

FEx Net 2022 Collated SAQs: Cardiology

Answers

- | | |
|-----------------------------|-------------------------------|
| 1. <u>AF</u> | 41. <u>OOHCA</u> |
| 2. <u>AF</u> | 42. <u>Pacemaker</u> |
| 3. <u>Anorexia</u> | 43. <u>Pacemaker</u> |
| 4. <u>APO</u> | 44. <u>Pacemaker</u> |
| 5. <u>APO</u> | 45. <u>Paeds NCT</u> |
| 6. <u>APO</u> | 46. <u>Paeds Syncope</u> |
| 7. <u>APO</u> | 47. <u>Palpitations</u> |
| 8. <u>Broad Complex</u> | 48. <u>Rheumatic Fever</u> |
| 9. <u>Broad Complex</u> | 49. <u>STEMI differential</u> |
| 10. <u>Broad Complex</u> | 50. <u>STEMI Differential</u> |
| 11. <u>Broad Complex</u> | 51. <u>STEMI</u> |
| 12. <u>Broad Complex</u> | 52. <u>STEMI</u> |
| 13. <u>Broad Complex</u> | 53. <u>STEMI</u> |
| 14. <u>Broad Complex</u> | 54. <u>STEMI</u> |
| 15. <u>Broad Complex</u> | 55. <u>STEMI</u> |
| 16. <u>Bradycardia</u> | 56. <u>STEMI</u> |
| 17. <u>BCT differential</u> | 57. <u>STEMI</u> |
| 18. <u>BCT differential</u> | 58. <u>STEMI</u> |
| 19. <u>BCT Differential</u> | 59. <u>STEMI</u> |
| 20. <u>Chest Pain</u> | 60. <u>SVT</u> |
| 21. <u>Chest pain</u> | 61. <u>Syncope</u> |
| 22. <u>Chest Pain</u> | 62. <u>Syncope</u> |
| 23. <u>Chest Pain</u> | 63. <u>Syncope</u> |
| 24. <u>Chest Pain</u> | 64. <u>Syncope</u> |
| 25. <u>Chest Pain</u> | 65. <u>Syncope</u> |
| 26. <u>Chest Pain</u> | 66. <u>Syncope</u> |
| 27. <u>Chest Pain</u> | 67. <u>Syncope</u> |
| 28. <u>CP Fever</u> | 68. <u>Syncope</u> |
| 29. <u>CP Fever</u> | 69. <u>Syncope</u> |
| 30. <u>CP post MI</u> | 70. <u>Syncope</u> |
| 31. <u>CHF</u> | 71. <u>Syncope</u> |
| 32. <u>Dizziness</u> | 72. <u>Syncope</u> |
| 33. <u>Dizziness</u> | 73. <u>Syncope</u> |
| 34. <u>ECHO</u> | 74. <u>Syncope</u> |
| 35. <u>Hypertension</u> | |
| 36. <u>Hypertension</u> | |
| 37. <u>Murmurs</u> | |
| 38. <u>Narrow Complex</u> | |
| 39. <u>Narrow Comple</u> | |
| 40. <u>OOHCA</u> | |

Question 1

1.

Haemodynamic instability

Definite onset AF within 24-48 hours

Lack of known structural heart disease

Non-chronic AF

Correctable or no clear precipitant

Pt preference

Pass 2 of 4

2.

Flecainide 2mg/kg – known LV dysfunction, intra-ventricular blocks (eg BBBs)

Amiodarone 300mg – iodine allergy, hypotension, thyroid dysfunction, long QT

Sotalol 40 – 80mg – long QT, asthma, hypotension

1 mark drug, 1 mark dose, 1 mark each contra-indication

Pass 5 of 8

3.

Metoprolol 2mg aliquots ,max 20mg

Verapamil 2.5-5mg aliquots, max 20mg

Digoxin initial loading dose 500mcg

1 mark for drug, 1 mark for dose

Pass 4 of 6

4.

Either CHADS2 or CHA2DS2-Vasc score

No pass

Total pass 11/19 corrects to **5.5/10**

Question 2

An elderly female is referred to your Emergency Department by her GP for review of new onset Atrial Fibrillation:

Observations:

GCS 15/15
BP 110/60
Sat 95% on RA
RR 18 per min

1. List 4 potential causes for Atrial fibrillation.

(4 Marks)

Causes for AF

1. Coronary artery disease
2. Hypertension
3. Rheumatic valvular heart disease
4. Thyrotoxicosis
5. COPD
6. Pericarditis
7. Pulmonary emboli
8. Electrolyte abnormalities (eg hypokalaemia/hypomagnesaemia)
9. Pericarditis
10. Cardiomyopathies
11. Pre-excitation syndromes

2. Your registrar asks you whether to aim for rhythm or rate control .

List 2 factors which would make you consider rhythm control in this lady and 2 factors which would make you consider rate control

(4 Marks)

Rhythm control

Haemodynamic instability
Symptomatic
Reversible cause

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Rate control

(No mortality difference)
 Asymptomatic or minimal symptoms
 Duration greater than 48 hours
 Non- reversible cause

3. Your resident asks you whether she needs to be anticoagulated.

List 4 factors you would consider for the above decision:

(4 Marks)

Factors that increase risk of thromboembolism

Age greater than 65/75
 Female
 Congestive heart failure
 Previous stroke / TIA /thromboembolism
 Hypertension
 Diabetes mellitus
 Vascular disease

Risks of anticoagulation

Falls
 Previous bleeds GIT / ICH
 Renal failure if using novel anticoagulants

Question 3

1. Long QT
2. Left Ventricular Hypertrophy (S-L criteria); U waves; Sinus bradycardia (rate 54/min)
3. Many here –

Mandatory:

bHCG***

BSL***

Some sort of electrolytes for K and Mg – VBG not enough alone (no Mg)

Others: FBE (anaemia), TFTs (hypothyroidism), urine (septic screen)

NEVER PAY PHOSPHATE BECAUSE IT'S NEVER IMPORTANT

4. Have to be present:

The patient must be lacking competence to reasonably refuse treatment/ lacking capacity

As demonstrated by a lack of ability to communicate a choice, to understand the relevant information, to appreciate the situation and its consequences and to apply rational judgement to the available information.

