening the control of Mrs JT's diabetes. It can also cause electrolyte disturbances, such as hypercalcaemia or hyponatraemia.

To start with, Mrs JT should be offered advice on how to improve her lifestyle (particularly, stopping smoking, but also weight reduction, exercise and stress management) which would complement any pharmacological interventions.

As far as the pharmacological management of hypertension is concerned, the presence of type diabetes mellitus and Mrs JT's Black British African ethnicity points towards the initiation of an ARB (e.g. candesartan 8 mg OD). Individuals of Black African or Caribbean ethnicity are at a greater risk of ACE inhibitor-induced angioedema compared to the general population. As such ARBs are recommended for individuals of these ethnicities in preference to ACE inhibitors. ACE inhibitor would be an alternative for Mrs JT if the ARB is not tolerated, although that is somewhat unlikely since the latter is usually prescribed where the patient cannot tolerate ACE inhibitors.

The target clinic BP should be set at < 140/90 mmHg. Note that if this patient suffered from type 1 diabetes mellitus and had significant chronic kidney disease (albumin:creatinine ratio (ACR) of ≥ 70 mg/mmol), her target clinic BP should be set lower at > 130/80 mmHg.

6. How different would the first-line pharmacological management of Mrs JT's hypertension be if she was 24-weeks' pregnant?

Considering Mrs JT's ethnicity, her BP may be particularly responsive to a CCB such a nifedipine which is likely the most appropriate option. Note that nifedipine is unlicensed for use in pregnancy, and if Mrs JT chooses not to pursue this option, an alternative, such as labetalol (100 mg BD and titrated to response) may be considered instead. As a beta blocker, labetalol should however be used with caution in diabetes (may affect control of blood glucose or mask the symptoms of hypoglycaemia).

Note that target clinic BP in pregnant patients is < 135/85 mmHg, i.e. lower than in the general population.

CASE 2 – Hypertension in Secondary Care

You are a rotational hospital pharmacist working on one of the medical wards. It is a Monday morning and Mr GK has just been transferred to your ward from the acute medical unit. His medical notes, blood tests and drug chart are below:

Patient:	Mr GK
Ethnicity:	White British
Hospital number:	483928
DoB:	15.03.1938
Address:	13 Birchwood road, Flatplace

PC: Dizziness leading to a fall whilst in the kitchen. Increased urinary frequency and confusion.

HPC: Symptoms started on Saturday and have grown worse over the weekend. Wife rang ambulance on Saturday night when she could no longer cope at home.

PMH: COPD (2001)
Hypertension (2005)

DH: Salbutamol Easi-Breathe® inhaler 2 puffs QDS PRN
Trelegy inhaler® one puff OM
Ramipril 7.5 mg OD
Amlodipine 5 mg OD
Bendroflumethiazide 2.5 mg OD

Allergies: Co-trimoxazole – unknown reaction.

OE: Patient feels dizzy and tired
Dry lips, sunken eyes
GCS 13/15
Chest clear
Soft abdomen
Heart sounds normal
BP 179/111 mmHg
HR 110 bpm (regular)
Body temperature 38.3 °C

SH: Retired builder, lives with wife
Alcohol: 2-3 units/week
Smoking: Ex-smoker (gave up 10 years ago, smoked for 30 years)

Diagnosis: UTI and uncontrolled hypertension

Plan: Admit for observation. Request MSU. Abx for UTI.
Fluids
Amlodipine 5 mg STAT, then review BP.

His blood test results on admission were as follows:

Norfolk and Norwich University Hospital NHS Trust PATHOLOGY DEPARTMENT	Consultant/GP: Dr T Mohammed			PATIENT LOCATION <i>PATH</i>
Patient Name: Mr GK			NHS No:	
Hosp no: 483928		Sex: M	Age: 85 Yr	Pathology
Patient Address: 13 Birchwood road, Flatplace				
Lab Episode No:	6832		Date/Time Collection: 12/11/2023	
Address for Report: Norfolk & Norwich University Hospital Colney Lane Norwich NORF NR4 7UY				

HAEMATOLOGY	Wbc 11.4 (4.0-11.0 10 ⁹ /L)	Hb 133 (13.0- 18.0 g/dL)	Plt 289 (150 - 400 X 10 ⁹ /L)	MCV 85 (80-100 fL)	CRP 9 (<3 mg/L)
Collection LAB No Today 2696					

BIOCHEMISTRY				
Collection LAB No Today 2696				
Sodium 127 (134-145 umol/L)	Potassium 5.8 (3.6-5.0 umol/L)	Urea 8.3 (1.7-7.1 umol/L)	Creatinine 121 (55-125 umol/L)	eGFR 49 (>90ml/min/1.73 ²)
Bilirubin 13 (0 - 22 umol/L)	AST 41 (0 - 50 U/L)	GGT 35 (0 - 60 U/L)	ALP 98 (38 - 126 U/L)	Albumin 36 (35 - 50 g/L)



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B

Observations Frequency:

O ₂ Code:	Inspired O ₂ :
N = Nasal cannulae	Record flow rate in
SM = Simple Mask	Litres (L)
RM = Reservoir Mask	
V = Venturi	Target Oxygen
H = Humidified	Saturations;
A = Air	Record %

WARD:

OBSERVATION CHART

Name: Mr GK

Registration No: 483928

NHS Number:

Date of Birth: 15/03/1938

DATE	12/11	13/11	13/11	DATE
TIME	22:00	6:00	6:00	TIME
B	240			40 °C T
P	230			39.5 E
A	220			39 M
N	210			38.5 P
D	200			38 E
	190			37.5 R
B	180			37 A
P	170			36.5 T
A	160			36 U
N	150			35.5 R
D	140			35 E
P	130			34.5
U	120			
L	110			
S	100			
E	90			
RESPS	14	12	14	
SATS %	91	90	91	SATS %
O ₂ Code				O ₂ Code
Inspired O ₂	AIR	AIR	AIR	Inspired O ₂
Weight	59			Weight
Urine pH:				Urine pH:
Glucose	N			Glucose
Ketones	N			Ketones
Sp. Gravity				Sp. Gravity
Blood	D			Blood
Protein	B			Protein
Nitrite	B			Nitrite
Leucocytes	D			Leucocytes
Bowels	BNG	V30		Bowels
Type stool	4			Type stool
ENTER EARLY WARNING SCORE BELOW & IF EWS TRIGGER 4 OR MORE DOCUMENT ACTIONS OVER PAGE				
TEMP	38.3	38.4	38.5	TEMP
Systolic BP	162	182	190	Systolic BP
PULSE	78	104	90	PULSE
RESPS	24	22	14	RESPS
AVPU	A	A	A	AVPU
URINE				URINE
TOTAL	2	2	1	TOTAL
Sign initials	AM	AM	AM	Sign initials

UEA Training Prescription Chart									Number of drug charts in use:	1
Date	Surname	Forename	Sex	D/O/B	Hospital No.	Weight (kg)	Height (cm)	Surface Area (m ²)	SAM?	
Day 1	K	G	M	15/03/1938	483928	59 <small>Estimate / Actual</small>	168		Yes / No	
Ward/ward change:		Holmwood			Patient address:			13 Birchwood road, Flatplace		
Consultant(s)		Dr T Mohammed								
DRUG SENSITIVITIES/ALLERGIES MUST BE ENTERED. If no allergies/sensitivities you must write 'NKDA' and sign and date.										
Medicine/Substance	Description of allergy/sensitivity					Signature		Date		
Co-trimoxazole	Rash					K Holden		12/11/2023		
PRE-MEDICATION AND ONCE ONLY DRUGS										
Pharm	Date	Drug (approved name)	Dose	Directions/ route/ other	Time to be given	Signature	Administered by			
							Initials	Date		
		Trimethoprim	200 mg	PO	21:00	H Tang	BV	12-Nov		
		Amlodipine	5 mg	STAT	21:00	H Tang	BV	12-Nov		
Thromboprophylaxis Risk Assessment										
Drug thromboprophylaxis recommended			X							
Drug thromboprophylaxis NOT recommended										
Prescribing			Drug omissions			Prescribers				
<ul style="list-style-type: none"> 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. 			If a drug is omitted, one of the below codes must be entered into the drug administration box.			Signature	Dr H Tang			
						Bleep no.	896			
			1. Nil by mouth	6. Patient off ward	Print name	Doctor H TANG				
			2. Not required	7. No IV access	Signature	Dr R Pearce				
			3. Patient refused	9. Contra-indicated	Bleep no.	251				
			4. Drug unavailable	8. Other - reason must be recorded in notes	Print name	Doctor R PEARCE				
			5. Vomiting/nausea		Signature					
			Self administration of medicines (SAM)			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										
Version 001-19										

REGULAR MEDICINES 1

CHECK PAGE 1 FOR ALLERGY STATUS

REGULAR MEDICINES 2

CHECK PAGE 1 FOR ALLERGY STATUS

				Date →	12-Nov	13-Nov	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Da y 10
Tick box to indicate time of admission or add other times ↓														
6. Drug (approved name)		Start date	End date	06:00										
Paracetamol		Day 2		08:00	<input checked="" type="checkbox"/>	X	AM							
Dose	Route	Frequency		12:00	<input checked="" type="checkbox"/>									
1000 mg	Po	QDS		14:00										
Indication	Pharm check			18:00	<input checked="" type="checkbox"/>									
				22:00	<input checked="" type="checkbox"/>	BV								
Prescriber's signature		Supply		00:00										
H Tang														
7. Drug (approved name)		Start date	End date	06:00										
Dalteparin		Day 1		08:00										
Dose	Route	Frequency		12:00										
5,000 units	SC	OD		14:00										
Indication	Pharm check			18:00										
				22:00	<input checked="" type="checkbox"/>	BV								
Prescriber's signature		Supply		00:00										
H Tang														
8. Drug (approved name)		Start date	End date	06:00										
Betahistidine		Day 1		08:00	<input checked="" type="checkbox"/>		AM							
Dose	Route	Frequency		12:00										
16 mg	Po	TDS		14:00	<input checked="" type="checkbox"/>									
Indication	Pharm check			18:00										
				22:00	<input checked="" type="checkbox"/>	X								
Prescriber's signature		Supply		00:00										
R Pearce														
9. Drug (approved name)		Start date	End date	06:00										
				08:00										
Dose	Route	Frequency		12:00										
				14:00										
Indication	Pharm check			18:00										
				22:00										
Prescriber's signature		Supply		00:00										
10. Drug (approved name)		Start date	End date	06:00										
				08:00										
Dose	Route	Frequency		12:00										
				14:00										
Indication	Pharm check			18:00										
				22:00										
Prescriber's signature		Supply		00:00										

CHECK PAGE 1 FOR ALLERGY STATUS

AS REQUIRED DRUGS

CHECK PAGE 1 FOR ALLERGY STATUS

1. Drug (approved name)		Start date	Date										
Salbutamol		Day 1											
Dose	Route	Max Frequency	Time										
2 puffs	INH	PRN											
Indication		Pharm check	Dose										
			Route										
Prescriber's signature		Supply	Given by										
H Tang													
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

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

Drug: Trimethoprim	Indication: UTI
Monitoring parameters	
Therapeutic	Toxic
↓ Symptoms (confusion, urinary frequency, pain, etc.) ↓ CRP and WBC ↓ Body temperature (although not elevated for Mr GK)	Signs/symptoms of hypersensitivity (e.g. rash, swelling) Renal function – dose may need adjustment (more later on in the module) U+Es – may cause electrolyte abnormalities, including hyperkalaemia.

Drug: Amlodipine	Indication: Hypertension
Monitoring parameters	
Therapeutic	Toxic
↓ BP (target < 150/90 mmHg) ↓ Signs/symptoms associated with increased BP (e.g. headaches, or indirectly, plasma creatinine)	BP (hypotension) S/E: Dizziness, tachycardia, ankle swelling, headaches, flushing, constipation.

Drug: Ramipril	Indication: Hypertension
Monitoring parameters	
Therapeutic	Toxic
↓ BP (target < 150/90 mmHg) ↓ Signs/symptoms associated with increased BP (e.g. headaches, or indirectly, plasma creatinine)	BP (hypotension) S/E: dry cough, dizziness, drowsiness, hypersensitivity reactions U+E: sodium (hyponatraemia), potassium (hyperkalaemia), plasma creatinine (and creatinine clearance; CrCl).

Drug: Bendroflumethiazide	Indication: Hypertension
Monitoring parameters	
Therapeutic	Toxic
↓ BP (target < 150/90 mmHg) ↓ Signs/symptoms associated with increased BP (e.g. headaches, or indirectly, plasma creatinine)	BP (hypotension) S/E: dizziness, postural hypotension, gout U+E: sodium (hyponatraemia), potassium (hypokalaemia), calcium (hypercalcaemia), chloride (hypochloraemia), uric acid (hyperuricaemia), plasma creatinine (and creatinine clearance; CrCl). LFTs

Drug: Fluticasone	Indication: COPD (unlicensed unless part of combination inhaler, e.g. Trelegy®)
Monitoring parameters	
Therapeutic	Toxic
<p>May ↓ signs/symptoms of COPD (e.g. shortness of breath), however no evidence unless part of combination inhaler, e.g. Trelegy®.</p> <p>If part of Trelegy®:</p> <ul style="list-style-type: none"> ↓ Symptoms of COPD (breathlessness, night-time awakenings) ↓ Annual rate of exacerbations ↓ Use of rescue medication ↑ Lung function (↑FEV₁) ↑ Health-related quality of life 	<p>S/E: Oral candidiasis, altered taste, voice alteration, paradoxical bronchospasm, adrenal suppression</p> <p>If part of Trelegy®, also monitor for:</p> <p>S/E: headaches, palpitations/arrhythmias (including QT interval prolongation), tremor, hypokalaemia (no routine monitoring of U+Es needed), hyperglycaemia (no routine monitoring of blood glucose needed).</p>

Drug: Paracetamol	Indication: Mild to moderate pain
Monitoring parameters	
Therapeutic	Toxic
↓ Pain (may be monitored using a relevant pain scale, e.g. 1-10 or visual analogue scale).	<p>S/E: hypersensitivity reactions (e.g. rash), rarely blood dyscrasias (no need for routine monitoring of FBC) LFTs.</p>

Drug: Betahistine	Indication: Vertigo
Monitoring parameters	
Therapeutic	Toxic
↓ Vertigo/dizziness	<p>S/E: GI discomfort, headache, nausea/vomiting, allergic dermatitis.</p>

Drug: Salbutamol	Indication: COPD - reliever
Monitoring parameters	
Therapeutic	Toxic
↓ Acute symptoms of COPD	<p>S/E: palpitations/arrhythmias (including QT interval prolongation), headache, tremor, muscle cramps, hypokalaemia with high doses (no routine monitoring of U+Es needed for inhaler), hyperglycaemia (no routine monitoring of blood glucose needed).</p>

2. Mr GK's blood pressure decreases to 152/94 mmHg by Monday evening. Repeat blood tests show a marked decline in inflammatory markers, and a partial resolution of electrolyte abnormalities. He feels significantly better in himself and is being prepared for discharge on Tuesday morning.

Review Mr GK's discharge prescription and letter against patient documentation provided, identify any pharmaceutical care issues, and formulate appropriate actions to resolve these.

You should have the following additional resources available to you:

- Inpatient drug chart (see above)
- Patient discharge letter (see below)
- Medicines reconciliation notes (see below)

You should complete the table provided with the pharmaceutical care issues you identify and the actions to resolve them.

Patient Discharge Letter (page 1 of 2)

Patient Name:	Mr GK	Address:	13 Birchwood road, Flatplace
DOB:	15/03/1938	Sex (at birth):	Male
Gender:	Male	Ethnicity:	White British
Hospital ID:	483928	NHS No:	456 781 981
Usual GP Name:	Dr Richards	Usual GP Address:	Flatplace Surgery, Flatplace
Date of Admission:	12/11/2023	Date of Discharge (predicted):	14/11/2023
Ward:	Holmwood	Discharging Consultant	Dr T Mohammed

Reason for Admission & Diagnosis:

Brought in by ambulance following a fall due progressive dizziness.
UTI, dehydration and uncontrolled hypertension.

Past Medical History:

COPD
Hypertension

Investigations & Relevant Results:

ECG – NAD
CT Head – NAD
BP 179/111 mmHg to 152/94 mmHg pre-discharge
HR 110 bpm (regular) to 93 bpm pre-discharge

BGs, HbA1c, LFTs – NAD
MSU – *E.coli* sensitive to trimethoprim and nitrofurantoin WBC 11.4 down to 8.9 on discharge (4.0-11.0 x 10⁹/L) CRP 9 down to 6 on discharge (<3 mg/L)
Na⁺ 127 to 130 pre-discharge (134-145 µmol/L)
K⁺ 5.8 TO 5.4 pre-discharge (3.6-5.0 µmol/L)
eGFR 49 to 52 pre-discharge (>90ml/min ml/min/ 1.732)

Management, Procedures & Complications:

Patient was prescribed IV fluids and initiated on PO trimethoprim for the treatment of UTI (total of 7 days). He was also loaded with an additional amlodipine 5 mg OD followed by a drop in BP. Ramipril initially held but re-started on discharge.

Patient has made a remarkable recovery and is planned for discharge on 14/11/2023.

DNAR/RESPECT:

For resuscitation

Patient Discharge Letter (page 2 of 2)

Follow-up and Actions for GP:

Please kindly re-check patient's U+Es and BP/HR in 7-14 days.

Multidisciplinary Notes (e.g., Physiotherapy Occupational Therapy, Speech & Language):

Reviewed by OT/PT who are happy for patient to be discharged home with support from his wife.