Under these conditions a patient can be kept for treatment and treated in line with best medical practice under a duty of care.

This situation is dynamic.

Question 4

1. Bilateral crackles
Raised JVP
Hepatomegaly
Tachycardia
Hypertension
Hypoxia
2. Hypertension
Cardiac Ischaemia
Renal failure
Non-compliance with fluid restriction / medications
Intercurrent illness
Stress (ie takotsubo cardiomyopathy)
3. GTN infusion
5-100mcg/min (IV infusion 50mg in 50ml)
Target end points – reduction in pre-load – systolic BP reduction to something reasonable ie 30% reduction or Clinical end point – decreased work of breathing or subjective dyspnoea, decreased tachypnoea, improved oxygenation etc

CPAP/BiPAP
Details: 5-10cm H2O PEEP/EPAP, IPAP less important here
Clinical end-points as above, improved O2, decreased work, decreased RR or decreased BP

Question 5

1.

Acute Ischaemia

Arrhythmia (ie new AF, AV block)

Medication changes/compliance issues

Electrolyte derangement (ie hypokalaemia)

2.

NIV – CPAP 10cm H₂O – mechanism – preload reduction through impeding SVC/IVC emptying into Rt Heart (secondary effect of improving gas exchange at alveolar-capillary membrane – End-Point SBP <140 or similar/ decreased resp distress/ normoxia

GTN infusion – 10-50mcg/min IV - mechanism – vasodilation and preload reduction (mild benefit on myocardial work/oxygenation through afterload and vasodilatory effects) – end-point – SBP <140mmHg

Question 6**1. What is the most likely diagnosis?****(1 mark)**

Acute pulmonary oedema

2. List 4 radiological features on the CXR that support this diagnosis.**(4 marks)**

- Bilateral interstitial infiltrates
- Bilateral small to moderate pleural effusions
- Upper lobe venous diversion
- Cardiomegaly (although AP film)

3. List 10 potential causes for the above condition.**(10 marks)**

- Cardiogenic
 - o Acute valvular dysfunction
 - o Acute arrhythmia, eg Atrial fibrillation
 - o ACS
 - o Fluid overload, eg iatrogenic – fluid overload alone is too vague
 - o Non-compliance with cardiac medications
- Non-cardiogenic
 - o Aspiration
 - o Inhalational injury
 - o SAH
 - o Near drowning
 - o Pancreatitis
 - o Pulmonary embolism
 - o DIC
 - o Sepsis
 - o Renal failure
 - o Hepatic failure

Note: do NOT give headings here. This question is easy, they should be able to come up with 10 answers.

4. List your two main treatments for this condition in this patient, including any relevant doses where necessary, and one contra-indication for each.**(6 marks)**

Treatment	Dose	Contra-indication
GTN Infusion SNP infusion	5-200 mcg/min 0.5-4 mcg/kg/min	Sildenafil use in prior 24h Hypotension SBP<90
NIV	CPAP or BIPAP Initial settings PEEP 5-8cm, PS 10, FiO2 1.0	ALOC/exhaustion/numerous... Poor resp effort Vomiting, haemoptysis Patient unable to tolerate mask

Question 7

A 72 year old male presents via ambulance short of breath. He is sweaty and looks unwell but is conscious. He has a history of IHD and has an AICD in situ.

Vital signs P 150 bpm
 BP 75/- mmHg
 RR 30 bpm
 SaO2 96% 15LNRB

- i. What rhythm is shown (1 mark)

A 12 LEAD ECG IS SHOWN IN THE PROPS BOOKLET, PAGE 8

- VT

You decide to perform DC cardioversion to treat the rhythm noted above. A VBG done after a cannula is placed shows the following.

pH	7.35	(7.35-7.45)
pCO2	57 mmHg	(32-45)
Lactate	3.3 mmol/L	(0.5-1.6)
K	6.1 mmol/L	(3.5-5.2)
Cr	160 mcmmol/L	(60-110)

- ii. What other treatment is required while cardioversion is being arranged (2 marks)

- Urgent treatment of hyperkalaemia. **CaCl for hyperkalaemia** and malignant rhythm 10ml 10% repeated if no change to ECG. Consideration of insulin/dextrose/and IV NaHCO3

- iii. Outline 2 pharmacologic agents you could use for sedation in this patient with initial doses and indicating advantages/disadvantages for each (8 marks)

Drug	Dose	Advantages	Disadvantages
Fentanyl	25-50mcg	CVS stable/analgesia	Resp depression
Midazolam	1-2mg	CVS stable/anxiolytic/amnesic	Resp depression/no analgesia
Ketamine	10-20mg	CVS stable/analgesia	Resp depression Apnoea Tachycardia

Morphine – not ideal given renal function/age, Propofol – not ideal given hypotension

- iv. Describe what settings you would set on the defibrillator and the positioning of the pads on the patient (2 marks)

- Synchronised 200 J, pads standard or AP with 10cm clearance of AICD box

- v. After cardioversion with sedation his rhythm is as follows. Describe the rhythm (1 mark)

A RHYTHM STRIP IS SHOWN IN THE PROPS BOOKLET, PAGE 8

- AF with VEB

- vi. Despite the ECG change the patient remains hypotensive, P 100bpm, SBP 80mmHg. Give 2 differential diagnoses for this (2 marks)

- Drug effect of sedation/stunned myocardium/NSTEMI/sepsis

Question 8

Questions:

1. What is your interpretation of the ECG and state your evidence.
(5 marks) – 3/5 – VT pass fail

Broad complex tachycardia – likely **Monomorphic VT**

NW axis

Concordance – esp V6 – negative

Jeffersons notch

2. What is the likely anatomical origin of the abnormality? (1 mark) – 1/1

Left VT – origin on left with electrical activity flowing to right

3. What initial treatment would you give this patient in ED? INCLUDE DOSE AND ROUTE.
(5 marks) – 4/5

2 priorities – Ischemia and VT

Treat likely ischaemia

Aspirin 300mg / morphine 2.5 mg IV / heparin 1000IU loading / GTN – sublingual

Treat VT

Amiodarone loading 300mg IV OR DCCV with sedation

Correct electrolytes

Passmark = 8/11 (adjust to /10)

(7.3/10)

Question 9

1.