Medication Changes:

Started:

Trimethoprim (to complete 7 days)

Paracetamol PRN for pain relief – short-term

Betahistine – dizziness (GP to review)

Discharge Destination:

Home with support of family

Medications on Discharge

Medication	Dosing	Quantity	GP to Continue
Trimethoprim 200 mg tablets	ONE to be taken TWICE DAILY for 5 more days	10	NO
Amlodipine 5 mg tablets	ONE to be taken in the MORNING	Patient's own	YES
Ramipril 5 mg capsules	ONE to be taken in the MORNING	Patient's own	YES
Ramipril 2.5 mg capsules	ONE to be taken in the MORNING	Patient's own	YES
Bendroflumethiazide 2.5 mg tablets	ONE to be taken in the MORNING	Patient's own	YES
Fluticasone inhaler	ONE puff to be inhaled in the MORNING	Patient's own	YES
Paracetamol 500 mg tablets	TWO tablets to be taken FOUR times daily	32	No
Betahistine 16 mg tablets	ONE to be taken THREE times daily	84	YES

Completed by:	Dr H Tang	Grade:	FY1
Speciality:	Acute Medicine (bleep 1891)		

Medicines Reconciliation Notes

Drug History		
Patient Name GK	Hospital no. 483928	Date 13/11/2023
Sources Used (circle) <input checked="" type="checkbox"/> Patient / <input type="checkbox"/> Patient's relative / <input checked="" type="checkbox"/> Patient's own medicines / <input type="checkbox"/> GP repeat list / <input checked="" type="checkbox"/> Summary Care Record		
Allergies/Sensitivities (Including the nature of the allergy/sensitivity): Co-trimoxazole - rash		
Regular Medications (complete for all medications including OTC preparations)		
Drug Name, Dose, Frequency and Route	Comments	
1. Salbutamol Easi-Breathe inhaler 2 puffs QDS PRN	Uses approximately once per week	
2. Trelegy inhaler one puff OM		
3. Ramipril capsules 7.5 mg OM (has 2.5 mg and 5 mg capsules)	Does not take – stopped himself 3 months ago due to dry cough (GP unaware)	
4. Amlodipine tablets 5 mg OM		
5. Bendroflumethiazide tablets 2.5 mg OM		
Acute medications		
Drug Name, Dose, Frequency and Route	Comments	
Medicines management pre-admission	<input checked="" type="checkbox"/> Patient	Other (state).....
Compliance aids Pre-Admission (circle) <input checked="" type="checkbox"/> None / <input type="checkbox"/> Medication Chart / <input type="checkbox"/> MDS (Dossett / NOMAD / Mediwallet) / Large print labels / <input type="checkbox"/> MAR chart		
For MDS state device:	MDS filled by: Patient / Community Pharmacy	
Drug History Completed By: K Johnson, Pharmacy Technician		

Issue	Action required
<p>Ramipril continued despite hyperkalaemia and hyponatraemia (these resolved only partially before discharge). ACE inhibitors may exacerbate hyperkalaemia and hyponatraemia. Patient was not actually taking ramipril pre-admission due to dry cough.</p>	<p>Speak with the prescriber/medical team and suggest stopping ramipril and re-checking U+Es in 7-14 days (preferably within 7 days), especially sodium and potassium. Monitor renal (kidney) function as plasma creatinine (and CrCl) – electrolyte abnormalities above may occur due to an acute kidney injury (AKI; more about this later in the module).</p>
<p>Bendroflumethiazide continued despite hyponatraemia and dehydration. Thiazides may exacerbate hyponatraemia and possess a weak diuretic effect which may worsen patient's dehydration. They may also worsen dizziness experienced by the patient, increasing the risk of falls.</p>	<p>Speak with the prescriber/medical team. Recommend stopping bendroflumethiazide, at least until sodium is re-stored and consider stopping permanently if patient is prone to falls, AKIs and electrolyte abnormalities. Thiazides should be avoided if CrCl further declines to < 30 mL/min (currently 33 mL/min).</p>
<p>The management of patient's hypertension. Patient's BP remains \geq 150/90 mmHg (target for individuals aged \geq 80 years is < 150/90 mmHg).</p>	<p>Speak with the prescriber/medical team and recommend increasing amlodipine dose to 10 mg OD on discharge instead of continuing ramipril and Bendroflumethiazide. The patient does not suffer from type 2 diabetes mellitus which would warrant the use of angiotensin II receptor blockers (ARBs) as alternatives to ACE inhibitors.</p>
	<p>If amlodipine fails to control BP (which is likely considering one or both of the other anti-hypertensives could be stopped), consider starting an alpha-blocker, e.g. doxazosin 1 mg OD, titrated upwards as needed. Caution in light of the history of falls. Beta-blockers may be an alternative and may also help \downarrowHR (mild tachycardia), however should be avoided in COPD if possible. Tachycardia is likely secondary to infection/anxiety and seems to be resolving as the patient recovers.</p>

<p>The selection of an antimicrobial for the treatment of UTI. Patient has a documented allergy to co-trimoxazole (rash) but is prescribed trimethoprim.</p> <p>Trimethoprim may further worsen hyperkalaemia.</p>	<p>Speak with the prescriber/medical team. Recommend stopping trimethoprim in light of patient's allergy and suggest replacing with nitrofurantoin 50-100 mg QDS for 7 days as per MSU results (<i>E.coli</i> sensitive to both trimethoprim and nitrofurantoin).</p> <p>If nitrofurantoin is prescribed, counsel the patient on ensuring they complete the course and on potential side-effects: may change the colour of urine to yellow or brown, acute pulmonary reactions (usually within the first week of treatment) and blood dyscrasias – monitor for signs/symptoms.</p>
<p>Incorrect prescribing of inhalers.</p> <p>Trelegy® inhaler prescribed as fluticasone alone.</p> <p>Salbutamol Easi-Breathe® prescribed without a formulation on inpatient chart which may default to the use of a metered-dose inhaler. Not prescribed on discharge letter at all.</p>	<p>Speak with the prescriber/medical team. Recommend changing fluticasone inhaler to Trelegy® inhaler, and prescribing salbutamol Easi-Breathe® on the discharge letter as per medicines reconciliation record.</p>
<p>Unclear indication of betahistine.</p> <p>Not licensed for the treatment of dizziness/vertigo unless they are associated with Meniere's disease.</p> <p>Possible that the dizziness experienced by the patient is a combined result of an acute infection and uncontrolled hypertension (could also be exacerbated by bendroflumethiazide).</p>	<p>Speak with the prescriber/medical team. Recommend that betahisine is discontinued unless clinically indicated.</p>

The patient may also be offered lifestyle counselling, however this is outside the scope of this task (i.e. the review/clinical screening of discharge prescriptions).

Counsel on diet (once sodium restored, low Na+, low fat, 5/day), exercise (30 mins/day on 5 days/week or exercising within their limits). Weight management, smoking cessation and alcohol consumption not relevant for this patient.

PHA-6020Y

Patient centred medicine from bench to bedside

CVS – Clinical Workshop 2 – **ANSWERS**

CV RISK ASSESSMENT & LIPID MANAGEMENT

Learning Outcomes

By the end of this workshop you will be able to:

- Apply the current NICE guidance for the prescribing of lipid lowering drugs
- Identify the range of risk factors for CVD
- Understand the concepts of primary and secondary prevention of CVD
- Calculate 10 year CVD risk
- Understand the relative and absolute benefits of lipid lowering treatment.
- Understand how risks and benefits of treatment should be explained to patients
- Assess the clinical need for the prescribing of lipid lowering drugs in patients and identify pharmaceutical care issues for these patients

Pre-workshop tasks:

- In advance of this workshop please complete **TASKs 1, 2 and 3** – you will be asked to feedback these in your groups during the workshop
- Read pages 5-7 of the document “Patient decision aid: user guide for healthcare professionals Implementing the NICE guideline on lipid modification (CG181)” which can be found on Bb

Resources

- On Bb:
 - Screencasts: Cardiovascular Risk Assessment and Cardiovascular Risk: Use of statins
 - NICE Guidelines: CV Risk and Lipid Modification, 2014 (<https://www.nice.org.uk/guidance/cg181>)
 - QRISK 3 calculator (www.qrisk.org/three)
 - Patient decision aid (in workshop folder on Bb)

TASKS 1-3 TO BE COMPLETED IN ADVANCE OF WORKSHOP

TASK 1:

List the known risk factors for cardiovascular disease.

Modifiable risk factors	Non-Modifiable risk factors
Weight	Age
Smoking	Gender
Cholesterol	Family history
Blood pressure	Ethnicity
Blood glucose (DM)	
Social deprivation	

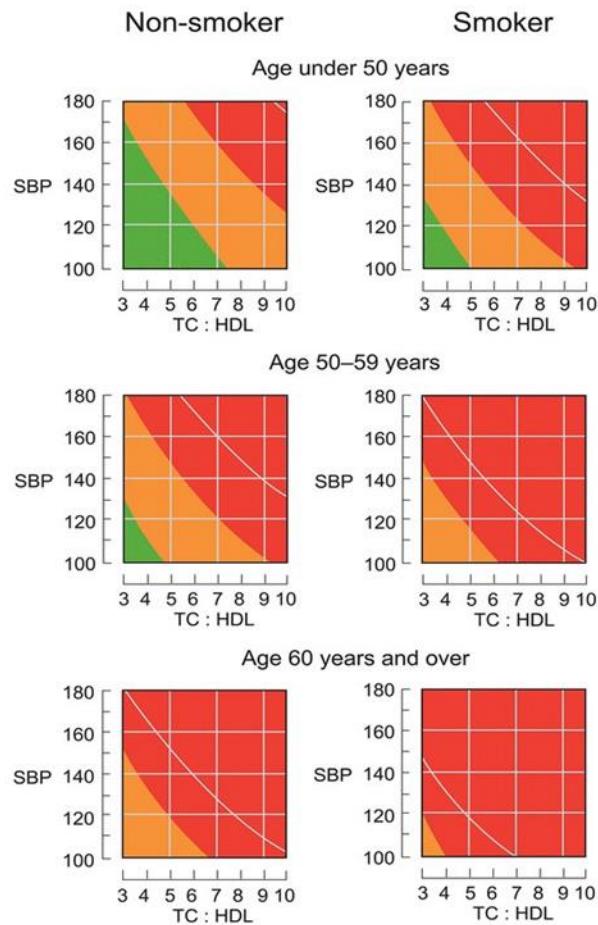
TASK 2:

With reference to the Framingham Cardiovascular Risk Prediction Charts (on next page), what is the 10 year cardiovascular risk of the following patients?

REMEMBER: Cardiovascular risk NOT JUST coronary heart disease risk

No.	Patient characteristics	CV Risk
1	Female 38 years, non-smoker, TC:HDL 6, SBP 115	<10%
2	Male 53 years, non-smoker, TC:HDL 6, SBP 140	>20%
3	Male 58 years, non-smoker, TC:HDL 4, SBP 128	10-20%
4	Female 73, smoker (>20/day) TC:HDL 5, SBP 138	>20%
5	Male 38 years, non-smoker, TC:HDL 6.3 , SBP 125	10-20%
6	Female 65 years, non-smoker TC: HDL 7.8, SBP 120	10-20%

Nondiabetic Men



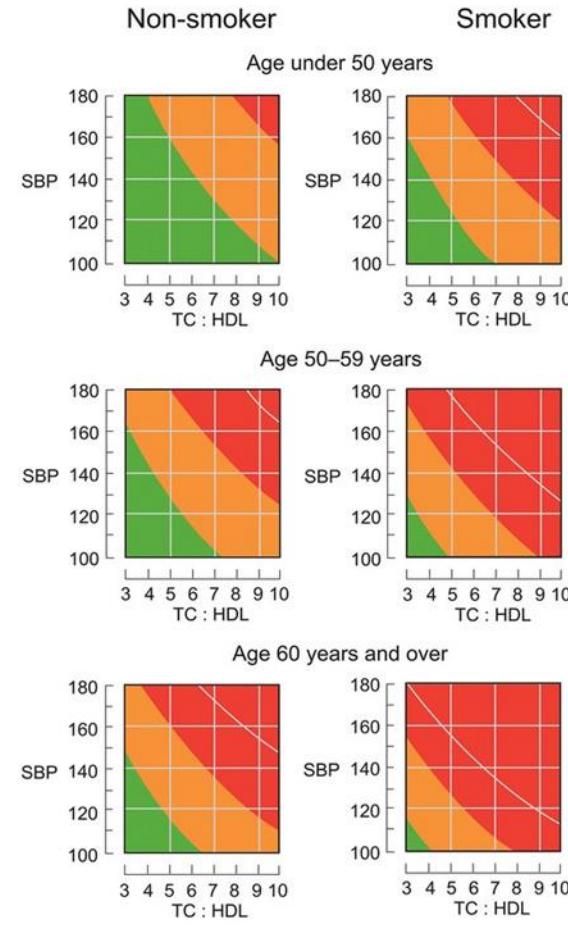
CVD risk <10% over next 10 years
 CVD risk 10–20% over next 10 years
 CVD risk >20% over next 10 years

CVD risk over next 10 years
 10% 20%

SBP = systolic blood pressure mmHg
 TC : HDL = serum total cholesterol to HDL cholesterol ratio

(Continued over)

Nondiabetic Women



CVD risk <10% over next 10 years
 CVD risk 10–20% over next 10 years
 CVD risk >20% over next 10 years

CVD risk over next 10 years
 10% 20%

SBP = systolic blood pressure mmHg
 TC : HDL = serum total cholesterol to HDL cholesterol ratio

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What other factors do you think should be ascertained and considered by a prescriber in estimating cardiovascular risk in these patients?

- Ethnicity
- Family history of CVD
- BMI
- Socioeconomic status
- Diabetes

In practice there are electronic risk engines eg QRISK3 which can be used to assess cardiovascular risk taking some of these other factors in account and are therefore recommended by NICE.

TASK 3:

(a): Access the qrisk3 calculator on-line (www.qrisk.org/three) and use to calculate the risk for the same group of patients (where you do not have relevant patient data required by calculator, leave blank)

No.	Patient characteristics	CV Risk
1	Female 38 years, non-smoker SBP 115 TC:HDL 6	0.8%
2	Male 53 years, non-smoker TC:HDL 6, SBP 140	8.2%
3	Male 58 years, non-smoker TC:HDL 4, SBP 128	7.5%
4	Female 73, smoker (>20/day) TC:HDL 5, SBP 138	26.4%
5	Male 38 years, non-smoker TC:HDL 6.3 , SBP 125	1.6%
6	Female 65 years, non-smoker TC: HDL 7.8, SBP 120	13%

Why do you think there may be any differences between the results above and those in Task 2?

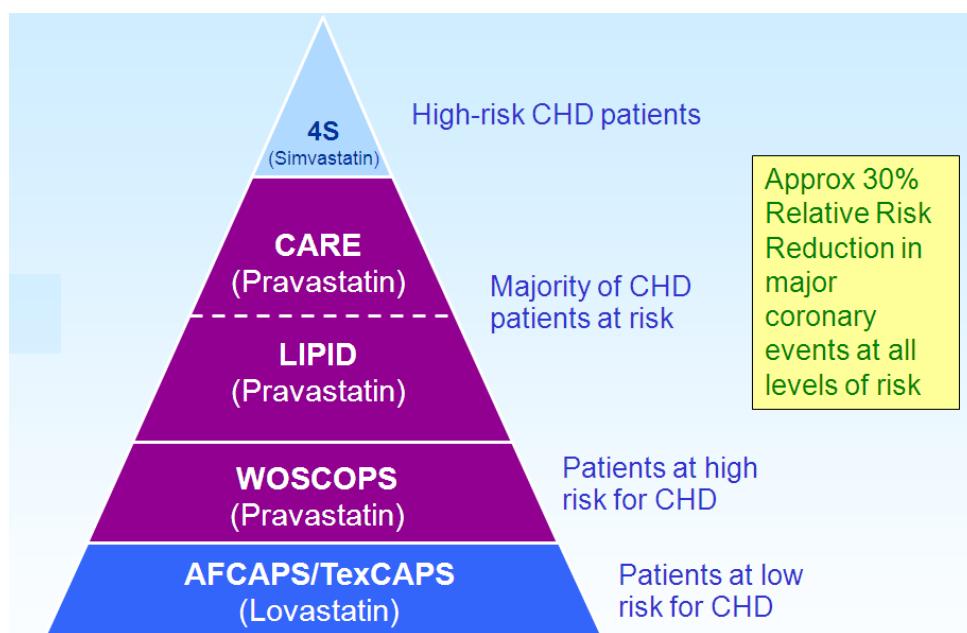
- Framingham based equations for risk reflect risks of CVD in 1960's - 1980's in a North America cohort
- Tend to overestimate risk in current UK population
- QRISK3 uses other parameters including ethnicity, socioeconomic status (postcode), DM, FH of premature CVD, CKD, AF, bp therapy, RA, BMI, etc (defaults to white/average population data when not known as in patients above)

(b): Access the qrisk3 calculator on-line (www.qrisk.org/three) again and use to calculate the risk for the same group of patients using the additional patient data and compare how this changes the calculated risk from part (a)

No.	Patient characteristics	CV Risk
1	Female 38 years, non-smoker, TC:HDL 6, SBP 115 with a first degree relative under 60 yrs with CVD	1.3%
2	Male 53 years, non-smoker, TC:HDL 6, SBP 140 with AF and CKD	27.1%
3	Male 58 years, non-smoker, TC:HDL 4, SBP 128, Pakistani	11.8%
4	Female 73, smoker (>20/day) TC:HDL 5, SBP 138, Type 2 DM	40.9%
5	Male 38 years, ex-smoker, TC:HDL 6.3 , SBP 125, height 168cm and weight 110kg	2.2%
6 (i)	Female 65 years, non-smoker TC: HDL 7.8, SBP 120 living at NR9 3AW (Norwich)	12%
6 (ii)	Female 65 years, non-smoker TC: HDL 7.8, SBP 120 living at BS5 0AP (Bristol)	16.1%

TASK 4:

This figure illustrates the early major landmark statin trials – in all cases there was demonstrated a 30% reduction in Relative Risk (RR) of having a myocardial infarction or stroke when ALL these different groups of patients took a statin.



(Please note the patients for Task 4 are DIFFERENT to the patients in the first 3 tasks!)

1. Calculate the new level of risk after the following patients start taking a statin (assuming a RRR reduction of 30%)
2. Calculate their absolute risk reduction (CV Risk – CV Risk with a statin)
3. Calculate their NNT (100/ARR)

COMPLETE THE TABLE BELOW WITH YOUR RESULTS

Patient No.	CV Risk %	CV Risk with a Statin %	Absolute Risk Reduction %	NNT
1	35	24.5	10.5	10
2	20	14	6	17
3	5	3.5	1.5	67
4	10	7	3	34
5	1	0.7	0.3	334
6	15	10.5	4.5	23

(A useful explanation of the difference between **relative risk reduction** and **absolute risk reduction** can be found in the NICE document “Patient decision aid: user guide for healthcare professionals” in workshop folder on Bb and also <https://patient.info/news-and-features/calculating-absolute-risk-and-relative-risk>)

From reviewing the results of NNT what conclusion can you draw about the benefits of taking statins?

The greater the CV risk the more benefit is obtained and less people needed to treat to gain the benefit

NICE advise that cardiovascular risk and the benefits/harm associated with potential treatment should be discussed with individual patients in advance of any decision to start therapy.

Resource:

CG181 Patient decision aid on should I take a statin - in workshop folder on Bb

How could you explain the benefits of statin treatment to a patient with a 10% 10 year risk of CVD?

10% risk – “there were 100 people like you, the best estimation is that, over the next 10 years 90 out of the 100 will be fine. Unfortunately, 10 will develop heart disease or have a stroke. It is not possible to predict whether you would be one of the 90 or one of the 10”

Cates plots – developed in 1999 – visual representation to aid discussion of CV risk and use of statins (uses data for statins as a group, not just atorvastatin)

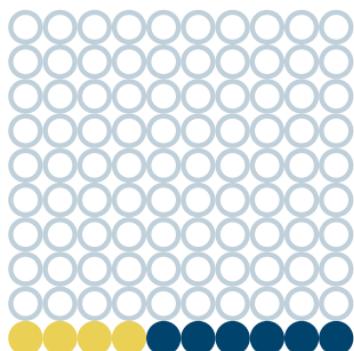
http://www.nntonline.net/visualrx/cates_plot/ - as in screencast on Bb

Recently produced document: CG181 Patient decision aid on should I take a statin – visual representation of NICE guideline recommendations i.e. atorvastatin (and hence differences)

“If all the 100 people took a statin for 10 years, about 6 will still have a heart attack or stroke, regardless of whether they take the statin or not. However, for about 4 of the 100 people, taking a statin will prevent them from having a heart attack or stroke. I can’t tell you if you are one of the 2 people who will gain a benefit from taking the statin or not, or one of the 90 people who will take a statin for ten years and not get any benefit.”

If your QRISK score is 10% over the next 10 years

On average, for every 100 people with this risk score who do not take a statin, over 10 years 10 people will get heart disease or have a stroke and 90 will not.



If 100 people take a statin, over 10 years on average:

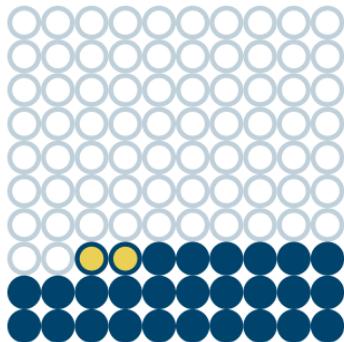
- about 90 people will not get heart disease or have a stroke, but would not even if they had not taken a statin
- about 4 people will not get heart disease or have a stroke because they take a statin
- about 6 people will get heart disease or have a stroke even though they take a statin

We cannot say for sure what will happen to any specific person

Can also be used to demonstrate side-effects e.g. muscle pain, risk of diabetes

Muscle pain

Statins can cause muscle pain, but many people get muscle pain from time to time whether they take a statin or not. The diagram below shows the results from many large studies. Muscle pain caused by statins tends to happen in the first year of treatment.



On average, for every 100 people who took a statin:

- about 72 people did not get muscle pain
- about 26 people got muscle pain but would have done if they had not taken a statin
- about 2 people got muscle pain because they took a statin

More rarely, people can get severe muscle damage. This happens anyway to about 3 in 10,000 people who do not take statins (so 9,997 people do not get this). If all 10,000 people took a statin, on average an extra 3 people would get severe muscle damage and 9,994 would not get severe muscle damage.

TASK 5:

Case study:

Mr JB is a 65 year old white Caucasian, who presents to his GP with a 3 day history of cough, SOB and production of green sputum.

He has a 1 year history of hypertension for which he is prescribed:

Amlodipine 10mg od

His GP diagnoses a chest infection and prescribes:

Clarithromycin 250mg bd for 7 days (he is allergic to Penicillin)

Mr JB smokes about 5 cigarettes a day having cut down from 20 cigarettes a day up until a year ago when he was diagnosed with hypertension. His current weight is 90kg and he is 175cm tall. He drinks about 5 pints of beer a week and exercises by walking his dog.

4 weeks previously he had visited his GP to have his blood pressure checked and it was 145/95 so his GP had at that time increased his Amlodipine from 5mg to 10mg od. His GP had also arranged for him to attend for a fasting glucose and lipid profile blood test.