Ventricular tachycardia

2.

Broad complex approx. 160ms

Regular tachycardia approx. 150/min

Fusion beats 4 and 7

Concordance across chest leads

3.

Ischaemia – signs on reversion ECG, Hx IHD, preceding chest pain

Electrolyte abnormality – hypoK on bloods

Drug toxicity – eg TCA ingestion

Primary arrhythmia – Hx cardiomyopathy eg ARVD

4.

Amiodarone 5mg/kg

Lignocaine 1mg/kg

Question 10

1. Name this rhythm: (1 Mark)

Torsades de pointes

2. List 5 drugs that may precipitate this rhythm: (5 Marks)

Class 1 (1A & 1C) and Class 3 antiarrhythmic drugs
--

Phenothiazines

Tricyclic antidepressants

Antibiotics eg erythromycin

Organophosphates

Accept also:

Antihistamines

Lithium

Antifungals

Anti-retrovirals (eg Amantidine)

3. List 3 non-pharmacological factors that can put patients at risk for this rhythm. (3 Marks)

Hypomagnesaemia

Hypokalaemia

Complete heart block or Bradycardia

Congenital long QT syndrome

4. List 3 treatment options for this arrhythmia. (3 Marks)

Magnesium sulphate IV 2 g

Isoprenaline infusion (increasing the HR decreases the QT interval)

Overdrive pacing

Cardioversion

Question 11

12 Marks

A 54-year-old man presents with palpitations and is light headed. He has a wide complex tachycardia on ECG.

Short Answer Witten Question: Submitted from Associate Professor Wayne Hazell

1. List the four steps in Brugada criteria to distinguish VT from SVT (4 marks)

Step Name
Absence of RS complex
R to nadir of S > 100ms
AV dissociation
Abnormal or atypical bundle branch morphology

Published in 1991, the Brugada criteria were the first to offer applicability to all WCT without limitation to one BBB configuration or another. The original paper reported overall accuracy of 98 %. However, no subsequent study has been able to achieve such results, with the overall accuracy of the algorithm 77–85 % across four large studies.^{13,15-17} Most authors note difficulty in applying the last step of the criteria (the morphology section), particularly among non-cardiologists. The criteria are applied in stepwise fashion, stopping further analysis if any step suggests VT.

- Step 1: Absence of RS complex anywhere in V1–V6 = VT.
- Step 2: Onset of R to nadir of S in any precordial lead >100 ms = VT.
- Step 3: AV dissociation = VT.
- Step 4: Morphology criteria (see [Figure 1](#) for details). Of particular note, both V1 and V6 must suggest VT for the diagnosis to be made; otherwise, SVT is the diagnosis.

Recognizing that the morphology criteria can be difficult to remember, some advocate using only steps 1 and 2. The results of this approach have been variable with PPV for VT of 81–96 % in two different studies.^{10,17}

2. State 8 other features on an ECG that are more indicative of VT than SVT in WCT.

(8 marks = 1 per feature)

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1. QRS width > 140 msec
2. Precordial concordance with all V lead waves being predominantly either positive or negative in concordance
3. Northwest axis with dominant R wave in AVR
4. In RBBB left R peak greater than R peak or first rabbit ear higher
5. Lead 2 initial R wave deflection > 40/50 msec
6. Lead 2 initial Q wave deflection > 40/50 msec
7. Axis changed from normal ECG
8. Similar ECG to past episodes of VT diagnosed by EP testing or EP analysis of ECG
9. VT producing condition on prior ECG such as Brugada or STEMI or ARVD
10. Verecki criteria in lead AVR or any of the following:

Step 1: An initial, dominant R in aVR = VT.

Step 2: An initial, non-dominant q or r in aVR >40 ms = VT.

•Step 3: Notching on an initial downstroke in aVR = VT.

•Step 4: $V_t \geq V_i$ in aVR = VT. To apply, measure the total vertical distance covered by the final 40 ms of the QRS in aVR. If this is equal to or more than the vertical distance covered by the first 40 ms of the aVR QRS, VT is diagnosed. The concept is that with aberration, ventricular activation during the first portion of the QRS is mediated by the His-Purkinje system, whereas in VT,

Any of these steps could be given 1 mark

Question 12

A 50 yearf old woman is in your ED with epigastric pain and vomiting. She has a background of hypertension and GORD. You are reviewing her on the ward round as an ECG is being performed.

She states that she feels a bit light headed.

The following ECG is recorded:

I. List three (3) relevant abnormalities on her ECG. (3 marks)

Polymorphic VT/Torsade de Pointes (must state this)

Extreme sinus Bradycardia (rate approx. 20 bpm)

Likely prolonged QTc

Ventricular ectopic

'R on T' phenomenon causing Torsades

II. State 3 possible causes for this clinical presentation. (3 marks)

Severe hypokalaemia/hypomagnesaemia secondary to vomiting

Use of QTc prolonging medication relevant to clinical scenario – anti-emetics, eg metoclopramide, ondansetron

Myocardial ischaemia, with epigastric pain an ACS equivalent presentation

Note: The above causes should be relevant to the clinical scenario, hence the wording of the question.

III. The patient's BP is 100/60 mmHg. List three (3) potential treatment, including doses and endpoints where relevant. (6 marks)

IV magnesium (10 mmol or 2g) over 1-2 minutes to termination of rhythm
--

IV potassium if associated hypokalaemia 10-20 mmol IV over 1 hour to K+ >3.5 mmol

Overdrive cardiac pacing to rate of 90-120 bpm
--

Isoprenaline infusion 0.05-1 microg/kg/min to rate of 90-120 bpm
--

References:

Textbook of Adult Emergency Medicine, Cameron et al, fourth edition, chapter 5.4

Tintinalli's Emergency Medicine, Tintinalli et al, 8th edition, chapter 18

Question 13

1. Capture beats
 - Fusion beats
 - AV dissociation
 - Extreme Axis (northwest)
 - Absence of typical LBBB or RBBB morphology
 - Very broad QRS
 - Concordance – Pos or Neg
 - RSR' with taller left rabbit ear
 - Rate appropriate - >120, mostly 150-200
 - Others – Josephson's sign/Brugada's sign are also ok if explained what they are.
2. Age >35
 - Known Structural Heart Disease
 - Known Ischaemic Heart Disease
 - Prior MI
 - Hx of CCF
 - Known cardiomyopathy
 - Family Hx of Sudden Cardiac Deat
3. Consent
 - Sedate – Fentanyl 50-100mcg + Midazolam 1-3mg
 - Synchronise
 - Shock – VT – 100Joules) – 200J is fine

Question 14

Your registrar brings you the ecg of a 46M who has presented with palpitations. He is in resus bay and being monitored. His condition is stable with BP 120/80, sats 99% RA, RR18, and gcs 15.

What are 4 features of VT that you look for in making a diagnosis ? (2 marks)

1. wide complex QRS >0.12mm
2. regular rhythm
3. rate 140-200 but this is not conclusive
4. presence of fusion or capture beats
5. concordance in precordial leads from V1-V6 either positive OR negative

The ECG shows a wide complex tachyarrhythmia. What else could this be (apart from VT) (2 marks)

1. SVT with aberrancy
2. SVT with wpw

What are 3 treatment options for this man with pros and cons of each (6 marks)

Do nothing: he is clinically stable and this may resolve> may deteriorate while waiting if VT

Vagal manouvures: no adverse event, simple, quick to try. Unlikely to work as accessory pathway not affected by this.

Drug treatment to reduce automaticity: amiodarone: but may impair future EPS studies (half life 60 /7) if VT.

Adenosine: quick, effective, needs proximal access : C/I in WPW

DC CV: requires sedation, may not work at such high rates in synch mode, may need to use in non synch risking R/T phenomenon outcome. Risks aspiration if not fasted.

Question 15**1. List 4 different causes of a broad complex tachycardia (4 Marks)**

- Ventricular Tachycardia
- SVT with aberrant conduction due to bundle branch block
- SVT with aberrant conduction due to the Wolff-Parkinson-White syndrome
- Pace-maker mediated tachycardia
- Metabolic derangements e.g. hyperkalaemia
- Poisoning with sodium-channel blocking agents (e.g. tricyclic antidepressants)

2. List 4 clinical features that increase the likelihood of VT (4 Marks)

- Age > 35
- Structural heart disease
- Ischaemic heart disease
- Previous MI
- Congestive heart failure
- Cardiomyopathy
- Family history of sudden cardiac death (suggesting conditions such as HOCM, congenital long QT syndrome, Brugada syndrome or arrhythmogenic right ventricular dysplasia that are associated with episodes of VT)

3. List 6 ECG features that increase the likelihood of VT (6 marks)

- Absence of typical RBBB or LBBB morphology
- Extreme axis deviation ("northwest axis")
- Very broad complexes (>160ms)
- AV dissociation
- Capture beats
- Fusion
- Positive or negative concordance throughout the chest leads
- Brugada's sign
- Josephson's sign
- RSR' complexes with a taller left rabbit ear

4. List 3 medications used to treat stable VT (3 Marks)

- Amiodarone 5mg/kg
- Procainamide 50mg/min
- Lignocaine 1mg/kg
- Sotalol 1mg/kg
- Magnesium 10mmol

Pass mark: 10/17

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QUESTION 16 (19 marks)

An 80yr female presents via ambulance from her GP to your ED. She has a 24 hour history of vomiting, followed by syncope this morning. She had a second syncope at her GPs office and was noted to be bradycardic on ambulance arrival.

Observations on arrival to ED are:

GCS 15 HR 76 BP 85/30 RR 18 SaO₂ 96% RA

She describes no chest pain, has had a recent course of antibiotics for a chest infection and has started on a “new drug for my memory”.

THE PATIENT’S AMBULANCE RHYTHM STRIP AND ARRIVAL ECG ARE SHOWN IN THE PROPS BOOKLET, PAGE 9 & 10

- i. List 3 relevant findings from the 12 lead ECG (3 marks)

- Sinus rhythm
- PR prolongation
- QT prolongation
- No ischaemic changes

- ii. List 3 causes of the ECG abnormalities in this patient (3 marks)

- Electrolytes
- Drugs (must provide a relevant example) eg cholinergic agents, macrolide, psychotropic agents
- Myocardial ischaemia

iii. List your management priorities (4 marks)

- Seek and treat cause – medications, AMI, electrolytes
- Address hypotension – fluids, inotropes
- Continuous monitoring
- Cardiology consult/admission
- Apply pacing pads and consider temporary/chemical pacing if further bradycardia

She becomes bradycardic to 35 again, and her BP drops to 75/30 with a rhythm matching the initial ambulance ECG strip.

iv. What is her likely diagnosis? (1 mark)

- Complete heart block

v. You decide to initiate transcutaneous pacing for her transfer to ICU. Outline your approach (5 marks)

- Inform and consent
- Analgesia/sedation as required – sensible options
- Technique-
 - AP pads
 - Set rate (60-80)
 - Start pacing and slowly increase mA until pacing rate captured on monitor
 - Ensure mechanical capture
 - If pacing not captured, consider increasing current or re-siting electrodes

Question 17

Questions:

1- What is the diagnosis and list 4 supportive ECG finding: (5 marks) – 3/5

Suggests **rapid AF with likely accessory pathway, eg WPW**

Irregularly irregular broad complex (but will accept narrow – it's borderline)
tachycardia (QRS widened, or borderline (approx 100ms)

Rate up to 300 bpm in parts

Delta waves visible in lead V3

2- In point form, List your management steps. For any drugs used, please provide the dose and route of administration. (8 marks) – 5/8

Answer:

Apply defibrillation pads - Monitor for degeneration into VF

Synchronised DC cardioversion 100-150 J

- Consent for DC cardioversion

- Analgesia: Fentanyl 0.5-1 mcg/Kg IV

- Sedation: Propofol 0.5 mg/kg IV titrated to effect

Ensure restoration of sinus rhythm and repeat ECG to look for accessory pathway

OR Chemical Cardioversion

- **Avoid drugs that act on AV node – Ca channel blockers, digoxin, b blocker**

- IV amiodarone 300 mg or Procainamide 15mg/kg IV, IV Flecainide

Cardiology referral/input/follow-up

Passmark = 8/13 (adjust to /10)

(6/10)

Question 18

1.