The results of these blood tests were as follows:

Glucose 8.2 mmol/l (this was repeated and found to be 8.6 mmol/l)
Total cholesterol 5.4mmol/l
HDL 0.9 mmol/l
TC:HDL ratio 6

His GP also re-checks his blood pressure and it is now 150/95.

Mr JB's GP starts him on:

Simvastatin 40mg od

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

Drug: Amlodipine	Indication: Hypertension
Monitoring parameters	
Therapeutic	Toxic
Bp – target <140/90	bp, pulse S/E e.g. SOA

Drug: Clarithromycin	Indication: Chest infection
Monitoring parameters	
Therapeutic	Toxic
Symptoms (cough, SOB, green sputum), WBC, Temp, C&S, CRP	Allergies, S/E e.g. G.I.

Drug: Simvastatin	Indication: 1 ^o prevention of CVD (MI/stroke)
Monitoring parameters	
Therapeutic	Toxic
Lipid profile – Total cholesterol + LDL + HDL (target >40% reduction in non-HDL cholesterol) Lack of CV event	LFTs, myopathy/muscle pain, creatine kinase (CK)

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
BP not controlled (150/95) despite being on optimised dose (target <140/90)	Commence ACEI eg Ramipril 1.25mg od (as patient now Type 2 DM) – step 2 NICE guidelines + also renal protective (newly diagnosed Type2 DM)
Monitoring parameters	
Therapeutic	Toxic
Bp – target <140/90	BP, RF, K+, dry cough

Issue	Action required
Drug interaction between amlodipine and clarithromycin causing increased amlodipine levels	As patient currently hypertensive OK to continue but monitor for increase in other side-effects of amlodipine e.g. SOA or advise change of antibiotic e.g. doxycycline 200mg STAT then 100mg od 7 days
Monitoring parameters	
Therapeutic	Toxic
If changing to doxycycline: Symptoms (cough, SOB, green sputum), WBC, Temp, C&S, CRP	Allergies, S/E e.g. G.I.

Issue	Action required
Drug interaction between amlodipine and simvastatin increasing risk of myopathy	Discuss with doctor and advise reduce simvastatin to 20mg or preferably change to Atorvastatin 20mg (as per NICE, 2014 Lipid modification guidelines)
Monitoring parameters	
Therapeutic	Toxic

Issue	Action required
Drug interaction between simvastatin and clarithromycin causing increased risk of myopathy and rhabdomyolysis	Don't start statin until completed antibiotic (same for atorvastatin – interaction also between atorvastatin and clarithromycin)
Monitoring parameters	
Therapeutic	Toxic

Issue	Action required
Simvastatin not EBM according to guidelines (& would require dose reduction to 20mg on due to interactions above)	Change to atorvastatin 20mg on as per EBM (+ no dose reduction required)
Monitoring parameters	
Therapeutic	Toxic
Lipid profile – Total cholesterol + LDL + HDL (target >40% reduction in non-HDL cholesterol) Lack of CV event	LFTs, myopathy/muscle pain, creatine kinase (CK)

Issue	Action required
Fasting blood glucose >7.0mmol/l – newly diagnosed Type 2 DM	Start patient 3 month weight loss/exercise/diet (low salt, 5 day veg/fruit, low saturated fat, oily fish (has low HDL), alcohol) and review (then start metformin + SGLT2 inhibitor if lack of response)
Monitoring parameters	
Therapeutic	Toxic

Issue	Action required
Lifestyle counselling	QRISK 3 44.6% - weight loss – BMI 29.4 – overweight - exercise – 30mins minimum 5x/week - diet (low salt, 5 day veg/fruit, low saturated fat, oily fish (has low HDL), alcohol – 14 units/week)
Monitoring parameters	
Therapeutic	Toxic

Issue	Action required
Counselling and education	All new drugs – counsel on indication, dose, frequency & side-effects SPECIFIC DETAILS eg muscle/night with statins, cough with ACEI
Monitoring parameters	
Therapeutic	Toxic

TASK 6: (for directed study after workshop)

Using the NICE Guidance for Lipid Modification, 2014 (<http://www.nice.org.uk/guidance/cg181/chapter/1-recommendations>), answer the following questions:

1. Mrs JA is a 52 year old lady who has a 10 year CVD risk of 25%.

Her lipid profile is as follows:

Total cholesterol	6.8 mmol/l
HDL cholesterol	0.9 mmol/l
Triglycerides	2.1 mmol/l

- (a) Before starting a statin what baseline checks should be carried out and what secondary causes of dyslipidaemia should be excluded?

smoking status
alcohol consumption
blood pressure
body mass index or other measure of HbA_{1c}
renal function and eGFR
transaminase level (alanine aminotransferase or aspartate aminotransferase)
thyroid-stimulating hormone (for hypothyroidism)

Exclude possible common secondary causes of dyslipidaemia (such as excess alcohol, uncontrolled diabetes, hypothyroidism, liver disease and nephrotic syndrome)

- (b) How should Mrs JA's lipid modification be managed?

Lifestyle modification and optimise the management of all other modifiable CVD risk factors if possible

Offer atorvastatin 20mg od

- (c) What is her target lipid levels?

>40% reduction on Non-HDL cholesterol

Mrs JA's non-HDL cholesterol = TC-HDL = 6.8-0.9 = 5.9 therefore target is <3.5mmol/l

(d) What would the recommendations be if she had been a diabetic?

No different!

Type 1 >40yrs + Type 2 with 10 yr CVD risk >10% offer atorvastatin 20mg od

(e) Mrs JA's non-HDL cholesterol is 5.2 mmol/l after 3 months of therapy. How should this be managed?

- discuss adherence and timing of dose
- optimise adherence to diet and lifestyle measures
- consider increasing the dose to 40mg if she is judged to be at higher risk because of comorbidities, risk score or using clinical judgement

(f) Mrs JA is admitted to hospital with a STEMI. How should her lipid modification therapy be changed?

Atorvastatin 80mg on

PHA-6020Y

Patient centred medicine from bench to bedside

CVS – Clinical Workshop 3 – **ANSWERS**

CORONARY/ISCHAEMIC HEART DISEASE

Learning Outcomes

By the end of this workshop you will be able to:

- Describe the therapeutic options for the treatment of:
 - Stable angina
 - Acute myocardial infarction (STEMI)
- Identify pharmaceutical care issues associated with the treatment of individual patients with IHD
- Identify the therapeutic and toxic monitoring parameters for the drug used in the treatment of IHD

Pre-workshop tasks:

- In advance of this workshop please complete **CASE 1**.

Resources

- On Bb:
 - Screencasts: Coronary Heart Disease
 - NICE Guidelines: Stable angina (<https://www.nice.org.uk/guidance/cg126>)
 - NICE Guidelines: Acute Coronary Syndromes (<https://www.nice.org.uk/guidance/nq185>)
 - BNF: Treatment summaries – Musculoskeletal system- NSAIDs – Cardiovascular events

CASE 1 TO BE COMPLETED IN ADVANCE OF WORKSHOP

CASE 1 – Stable Angina

Mr HS, a 52 yr old South Asian man, presents to his GP with a history of chest tightness/pain on several occasions whilst walking his dog. His symptoms resolved completely on each occasion following a period of rest. He initially assumed it was 'indigestion' but on each occasion was unrelated to food or alcohol intake. He has hypertension, is slightly overweight (BMI 26), smokes 10 cigarettes/day (recently cut down from 20/day) and now 'exercises' by taking the dog for a walk each day (wife had previously done this but GP had advised increased exercise when he was diagnosed with HT). His brother had an AMI aged 62 yrs and his mother has Type II DM.

His current regular drug therapy is:

Indapamide 2.5mg om
Celecoxib 100mg bd prn (for recent knee pain)

Diagnosis: Stable angina

1. What are Mr HS's risk factors for CHD?

Male
HT
Overweight
Family history of IHD (& DM)
Smoking
South Asian ethnicity

2. What is celecoxib and what are the problems associated with its use in Mr HS?

Cyclo-oxygenase-2 inhibitor (NSAID) – indicated for pain & inflammation in OA and RA

Increased cardiovascular risk associated with use of COX-2 inhibitors + diclofenac (also some recent data indicating may also be a risk with other non-selective NSAIDs, although appears some worse than others – **Naproxen/low dose ibuprofen** (max 400mg tds – risk increases if use 2.4g daily) appear safest with short duration)

CSM advises with IHD should be switched to alternative therapy where at all possible

Also issue with **ALL NSAIDs** is risk of fluid retention and increased BP so avoid if possible.

Check if still has knee pain and advise try paracetamol and review pain control

3. Comment on the appropriateness of Mr HS's current therapy for his HT

NICE/BHS 2019 guidelines advise ACEI (or ARB) as <55yrs but no need to change unless problems

Check efficacy (target <140/90) and toxicity

4. What drug therapy would be appropriate for Mr HS's angina?

- PRN S/L GTN – for treatment of acute angina attacks
- β-blocker /Calcium channel blocker – joint first line for stable angina (NICE guidance) – either drug can be used first, then add on as a second agent if required
- If angina not controlled by β-blocker /Calcium channel blocker (or combination of both) add in any of following:
Nitrate (long acting)/ivabradine/ ranolazine /nicorandil (2016 MHRA guidance – consider nicorandil after all others due to risk of ulceration)
- + secondary prevention – aspirin + statin (atorvastatin 80mg)

NB: When starting either β-blocker /Calcium channel blocker for angina, these will also lower bp, so **stop Mr HS's indapamide** to prevent polypharmacy

Mr HS's GP prescribes the following for his angina:

Propranolol 40mg tds
GTN tabs s/l prn

5. Comment on the appropriateness of Mr HS's therapy for his stable angina, what problems may occur and what changes would you recommend to help improve adherence?

β-blocker tends to be 1st line choice over CCB unless C/I

No evidence than one is better than the other although **drug characteristics/side-effect profile** may affect choice:

Propranolol cheap but likely to have more S/E's & TDS regime will not improve adherence

Advise use **cardioselective** (N.B. these are still not cardiospecific) (eg Atenolol, bisoprolol, metoprolol) to avoid problems with β₂ receptor blockade (bronchospasm)

(Not relevant to this patient but cardioselective β-blocker also less likely to mask symptoms of hypo in diabetic patient)

Also use of water soluble β-blocker (eg atenolol) rather than lipid soluble (eg propranolol) is less likely to cause CNS S/E's (eg sleep disturbance, nightmares)

[Oxprenolol, pindolol, acebutolol, celiprolol - **Intrinsic sympathomimetic activity** – partial agonist stimulate as well as block adrenergic receptors – less likely to cause bradycardia & cold extremities]

Advise change to alternative β - blocker E.g. Atenolol 100mg od

6. What are the counselling points for his recommended drug treatment?

Atenolol 100mg od:

Name, strength, frequency, indication, S/E's (bradycardia, dizziness, cold extremities, sleep disturbances, fatigue, impotence etc) – use PIL & emphasise less likely with atenolol vs propranolol

DO NOT STOP ABRUPTLY – may ppt angina due to rebound receptor hypersensitivity

GTN s/l: (most patients will receive s/l spray but occasionally get tablets)

Name & indication

Under the tongue when get chest pain (or when know going to get chest pain on exertion)

[If tablets => don't swallow (inactive)]

Sit down (may cause dizziness and rest helps chest pain)

May cause headache [if tablets can spit out or swallow when chest pain gone to prevent this] but explain caused by opening up of blood vessels in head and goes quickly

If chest pain not relieved after 5 mins taken another, if no improvement after further 5 min take a 3rd BUT must contact GP/ambulance as well

Spray – expiry usually about 2 years but remind patient to check

Tablets have 8-week expiry once opened (write date on bottle when opened)

Keep with you at all times, keep spare, can be bought OTC in pharmacy

One month later, Mr HS is still suffering intermittent chest pain and his GP refers him to the local hospital to see a consultant cardiologist in the outpatient clinic. The consultant prescribes him:

Isosorbide mononitrate 10mg bd

This controls his chest pain for a while, but then he begins to get increasing chest pain on exertion

7. What is the likely cause of his treatment not working and what can be done to improve its efficacy? What are the counselling points for ISMN?

Nitrate tolerance – nitrates interact with sulphydryl groups in vascular tissue (to cause release of nitric oxide to cause vasodilatation) – continued use depletes the sulphydryl groups resulting in tolerance, but restoration will occur within hours of interruption in nitrate use

Need 4-8 hr “nitrate free period” in every 24hrs:

Plan for when least likely to get chest pain

- BD dosing – 2nd dose ideally no later than 2-4pm (or definitely no later than 6pm)
- MR preparations- have only 15-20 hr action (i.e. in-built nitrate-free period)
- Patches – remove overnight

Because of need for “nitrate-free” period => nitrates do not provide full 24-hour control of angina => therefore nitrates only appropriate for “add-on” use to other antianginals and not appropriate for monotherapy

Counselling:

Name, strength, frequency, regime (re: tolerance avoidance), indication

Side-effects: throbbing headache (particularly in first few days – patients often refuse to continue taking but if can be encouraged to persevere & use prn paracetamol, usually stops after a few days), flushing, dizziness, tachycardia

CASE 2 – STEMI (ST-elevated Myocardial Infarction)

For case 2, Mr HL, you have been provided with the following documents:

- Drug chart (pages 7-12)
- Medical notes (pages 13-20)
- “End-of-bed” TPR chart (page 21)

His blood test results on admission are as follows:

Norfolk and Norwich University Hospital NHS Trust PATHOLOGY DEPARTMENT	Consultant/GP: Dr T Wright	PATIENT LOCATION Cardiac Ward
Patient Name: Mr HL	NHS No: 987654332	
Hosp no: 123456	Sex: M	Age: 55 Yr
Patient Address:		
Lab Episode No: 8904		
Address for Report: Norfolk & Norwich University Hospital Colney Lane Norwich NORF NR4 7UY		

BIOCHEMISTRY	Trop I	Total chol	Bilirubin	ALP	AST
Collection LAB No Today 8904	6,356* <0.4 ng/ml	6.8* mmol/L	18 (3-20) μmol/l	61 (20-100) IU/l	39 (5-40) IU/l
	ALT 26 (5-30) IU/l	GGT 41 (5-45) IU/l	PT 12 (10-15) secs	Hb 15.2 (14-18) g/dl	WBC 10.3 (4-11) x 10 ⁹ /l
	Na 138 (134- 145) mmol/L	K 4.7 (3.6- 5.0) mmol/L	Urea 5.8 (1.7-7.1) mmol/L	Creatinine 122 (55-125) μmol/L	eGFR >90 ml/min/m ²

E

Inpatient Prescription Chart

Weight (kg)	Height (cm)	Surface Area (m ²)	Name	Hospital No																																																																																																		
<i>82kg</i>			<i>MR HL</i>																																																																																																			
Admission Date	Ward	Consultant(s)	Address																																																																																																			
<i>15-4</i>	<i>CARDIAC</i>	<i>WRIGHT</i>																																																																																																				
Oral Medication in Surgical Pre Op Patients			Use Label																																																																																																			
<p>Patients who are "nil-by-mouth", awaiting surgery MUST receive their usual oral medication (except oral hypoglycaemics) unless the prescription has been cancelled.</p> <p>Non-administration of Drugs</p> <p>Use the appropriate code on the administration record and record detailed reason (e.g. steps to obtain medication) on the notice board.</p> <table border="0"> <tr> <td>1 Nil By Mouth</td> <td>5 Medical instruction</td> </tr> <tr> <td>2 Off Ward</td> <td>6 No IV cannula in situ</td> </tr> <tr> <td>3 Vomiting/Nausea</td> <td>7 Contraindicated</td> </tr> <tr> <td>4 Refused</td> <td>8 Drug not available</td> </tr> </table>			1 Nil By Mouth	5 Medical instruction	2 Off Ward	6 No IV cannula in situ	3 Vomiting/Nausea	7 Contraindicated	4 Refused	8 Drug not available	<p>Allergies & Sensitivities</p> <p>If none, state "None". Record source of information e.g. "patient", "notes" etc</p> <p><i>NICDA</i></p> <p>Latex Allergy <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p><input type="checkbox"/> Patient <input type="checkbox"/> Medical Notes <input type="checkbox"/> GP <input type="checkbox"/> Dr <input type="checkbox"/> Nurse <input type="checkbox"/> Pharmacist</p> <p>Signed <i>D</i> Name <i>15/4/11</i> Date</p>																																																																																											
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<p>Thromboprophylaxis Risk Assessment</p> <p>Complete for ALL ADULT PATIENTS, excluding OBSTETRIC patients.</p> <p>REASSESS within 24 HOURS of Admission and whenever the clinical situation changes (see STEP SIX below)</p> <p>STEP ONE: CLASSIFICATION OF PATIENT – Tick the relevant box</p> <table border="0"> <tr> <td>Surgical Patient <input type="checkbox"/></td> <td>Medical Patient : not ambulant <input type="checkbox"/></td> <td>Medical Patient : ambulant <input checked="" type="checkbox"/></td> </tr> <tr> <td colspan="3">Assess for thrombosis and bleeding risk (complete all steps below)</td> </tr> </table> <p>STEP TWO: ASSESS THROMBOSIS RISK FACTORS – Tick all boxes that apply or tick here if NO thrombosis risk factor</p> <table border="0"> <tr> <td>Significantly reduced mobility for 3 days or more</td> <td><input type="checkbox"/></td> <td>Active cancer or cancer treatment</td> <td><input type="checkbox"/></td> </tr> <tr> <td>Hip or knee replacement</td> <td><input type="checkbox"/></td> <td>Age > 60 years</td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>Hip fracture</td> <td><input type="checkbox"/></td> <td>Dehydration</td> <td><input type="checkbox"/></td> </tr> <tr> <td>Total anaesthetic plus surgical time >90 minutes</td> <td><input type="checkbox"/></td> <td>Known thrombophilia</td> <td><input type="checkbox"/></td> </tr> <tr> <td>Surgery involving pelvis or lower limb with total anaesthetic plus surgical time >60 minutes</td> <td><input type="checkbox"/></td> <td>Medical morbidity (heart failure; 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Well</i> Sign: <i>D.S.</i> Date: <i>15/4/11</i></p> <p>STEP SIX: REASSESS within 24 HOURS of admission and whenever the clinical situation changes</p> <table border="0"> <tr> <td>Within 24 Hours</td> <td>Reason if change in risk assessment outcome:</td> <td>Sign:</td> </tr> <tr> <td>Date:</td> <td></td> <td></td> </tr> <tr> <td>Clinical Change</td> <td>Reason if change in risk assessment outcome:</td> <td>Sign:</td> </tr> <tr> <td>Date:</td> <td></td> <td></td> </tr> </table>					Surgical Patient <input type="checkbox"/>	Medical Patient : not ambulant <input type="checkbox"/>	Medical Patient : ambulant <input checked="" type="checkbox"/>	Assess for thrombosis and bleeding risk (complete all steps below)			Significantly reduced mobility for 3 days or more	<input type="checkbox"/>	Active cancer or cancer treatment	<input type="checkbox"/>	Hip or knee replacement	<input type="checkbox"/>	Age > 60 years	<input checked="" type="checkbox"/>	Hip fracture	<input type="checkbox"/>	Dehydration	<input type="checkbox"/>	Total anaesthetic plus surgical time >90 minutes	<input type="checkbox"/>	Known thrombophilia	<input type="checkbox"/>	Surgery involving pelvis or lower limb with total anaesthetic plus surgical time >60 minutes	<input type="checkbox"/>	Medical morbidity (heart failure; respiratory disease; infection; inflammatory conditions; metabolic, diabetic/endocrine crisis)	<input type="checkbox"/>	Acute surgical admission with inflammatory or intra-abdominal condition	<input type="checkbox"/>	Obesity (BMI >30 kg/m ²)	<input type="checkbox"/>	Critical Care admission	<input type="checkbox"/>	On HRT or oestrogen containing contraceptive	<input type="checkbox"/>	Plaster cast immobilisation of lower limb	<input type="checkbox"/>	Personal history or first degree relative with PE or DVT	<input type="checkbox"/>		<input type="checkbox"/>	Reduced mobility	<input type="checkbox"/>		<input type="checkbox"/>	Varicose veins with phlebitis	<input type="checkbox"/>		<input type="checkbox"/>	Pregnancy or < 6 weeks post partum	<input type="checkbox"/>	Neurosurgery, spinal surgery or eye surgery	<input type="checkbox"/>	Acute stroke or history of intracranial haemorrhage	<input type="checkbox"/>	Other procedure with high bleeding risk	<input type="checkbox"/>	Already on anticoagulant (e.g. warfarin) therapy	<input type="checkbox"/>	If patient has lumbar puncture, spinal/epidural anaesthesia or epidural catheter planned or in situ and anticoagulation is indicated, refer to Trust guideline CA2031 for timing of anticoagulation		Active bleeding from any source/major bleeding risk e.g. peptic ulcer	<input type="checkbox"/>			Blood pressure >230 systolic or >120 diastolic	<input type="checkbox"/>			Thrombocytopenia (platelets < 75 x 10 ⁹ /L)	<input type="checkbox"/>			Untreated inherited bleeding disorder e.g. Haemophilia and VWD	<input type="checkbox"/>			High risk of falls and head injury	<input type="checkbox"/>			Acquired bleeding disorder e.g. liver disease INR>1.3 or varices	<input type="checkbox"/>			Heparin Allergy or Heparin Induced Thrombocytopenia (seek advice)	<input type="checkbox"/>	Within 24 Hours	Reason if change in risk assessment outcome:	Sign:	Date:			Clinical Change	Reason if change in risk assessment outcome:	Sign:	Date:		
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Signature Record

All Prescribers MUST complete the Signature Record (including signature as used on the prescription chart)

Date	Name (BLOCK CAPITALS)	Stamp	Signature	Date	Name (BLOCK CAPITALS)	Status	Signature
1.	A. Well	873	R	2.			
3.				4.			
5.				6.			
7.				8.			
9.				10.			
11.				12.			