VT

2.

Broad complex QRS

Tachycardia rate approx 180

Presence of capture beats

3.

Cardiac Ischaemia

Electrolyte – hypokalaemia, hypomagnesaemia

Drug – eg tricyclics

Primary arrhythmia

Congenital

Cardiomyopathies

Infiltrative diseases

(3 of 4 to pass)

4.

Sedate – fentanyl 25mcg boluses, midazolam 0.5 – 1mg boluses

Synchronized DC cardioversion – 100 – 200J

Correct underlying cause

Total pass 8/14 – corrects to **5.5/10**

Question 19

1.

Rhythm irregularly irregular – atrial fibrillation

Ventricular rate variable – approx. 200-250/min – very fast

Left ward axis of broad complexes

2 types QRS complex – narrow and broad (mostly) – represent different pathways of activation of ventricles – narrow through AV node, broad through accessory pathway

Hence AF with rapid ventricular response in pt with accessory pathway (WPW)

Delta wave seen best in V4

2.

Pt needs emergent cardioversion

- Consent / explanation
- Small aliquots of sedation (eg midazolam 1mg boluses titrated to light sedation) 2 marks
- DC cardioversion synchronized 200J
- Optimise electrolytes – K, Mg

Question 20 :

A 62 year old male presents to your small rural Emergency Department with 30 minutes of central heavy chest pain with some radiation into the throat and some belching. His ECG is attached.

a) Identify the abnormalities on the ECG (4 marks)

- *Sinus Tachycardia*
- *LA Hypertrophy*
- *ST elevation in aVR 1mm, T inversion aVR.*
- *ST depression v2 to v6, Lead I and II.*

b) Where are the most likely areas of concern in the coronary arteries. (2 marks)

Answer

Left Main Coronary Artery

Proximal left anterior descending artery (LAD)

Severe triple-vessel disease (3VD)

Diffuse sub-endocardial ischaemia

Must include answers in bold or maximum score 1.

c) What are the four priorities in managing this case? (4 marks)

Answer

- i) Initial stabilisation including pain control***
- ii) Medication for Non STEACS – aspirin, clopidogrel, heparin.***
- iii) Exclusion of contraindications to fibrinolysis*
- iv) Close monitoring and serial ECGs to avoid missing a STEMI*
- v) Urgent transfer out to interventional cardiology***

Must include options in bold or maximum score is 2/4

Question 21

1.

LBBB – left axis deviation, QRS broad approx. 160ms (2 marks)

STEMI equivalent Sgarbossa criteria

- Concordant ST elevation (I, avL)
- Excessively discordant ST elevation >5mm (V2 V3) (2 marks)

Hyperacute tall T waves anterior leads (V2-V4) (1 mark)

2.

STEMI equivalent, requires urgent re-perfusion

3.

Arrhythmias – tachy VT / VF, brady heart blocks

LVF / APO

Cardiogenic shock with hypotension and poor end-organ perfusion

4.

Availability of cath lab within 90 min door to balloon time (one category encompassing all excuses here)

Contra-indications to thrombolysis

Presence of shock/complications – cath lab only good option

Pt consent

Local protocols

Allergies

Question 22

1.

Inferior STEMI – ST Elevation III > II

Posterior Involvement with early R waves, ST depression and upright T waves V 2-3

Likely RV involvement with 'relative ST elevation' in V1 compared to V2 (ie lack of ST depression)

Accelerated Junctional rhythm with rate 78/min and evidence retrograde P waves in ST segment

2

Inferoposterior STEMI with RV involvement

Meets criteria for reperfusion

3.

Aspirin 300mg PO

Fluid load 10-20ml/kg aiming SBP >100 or MAP >65

Second antiplatelet in appropriate dose

Heparin load (5000u or similar) + bolus

Analgesia Fentanyl 25mcg repeat to comfort

Activate cath lab

Note rate currently 78/min – chronotherapy not currently indicated

Fail – if gives GTN

Question 23

Questions:

1- List the abnormalities on the ECG.

(3 marks) – 3/3

Answer:

PR depression I, II, V5, V6 (PR elevation in aVR)
Diffuse ST elevation I, II and Chest leads
No geographical distribution - no reciprocation
(Except aVR)

2. What is your provisional likely diagnosis? Justify your choice. (3 marks) – 2/3

Acute pericarditis
Nature of pain - age young - no obvious risks for PE.
ECG pathognomonic

3. List 3 additional investigations that are indicated to further assess the extent and severity of this condition. (3 marks) – 2/3

Answer:

Troponin/CK
Echo
MRI

4. In the table below, list the possible underlying aetiological processes causing this patient's condition. Give 1 example of each and list the relevant investigation that could be ordered. (12 marks) – 9/12

Infectious

Viral - usually no testing needed, PCR, serology

Bacterial - bc if patient febrile

Tb - if contact history or from high risk group - Mantoux CXR

Inflammatory

SLE / rheumatoid - if other symptoms or family history and no other cause apparent -

Ana screen / complement 1-2

Rheum factor / CRP

Metabolic - uremia - renal function testing

Malignant – lung Ca, if other symptoms or signs suggestive - CT chest / abdomen as appropriate to suspected source.

Passmark = 16/21 (adjust to /10) (7.6/10)

Question 24:

FEx Net 2022 Collated SAQs

Answers:

1. Describe 2 significant findings on this ECG and your interpretation (3 marks) 2/3

- LBBB
- discordant ST elevation of >5mm in anterior leads (V1-V4).
- (ECG Sgarbossa criteria for STEMI)
- clinical picture and ECG findings are consistent with an anterior STEMI.

2. Outline the criteria used for question 1 (3 marks) 2/3

Sgarbossa criteria:

- Concordant ST elevation > 1mm in leads with a positive QRS complex (score 5)
- Concordant ST depression > 1 mm in V1-V3 (score 3)
- Excessively discordant ST elevation > 5 mm in leads with a negative QRS complex (score 2). This criterium is sensitive, but not specific for ischemia in LBBB. It is however associated with a worse prognosis, when present in LBBB during ischemia.