Medicines Policy

Full policy available on the Trust intranet homepage via DTMM icon

Good Prescribing Practice

All medicines to be administered or applied to a patient must be clearly written on the drug chart.
No medicines should be given unless details are clear and can be easily understood.

All prescriptions must include:

- The APPROVED NAME of the medicines, written in CAPITAL LETTERS e.g. FUROSEMIDE not LASIX®
- The FORM AND/OR ROUTE of administration e.g. tablet, syrup, injection; oral, subcutaneous
- The DOSE must be IN FULL UNITS; e.g. 500 mg not 0.5 g or 250 micrograms not 0.25 mg. state micrograms in full not mcg
- Where the dose is expressed in terms of units, the word 'UNITS' must be written in full
- The directions and times of administration. It is the prescriber's responsibility to state times of administration using the 24 hour clock.
- The FULL SIGNATURE and BLEEP NUMBER of the prescriber (initials do not fulfil the legal requirement). In the case of consultant staff please state telephone extension number. The prescriber will be a qualified, UK registered Doctor.
- The FULL DATE, including year; e.g. 01/01/10 or 1st Jan 10
- If a volume then the stated dose must also include a strength e.g. Salbutamol 2mg/5mL; dose 5mL/hour

If there remains any doubt about the legibility of a prescription or if it is not understood, the nurse or other healthcare practitioner has a responsibility NOT to administer or supply the drug, and must contact the prescriber concerned or another doctor or a pharmacist.

For As Required Medication the prescription must also state the following in addition to the above:

- The frequency of administration including definite dosing intervals and/or maximum dose
- The indication of the medicine e.g. "for headache"

Alterations to the Prescription

Alterations to an existing prescription are NOT allowed. The prescription must be re-written if alterations to any part are required.

Discontinuation of Prescriptions

- When a medication is no longer required, the prescriber should cancel the prescription by drawing a thick line beside the last entry, which should be signed and dated; in addition, a single oblique line should be scored through the drug name
- The prescriber must sign and date at the end of the administration record next to the thick line.
- The cancelling of a prescription must be unambiguous in its intent but must NOT totally obscure the record.

Allergies

- Allergies must be written and signed (by initials) clearly in the box provided on the front of the prescription chart.
- Allergies must state the name of the medicines in capital letters, the nature of the allergy (if known) and the source of the information.
- Where no allergies/hypersensitivities exist "None Known" should be entered and signed.
- If the allergy section is left blank the practitioner can refuse to administer or dispense any item from the prescription.

Dose to be omitted

If a dose is to be omitted, the prescriber must clearly annotate the medication chart with a "X" in the relevant space in relation to date and time on the record of administration section of the chart.

Once-only Drugs		Name	Hospital No.						
Date to be given	Time to be given	Drug [approved name]	Dose	Route	Prescriber's Signature & Bedep Number	Date	Given by	Time Given	Pharmacy
		1.							
		2.							
		3.							
		4.							
		5.							
		6.							
		7.							
		8.							
		9.							
		10.							
		11.							
		12.							
		13.							
		14.							
		15.							
Noticeboard									
This section is used by healthcare professionals to record useful information relevant to this prescription chart.									
(IS/41 - TC 5.4, LFT'S✓, e GFD 790)									

Regular Prescriptions			Name: MR. HL	Hospital No.
			Date: 15/4 <input checked="" type="checkbox"/> 17/4	
Circle times or enter other times ▼				
1. Drug (approved name)	Start Date	06		
		08		
Dose	Route	Stop Date	12	
			14	
Frequency/Other Instructions	Pharmacy: DH <input type="checkbox"/> New <input checked="" type="checkbox"/>	18		
POD: TTO / IP / STOCK / CD Sign: 15/4	16/4	22		
Prescriber's Signature	Sleep No.	24		
Refer to http://www.medicationschedule.com for more information				
2. Drug (approved name)	Start Date	06		
ASPIRIN	15/4	08	✓ ↗	LC.
Dose	Route	Stop Date	12	
75mg	PO		14	
Frequency/Other Instructions	Pharmacy: DH <input checked="" type="checkbox"/> New <input type="checkbox"/>	18		
OD	16/4	22		
Prescriber's Signature	Sleep No.	24		
3. Drug (approved name)	Start Date	06		
CLOPIDOGREL	15/4	08	✓ ↗	LC.
Dose	Route	Stop Date	12	
75mg	PO		14	
Frequency/Other Instructions	Pharmacy: DH <input checked="" type="checkbox"/> New <input type="checkbox"/>	18		
OD	16/4	22		
Prescriber's Signature	Sleep No.	24		
4. Drug (approved name)	Start Date	06		
BISOPROLOL	15/4	08	X ?	RV
Dose	Route	Stop Date	12	
2.5mg	PO		14	
Frequency/Other Instructions	Pharmacy: DH <input checked="" type="checkbox"/> New <input type="checkbox"/>	18		
OD	16/4	22		
Prescriber's Signature	Sleep No.	24		
5. Drug (approved name)	Start Date	06		
METFORMIN	15/4	08	X X X X	
Dose	Route	Stop Date	12	
500mg	PO		14	
Frequency/Other Instructions	Pharmacy: DH <input checked="" type="checkbox"/> New <input type="checkbox"/>	18		
OD	16/4	22		
Prescriber's Signature	Sleep No.	24		
6. Drug (approved name)	Start Date	06		
RAMIPRIL	15/4	08	X	
Dose	Route	Stop Date	12	
2.5mg	PO		14	
Frequency/Other Instructions	Pharmacy: DH <input checked="" type="checkbox"/> New <input type="checkbox"/>	18		
OD	16/4	22		
Prescriber's Signature	Sleep No.	24		
7. Drug (approved name)	Start Date	06		
		08		
Dose	Route	Stop Date	12	
			14	
Frequency/Other Instructions	Pharmacy: DH <input checked="" type="checkbox"/> New <input type="checkbox"/>	22		
POD: TTO / IP / STOCK / CD Sign: 16/4	16/4	22		
Prescriber's Signature	Sleep No.	24		

As Required Prescriptions			Name	Mr. H.L.	Hospital No.	
1. Drug (approved name) GIN SPRAY	Start Date 15/4/	Date/ Time				
Dose T - II	Route S/L	Pharm co. DH New STOCK/POD/TID/P/CD 1674	Route			
Maximum Frequency	Indication / Other Instructions		Dose			
Prescriber's Signature R		Sleep No.	Given By			
2. Drug (approved name) DIAMORPHINE	Start Date 15/4/	Date/ Time				
Dose 2.5mg	Route IV	Pharm co. DH New STOCK/POD/TID/P/CD 1674	Route			
Maximum Frequency	Indication / Other Instructions		Dose			
Prescriber's Signature R		Sleep No.	Given By			
3. Drug (approved name) METOCLOPRAMIDE	Start Date 15/4/	Date/ Time				
Dose 10mg	Route IV	Pharm co. DH New STOCK/POD/TID/P/CD 1674	Route			
Maximum Frequency	Indication / Other Instructions		Dose			
Prescriber's Signature R		Sleep No.	Given By			
4. Drug (approved name)	Start Date	Date/ Time				
Dose	Route	Pharm co. DH New STOCK/POD/TID/P/CD	Route			
Maximum Frequency	Indication / Other Instructions		Dose			
Prescriber's Signature		Sleep No.	Given By			
5. Drug (approved name)	Start Date	Date/ Time				
Dose	Route	Pharm co. DH New STOCK/POD/TID/P/CD	Route			
Maximum Frequency	Indication / Other Instructions		Dose			
Prescriber's Signature		Sleep No.	Given By			
6. Drug (approved name)	Start Date	Date/ Time				
Dose	Route	Pharm co. DH New STOCK/POD/TID/P/CD	Route			
Maximum Frequency	Indication / Other Instructions		Dose			
Prescriber's Signature		Sleep No.	Given By			
7. Drug (approved name)	Start Date	Date/ Time				
Dose	Route	Pharm co. DH New STOCK/POD/TID/P/CD	Route			
Maximum Frequency	Indication / Other Instructions		Dose			
Prescriber's Signature		Sleep No.	Given By			
8. Drug (approved name)	Start Date	Date/ Time				
Dose	Route	Pharm co. DH New STOCK/POD/TID/P/CD	Route			
Maximum Frequency	Indication / Other Instructions		Dose			
Prescriber's Signature		Sleep No.	Given By			

Pharmacy Use Only

Drug History: Completed by: Name.....AB..... Bleep No 0512 Date 16/4 (Technician / Pharmacist)

Sources used (circle): PODs / Patient / GP List / Repeat Rx / GP verbal / Community MAR / Recent TTO / Relative or Carer / Other.....

As per chart (list numbers):5.....

Complete ONLY for medication that has NOT already been charted OR if there are dose discrepancies.

Drug Name	Dose / Freq / Route	Sign & Date	Action			Reason	Sign & Date
			Continue	Stopped	Changed		
1. <i>Meloxicam</i>	<i>9.5mg od pbdly</i>						
2. <i>Lansoprazole</i>	<i>75mg pmh</i>						
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							

Medicines Reconciliation: Completed by: Name.....AB..... Bleep No 0512 Date 16/4 (Pharmacist)

Medicines Management Pre-Admission: Patient Other.....

Compliance Aids Pre- Admission (circle as appropriate)

Medication chart / Nomad® / Mediwallet® / Large print labels / Easy-open bottles/ Carers MAR chart / Other

Community Pharmacy Details: Name Tel: Contacted: Date: Sign:

Nursing / Residential Home: Name Tel: Medication at Nursing Home Yes / No

Pharmacy Communication Board:

Date	Issue	Sign	Resolved Sign & Date

Drug Chart re-write checked Name..... Bleep No Date (Pharmacist)
 OSD Locker re-checked Name..... Bleep No Date (Pharmacist/Technician)

Discharge Medicines

Patients own medication at home Yes / No Name..... Date.....

TTO Clinically Checked Name..... Bleep No Date (Pharmacist)

Compliance Aids (circle) Medication chart / Nomad® / Mediwallet® / Large print labels / Easy open bottles/ Carers MAR chart / Other



Clinical Assessment

MRZ HL

h Label

Date and Time	Presenting complaint:
	Clerking Doctors Name: A. Will Grade: ST ₃
15/04/	
	SS }
	<ul style="list-style-type: none">- No previous cardiac hx- Ex-smoker- +ve FH- DM
	onset of chest pain around 1630 while watch football
	match on television - during half time
	while having cup of tea. 9/10 sweaty
	9/10 pain
	Called ambulance
	999 - post 8FEMI
	had respi clop &
	Morphine 10mg
	On arrival still have pain 9/10
	Morphine 2.5mg



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Adm [REDACTED]
MR HL

Past Medical History

- T2 DM
- Arthritis
- previous Indigestion - not on regular PR

Co-morbidities	Tick	Co-morbidities	Tick	Co-morbidities	Tick
Acute myocardial infarction		Diabetes complications		Renal disease	
Cerebrovascular accident		Peptic ulcer disease		Liver disease	
Congestive heart failure		Peripheral vascular disease		Severe Liver disease	
Connective tissue disorder		Pulmonary disease		Paroxysmia	
Dementia		Cancer			
Diabetes		Metastatic cancer			

Family History

Smoking: Have you ever smoked? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> [If smoked <100 in lifetime = never smoked]	
If yes: When did you start? When was your last cigarette? How many cigarettes do/did you smoke a day at most? Calculate maximum packs per year?	
Recreational Drugs:	

Alcohol: How often have you had 6 or more drinks if female, or 8 or more if male, on a single occasion in the last year?

0	1	2	3	4
Never	Less than Monthly	Monthly	Weekly	Daily, or almost daily

Scoring: Total of 0-1 indicates low risk drinkers;
Total of 2-4 indicates increasing or higher risk drinkers;
Overall Total of 2 or above is SASQ positive:

Consent for Alcohol team to contact:

Score:



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MR HL oh Label

Systems Review

Current medication (including over the counter, herbal and homeopathic remedies and any medication recently stopped e.g. antibiotics)

Medication	Indication (if known)	Dose	Frequency	Reconciled (Pharmacist)
- Meloxicam	?	?	?	
- PRN - Lansoprazole.	?	?	?	
- Metformin	?	?	?	{ ④ (see drug chart) 16/4}

On anticoagulant medication On diabetic medication On steroid / Immunosuppressant's
If on Warfarin / Clopidogrel see protocol for elective surgery

Allergies (see A+E front sheet)

Drug:

84

AKDA

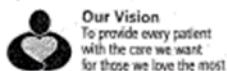
Latex: yes / no

Single Record - Clinical Assessment

Page 3 of 12

Version 2

Version 2



MR HL

bel

Clinical Examination

Temp	°C	BP	130 / 66	Pulse	70	min	RR	/min
O ₂ sat	% (FiO ₂)		%					
EWS	GCS	/15	AVPU		Pain 0 1 2 3 (circle)		AMT	/10
BMI =		Height =			Weight =			

S₁ + S₂ + 0

DD clear

JVP →

LJ & H

AMT		GCS	Eye opening	1. none 2. to pain 3. to speech
1. age	6. monarch		Verbal	4. spontaneously
2. dob	7. WW1			1. none 2. incomprehensible
3. year	8. 20 - 1			sounds 3. inappropriate words
4. time	9. two people recognition		Motor	4. confused 5. orientated
5. place	10. recall address			1. none 2. extension to pain
Pain score 0 - no pain. 1 - mild. 2 - moderate. 3 - severe				3. flexion
AVPU: A= Alert Responds		V = Verbal Responds to voice	P = Pain Responds to pain	4. withdrawal 5. localises pain 6. obeys commands
				U = Unconscious
				Circle best response
				No response to any stimulus



ABEL
MR UL

Investigations Ordered & Results

Investigations ordered (tick)

FBC	<input type="checkbox"/>	U+E	<input type="checkbox"/>	LFT	<input type="checkbox"/>	Troponin	<input type="checkbox"/>	Coag	<input type="checkbox"/>
D-dimer	<input type="checkbox"/>	Calcium	<input type="checkbox"/>	CXR	<input type="checkbox"/>	ECHO	<input type="checkbox"/>	Gp and Save	<input type="checkbox"/>
Glucose	<input type="checkbox"/>	Amylase	<input type="checkbox"/>	Paracetamol	<input type="checkbox"/>	Salicylate	<input type="checkbox"/>	X-match	<input type="checkbox"/>
Blood Culture	<input type="checkbox"/>	ECG	<input type="checkbox"/>	Vitalograph	<input type="checkbox"/>				

Results:

Differential Diagnosis & Interim Management Plan by Junior Doctor

Ing Post STEM

→ PCS

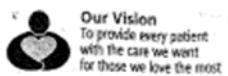
Name A. Well

Signature

Grade S93

Date 15/7/11

Time



Mr HL

Label

Consultant Review

19:30
20:10 PCI AM

Gr-② initial Q4

Occluded during RIN

SWW VJ → clot

2-T IT balloon

2-T 24 Month S

3.0 mm

cross dist.

light mid Cr

② LMI

light mid LAD

TH band CMI - MCI

? none 18412

PCI rehab re-angio tr- NCx/Cx 4-6/52

Consider if patient not for CPR

D. Wright

Dr Con
Signature: *Concluding*

Date:

Time:

Criteria led discharge

or

Expected Date of Discharge:

- 1.
- 2.
- 3.
- 4.

Consultant Name:

Sign:

Grade:

Date: Time:



MR HL

del

Date and Time	CLINICAL NOTES	
16.4. 05.30	Nursing: Pt monitored in Sinus Brady rate occasionally dropping under 40 bpm whilst pt asleep. Obs stable. RN Right wrist intact.	
16/4 08.40	SpR PPCI to RCA. for staged PCI to LAD/Cx. CK 608 Na 139 Uu 6.6 Lw 71 Hb 12.3 WCC 117 Plt 212	CXR (AP). Borderline heart. upper lobe dinrath. Diaphone 2x mm of 4-5 beat NVT.
16/4/12 NOCTE	(P) Continue monitoring tonight Home on 18/4/ for staged PCI to Cx/LAD.	
16/4/12 NOCTE	(N) - monitored via telemetry, continues to be in Sinus Rhythm no VT observed.	SN



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CLINICAL NOTES

Date and Time	CLINICAL NOTES
7/4/2012 5pm	
11:30	
	① PACI to NEA
	② Stage PCP to exp/PMD w/4-6/n
	No chest pain
<u>Reh</u>	Non <u>Sob^b</u>
Scalp of 1	
wce mes.	<u>Plan</u>
	① off to telemedy
	② plan tomorrow
	<u>010f</u>



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NHS Foundation Trust

B

Observations Frequency:

O₂ Code:		Inspired O₂:
N = Nasal cannulae		Record flow rate in
SM = Simple Mask		Litres (L)
RM = Reservoir Mask		
V = Venturi		Target Oxygen
H = Humidified		Saturations:
A = Air		Record %

WARD:

OBSERVATION CHART

Name: MR H L
Registration No: 123 456
NHS Number: 98765432
Date of Birth: (55 yr old)

DATE	15/4	15/4	16/4	16/4	16/4	17/4	DATE
TIME							TIME
B P	240	230	220	210	200	190	40 °C T
A N D	120	110	100	90	80	70	39.5 E
P U L S E	130	120	110	100	90	80	39 M
RESPS	100	90	80	70	60	50	38.5 P
SATS %	98						38 E
O ₂ Code							37.5 R
Inspired O ₂	AIR						37 A
Weight	88						36.5 T
Urine pH:							36 U
Glucose							35.5 R
Ketones							35 E
Sp. Gravity							34.5
Blood							
Protein							
Nitrite							
Leucocytes							
Bowels	GO	GO					Bowels
Type stool							Type stool
ENTER EARLY WARNING SCORE BELOW & IF EWS TRIGGER 4 OR MORE DOCUMENT ACTIONS OVER PAGE							
TEMP							TEMP
Systolic BP							Systolic BP
PULSE							PULSE
RESPS							RESPS
AVPU							AVPU
URINE							URINE
TOTAL							TOTAL
Sign initials							Sign initials

V5 revised Jan 2014

NNR775

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

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

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

Drug: Bisoprolol	Indication: 2° prevention of MI
Monitoring parameters	
Therapeutic	Toxic
↓CV events	BP, pulse, awareness of hypoglycaemia

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

Drug: Ramipril	Indication: 2° prevention of MI (+ prevention of diabetic nephropathy)
Monitoring parameters	
Therapeutic	Toxic
↓CV events, (BP-target<140/90), (RF)	BP, RF, K+, dry cough

Drug: GTN	Indication: Ischaemic chest pain
Monitoring parameters	
Therapeutic	Toxic
Chest pain, usage	Bp, pulse, flushing/dizziness

Drug: Diamorphine	Indication: Severe chest pain on admission
Monitoring parameters	
Therapeutic	Toxic
Control of pain	RR, S/E: N&V

Drug: Metoclopramide	Indication: N&V from diamorphine
Monitoring parameters	
Therapeutic	Toxic
Control of N&V	RF, S/E's e.g. EPSE

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
Bisoprolol not been given	Check pulse on TPR chart (pulse dropped to 40 bpm) – potentially reduce dose to 1.25mg od. (Long term aim to titrate up to evidence based dose of 10mg od with rate control down towards 60bpm)
Monitoring parameters	
Therapeutic	Toxic

Issue	Action required
Metformin frequency states od, but administration times bd	Confirm as part of drug history with patient and ask Dr to amend Rx
Monitoring parameters	
Therapeutic	Toxic

Issue	Action required
Metformin being omitted	Ensure restarted once renal function checked to be OK post PPCI (usually 48hrs)*
Monitoring parameters	
Therapeutic	Toxic

* Metformin C/I in recent myocardial infarction (due to risk of lactic acidosis increased by hypoxia) but can be used once patient stable.

Use of iodine-containing X-ray contrast media (as used in angio) is contraindicated in a patient on Metformin due to risk of renal impairment. Need to stop metformin 48hrs before angio (obviously not possible with PPCI) and only restart when confirmed renal function is normal (48hrs) (see SPC for metformin accessed at www.medicines.org.uk/emc)

Issue	Action required
Optimisation of Type 2 DM management	Consider addition of SGLT2I e.g. dapagliflozin 10mg od to optimised metformin prescription as per NICE guidelines for Type 2 DM)
Monitoring parameters	
Therapeutic	Toxic

Issue	Action required
Ramipril frequency not prescribed clearly	Confirm with Dr and ask to clarify prescription (usually od at night) (beta-blockers in morning and ACEIs to help prevent hypotension)
Monitoring parameters	
Therapeutic	Toxic

Issue	Action required
Need to up-titrate dose of ramipril - EBM trial dose of ramipril is 10mg daily	Need to ask Dr to titrate dose up after checking patient's Bp and RF
Monitoring parameters	
Therapeutic	Toxic

Issue	Action required
Need for atorvastatin (one of five drugs recommended by NICE for secondary prevention of MI)	Request Dr to prescribe atorvastatin 80mg on
Monitoring parameters	
Therapeutic	Toxic
↓CV events, Lipid profile	LFTs, myopathy/muscle pain, creatine kinase (CK)

Issue	Action required
Need for gastric protection (now on DAPT and PMH GORD) – previously on prn lansoprazole	Ask Dr to prescribe regular lansoprazole 15mg od
Monitoring parameters	
Therapeutic	Toxic
G.I. symptom control, lack of GI bleed	S/E: e.g. diarrhoea, low sodium

Issue	Action required
Lack of pain control for OA – previously on meloxicam which is associated with increased risk of thrombotic events	Request Dr to prescribe alternative e.g. paracetamol/co-codamol or naproxen/ibuprofen (max 1.2g daily) if needs to continue NSAID
Monitoring parameters	
Therapeutic	Toxic
Pain control	Paracetamol/co-codamol: LFTS, S/E: e.g. constipation NSAIDs: g.i., bleed, RF, bp

Issue	Action required
Lifestyle counselling	Counsel on diet (low Na ⁺ , low fat, 5/day), exercise (30mins/day/min 5days/wk), alcohol, (smoking cessation – not relevant for this patient) **
Monitoring parameters	
Therapeutic	Toxic

** Most cardiac units offer a follow-up rehabilitation service for MI patients after they have been discharged (potential pharmacist involvement)

Issue	Action required
Counselling and education on drugs	All new drugs – counsel on indication, dose, frequency & side-effects (give examples of DETAILS FOR INDIVIDUAL DRUGS e.g DAPT for 12 months + risk of bleeding, atorvastatin and muscle pain etc)
Monitoring parameters	
Therapeutic	Toxic

CVA – Stroke **ANSWERS**

CVD Clinical Workshop 4

By the end of this workshop you will be able to:

- Explain the rationale for the safe and effective therapeutic use of drugs commonly used in the treatment of cerebrovascular disease.
 - Interpret individual patient data in order to identify and recommend appropriate pharmaceutical and non-pharmaceutical interventions for the treatment and prevention of cerebrovascular disease.
 - Counsel patients on the safe and effective use of warfarin and DOACs.
-
- Complete the independent study pack.

You will need to refer to the following to complete application exercise 1:

HYPERLINK "<http://www.medicinescomplete.com>" www.medicinescomplete.com

Login via 'Shibboleth/Open athens' – select 'UEA' – login using your UEA login.

You will need: Drug administration via enteral feeding tubes.

-

Instructions:

- In your groups, **complete the 10 MCQ questions** using the scratch card.
 - Whole class discussion about the questions.
- In your groups, **review the drug history, medical notes and drug chart** for your patient.
- **Task 2 - Complete the tables to indicate the therapeutic and toxic monitoring parameters for each of the prescribed drugs.**
- **Task 3 - Identify actual and potential pharmaceutical care issues** for your patient. Document the issue and the actions required. (Please remember that for any new drug you recommend/start, you will need to complete a new monitoring parameter table).
- **Task 4** - Once all pharmaceutical care issues have been identified and documented, decide which **TWO** pharmaceutical care issues are your **priority issues** – those that you would deal with first. You will be required to justify your team decision during feedback.

Scenario -

You are the ward pharmacist reviewing a new patient's drug chart and medical notes first thing in the morning.

Mr GB brought in his own medication, and along with a discussion with the patients wife, your clinical pharmacy technician has documented his drug history. Mr GB was admitted this morning.

Drug History:

Patient Name GB	Hospital no. 890098	Date Today
Sources Used (circle) Patient / Patient's relative / Patient's own medicines / GP repeat list / Summary Care Record		
Allergies/Sensitivities (Including the nature of the allergy/sensitivity): Penicillin - Rash		
Regular Medications (complete for all medications including OTC preparations)		
Drug Name, Dose, Frequency and Route	Comments	
1. Bendroflumethiazide 2.5mg tablet - 1 OD	Mrs B reports that he doesn't always take doesn't see the point of 2 BP meds.	
2. Felodipine MR 5mg tablet – 1 OD		
3. Morphine sulphate MR 20mg tablet – 1BD		
4. <i>Remegel® (buys OTC for dyspepsia)</i> – 1 PRN		
Acute medications		
Drug Name, Dose, Frequency and Route	Comments	
Medicines management pre-admission	<input checked="" type="checkbox"/> Patient	Other (state).....
Compliance aids Pre-Admission (circle) None / Medication Chart / MDS (Dossett / NOMAD / Mediwallet) / Large print labels / MAR chart		
For MDS state device:	MDS filled by; Patient / Community Pharmacy	
Drug History Completed By: R Addison, Clinical Pharmacy Technician		

Patient medical notes, drug chart:

	<p>Patient: Mr GB Hospital number: 890098 DoB: 28/1/1955 Address: 180 Hills Road, Flatplace</p>
Allergies:	<i>Penicillin</i>
Weight:	108kg
Occupation:	<i>Retired builder</i>
SH -	
Alcohol:	<i>approximately 12 units/week</i>
Smoking status:	<i>20 cigarettes a day</i>
PMHx:	<i>Hypertension (Feb 2015) Chronic back pain Dyspepsia</i>
DHx:	<i>Bendroflumethiazide 2.5mg od Felodipine MR 5mg od MST 20mg bd</i>
PC:	<i>Unable to use left side with difficulty speaking.</i>
HPC:	<i>Patient last seen well 16 hours ago (4 pm yesterday) when wife left home to baby sit the grandchildren. Patient found upon her return at 8am slumped on the kitchen floor.</i>
OE:	<i>Obese.</i>
	<p>BP: 160/100 mmHg Temperature: 36.8 degrees Celsius Pulse: 145 BPM (apex), irregularly irregular</p>
	<p><i>Cr, U&E, FBC, glucose, LFT – NAD NIHSS 17</i></p>
	<p><i>ECG – Atrial fibrillation CT scan – no haemorrhage present.</i></p>
Δ	<i>Ischaemic CVA secondary to AF.</i>
Plan	<p><i>STAT dose aspirin 300mg Transfer to stroke ward Refer to SALT</i></p>

UEA Training Prescription Chart									Number of drug charts in use:	1
Date	Surname	Forename	Sex	D/O/B	Hospital No.	Weight (kg)	Height (cm)	Surface Area (m ²)	SAM?	
Day 1	B	G	M	28/01/1955	890098	108 Estimate / Actual			Yes / No	
Ward/ward change:		Stroke			Patient address:			180 Hills Rd, Flatplace		
Consultant(s)		AN Doctor								
DRUG SENSITIVITIES/ALLERGIES MUST BE ENTERED. If no allergies/sensitivities you must write 'NKDA' and sign and date.										
Medicine/Substance		Description of allergy/sensitivity					Signature		Date	
Penicillin										
PRE-MEDICATION AND ONCE ONLY DRUGS										
Pharm	Date	Drug (approved name)	Dose	Directions/ route/ other	Time to be given	Signature	Administered by			
	Day 1	Aspirin	300mg	PO STAT	09.15	AN Doctor	Initials	Date		
Thromboprophylaxis Risk Assessment										
Drug thromboprophylaxis recommended										
Drug thromboprophylaxis NOT recommended X										
Prescribing			Drug omissions			Prescribers				
<ul style="list-style-type: none"> 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. 			If a drug is omitted, one of the below codes must be entered into the drug administration box. 1. Nil by mouth 6. Patient off ward 2. Not required 7. No IV access 3. Patient refused 9. Contra-indicated 4. Drug unavailable 8. Other - reason must be recorded in notes 5. Vomiting/nausea			Signature	AN Doctor			
						Bleep no.	5893			
						Print name	AN Doctor			
						Signature	Dr Jones			
						Bleep no.	3210			
						Print name	KE Jones			
			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.			Signature				
						Bleep no.				
						Print name				
Pharmacy codes										
Pharm: Signature confirms checked/date										
ITO ✓ = 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										
Version 001-19										

REGULAR MEDICINES 1

CHECK PAGE 1 FOR ALLERGY STATUS

				Date →	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
Tick box to indicate time of admission or add other times 1														
1. Drug (approved name)		Start date	End date	06:00										
Bendroflumethiazide		Day 1		08:00	✓	X								
Dose 2.5mg	Route Po	Frequency OD		12:00										
Indication		Pharm check		18:00										
				22:00										
Prescriber's signature <i>AN Doctor</i>		Supply		00:00										
2. Drug (approved name)		Start date	End date	06:00										
Felodipine MR		Day 1		08:00	✓	X								
Dose 5mg	Route Po	Frequency OD		12:00										
Indication		Pharm check		18:00										
				22:00										
Prescriber's signature <i>AN Doctor</i>		Supply		00:00										
3. Drug (approved name)		Start date	End date	06:00										
MIST		Day 1		08:00	✓	X								
Dose 20mg	Route Po	Frequency BD		12:00										
Indication		Pharm check		18:00	✓									
				22:00										
Prescriber's signature <i>AN Doctor</i>		Supply		00:00										
4. Drug (approved name)		Start date	End date	06:00										
Dose	Route	Frequency		08:00										
Indication		Pharm check		12:00										
				14:00										
Prescriber's signature		Supply		18:00										
				22:00										
5. Drug (approved name)		Start date	End date	06:00										
Dose	Route	Frequency		08:00										
Indication		Pharm check		12:00										
				14:00										
Prescriber's signature		Supply		18:00										
				22:00										
CHECK PAGE 1 FOR ALLERGY STATUS														

AS REQUIRED DRUGS

CHECK PAGE 1 FOR ALLERGY STATUS

1. Drug (approved name)		Start date		Date									
Paracetamol		Day 1											
Dose 1 g	Route Po	Max Frequency QDS PRN		Date	Time								
Indication		Pharm check		Date	Time								
Prescriber's signature <i>AN Doctor</i>		Supply		Date	Given by Route								
2. Drug (approved name)		Start date		Date	Time								
Dose	Route	Max Frequency		Date	Time								
Indication		Pharm check		Date	Time								
Prescriber's signature		Supply		Date	Given by Route								
3. Drug (approved name)		Start date		Date	Time								
Dose	Route	Max Frequency		Date	Time								
Indication		Pharm check		Date	Time								
Prescriber's signature		Supply		Date	Given by Route								
4. Drug (approved name)		Start date		Date	Time								
Dose	Route	Max Frequency		Date	Time								
Indication		Pharm check		Date	Time								
Prescriber's signature		Supply		Date	Given by Route								
5. Drug (approved name)		Start date		Date	Time								
Dose	Route	Max Frequency		Date	Time								
Indication		Pharm check		Date	Time								
Prescriber's signature		Supply		Date	Given by Route								
CHECK PAGE 1 FOR ALLERGY STATUS													

AS REQUIRED DRUGS CONTINUED

CHECK PAGE 1 FOR ALLERGY STATUS

6. Drug (approved name)		Start date		Date									
Dose	Route	Max Frequency		Time									
Indication		Pharm check		Dose									
Prescriber's signature		Bleep no.		Given by									
7. Drug (approved name)		Start date		Date									
Dose	Route	Max Frequency		Time									
Indication		Pharm check		Dose									
Prescriber's signature		Bleep no.		Given by									

COMMUNICATION BOARD

Factors affecting drug selection/dosing (please tick):	Renal impairment	Pregnancy
	Liver impairment	Breastfeeding

TO HELP YOU:

Questions to consider when evaluating patient and identifying pharmaceutical care issues,
(Remember to work methodically and cover all aspects of the patient's care (i.e. consider acute and chronic management)

1. What risk factors does Mr GB have for developing a stroke that may require management?
2. Has initial pharmacological treatment been provided appropriately?
3. What is a SALT referral and what is it used for?
4. What are the pharmaceutical care issues associated with the outcome of the SALT review?
(You need to consider how you would manage the different potential outcomes for acute and chronic management).
5. What could be used to treat ischaemic stroke in the acute phase, and would they be suitable for Mr GB?
6. Are his concomitant conditions being treated appropriately at this time? Why is this important?
7. What are your long-term pharmacological treatment options and which one(s) would be appropriate for Mr GB?
8. What are the pharmaceutical care issues associated with his future discharge?

Task 1 - Monitoring parameters – Complete the below tables for the prescribed medication.

Drug: Bendroflumethiazide	Indication: Hypertension
Monitoring parameters	
Therapeutic	Toxic
BP (target pre-stroke for what it was prescribed—140/90)	Renal function, U&E's (K^+ / Na^+ / mg^{2+} / Ca^{2+}), glucose, Lipids, urate, BP

Drug: Remegel (800mg calcium carbonate)	Indication: Dyspepsia
Monitoring parameters	
Therapeutic	Toxic
Relief of dyspepsia symptoms	Interactions, Calcium, symptoms

Drug: Felodipine MR	Indication: Hypertension
Monitoring parameters	
Therapeutic	Toxic
BP	BP, Flushing, swelling of ankles

Drug: Morphine sulphate MR tablets	Indication: Chronic back pain
Monitoring parameters	
Therapeutic	Toxic
Pain score/patient report	Respiratory rate, constipation, renal function, drowsiness, N&V, rash

Task 2 - Pharmaceutical care issues and management – Document your identified pharmaceutical care issues in the tables below.

Issues	Action required
Patients dyspepsia treatment not considered in the drug history.	Ensure this is documented as a discrepancy in the medical note documentation relating to the medicine reconciliation at admission. Consider during treatment, see below.

Issues	Action required

Patient allergy documentation incomplete, missing reaction to penicillin.	Ask the patient/patient's wife what happens when penicillin is administered. Document details of the reaction on the drug chart and in the medical notes.
---	---

Issues	Action required
ACUTE Patient should not be on their antihypertensive therapy until stabilised and ongoing need established. Slightly increased BP can improve perfusion.	Ask Dr to stop patient's current antihypertensive treatment (bendroflumethiazide and felodipine-would not be able to be given as MR) and monitor patients BP.

Issues	Action required
ACUTE Determine whether the patient has had their SALT assessment and the outcome, to determine how medication can be administered.	Determine information from the doctor or SALT. <u>The outcome of this was that the patient had failed their SALT assessment and were going to have an NG tube inserted.</u>

Issues	Action required
ACUTE MST continuus tablets are a modified release morphine tablet, due to its formulation it cannot be crushed for administration down an NG tube. Remegel is an OTC indigestion preparation which is not appropriate for administration down an NG tube.	Ask Dr to stop MST continuus tablets. Ensure prescriber aware of the patients use of Remegel prior to admission.

Issues	Action required
There is a need to determine how severe the patients back pain is/how well controlled it was with their current medication.	If it was well controlled, an equivalent dose of analgesic appropriate for administration down an NG tube, i.e. morphine sulphate oral solution 10mg/5mL – 5mg every 4 hours or Zomorph capsules, opened and mixed in water. You would also provide some PRN morphine sulphate for any break-through pain (1/6 th to 1/10 th of he dose), monitor the use and pain score to determine whether higher regular doses were required. Addition of regular

	<p>paracetamol 1g QDS effervescent tablets via the NG tube would be appropriate as per the WHO pain ladder.</p> <p>Speak to doctor to make amendments as described above.</p>
Monitoring parameters	
Therapeutic	Toxic
Morphine sulphate oral solution/zomorph capsules: Pain score/patient report	<p>Respiratory rate, constipation, renal function, drowsiness, N&V, rash</p>
Paracetamol: Pain score/patient report	<p>LFT, weight, renal function, timing</p>

Issues	Action required
ACUTE Did the patient receive the aspirin 300mg STAT dose and was it administered appropriately?	<p>Review drug chart to determine (speak to nursing staff) if administration correct. It is important to give the aspirin dose as quickly as possible (after confirmation that there has not been a haemorrhage). It will take time for a SALT review and even after that it would take time for an NG tube to be fitted. For this reason, it would be important for the aspirin to be given via an appropriate alternative route. Aspirin exists as 300mg suppositories which would enable the dose to be given without relying on oral administration at all. Ensure STAT prescription is changed to enable this administration if the dose has not been given.</p> <p>Ensure the aspirin 300mg OD PR or PO effervescent (once NG tube in place) is prescribed. Patients with large disabling strokes should receive aspirin 300mg OD for '14 days' (see below for more detail) before being converted onto an appropriate long-term antithrombotic (see below for detail based on the patients other condition).</p> <p>(For patients with reduced risk factors for haemorrhagic transformation (smaller infarct size and/or not cardioembolic) the change to long term antithrombotic therapy may happen before the full 14 days of aspirin treatment, i.e. when discharged home from hospital).</p>
Monitoring parameters	

Therapeutic	Toxic
Long term prevention of CV events	Signs of bleeding, GI irritation, Hb

Issues	Action required
Mr GB has a history of dyspepsia and has now been given a '2 week' course of aspirin. NICE NG128, indicates the use of a PPI.	Discuss with Dr and ask them to prescribe a PPI, i.e. lansoprazole 15mg OD orodispersible.
Monitoring parameters	
Therapeutic	Toxic
Prevention of dyspepsia	Magnesium, gastric infection, GI S/E, fractures, LFTs

Issues	Action required
Patient is newly diagnosed with AF (time of onset unclear). They should be started on treatment to control their AF as per NICE CG 196.	Ask the Dr to prescribe bisoprolol (cardioselective) 5mg OD. Monitor BP and pulse, increase dose if HR not controlled.
Monitoring parameters	
Therapeutic	Toxic
Apex pulse (controlled heart rate approx. 60 bpm)	BP, pulse (bradycardia), respiratory rate (bronchospasm), glucose (hypoglycaemia and masked symptoms)

Issues	Action required
Long term secondary prevention - After the initial acute management (discussed above) - Monitor Mr GB's BP (it would generally fall but possibly not to what we are aiming for, especially as the patient was hypertensive before admission) and consider initiation of treatment if systolic >130mmHg. This may or may not be required as patient has been started on a beta-blocker (which will lower BP) for control of his AF.	Consider re-initiation of felodipine 5mg MR (if swallowing issues resolved) or amlodipine 5mg OD (to be administered via the NG tube). Monitoring required. If BP remains high, increase the dose to 10mg. If BP still not controlled below systolic 130mmHg, add an ACE-I or ARB, i.e. perindopril 2mg OD
Monitoring parameters	
Therapeutic	Toxic
ACE-I:	

BP (130/80)	BP, U&E (K+), renal function, S/E dry cough, lack of taste etc., LFTs
Thiazide like diuretic: BP (130/80)	Renal function, U&E's (K⁺ / Na⁺ / mg²⁺ / Ca²⁺), glucose, Lipids, urate, BP

Issues	Action required
Long term secondary prevention - Patient should be initiated on statin therapy <u>at least 48 hours</u> after the acute stroke for the secondary prevention of further strokes.	Ask the Dr to prescribe atorvastatin 80mg OD. Plus, diet and lifestyle interventions – diet, activity, weight, alcohol, smoking (all relevant to this patient – see below).
Monitoring parameters	
Therapeutic	Toxic
Long term prevention of CV events (fasting LDL to below 1.8 mmol/L), lipid profile	LFTs, CK, myopathy, Counselling

Issues	Action required
Long term secondary prevention - After initial '14 days' of aspirin 300mg, patient should be initiated on long-term antithrombotic treatment with an anticoagulant to reduce the risk of another stroke due to the AF. See pre-workshop study pack for additional detail on initiation of anticoagulation based on infarct size and relating to risk of haemorrhagic transformation.	Ask Dr to prescribe warfarin or a DOAC because the patient has AF (suggest name and starting dose, i.e. Edoxaban 60mg OD) Stop aspirin.
Monitoring parameters	
Therapeutic	Toxic
DOAC general – see individual drugs for further detail: Longterm prevention of clot formation/CV event	Signs of bruising and bleeding (Haemoptysis, haematuria, haematemesis, unexplained/extensive bruising), Hb

Issues	Action required
Appropriate counselling required for all newly started medication.	Counselling on all new medication - name, strength, dose, frequency. Any appropriate additional information, i.e. reporting muscle pain with statin use etc.