A total score of ≥ 3 has a specificity of 90% for diagnosing myocardial infarction.

Would also accept alternative 3rd criterion of proportionally excessively discordant ST elevation in V1-V4, as defined by an ST/S ratio of equal to or more than 0.20 and at least 2 mm of STE. (Smith et al)

3. List six management priorities for this patient (6 marks) 4/6
- Goal is reperfusion- ideally via PCI if able to access within 120 minutes otherwise lysis
 - Consider NIV if unable to maintain oxygenation via mask (high risk for APO/CCF)
 - Judicious fluid bolus (e.g. 250ml) to maintain perfusing BP. May need inotropes if ongoing or progressive hypotension (concerning for cardiogenic shock)
 - Anti-platelet therapy- aspirin 300mg + clopidogrel 600mg/ or ticagrelor 180mg loading dose
 - Analgesia e.g. fentanyl 25mcg aliquots until pain free (unlikely to tolerate GTN given SBP 90mmHg)
 - Anti-coagulation in liaison with cardiology team e.g. heparin 5000 units iv bolus

Passmark: 8/12 Adjust to ../10 please

References:

2013 ACCF/AHA Guideline for the management of STEMI

Life in the Fast Lane

Smith, Stephen W.; Dodd, Kenneth W.; Henry, Timothy D.; Dvorak, David M.; Pearce, Lesly A. (2012). "Diagnosis of ST-Elevation Myocardial Infarction in the Presence of Left Bundle Branch Block With the ST-Elevation to S-Wave Ratio in a Modified Sgarbossa Rule". Annals of Emergency Medicine 60 (6): 766–776.

Question 25

READ the question first then **START** with the elephant on the ECG:

Things to consider before answering this question:

READ the Question and answer THE QUESTION

try to guess the sense (Flavour if you wish) of the question (what is it asking???—

Ischemia/dysrhythmia/anything specific that I should know,...)

Consider it as a real patient in front of you or in this case a nurse showing you an ECG in a busy shift —> what's your immediate response ? —> **I hope it is " Where is this patient ?? "**

Have a systematic approach,don't just look for findings (Always check calibration) for higher Marks give appropriate informations (Extras) ie instead of Sinus tachycardia you can easily calculate rate and write ST ~138bpm

ELEPHANT here : Electrical alternans ,Low Voltage,Sinus Tachycardia 138 bpm
less important :prolong QTc ,poor R wave progression ,maybe non specific PR/ST-T changes

*** most candidate didn't notice **"interpret "** in part (a)

*** don't make up signs (bigeminy/ashman phenomenon,...)

***answer the question and don't waste your time

ie:

just positive findings are asked here,don't write negatives

instead of : regular narrow complex tachycardia ,sinus wave with rate 138 bpm you can simply write: **Sinus tachycardia Rate ~138 bp**

***DDX for ECG appearance not Sinus tachycardia or cause of effusion;you can start from simple i.e. Obesity or more important ones for higher marks (here :pericardial effusion,...)

version A:

- 1 Pericardial effusion, Pleural Effusion
- 2 Emphysema
- 3 Pneumothorax or Pneumopericardium
- 4 Subcutaneous emphysema
- 5 Severe hypothyroidism (myxoedema)
- 6 End-stage dilated cardiomyopathy
- 7 Old large MI
- 8 Infiltrative/restrictive diseases such as amyloidosis or hemochromatosis.
- 9 Obesity

Version B:

- "Low Power/Weak Battery"
- Infiltrative diseases (Amyloid, Sarcoid, etc.)
- End stage cardiomyopathy
- Myxedema (severe hypothyroidism)

- Conduction blockage
- Fluid/Effusion (pericardial or pleural)
- Fat (obesity)
- Air (COPD, PTX)

for higher mark use scoring system, validated criteria etc as a frame work and list according to priority, also give disposition options (ICU/HDU/Ward with telemetry/Home,...); for example in this question :

disposition according to haemodynamic situation and **Pericardial effusion scoring index** based on :

1. Echocardiographic assessment of **haemodynamics**
 2. effusion **Size** on echo
 3. **aetiology** of effusion (not all relevant in this case)
 - a) infective - **viral most common** (coxsackie, CMV, Echo, HIV) - other:
 - bacterial/ fungal /TB
 - b) Uremia
 - c) autoimmune (SLE, RA,...)
 - d) malignancy
 - e) MI
 - f) Trauma
- Less relevant here but to consider:

score > 4 → will need pericardiocentesis

*** consideration of **social** circumstances and follow up

always consider discharge planning at the end, ie in this case if good F/u **AND** LOW Pericardial effusion scoring index < 3 at initial presentation without haemodynamic compromise (clinically/radiologically)

Question 26

12 Marks

Your department is in the process of revising its pathway for patients presenting to the ED with chest pain. You have been asked to help develop a pathway.

1. As per the National Heart Foundation of Australia & Cardiac Society of Australia and New Zealand guidelines, what are the high risk features of chest pain for Acute Coronary Syndrome (ACS), **not** including clear ST elevation on an ECG or an elevated Troponin? List 4 features. (4 marks)

- a) On-going/repetitive chest pain
Persistent St depression or T wave inversion in 2 contiguous leads
Haemodynamic compromise
Syncope
Sustained VT
Known poor LV systolic fxn
AMI/PCI/CABG in last 6 months

2. List 4 low risk criteria. (4 marks)

- b) Normal ECG
Normal Tnl
Age <40 y
Absence of known CAD
Atypical sx
Symptoms gone

3. Excluding ACS, list 8 causes of a raised serum Troponin by filling in the table below.(4 marks)

Cardiac causes	Non-cardiac causes
Aortic dissection	Acute SAH
Cardiac contusion	Renal failure
CCF	Sepsis
Cardiomyopathy	Hypoxia

Plus more if you're happy

Question 27 (31 Marks)

Questions:

1. List five (5) potential differential diagnoses? (5 Marks)

Factors that increase risk of thromboembolism

Pulmonary Embolus
Ischaemia
Pericarditis
Pneumothorax
Pneumonia
Aortic dissection

2. During your assessment, she deteriorates clinically and becomes agitated, tachycardic, hypotensive and hypoxic.

Her vital signs are now:

GCS 13/15 (agitated),
 HR 130 Sinus Tachycardia
 BP 90/60
 Sats 89% RA
 RR 28.