<p>Adherence issues as identified from DHx</p> <p>Dependent on the patient's condition at the time of discharge appropriate discharge planning is required to ensure Mr GB can receive his required treatment when he is discharged from hospital.</p>	<p>Especially important for anticoagulant therapy. Need to ensure patient has all required information, i.e. yellow book or DOAC patient information. <u>See workshop 5 – important points from your counselling lists.</u></p> <p>Discuss importance of medication (anticoagulant, statin, BP) use with patient and carer. Reinforce the need for potentially multiple BP medications (as highlighted as the issue previously (DHx)) and that we are wanting optimum control of BP.</p>
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Issues	Action required
<p>Long term secondary prevention -</p> <p>Patient smokes 20 cigarettes a day. Smoking increases your risk of stroke.</p>	<p>Discuss reduction/cessation of smoking. Determine the patient's stage of change and respond appropriately to this. If indicated discuss assistance to smoking cessation in the form of NRT.</p>
<p>Patient is obese. Obesity increases your risk of stroke and MI.</p>	<p>Discuss healthy diet – 5+ fruit and vegetables per day, decreased saturated fat and cholesterol intake, appropriate exercise – mobilisation around the house, gardening, cleaning as appropriate to the patient's ability. Discuss weight loss.</p>

Issues	Action required
<p>Long term secondary prevention -</p> <p>Potential for continued issues with swallowing.</p>	<p>Consider appropriate treatments as discussed for this patient:</p> <p>If the secondary prevention is required to go down an NG tube the following information may be helpful (remember to always use an up-to-date appropriate resources such as 'Handbook of drug administration via enteral feeding tubes' or 'The NEWT guidelines'):</p>

	<p>Amlodipine, Lisinopril, bendroflumethiazide, atorvastatin, warfarin – can be crushed and dispersed in water.</p> <p>Apixaban – Swallowed with water, with or without food. Can be crushed.</p> <p>Edoxaban – Can be taken with or without food. Can be crushed.</p> <p>Dabigatran – Do <u>not</u> crush. The oral bioavailability may be increased by 75% after a single dose. Can be taken with or without food.</p> <p>Rivaroxaban – Should be taken with food. Tablet can be crushed.</p>
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Task 3 - Priority issues

Please document your two priority issues below. Be prepared to discuss your discussions during feedback.

1. **NBM (from the time of suspecting stroke) /SALT assessment required (so patient will not receive any medication orally including their antihypertensive therapy)**

2. **Aspirin 300mg ASAP (PR) - (then for '14 days'-see details of when it may not be for a full 14 days)**

Thought process (use alongside the information provided to you in the independent study pack):

- What has the patient been diagnosed with?

Ischaemic stroke

- Is there any information that you need to clarify?

Before clinically screening any drug for a patient you must ensure that the patient does not have any allergies to anything, and if they do, that you are aware of the reaction the patient suffers.

Pharmaceutical care issue (PCI) – Patient documented to be allergic to penicillin, but the reaction the patient suffers is unknown.

Action (A) – Ask the patient/patient's wife what happens when penicillin is administered. Document details of the reaction on the drug chart and in the medical notes.

Will any of the medicines the patient was on pre-admission be inappropriate (need to be put on hold/discontinued) in view of diagnosis?

Acute management of hypertension – during the early stages of a stroke, it is common for a patients BP to be elevated but this usually resolves back to the patients 'normal state'. This is seen as beneficial as it helps to increase perfusion to the brain tissue, maintaining the integrity of the penumbra and preventing further damage through ischaemia to the brain tissue. For this reason, strict control of blood pressure is not required in the acute phase after a stroke (unless a hypertensive crisis/for alteplase when a specific BP needs to be achieved before administration). A patients current antihypertensive medication would be held until the patient was stabilised, antihypertensive treatment in line with NICE NG 136 would be initiated if BP did not resolve (Long term secondary prevention).

Having very high blood pressure is dangerous and can increase a patient's risk of suffering with a haemorrhagic stroke, in this situation antihypertensive control would be initiated.

Pharmaceutical care issue (PCI) – Patient should not be on their antihypertensive therapy until stabilised and ongoing need established.

Action (A) - Ask Dr to stop patient's current antihypertensive treatment (bendroflumethiazide and felodipine) and monitor patients BP.

This would leave our patient with MST continuus tablets and Remegel.

- Are there any reasons why the patient cannot receive their remaining medication?

Following a stroke, a patient is at high risk of suffering issues with their ability to swallow due to the stroke affecting areas of the brain that control that process. For this reason all stroke patients are made, 'nil by mouth' until they have had their swallow assessed by a member of the SALT or SLT – speech and language therapist. The SALT will then decide on how the patient can receive food, fluids and medication.

PCI – Determine whether the patient has had their SALT assessment and the outcome to determine how medication can be administered.

The outcome of this was that the patient had failed their SALT assessment and were going to have an NG tube inserted.

PCI – MST continuus tablets are a modified release morphine tablet, due to its formulation it cannot be crushed for administration down an NG tube. Remegel is an OTC indigestion preparation which is not appropriate for administration down an NG tube.

A – Ask Dr to stop MST continuus tablets and Remegel.

PCI – There is a need to determine how severe the patients back pain is/how well controlled it was with their current medication.

A - If it was well controlled, an equivalent dose of analgesic appropriate for administration down an NG tube, i.e. morphine sulphate oral solution 10mg/5mL – 5mg every 4 hours or suspension 20mg BD or opening Zomorph capsules (20mg BD). You would also provide some PRN morphine sulphate solution for any break-through pain; monitor PRN use and pain score to determine whether higher regular doses were required. Addition of regular paracetamol 1g QDS effervescent tablets via the NG tube would be appropriate as per the WHO pain ladder.

PCI - There is a need to determine how severe the dyspepsia is/how well controlled it was with the Remegel. If possible determine how often it was used and whether it was linked to food intake.

A – Speak to patient (if appropriate) or a relative or carer. Consider whether any appropriate equivalent preparation would be required. See later.

PCI – When/if antihypertensive treatment is required (if BP doesn't start to normalise especially as patient had hypertension prior to admission you would not expect it to normalise to required BP target), if the patient was still experiencing swallowing issues, it would not be appropriate to use felodipine as this is a modified release preparation. See later re. antihypertensive treatment?

A – Recommend an appropriate antihypertensive in line with NG 136 and appropriate for administration down an NG tube (if still in place), i.e. amlodipine .

- What additional acute medication should be prescribed for this patient's stroke?

Following diagnosis of stroke with confirmation of ischaemia (through imaging), the appropriate first line treatment can be provided. Within the 4.5 hour window, it may be appropriate to give a patient thrombolysis with alteplase, however Mr GB's collapse was 6 hours previous so this treatment would not be appropriate.

The first –line treatment here would therefore be – Aspirin 300mg STAT (this had been prescribed for Mr GB).

PCI – Did the patient receive the aspirin 300mg STAT dose and was it administered appropriately.

A – Review drug chart to determine if administration correct. It is important to give the aspirin dose as quickly as possible. Even if the patient had been reviewed by SALT, it would take time for the nurses to fit an NG tube. For this reason, it would be important for the aspirin to be given via an appropriate alternative route. Aspirin exists as 300mg suppositories which would enable the dose to be given without relying on oral administration.

PCI – Patients with large disabling strokes should receive aspirin 300mg OD for 14 days before being converted onto an appropriate long-term antithrombotic (see later).

A – Ensure the aspirin 300mg OD is prescribed for 14 days, dispersible are appropriate for administration down an NG tube or the suppository is available if that route is unavailable.

PCI – Mr GB has a history of dyspepsia and has now been given a 2 week course of aspirin. NICE NG128, indicates the use of a PPI for any patient who has previously suffered with dyspepsia with aspirin.

A – Discuss with Dr and ask them to prescribe a PPI, i.e. lansoprazole 15mg OD.

Statins therapy is not indicated in the acute stages of stroke. This is because there is contradictory evidence which may indicate statins to increase the risk of haemorrhagic transformation (the patient also suffering with a cerebrovascular haemorrhage).

- Does the patient have any other conditions that require management in the acute phases of his stroke admission?

Mr GB is one of the 25% of people who suffer with an ischaemic stroke that is caused by AF. AF causes the stasis of blood in the heart due to the disordered pumping of the atria, which in turn allows the blood to clot and then for the clot to be pumped out of the heart to the brain. For this reason, it is important for the AF to be controlled. In line with NICE CG 196, the first line pharmacological treatment for rate or rhythm control in AF is a beta-blocker.

PCI – Patient is newly diagnosed with AF (time of onset unclear). They should be started on treatment to control their AF.

A – Ask the Dr to prescribe bisoprolol (cardioselective) 5mg OD. Monitor BP and pulse, increase dose if HR not controlled.

Additional treatment for AF, anticoagulation is not appropriate to give to a patient in the acute phase of a stroke. A stroke patient's risk of haemorrhagic transformation is increased in the acute phase and by the size of the infarct. For this reason, it is not appropriate to initiate anticoagulant therapy until the patient had received 14 days of aspirin due to the increased potential for a more severe bleed if it were to occur.

▪ What stroke secondary prevention is required?

BP control – The patients BP would be closely monitored whilst in hospital. If their BP stabilises during the acute stage of the stroke but remains high, systolic >130mmHg, antihypertensive therapy should be started in line with the NICE NG 136.

PCI – Monitor Mr GB's BP and consider initiation of treatment if systolic >130mmHg. This may or may not be required as patient has been started on a beta-blocker for control of his AF.

A – Consider initiation of felodipine 5mg MR (if swallowing issues resolved) or amlodipine 5mg OD (to be administered via the NG tube). If BP remains high, increase the dose to 10mg. If BP still not controlled below systolic 130mmHg, add an ACE-I or ARB, i.e. perindopril 2mg OD or thiazide-like diuretic, i.e. indapamide 2.5mg OM.

Statin –

PCI – Patient should be initiated on statin therapy at least 48 hours after the acute stroke for the secondary prevention of further strokes.

A – Ask the Dr to prescribe atorvastatin 80mg OD.

Anticoagulant – All patients with AF are at an increased risk of suffering with a stroke. For this reason, all AF patients should be assessed for their likelihood of suffering with a stroke. Patients who have already had a stroke are at greater risk than if they only have AF. The CHA₂ DS₂-VASc assessment tool is used; male patients with a score of 1 or more and female patients with a score of 2 or more indicate that anticoagulation should be initiated.

It is also important to consider that patients risk of bleeding, this is done using the ORBIT assessment tool; here increasing points indicate that the patient is at increased risk of bleeding. Clinicians use this and their clinical judgement to determine whether the patient is still appropriate to be started on anticoagulation.

PCI – After initial 14 days of aspirin 300mg, patients should be initiated on long-term antithrombotic treatment with an anticoagulant to reduce the risk of another stroke due to the AF.

A – Ask Dr to prescribe warfarin or a DOAC (suggest name and starting dose, i.e. Warfarin 2mg OD and monitor INR).

The patient will continue to be reviewed by the SALT team and will hopefully not require an NG tube/or equivalent long-term (although some patients do). If the secondary prevention is required to go down an NG tube the following information may be helpful (remember to always use an up-to-date appropriate resource such as 'Handbook of drug administration via enteral feeding tubes' or 'The NEWT guidelines'):

Amlodipine, Lisinopril, bendroflumethiazide, atorvastatin, warfarin – can be crushed and dispersed in water.

Apixaban – Swallowed with water, with or without food. Can be crushed.

Edoxaban – Can be taken with or without food. Can be crushed.

Dabigatran – Do **not** crush. The oral bioavailability may be increased by 75% after a single dose. Can be taken with or without food.

Rivaroxaban – Should be taken with food. Tablet can be crushed.

▪ What additional general interventions should you make for this patient?

PCI – New medication started, appropriate counselling required.

A – Counselling on all new medication, name, strength, dose, frequency. Any appropriate additional information, i.e. reporting muscle pain with statin use etc.

PCI – Warfarin/DOAC started; appropriate counselling required.

A – Warfarin/DOAC counselling (see workshop 5). Provide patient with completed yellow book/specific drug information book.

PCI – Dependent on the patient's condition at the time of discharge appropriate discharge planning is required to ensure Mr GB can receive his required treatment when he is discharged from hospital.

A - Discharge planning – Ensure you know where the patient is being discharged to and what care is in place. Provide the relevant carer and patient information regarding medications.

▪ What lifestyle intervention should you make for this patient?

PCI – Patient smokes 20 cigarettes a day. Smoking increases your risk of stroke.

A - Discuss reduction/cessation of smoking. Determine the patient's stage of change and respond appropriately to this. If indicated discuss assistance to smoking cessation in the form of NRT.

PCI – Patient is obese. Obesity increases your risk of stroke and MI.

A – Discuss healthy diet – 5+ fruit and vegetables per day, decreased saturated fat and cholesterol intake, appropriate exercise – mobilisation around the house, gardening, cleaning as appropriate to the patient's ability. Discuss weight loss.

PHA-6020Y

Patient centred medicine from bench to bedside

CVS – Clinical Workshop 6 – **ANSWERS**

HEART FAILURE

Learning Outcomes

By the end of this workshop you will be able to:

- Describe the therapeutic options for the treatment of heart failure in line with NICE guidance
- Identify pharmaceutical problems associated with the treatment of individual patients with heart failure
- Identify the therapeutic and toxic monitoring parameters for the drug used in the treatment of heart failure

Pre-workshop tasks:

- In advance of this workshop please complete **CASE 1** – you will be asked to feedback these in your groups during the workshop

Resources

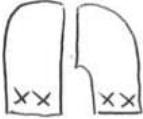
- On Bb:
 - Screencasts: Heart Failure
 - NICE Guidelines: Acute Heart Failure (<https://www.nice.org.uk/guidance/cg187>)
 - NICE Guidelines: Chronic Heart Failure (<https://www.nice.org.uk/guidance/ng106>)
 - NICE TA267: Ivabradine (<https://www.nice.org.uk/guidance/ta267>)
 - NICE TA388: Sacubitril- Valsartan (<https://www.nice.org.uk/guidance/ta388>)
 - NICE TA679: Dapagliflozin (<https://www.nice.org.uk/guidance/TA679>)
 - ESC 2021 Guidelines for the diagnosis and treatment of acute and chronic heart failure (<https://www.escardio.org/Guidelines/Clinical-Practice-Guidelines/Acute-and-Chronic-Heart-Failure>)

(all accessed 21/11/23)

CASE 1 TO BE COMPLETED IN ADVANCE OF WORKSHOP

CASE 1

You have a new patient on your ward, Mr BB. His medical notes, blood tests and drug chart are below:

	Patient: Mr BB Hospital number: 013580 DoB: 1.7.1956 Address: 24 Primrose Rd, Flatplace
PC:	Severe shortness of breath (SOB)
HPC:	Over past week increasing SOB, waking up at night coughing and struggling to breathe. Feels very tired, becomes SOB when walking on flat, but returns to normal when rests.
PMH:	STEMI (2 years) Hypertension (8 years)
DH:	Atenolol 100mg om Lisinopril 5mg on Aspirin 75 mg od Atorvastatin 80mg on NKDA
OE:	Patient short of breath, struggling to speak. SOA BP: 150/98 mmHg Temperature: 36.8 degrees Celsius Pulse: 78 BPM Weight: 98kg (normally around 88kg) Lungs: 
SH:	 Occupation: Retired salesman Alcohol: 30 units/week Smoking status: Ex-smoker (gave up when had STEMI 2 years ago)
Investigations:	Chest X-ray – pulmonary oedema Echo – LVH + EF 35%
Diagnosis:	Acute Heart failure

G Patel bleep 561

His blood test results on admission are as follows:

Norfolk and Norwich University Hospital NHS Trust PATHOLOGY DEPARTMENT		Consultant/GP: Dr J Sulfi		PATIENT LOCATION
Patient Name: Mr BB		NHS No: 987654332		
Hosp no: 013580		Sex: M	Age: 64 Yr	Pathology
Patient Address:				
Lab Episode No:	3905		Date/Time Collection: Today	
Address for Report: Norfolk & Norwich University Hospital Colney Lane Norwich NORF NR4 7UY				

BIOCHEMISTRY		Total chol	Bilirubin	ALP	AST
Collection LAB No Today 8904		3.8 mmol/L	18 (3-20) μmol/l	70 (20-100) IU/l	32 (5-40) IU/l
	ALT 22 (5-30) IU/l	GGT 42 (5-45) IU/l	PT 13.5 (10-15) secs	Hb 16.2 (14-18) g/dl	WBC 9.3 (4-11) x 10 ⁹ /l
	Na 138 (134- 145) mmol/L	K 4.2 (3.6- 5.0) mmol/L	Urea 6.8 (1.7-7.1) mmol/L	Creatinine 124 (55-125) μmol/L	eGFR 88 ml/min/m ²

UEA Training Prescription Chart									Number of drug charts in use:	1									
Date	Surname	Forename	Sex	D/O/B	Hospital No.	Weight (kg)	Height (cm)	Surface Area (m ²)	SAM?										
Day 1	B	B	M	01/07/1956	13580	98 Estimate / Actual			Yes / No										
Ward/ward change:		Cardio			Patient address:		24 Primrose Rd, Flatplace												
Consultant(s)		Dr J Sulfi																	
DRUG SENSITIVITIES/ALLERGIES MUST BE ENTERED. If no allergies/sensitivities you must write 'NKDA' and sign and date.																			
Medicine/Substance	Description of allergy/sensitivity					Signature		Date											
	NKDA					<i>G Patel</i>		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 thromboprophylaxis recommended			X																
Drug thromboprophylaxis NOT recommended																			
Prescribing			Drug omissions			Prescribers													
<ul style="list-style-type: none"> 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. 			If a drug is omitted, one of the below codes must be entered into the drug administration box. <table border="0"> <tr> <td>1. Nil by mouth</td> <td>6. Patient off ward</td> </tr> <tr> <td>2. Not required</td> <td>7. No IV access</td> </tr> <tr> <td>3. Patient refused</td> <td>9. Contra-indicated</td> </tr> <tr> <td>4. Drug unavailable</td> <td>8. Other - reason must be recorded in notes</td> </tr> <tr> <td colspan="2">5. Vomiting/nausea</td> </tr> </table> <p>Self administration of medicines (SAM)</p> <p>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.</p>			1. Nil by mouth	6. Patient off ward	2. Not required	7. No IV access	3. Patient refused	9. Contra-indicated	4. Drug unavailable	8. Other - reason must be recorded in notes	5. Vomiting/nausea		Signature	<i>Dr G Patel</i>		
1. Nil by mouth	6. Patient off ward																		
2. Not required	7. No IV access																		
3. Patient refused	9. Contra-indicated																		
4. Drug unavailable	8. Other - reason must be recorded in notes																		
5. Vomiting/nausea																			
			Bleep no.	561															
			Print name	<i>Dr G Patel</i>															
			Signature																
			Bleep no.																
			Print name																
			Signature																
			Bleep no.																
			Print name																
			Signature																
			Bleep no.																
			Print name																
Pharmacy codes			Signature																
Pharm: Signature confirms checked/date			Bleep no.																
TTO ✓ = from locker; H = at home; R = relabel; ★ = new supply at discharge			Print name																
Supply: S = ward stock; T = dispensing, see date and quantity; P = POD, see date and quantity			Version 001-19																

REGULAR MEDICINES 1

CHECK PAGE 1 FOR ALLERGY STATUS

				Date →	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
Tick box to indicate time of admission or add other times ↓														
1. Drug (approved name) Dalteparin		Start date Day 1	End date	06:00										
Dose 5000IU	Route sc	Frequency OD		12:00										
Indication		Pharm check		18:00	<input checked="" type="checkbox"/>									
				22:00										
Prescriber's signature G Patel		Supply		00:00										
2. Drug (approved name) Atenolol		Start date Day 1	End date	06:00										
Dose 100mg	Route Po	Frequency OD		08:00	<input checked="" type="checkbox"/>	JA								
Indication		Pharm check		12:00										
				14:00										
Prescriber's signature G Patel		Supply		18:00										
				22:00										
3. Drug (approved name) Atorvastatin		Start date Day 1	End date	06:00										
Dose 80mg	Route Po	Frequency ON		08:00										
Indication		Pharm check		12:00										
				14:00										
Prescriber's signature G Patel		Supply		18:00										
				22:00	<input checked="" type="checkbox"/>									
4. Drug (approved name) Aspirin		Start date Day 1	End date	06:00										
Dose 75mg	Route Po	Frequency OD		08:00	<input checked="" type="checkbox"/>	JA								
Indication		Pharm check		12:00										
				14:00										
Prescriber's signature G Patel		Supply		18:00										
				22:00										
5. Drug (approved name) Lisinopril		Start date Day 1	End date	06:00										
Dose 5mg	Route PO	Frequency ON		08:00										
Indication		Pharm check		12:00										
				14:00										
Prescriber's signature G Patel		Supply		18:00										
				22:00	<input checked="" type="checkbox"/>									
CHECK PAGE 1 FOR ALLERGY STATUS														

AS REQUIRED DRUGS

CHECK PAGE 1 FOR ALLERGY STATUS

1. What are Mr BB's risk factors for heart failure?

Ischaemic Heart Disease
Previous MI
Previous smoker
High alcohol intake
Hypertension
Overweight
65 years old
Male

2. What signs and symptoms indicate that Mr BB has heart failure? Does he have right-sided or left-sided heart failure or both?