For the table below, List five (5) immediate investigations and the rationale for each:

(10 Marks)

CXR	Alt DX- LRTI, PTx, cardiac size and shape
ECG	Ischaemia, arrhythmia
ABG	Gas exchange, metabolic status, Hb, creat for contrast Ix, bsl
Bedside ECHO	Fluid status, RWMA, Dx- PE/dissection
Lung USS	PTx

3. You diagnose a pericardial effusion from your history/examination and investigations.

List eight (8) common causes of ANY pericardial collection for patients presenting to the emergency department?

(8 Marks)

Factors that increase risk of thromboembolism

Infectious pathogen (viral, bacterial, HIV)
Neoplastic

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Renal failure
CCF
Aortic dissection
AMI +/- free wall rupture
Myxoedema
SLE
Rheumatoid arthritis

4. List five (5) main ECHO features to support a clinical diagnosis of cardiac tamponade? (5 Marks)

Factors that increase risk of thromboembolism

Pericardial effusion
Late diastolic collapse of RV free wall
Early diastolic collapse of RA free wall
Abnormal septal motion due to reciprocal ventricular filling
Dilated IVC with no respiratory collapse
Diastolic flow reversal in hepatic veins

5. List three (3) ECG finding that support a clinical diagnosis of cardiac tamponade: (3 Marks)

Factors that increase risk of thromboembolism

Low voltage
Tachycardia
Electrical alternans

Pass mark: 20/31

Question 28

A 30 yr old man presents to the emergency department with fever of 38.5 and chest pain and SOB. He reports that he is an IVDU. On examination he has bibasal crepitations and a murmur which was not present of previous presentations.

1. What is the most likely diagnosis? (1 mark)

Infective endocarditis

2. List 4 components of Dukes Criteria (4 marks)

Major

2x positive BC of typical MO >12 hrs apart

Mobile echodense intracardiac mass on echo

periannular abscess

Partial dehiscence of prosthetic valve on echo

New regurg on echo

Minor

IVDU/Congenital heart disease

Temp >38

Vascular Phenomena

Immunological phenomena

+ ive BC/echo not meeting major criteria

either 2 major or 1 major and 3 minor or 5 minor

3. Name 2 of the most common organisms which cause this pathology in the IVDU population. (2 marks)

Staph Aureus

Streptococcal species – Strep Viridans

Pseudomonas aeruginosa

Fungi – candida

Mixed organism

5. What antibiotics would you use to treat it? (3 marks)

Ceftriaxone

Vacomycin

Gentamicin

Sources – Campbell and Dunn

Question 29 (16 marks)

A 26 yr man presents with a 3 day history of sharp central chest pain suggestive of pericarditis. His observations are stable apart from a temp of 38C.

THE ECG IS SHOWN IN THE PROPS BOOKLET, PAGE 4

- i. List the ECG abnormalities (3 marks)

- Sinus tachycardia
- Concave STE inf and V4-6
- PR depression inf & V4-6
- Reciprocal ST depression & PR elevation V1 & aVR

- ii. What ECG features would make a diagnosis of benign early repolarisation more likely? (2 marks)

- ST elevation limited to the precordial leads
- Absence of PR depression
- Prominent T waves
- Changes do not evolve over time

- iii. List 5 causes of pericarditis (5 marks)

- uraemia
- viral infection (all causes of myocarditis)
- bacterial infection
- radiation
- malignancy (metastatic: lung>breast>leukaemia and lymphoma>melanoma)
- vasculitis
- autoimmune (SLE, RA, scleroderma, sarcoid...)
- TB

- iv. List 3 investigations used to detect a pericardial effusion in this setting – include a brief description of the positive finding for each investigation (6 marks)

- ECG – low voltage QRS complexes
- CXR – globular shaped heart
- ECHO – fluid seen as a black stripe

Question 30

You are the duty consultant covering the resuscitation area in a tertiary ED. A 56 year old male has been brought in complaining of chest heaviness, dyspnoea and faintness. He was discharged 3 days ago at Day 9 post-CABG for a myocardial infarction.

His 12-lead ECG has been reproduced below:

His observations are:

- Temperature 36.2 degrees
- HR 92 /min
- BP 85/52 mmHg
- RR 22 /min
- SPO2 96% on 6L Hudson mask
- BSL 5.6 mmol/l

Questions

1. List 5 differential diagnosis for this patient's presentation. (5 marks)

- a. Causes of cardiogenic shock

- i. ACS (Reinfarction)
- ii. Arrhythmia: drop in LVEF/CO if AF new
- iii. Mechanical:
 1. Pericardial tamponade (CABG dehiscence, Dressler's syndrome)
 2. Acute MV prolapse (papillary muscle rupture)
 3. Ventricular septal rupture
 4. LV aneurysm/rupture
 5. Acute AR
- iv. Medication error (e.g B-blocker)

- b. Non cardiogenic causes

- i. Massive PE
- ii. Hypovolaemia/severe anaemia (mediastinal/GIT/retroperitoneal bleeding. Post op and anticoagulated)
- iii. Sepsis/LRTI (hospital/ventilator acquired, surgical complication)
- iv. Tension pneumothorax (although unlikely this late)

2. List and justify 3 investigations that you would perform at the bedside. (6 marks)

- Repeat ECG, looking for dynamic ischaemic changes or arrhythmia
- VBG to exclude severe acidosis (shock/lactate), critically low Hb
- Mobile CXR to exclude LRTI or pneumothorax, define pleural effusion/LVF if present
- POCUS (or formal echo if immediately available), seeking to define:
 - i. Presence of significant volume pericardial fluid/RA/RV collapse in diastole (tamponade)
 - ii. Global LV and RV function, ?RWMA to suggest ischaemia
 - iii. Valvular function (?prolapse/regurg)
 - iv. Exclude LV/septal rupture
 - v. Evidence of massive PE with dilated RV/RA, bowing of septum into LV
 - vi. Evidence of hypovolaemia (collapsing RA and IVC)
 - vii. Evidence of sepsis (hyperdynamic cardiac activity)

You have not identified an immediately reversible cause for this patient's presentation. You suspect that his clinical findings may be due to his underlying coronary artery disease.