Breathlessness (L)
Orthopnoea (L)
Reduced exercise tolerance
Swollen ankles (R)
Weight gain = fluid overload
Coughing
Tiredness
Pulmonary oedema (L)
Left ventricular hypertrophy (L)
Ejection fraction 35% (L)

He has a mixture of right & left sided-heart failure

Classic heart failure symptoms are exercise limitation, SOB and oedema

3. Where would you classify Mr BB's symptoms on the New York Heart Association (NYHA) classification of heart failure symptoms?

Class III merging in to IV

Class III – Moderate Heart Failure – Mr Blue returns to normal at rest, makes him breathless. Class III: Marked limitation of physical activity. Although patients are comfortable at rest, less than ordinary physical activity will lead to symptoms ('Moderate' heart failure).

Class IV - Inability to carry on any physical activity without discomfort. Symptoms of congestive cardiac failure are present even at rest. With any physical activity increased discomfort is experienced ('Severe' heart failure).

Now waking up at night SOB

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

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

Drug: Atenolol	Indication: 2° prevention MI/(HT)
Monitoring parameters	
Therapeutic	Toxic
↓CV events, pulse (aim for control down to 60bpm),	BP, pulse, S/E e.g. g.i., fatigue

Drug: Lisinopril	Indication: 2° prevention MI/HT
Monitoring parameters	
Therapeutic	Toxic
↓CV events, BP (<140/90), improvement long-term in symptoms of heart failure	BP, RF, K+, dry cough

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

Drug: Dalteparin	Indication: VTE thromboprophylaxis
Monitoring parameters	
Therapeutic	Toxic
Lack of VTE	RF, bleeding

5. 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
Need for IV diuretics as fluid overloaded	Ask Dr to prescribe e.g. furosemide IV 40mg/80 mg bd
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)

Issue	Action required
Atenolol not licensed for heart failure	Request doctor to change to alternative e.g. bisoprolol 1.25mg od and titrate up – start low, go slow (usually atenolol is stopped on admission & then bisoprolol/carvedilol is started once stable – start low go slow)
Monitoring parameters	
Therapeutic	Toxic
↓CV events, pulse (aim for control down to 60bpm), improvement long-term in symptoms of heart failure	BP, pulse, initial worsening of symptoms of heart failure

Issue	Action required
Need to up-titrate dose of lisinopril (EBM Trial dose of lisinopril is 30-35mg daily for heart failure) + bp not controlled at 150/98	Need to ask Dr to titrate dose up towards after checking patient's BP and RF
Monitoring parameters	
Therapeutic	Toxic

Issue	Action required
Need for MRA (e.g. spironolactone) as per NICE guidelines for chronic heart failure	Request Dr to prescribe e.g. spironolactone 25mg om
Monitoring parameters	
Therapeutic	Toxic
Improvement long-term in symptoms of heart failure	BP, RF, K+, S/E: e.g. gynaecomastia

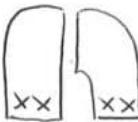
Issue	Action required
Counselling and education on drugs	All new drugs – counsel on indication, dose, frequency & side-effects DETAILS FOR INDIVIDUAL DRUGS AVOID OTC: NSAIDs, sodium containing antacids
Monitoring parameters	
Therapeutic	Toxic

Issue	Action required
Lifestyle counselling	Counsel on diet (low Na+, low fat, 5 a day), alcohol (max 14 units over week), exercise (30 mins 5x/week)
Monitoring parameters	
Therapeutic	Toxic

NB: ESC 2021 Guidelines: Recommend commencement of ARNI (Sacubitril/Valsartan) and SGLT2I also as first line – see case 2

CASE 2

You have a patient on your ward, Mrs Red. Her medical notes, blood tests, TPR chart and drug chart are below:

	Patient: Mrs Red Hospital number: 987654 DoB: 3.2.1935 Address: 99 Clover Rd, Flatplace	
PC:	Severe shortness of breath (SOB)	
HPC:	Over past few weeks increasing SOB, not able to mobilise, SOB at rest, unable to get out of bed	
PMH:	NSTEMI (4 years) CCF (4 years) Atrial fibrillation (1 year)	
DH:	Furosemide 40mg bd Ramipril 10mg on (increased recently by GP from 5mg) Aspirin 75 mg od Atorvastatin 80mg on Bisoprolol 2.5mg om Digoxin 62.5mcg om	NKDA
OE:	Patient short of breath, struggling to speak. Significant SOA & legs (oedema to knees). Coughing +++ BP: 100/60 mmHg Temperature: 36.5 degrees Celsius Pulse: 65 BPM (regular) Weight: 92kg (normally around 80kg) Lungs: Bibasal crackles +++	
		
SH:		
Alcohol:	NIL	
Smoking status:	20/day	
Investigations:	Chest X-ray – pulmonary oedema Echo – LVH + EF 30%	
Diagnosis:	Acute Heart failure	
Plan:	Usual medication, Rx spironolactone, daily weights	

G Patel bleep 561

Mrs Red's blood tests on admission:

Norfolk and Norwich University Hospital NHS Trust PATHOLOGY DEPARTMENT	Consultant/GP: Dr C Maron			PATIENT LOCATION Cardiac Ward
Patient Name: Mrs Red		NHS No: 6789543		
Hosp no: 987654		Sex: F	Age: 88 Yr	Pathology
Patient Address:				
Lab Episode No:	7896		Date/Time Collection: Day 1	
Address for Report: Norfolk & Norwich University Hospital Colney Lane Norwich NORF NR4 7UY				

BIOCHEMISTRY Collection Today		Total chol mmol/L	Bilirubin (3-20) μmol/l	ALP (20-100) IU/l	AST (5-40) IU/l
	ALT 22 (5-30) IU/l	GGT 39 (5-45) IU/l	PT 13.5 (10-15) secs	Hb 16.2 (14-18) g/dl	WBC 9.3 (4-11) x 10 ⁹ /l
	Na 138 (134- 145) mmol/L	K 4.2 (3.6- 5.0) mmol/L	Urea 6.8 (1.7-7.1) mmol/L	Creatinine 124 (55-125) μmol/L	eGFR 88 ml/min/m ²



Our Vision
To provide every patient
with the care we want
for those we love the most

Observations Frequency:

O₂ Code:
N = Nasal cannulae
SM = Simple Mask
RM = Reservoir Mask
V = Venturi
H = Humidified
A = Air

Inspired O₂:
 Record flow rate in
 Litres (L)
 Target Oxygen
 Saturations:
 Record %

WARD:

OBSERVATION CHART

Name: MRS RED

Registration No: 123

NHS Number: 987654

Date of Birth: 88 YEARS OLD

DATE	1	1	2	2	3	DATE
TIME	1230	1800	0800			TIME
BP	240	230	220	210	200	40 °C T
P	210	200	190	180	170	39.5 E
A	190	180	170	160	150	39 M
N	170	160	150	140	130	38.5 P
D	160	150	140	130	120	38 E
PULSE	150	140	130	120	110	37.5 R
E	140	130	120	110	100	37 A
RESPS	130	120	110	100	90	36.5 T
SATS %	120	110	100	90	80	36 U
O ₂ Code	110	100	90	80	70	35.5 R
Inspired O ₂	90	80	70	60	50	35 E
Weight	80	75	70	65	60	34.5
Urine pH:						
Glucose						
Ketones						
Sp. Gravity						
Blood						
Protein						
Nitrite						
Leucocytes						
Bowels						
Type stool						
ENTER EARLY WARNING SCORE BELOW & IF EWS TRIGGER 4 OR MORE DOCUMENT ACTIONS OVER PAGE						
TEMP						TEMP
Systolic BP						Systolic BP
PULSE						PULSE
RESPS						RESPS
AVPU						AVPU
URINE						URINE
TOTAL						TOTAL
Sign initials						Sign initials

UEA Training Prescription Chart

Number of drug charts in use:

1

Date	Surname	Forename	Sex	D/O/B	Hospital No.	Weight (kg)	Height (cm)	Surface Area (m ²)	SAM?
Day 1	R	R	F	03/02/1933	987654	92 Estimate / Actual			Yes / No

Ward/ward change:

Cardio

Patient address:

99 Clover Rd, Flatplace

Consultant(s)

Dr C Maron

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

Medicine/Substance	Description of allergy/sensitivity	Signature	Date
	NKDA	G Patel	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 thromboprophylaxis recommended		X						
Drug thromboprophylaxis NOT recommended								

Prescribing	Drug omissions	Prescribers
• 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.	If a drug is omitted, one of the below codes must be entered into the drug administration box. 1. Nil by mouth 6. Patient off ward 2. Not required 7. No IV access 3. Patient refused 9. Contra-indicated 4. Drug unavailable 8. Other - reason must be recorded in notes 5. Vomiting/nausea Self administration of medicines (SAM)	Signature Bleep no. Print name Signature Bleep no. Print name Signature Bleep no. Print name Signature Bleep no. Print name
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	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.	Signature Bleep no. Print name

Pharmacy codes	Signature Bleep no. Print name
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	Version 001-19

REGULAR MEDICINES 1

CHECK PAGE 1 FOR ALLERGY STATUS

REGULAR MEDICINES 2

CHECK PAGE 1 FOR ALLERGY STATUS

			Date →	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
			Tick box to indicate time of admission or add other times ↓										
6. Drug (approved name)		Start date	End date	08:00									
<i>Spiromolactone</i>		<i>Day 1</i>		08:00	✓	JA							
Dose	Route	Frequency		12:00									
<i>2.5mg</i>	<i>PO</i>	<i>OD</i>		14:00									
Indication		Pharm check		18:00									
				22:00									
Prescriber's signature		Supply		00:00									
<i>G Patel</i>													
7. Drug (approved name)		Start date	End date	08:00									
				08:00									
Dose	Route	Frequency		12:00									
				14:00									
Indication		Pharm check		18:00									
				22:00									
Prescriber's signature		Supply		00:00									
8. Drug (approved name)		Start date	End date	08:00									
				08:00									
Dose	Route	Frequency		12:00									
				14:00									
Indication		Pharm check		18:00									
				22:00									
Prescriber's signature		Supply		00:00									
9. Drug (approved name)		Start date	End date	08:00									
				08:00									
Dose	Route	Frequency		12:00									
				14:00									
Indication		Pharm check		18:00									
				22:00									
Prescriber's signature		Supply		00:00									
10. Drug (approved name)		Start date	End date	08:00									
				08:00									
Dose	Route	Frequency		12:00									
				14:00									
Indication		Pharm check		18:00									
				22:00									
Prescriber's signature		Supply		00:00									

CHECK PAGE 1 FOR ALLERGY STATUS

AS REQUIRED DRUGS

CHECK PAGE 1 FOR ALLERGY STATUS

1. Drug (approved name)		Start date		Date							
Dose	Route	Max Frequency		Time							
Indication		Pharm check		Dose							
Prescriber's signature			Supply	Given by							
2. Drug (approved name)		Start date		Date							
Dose	Route	Max Frequency		Time							
Indication		Pharm check		Dose							
Prescriber's signature			Supply	Given by							
3. Drug (approved name)		Start date		Date							
Dose	Route	Max Frequency		Time							
Indication		Pharm check		Dose							
Prescriber's signature			Supply	Given by							
4. Drug (approved name)		Start date		Date							
Dose	Route	Max Frequency		Time							
Indication		Pharm check		Dose							
Prescriber's signature			Supply	Given by							
5. Drug (approved name)		Start date		Date							
Dose	Route	Max Frequency		Time							
Indication		Pharm check		Dose							
Prescriber's signature			Supply	Given by							

1. Where would you classify Mrs Red's symptoms on the New York Heart Association (NYHA) classification of heart failure symptoms?

Class IV

Inability to carry on any physical activity without discomfort. Symptoms of congestive cardiac failure are present even at rest. With any physical activity increased discomfort is experienced ('Severe' heart failure).

Mrs Red's consultant is considering starting her on:

SacubitriI/valsartan 24/26 mg (Entresto®) bd

and

Dapagliflozin 10mg od

2. Is this an appropriate prescription for Mrs Red's chronic heart failure?

NICE guidance recommends sacubitriI/valsartan as an option if:

- New York Heart Association (NYHA) class II to IV symptoms and
- Left ventricular ejection fraction of 35% or less and
- Already taking a stable dose of angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor-blockers (ARBs)

Need to stop ramipril 36hrs before starting to prevent risk of ADRs e.g. angioedema from exposure to both ramipril and valsartan

NICE TA (Feb 2021) recommends dapagliflozin as an option to treat symptomatic chronic HFREF as an add-on in people who are already taking optimised standard care based on an ACE inhibitor or ARB, or on sacubitriI valsartan.

Additional note: NICE currently recommends above as "add-on" therapy whilst ESC recommend joint first-line with beta-blocker and MRA=> NICE due to update in 2024 and this likely to form new recommendation

3. 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
VTE assessment states thromboprophylaxis required and not prescribed	Ask Dr to prescribe e.g. dalteparin s/c 5000IU od, enoxaparin s/c 40mg od
Monitoring parameters	
Therapeutic	Toxic
Lack of VTE	RF, bleeding

Issue	Action required
Atorvastatin missing – on patient's drug history.	Ask doctor to prescribe (check not considered to stop/deprescribing in 90 year old)
Monitoring parameters	
Therapeutic	Toxic
Lack of CV events, lipid profile	LFTS, myopathy, CK

Issue	Action required
Dose and route not effective in severe acute heart failure	Advise change furosemide to IV (at max rate 4mg/min to prevent ototoxicity) and consider increased dose eg 80mg bd initially If no response consider 240mg iv infusion over 24 hrs If still no response, consider addition of metolazone (e.g. 2.5mg STAT/2.5mg od for 2-3 days – short term use)
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+),

Issue	Action required
Bradycardia – pulse <45bpm	Stop digoxin and control AF with bisoprolol (bisoprolol also needed for secondary prevention of MI and CCF – if pulse continues to be low then consider reduction of bisoprolol dose as well)
Monitoring parameters	
Therapeutic	Toxic

Issue	Action required
Bisoprolol => Bradycardia => can make acute heart failure worse	Consider initial discontinuation until acute episode controlled then very slow uptitration of dose (start low, go slow). Aim for target dose (10mg OD) or the highest tolerated dose (discontinuation of digoxin to solve issue of bradycardia)
Monitoring parameters	
Therapeutic	Toxic

Issue	Action required
Need for anticoagulation as patient has AF and increased risk of stroke [CHA ₂ DS ₂ VAsc score =5]	Request doctor to prescribe DOAC if appropriate (review ORBIT) before discharge (see above – whilst on LMWt heparin e.g. dalteparin, this provides stroke prevention in AF as well – stop when DOAC started)
Monitoring parameters	
Therapeutic	Toxic
Lack of stroke	Bleeding, RF, COUNSELLING

Issue	Action required
Lifestyle counselling	Counsel smoking cessation, diet (low Na=, low fat, 5 a day), exercise (if able – mobility issue)
Monitoring parameters	
Therapeutic	Toxic

Issue	Action required
Counselling and education on drugs	All new drugs – counsel on indication, dose, frequency & side-effects DETAILS FOR INDIVIDUAL DRUGS

	AVOID OTC: NSAIDs, sodium containing antacids DETAILS of anticoagulant counselling
--	--

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

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

Drug: Furosemide	Indication: 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+),

Drug: Ramipril	Indication: 2 ^o prevention MI/heart failure
Monitoring parameters	
Therapeutic	Toxic
↓CV events, improvement long-term in symptoms of heart failure	BP, RF, K+, dry cough

Drug: Atorvastatin	Indication: 2 ^o prevention MI
Monitoring parameters	
Therapeutic	Toxic
↓CV events, lipid profile	LFTs, myopathy, CK

Drug: Bisoprolol	Indication: 2 ^o prevention MI, heart failure, AF
Monitoring parameters	
Therapeutic	Toxic
↓CV events, pulse (aim for control down to 60bpm), improvement long-term in symptoms of heart failure	BP, pulse

Drug: Digoxin	Indication: AF, HF (add on therapy)
Monitoring parameters	
Therapeutic	Toxic
Apex pulse	Apex pulse, RF, K ⁺ , Ca ²⁺
Drug: Spironolactone	
Monitoring parameters	
Therapeutic	Toxic

Improvement long-term in symptoms of heart failure

BP, RF, K⁺, S/E: e.g. gynaecomastia

5. What other drug options are available to add to Mrs Red's current therapy should her heart failure continue to worsen?

Ivabradine (NB: must be in sinus rhythm – not appropriate for Mrs Red) – useful as does not drop BP.

Hydralazine + nitrates – evidence for use pre-dates ACEIs but occasionally useful if other routine treatment not tolerated/appropriate.

PHA-6020Y

CVS – Clinical Workshop 7 – **ANSWERS**

ATRIAL FIBRILLATION

Learning Outcomes

By the end of this workshop you will be able to:

- Describe the therapeutic options for the treatment of atrial fibrillation in line with NICE guidance
- Utilise the CHA₂DS₂ - VASc and ORBIT score to advise on the use of anticoagulation
- Identify pharmaceutical problems associated with the treatment of individual patients with atrial fibrillation
- Identify the therapeutic and toxic monitoring parameters for the drug used in the treatment of atrial fibrillation

Pre-workshop tasks:

- In advance of this workshop please complete **CASE 1** – you will be asked to feedback these in your groups during the workshop

Resources

- On Bb:
 - Screencasts: Arrhythmias
 - NICE Guidelines: Atrial Fibrillation (<https://www.nice.org.uk/guidance/ng196>)
 - Stroke TBL
- In workshop document:
 - CHA₂DS₂-VASc stroke risk score (available on-line at: <https://www.mdcalc.com/cha2ds2-vasc-score-atrial-fibrillation-stroke-risk>)
 - ORBIT score for bleeding (available on-line at: <https://www.mdcalc.com/orbit-bleeding-risk-score-atrial-fibrillation>)

(all accessed 24/11/23)

CASE 1 TO BE COMPLETED IN ADVANCE OF WORKSHOP

CASE 1

Mr GH, 68yr old man admitted via his GP with a 2-week history of “racing heart beat”, increasing angina and dizziness.

PMH: HT, stable angina

OE: Ventricular rate 130 bpm, irregular

Diagnosis: uncontrolled AF causing exacerbation of angina

Drug history:

Aspirin 75mg od

Perindopril 4mg od

Amlodipine 10mg od – recently increased from 5mg od

GTN prn

NKDA

- According to NICE guidelines, what is the first line drug treatment for someone with a ventricular rate of 130bpm?

Standard beta-blocker e.g. bisoprolol 2.5mg od & titrate according to response

- What are the complications of AF?

Thromboembolism - Stasis of blood within atria predisposes to cerebral and systemic thromboembolism. Sluggish atrial blood flow also allows partial activation of the clotting cascade. AF increases risk of stroke 5 fold, 25% of all ischaemic strokes are caused by underlying AF

Heart failure

Exacerbation of angina – Mr GH

3. Using the CHA₂DS₂VASc and ORBIT score decide whether Mr GH should be considered for anticoagulation. What would you recommend?
(When calculating the ORBIT score assume Mr GH's blood tests are normal)

CHA₂DS₂VASc:

Aged 65–74 years (1 point) + hypertension (1 point) + angina (vascular disease) (1 point) = **3 points**

ORBIT:

Treatment with antiplatelet = **1 point**

NICE recommends anyone with CHA₂DS₂VASc of 2 or more (1 or more if male) should be considered for anticoagulation (with assessment of bleeding risk using ORBIT)

Mr GH should be considered for anticoagulation e.g. DOAC

4. After an increase in dose and optimisation of Mr GH's first line treatment he still has a ventricular rate of 100bpm – what are the second-line recommendations for the treatment of his AF and how should Mr GH's therapy be adjusted?

If monotherapy does not work, consider combination therapy with 2 from:

- Beta-blockers
- Diltiazem
- Digoxin

(digoxin only appropriate for monotherapy if sedentary but can be used for add on therapy)

Suggest add in diltiazem (and therefore stop amlodipine – also a CCB but not rate limiting)

5. Mr GH's consultant decides to refer him for DCCV. What is DCCV and what drug therapy needs to be considered?

Direct current cardioversion

- application of controlled electric shock across chest wall
- override disordered conduction
- allow SA node to regain control of HR
- patient briefly anaesthetised

Procedure is thrombogenic – need to be anticoagulated before procedure and for 3 weeks before and 4 weeks after (if not planned admission anticoagulated with Low Molecular weight heparin)

NICE recommend consideration of amiodarone therapy starting 4 weeks before and continuing for up to 12 months to maintain sinus rhythm – may not be used if already on other rate/rhythm control therapy

CHA₂DS₂-VASc stroke risk score

The **CHA₂DS₂-VASc** stroke risk score estimates the risk of stroke in people with non-valvular atrial fibrillation on a point scale of 1–9, using the following risk factors:

- aged 65–74 years (1 point)
- aged 75 years or older (2 points)
- female (1 point)
- congestive heart failure (1 point)
- hypertension (1 point)
- diabetes (1 point)
- stroke, transient ischaemic attack or thromboembolism (2 points)
- vascular disease – previous myocardial infarction, peripheral arterial disease, aortic plaque (1 point).

ORBIT Bleeding Risk Score

The ORBIT score predicts the risk of bleeding and is recommended to be taken into account when offering anticoagulation. The ORBIT score estimates the risk of bleeding on a point scale of 1– 7, using the following risk factors:

- Hb <13g/dL for males and <12g/dL for females, or haematocrit <40% for males and <36% for females (2 points)
- Age >74 years (1 point)
- Any history of GI bleeding, intracranial bleeding, or haemorrhagic stroke (2 points)
- eGFR <60 mL/min/1.73 m² (1 point)
- Treatment with antiplatelet agents (1 point)

Interpretation:

ORBIT Score	Risk group	Bleeds per 100 patient-years
0-2	Low	2.4
3	Medium	4.7
4-7	High	8.1

CASE 2

You have a new patient on your ward, Mrs LM. Her medical notes, blood tests and drug chart are below:

	Patient: Mrs LM Hospital number: 2672345 DoB: 11.11.1942 Address: 5 Rose Close, Flatplace
PC:	uncontrolled AF
HPC:	Admitted via GP with uncontrolled AF (picked up when attended surgery for 'flu jab')
PMH:	AF (2 years) Hyperthyroidism (4 years) Hypertension (5 years) LVF (HFREF) (1 year) Type 2 DM – diet controlled (5 years)
DH:	Warfarin variable dose according to INR (patient unable tell you her normal dose as it keeps changing each week) Bisoprolol 10mg od Diltiazem XL 240mg od Ramipril 5mg on Carbimazole 5mg od Furosemide 40mg om (patient admits to not taking this when she goes out for the day)
OE:	Patient feels well but anxious about being in hospital BP: 150/100 mmHg Pulse: 120 BPM, irregular
SH:	Retired, lives with husband
Alcohol:	1-2 units/week
Smoking status:	Non-smoker
Diagnosis:	Uncontrolled AF
Plan:	Two previous admissions with uncontrolled AF and underwent DCCV on both admissions, but both were unsuccessful - duty consultant does not wish to attempt any further procedures => for drug management – start amiodarone and digoxin
<i>J Findlay Bleep 467</i>	

Her blood test results on admission were as follows:

Norfolk and Norwich University Hospital NHS Trust PATHOLOGY DEPARTMENT	Consultant/GP: Dr T Thomas	PATIENT LOCATION
Patient Name: Mrs LM	NHS No:	PATH
Hosp no: 2672345	Sex: F	Age: 81 Yr Pathology
Patient Address:		
Lab Episode No: 5432		Date/Time Collection: Today
Address for Report: Norfolk & Norwich University Hospital Colney Lane Norwich NORF NR4 7UY		

HAEMATOLOGY	Wbc 6.5 (4.0-11.0 10 ⁹ /L)	Hb 14.7 (13.0- 18.0 g/dL)	Plt 288 (150 - 400 X 10 ⁹ /L)	MCV 91 (80-100 fL)	INR 1.8
Collection LAB No Today 2696					

BIOCHEMISTRY						
Collection LAB No Today 2696						
TSH 0.2* (0.35-5.0 mU/L)	Free T4 40* (9-24 pmol/L)	Sodium 134 (134-145 umol/L)	Potassium 4.7 (3.6-5.00 umol/L)	Urea 6.7 (1.7-7.1 umol/L)	Creatinine 122 (55-125 umol/L)	
Bilirubin 16 (0 - 22 umol/L)	AST 38 (0 - 50 U/L)	GGT 35 (0 - 60 U/L)	ALP 100 (38 - 126 U/L)	Albumin 35 (35 - 50 g/L)	eGFR 89 (>90ml/min ml/min/ 1.73 ²)	

Additional information: Mrs LM's INR is 1.8 on admission and her TTR (time in therapeutic range) from her GP records is calculated to be 50%.

TTR (Time in therapeutic range):

Indication of how well controlled patient's INR is over a defined period of time – does not differentiate between being over or under target

Various means of calculating:

- Percent of Visits in Range (Traditional Method)

This looks at how many visits had INR results in range, and divides by the total number of visits. If the patient has had 8 visits, and 6 had readings within their therapeutic range, then the patient is considered in range 75% of the time.

- Percent of Days in Range (Rosendaal Method)

This is more complex calculation, as it looks at the amount of time between visits to determine how long the patient might have been within their therapeutic range. If a patient has a therapeutic range of 2.0 - 3.0, and on May 1st tested at 2.5, then tested 3.5 on May 31st, then we can estimate how many days were in range. Since there were 30 days between tests, you assume that the patient slowly moved from 2.5 to 3.5 over those 30 days, so around May 15th, the patient was probably over 3.0, and therefore was out of range. Therefore, we estimate that 15 days were in range, and 15 days were out of range (within the 30 day time period), which means the patient is within range 50% of the time.

- On-line calculator used

UEA Training Prescription Chart								Number of drug charts in use: 1										
Date	Surname	Forename	Sex	D/O/B	Hospital No.	Weight (kg)	Height (cm)	Surface Area (m ²)	SAM?									
Day 1	M	L	F	11/11/1942	2672345	Estimate / Actual			Yes / No									
Ward/ward change:			Cardio			Patient address:		5 Rose Close, Flatplace										
Consultant(s)			Dr T Thomas															
DRUG SENSITIVITIES/ALLERGIES MUST BE ENTERED. If no allergies/sensitivities you must write 'NKDA' and sign and date.																		
Medicine/Substance		Description of allergy/sensitivity				Signature		Date										
PRE-MEDICATION AND ONCE ONLY DRUGS																		
Pharm	Date	Drug (approved name)	Dose	Directions/ route/ other	Time to be given	Signature	Administered by											
							Initials	Date										
	Day 1	Digoxin	500mcg	PO	09.00	J Findlay	KM	Day 1										
	Day 1	Digoxin	500mcg	PO	15.00	J Findlay												
Thromboprophylaxis Risk Assessment																		
Drug thromboprophylaxis recommended																		
Drug thromboprophylaxis NOT recommended			X															
Prescribing			Drug omissions			Prescribers												
<ul style="list-style-type: none"> 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. 			<p>If a drug is omitted, one of the below codes must be entered into the drug administration box.</p> <table> <tr> <td>1. Nil by mouth</td> <td>6. Patient off ward</td> </tr> <tr> <td>2. Not required</td> <td>7. No IV access</td> </tr> <tr> <td>3. Patient refused</td> <td>9. Contra-indicated</td> </tr> <tr> <td>4. Drug unavailable</td> <td>8. Other - reason must be recorded in notes</td> </tr> <tr> <td>5. Vomiting/nausea</td> <td></td> </tr> </table> <p>Self administration of medicines (SAM)</p> <p>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.</p>			1. Nil by mouth	6. Patient off ward	2. Not required	7. No IV access	3. Patient refused	9. Contra-indicated	4. Drug unavailable	8. Other - reason must be recorded in notes	5. Vomiting/nausea		Signature	Dr J Findlay	
1. Nil by mouth	6. Patient off ward																	
2. Not required	7. No IV access																	
3. Patient refused	9. Contra-indicated																	
4. Drug unavailable	8. Other - reason must be recorded in notes																	
5. Vomiting/nausea																		
			Bleep no.	467														
			Print name	Doctor J Findlay														
			Signature															
			Bleep no.															
			Print name															
			Signature															
			Bleep no.															
			Print name															
			Signature															
			Bleep no.															
			Print name															
Pharmacy codes			Signature															
Pharm: Signature confirms checked/date			Bleep no.															
TTO ✓ = from locker; H = at home; R = relabel; ★ = new supply at discharge			Print name															
Supply: S = ward stock; T = dispensing, see date and quantity; P = POD, see date and quantity			Version 001-19															

REGULAR MEDICINES 1

CHECK PAGE 1 FOR ALLERGY STATUS

			Date →	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
Tick box to indicate time of admission or add other times ↓													
1. Drug (approved name)		Start date	End date	08:00									
<i>Warfarin</i>		<i>Day 1</i>		08:00									
Dose	Route	Frequency		12:00									
<i>As per INR</i>	<i>Po</i>	<i>OD</i>		14:00									
Indication		Pharm check		18:00	<i>✓</i>								
				22:00									
Prescriber's signature		Supply		00:00									
<i>J Findlay</i>													
2. Drug (approved name)		Start date	End date	08:00									
<i>Bisoprolol</i>		<i>Day 1</i>		08:00	<i>✓</i>	<i>KU</i>							
Dose	Route	Frequency		12:00									
<i>10mg</i>	<i>Po</i>	<i>OD</i>		14:00									
Indication		Pharm check		18:00									
				22:00									
Prescriber's signature		Supply		00:00									
<i>J Findlay</i>													
3. Drug (approved name)		Start date	End date	08:00									
<i>Diltiazem XL</i>		<i>Day 1</i>		08:00	<i>✓</i>	<i>KU</i>							
Dose	Route	Frequency		12:00									
<i>240mg</i>	<i>Po</i>	<i>OD</i>		14:00									
Indication		Pharm check		18:00									
				22:00									
Prescriber's signature		Supply		00:00									
<i>J Findlay</i>													
4. Drug (approved name)		Start date	End date	08:00									
<i>Ramipril</i>		<i>Day 1</i>		08:00									
Dose	Route	Frequency		12:00									
<i>5mg</i>	<i>Po</i>	<i>ON</i>		14:00									
Indication		Pharm check		18:00									
				22:00	<i>✓</i>								
Prescriber's signature		Supply		00:00									
<i>J Findlay</i>													
5. Drug (approved name)		Start date	End date	08:00									
<i>Carbimazole</i>		<i>Day 1</i>		08:00	<i>✓</i>	<i>KU</i>							
Dose	Route	Frequency		12:00									
<i>5mg</i>	<i>Po</i>	<i>OD</i>		14:00									
Indication		Pharm check		18:00									
				22:00									
Prescriber's signature		Supply		00:00									
<i>J Findlay</i>													
CHECK PAGE 1 FOR ALLERGY STATUS													

REGULAR MEDICINES 2

CHECK PAGE 1 FOR ALLERGY STATUS

			Date →	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
Tick box to indicate time of admission or add other times													
6. Drug (approved name) Furosemide		Start date Day 1	End date 08.00 08.00	<input checked="" type="checkbox"/>	KU								
Dose 40mg	Route Po	Frequency OM	12.00 14.00										
Indication		Pharm check	18.00 22.00										
Prescriber's signature J Findlay		Supply	00.00										
7. Drug (approved name) Digoxin		Start date Day 2	End date 08.00 08.00	<input checked="" type="checkbox"/>	X								
Dose 1.25mcg	Route Po	Frequency OM	12.00 14.00										
Indication		Pharm check	18.00 22.00										
Prescriber's signature J Findlay		Supply	00.00										
8. Drug (approved name) Amiodarone		Start date Day 1	End date 08.00 08.00	<input checked="" type="checkbox"/>	KU								
Dose 200mg	Route PO	Frequency TDS 7 days	12.00 14.00	<input checked="" type="checkbox"/>							X	X	X
Indication		Pharm check	18.00 22.00	<input checked="" type="checkbox"/>									
Prescriber's signature J Findlay		Supply	00.00										
9. Drug (approved name)		Start date	End date 08.00 08.00										
Dose	Route	Frequency	12.00 14.00										
Indication		Pharm check	18.00 22.00										
Prescriber's signature		Supply	00.00										
10. Drug (approved name)		Start date	End date 08.00 08.00										
Dose	Route	Frequency	12.00 14.00										
Indication		Pharm check	18.00 22.00										
Prescriber's signature		Supply	00.00										
CHECK PAGE 1 FOR ALLERGY STATUS													

AS REQUIRED DRUGS

CHECK PAGE 1 FOR ALLERGY STATUS

1. Drug (approved name)		Start date		Date				
Dose	Route	Max Frequency		Time				
Indication		Pharm check		Dose				
Prescriber's signature			Supply	Given by Route				
2. Drug (approved name)		Start date		Date				
Dose	Route	Max Frequency		Time				
Indication		Pharm check		Dose				
Prescriber's signature			Supply	Given by Route				
3. Drug (approved name)		Start date		Date				
Dose	Route	Max Frequency		Time				
Indication		Pharm check		Dose				
Prescriber's signature			Supply	Given by Route				
4. Drug (approved name)		Start date		Date				
Dose	Route	Max Frequency		Time				
Indication		Pharm check		Dose				
Prescriber's signature			Supply	Given by Route				
5. Drug (approved name)		Start date		Date				
Dose	Route	Max Frequency		Time				
Indication		Pharm check		Dose				
Prescriber's signature			Supply	Given by Route				

1. Mrs LM is on warfarin for stroke prevention – calculate her CHA₂DS₂VASc and ORBIT score and comment on whether this therapy is appropriate.

CHA₂DS₂VASc:

Aged >75 years (2 points) + female (1 point) + heart failure (1 point) + HT (1 point) + DM (1 point) = **6 points**

ORBIT: >74 years = **1 point**

Anticoagulant therapy therefore appropriate (but potentially not warfarin – unable to remember dosing regime, TTR 50% and DOACs first-line NICE guidelines)

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
Allergy status not known	Check with patient and document on drug chart and in medical notes
Monitoring parameters	
Therapeutic	Toxic

Issue	Action required
TTR = 50% - demonstrates poor INR control	Consideration of change from warfarin to DOAC (check SPC for guidance on when to start DOAC when stopping warfarin e.g. apixaban – start when INR <2)
Monitoring parameters	
Therapeutic	Toxic

Issue	Action required
Diltiazem contraindicated in heart failure	Advise Dr to stop (now commenced amiodarone and digoxin)
Monitoring parameters	
Therapeutic	Toxic

Issue	Action required
Bp not controlled at 150/100 (may resolve with control of AF) Additional optimisation of HF therapy (EBM dose 10mg/day), titrate towards 10mg	Monitor and if appropriate advise Dr to consider uptitration of Ramipril – to 7.5mg od then 10mg od as appropriate – target <150/90 (RF OK)
Monitoring parameters	
Therapeutic	Toxic

Issue	Action required
Low TSH and high free T4 indicating uncontrolled hyperthyroidism (? cause of uncontrolled AF)	Advise Dr to increase carbimazole to 10mg od & monitor response
Monitoring parameters	
Therapeutic	Toxic

Issue	Action required
Amiodarone can cause abnormal TFTs (already got)	Monitor TFTs very closely – ideally would change amiodarone to alternative – discuss plan with prescriber and ensure risks have been considered. Limited choice as had other first-line treatment (Possibly consider sotalol – non-standard beta-blocker – both class II and class III effects – would stop bisoprolol and amiodarone)
Monitoring parameters	
Therapeutic	Toxic

Issue	Action required
Amiodarone interaction between amiodarone and digoxin causing increase in digoxin levels	If digoxin to continue then need to advise Dr to reduce dose of digoxin by 50% (possible that digoxin may be stopped once AF controlled with amiodarone)
Monitoring parameters	
Therapeutic	Toxic

Issue	Action required
Review need for statin therapy => increased CV risk (QRISK3>50%)	Discuss with Dr to commence atorvastatin 20mg on (primary prevention) – however also consider age
Monitoring parameters	
Therapeutic	Toxic
Lack of CV events, lipid profile	LFTs, myopathy, CK

Issue	Action required
Optimisation of HF treatment – add spironolactone as per NICE guidelines	Ask doctor to add in spironolactone 25mg om (From ESC guidelines: consider change to ARNI and addition of SGLT2I)
Monitoring parameters	
Therapeutic	Toxic
Improvement long-term in symptoms of heart failure	BP, Rf, K+, S/E: eg gynaecomastia

Issue	Action required
Lifestyle counselling	Counsel on diet, exercise, alcohol Ok (but check not exacerbating AF)
Monitoring parameters	
Therapeutic	Toxic

Issue	Action required
Counselling and education on drugs	All new drugs – counsel on indication, dose, frequency & side-effects SPECIFIC INFORMATION as appropriate eg amiodarone – phototoxicity, night glare, atorvastatin – take at night, muscle Address adherence issues (including furosemide)
Monitoring parameters	
Therapeutic	Toxic

3. What alternative non-pharmacological interventions are available to prevent thromboembolism in AF patients?

Left atrial appendage occlusion – left atrial appendage is a small muscular sac in the wall of left atrium (function not known) – 80-90% of all non-valvular strokes in AF patients occur as a result of blood clots formed in left atrial appendage.

Watchman device can be inserted to seal it off (parachute shaped, self-expanding device)

Will continue anticoagulants for up to 6 months after procedure

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

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

Drug: Bisoprolol	Indication: AF, heart failure, (HT)
Monitoring parameters	
Therapeutic	Toxic
Apex pulse (aim for control down to 60bpm), improvement long-term in symptoms of heart failure, (bp <140/90), control of AF symptoms	BP, pulse S/E: e.g. fatigue, cold extremities

Drug: Diltiazem	Indication: AF, HT
Monitoring parameters	
Therapeutic	Toxic
Apex pulse (aim for control down to 60bpm), bp (<140/90), control of AF symptoms	Bp, pulse S/E: g.i., flushing

Drug: Ramipril	Indication: HT, heart failure
Monitoring parameters	
Therapeutic	Toxic
BP (<140/90), long-term symptoms of heart failure	BP, RF, K+, dry cough

Drug: Carbimazole	Indication: Hyperthyroidism
Monitoring parameters	
Therapeutic	Toxic
TFTs (TSH & Free T4), pulse	TFTs, WBC, signs of infection, RBC, signs of bruising/bleeding

Drug: Furosemide	Indication: Heart failure
Monitoring parameters	
Therapeutic	Toxic
Symptoms of heart failure e.g. SOB, weight	BP, RF, U&Es (K+, Na+), blood glucose

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

Drug: Digoxin	Indication: AF, (HF)
Monitoring parameters	
Therapeutic	Toxic
Apex pulse, (improvement in symptoms of HF)	Pulse, RF, U&Es (K+, Ca ²⁺), levels, signs of toxicity e.g. N&V