3. In an escalating manner, state 3 approaches (including route and doses) to haemodynamic resuscitation. (3 marks)

- Careful fluid boluses 5 mls/kg IV NaCl 0.9%
- Inotropes
 - i. Dobutamine 5 mcg/kg/min IVI
 - ii. Adrenaline 0.04 mcg/kg/min
 - iii. Accept other reasonable choices
- Mechanical - IABP via PCI

4. State 2 end points of haemodynamic resuscitation for this patient. (2 marks)

Given known IHD, higher than generic haemodynamic targets to maintain coronary perfusion:

- SBP $\geq$ 100mmHg
- MAP $\geq$ 70mmHg
- Urine output $>0.5\text{ml/kg/hr}$
- Normalisation of mentation if abnormal
- Normalisation of lactate if abnormal

5. State and justify this patient's preferred disposition. (2 marks)

- Provided no surgical intervention immediately indicated, cardiogenic shock should be investigated by PCI in case of acute coronary occlusion
- Initial transfer to **cardiac catheterisation lab** in discussion with senior cardiologist
- IABP decreases mortality in cardiogenic shock. If medical refractory to medical resuscitation, IABP placement is indicated.
- Ultimate disposition is CCU, or ICU if other organ system support required

Question 31

Questions:

1-Describe the abnormalities on her ECG. (2 marks) - 2/2

RBBB and LAFB/L axis deviation (Bifascicular block)

2- What is the significance of these findings? (2 marks) - 1/2

Complete heart block may have occurred, with intermittent block of the posterior fascicle with resultant syncope.

3-List 4 causes contributing to the findings on the ECG. (4 marks) - 3/4

Ischaemic heart disease
Rate related LBBB with complete heart block
CCF
Outflow tract obstruction - HT/Aortic stenosis
Infiltrative/Degenerative
Inflammatory - SLE
Medication related – B Blockade, Digoxin
(Any 4 of these for 1 mark each)

4- What definitive cardiac investigations does this patient need and state why?
(3 marks) 3/3

(3 issues to address – heart failure, arrhythmia and need for pacemaker, underlying ischemia → 2/3 of these to pass)
Test for cardiac ischaemia - Stress Echo / MPS/ Angiogram
Test for arrhythmias - Holter monitor, Electrophysiological study
Tests for underlying cardiac structure & function - Echo

Passmark = 9/11 (adjust to /10) (9/10)

Question 32

1.

Polymorphic VT (TdP)

2.

Very Broad QRS 200ms

Tachycardia rate ($36 \times 6 = 216/\text{min}$)

Shifting axis

3.

Electrolytes – hypoK, hypoMg

Drugs ie Sotalol

Congenital ie long QT syndrome

Infiltrative ie Cardiac Amyloid

Structural ie Dilated Cardiomyopathy

Ischaemia

4.

Cardioversion (synchronized) – 200J

Magnesium 10mmol over 5 mins

Fix cause eg hypoK

5.

Chemical pacing – isoprenaline infusion 5-30mcg/min, aiming for HR >100/min

Electrical overdrive pacing – synchronized pacing at rate 100/min, increase current to achieve electrical and mechanical capture

Question 33

1.

Complete heart block

AV dissociation

QRS rate approx. 40/min

QRS duration 120ms (broad) with RBBB pattern [need both for this mark]

- (this will represent left bundle escape focus, or junctional escape with pre-existing RBBB)

2.

Ischaemia

Electrolyte eg hyperkalaemia

Drugs eg beta blockers

Degenerative disease conducting system

Infiltrative disorders eg sarcoidosis

3.

Hypotension

Impaired mentation

Chest pain

(anything else that fits with end organ hypoperfusion)

4.

Isoprenaline

Adrenaline

Dopamine

Dobutmaine

Question 34 (13 marks)

What is the name of this cardiac window/view? (1 mark)

- Apical 4 chamber view

List 3 echocardiographic findings suggestive of pericardial tamponade on bedside ultrasound (3 marks)

- Presence of pericardial effusion (>2cm)
- Right atrial collapse (end of Diastole)
- Right ventricle collapse (start of Diastole)

List 5 causes of a Pericardial Effusion in this patient – candidates should list 5 causes from different categories of causes (5 marks)

- Viral – Enterovirus / Adenovirus / EBV / Mumps
- Bacterial – Staph aureus / Streptococci / Pneumococci / Legionella / TB
- Malignancy – lung / Breast / Leukaemia / Lymphoma / Melanoma
- Autoimmune – RA / SLE / Dressler's syndrome
- Uraemia
- Serum sickness
- Post Myocardial Infarction

Weaker answers – Post cardiac surgery and Irradiation not accepted for this patient given no history of.

You have decided to perform a therapeutic pericardiocentesis on this patient for cardiac tamponade. Complete the following table outlining your technique for this procedure (4 marks)

Positioning of the patient for procedure	Sat up at 45 degrees
Gauge of needle used	14-18 G
Insertion point of needle	Between left xiphoid and costal margin
Direction of needle advancement	Left shoulder or right clavicle (2 Techniques) Or accept 'Ultrasound guided'

Question 35

A 38 yo female presents with BP 220/125 and a headache.

Define Hypertensive emergency (1 mark)

Systolic >180mmHg or diastolic >110mmHg associated with evidence of end organ damage

List 6 end organs that might be damaged from severe hypertension and at least one clinical manifestation that you might find on history taking, examination and the appropriate investigation.

Name the medication of choice for management of that (6 marks)

<i>Organ</i>	<i>Symptom or sign</i>	<i>Investigation</i>
<i>Heart</i>	<i>CCF</i>	<i>CXR</i>
	<i>Chest pain</i>	<i>ECG</i>
<i>Vascular - aorta</i>	<i>Chest pain</i>	<i>CT aortogram</i>
	<i>BP disparity between arms</i>	<i>CXR</i>
	<i>syncope</i>	
<i>kidney</i>	<i>Nausea, vomiting</i>	<i>EUC's</i>
	<i>Reduced urine output</i>	<i>U/A for proteinuria</i>
	<i>polyuria</i>	
<i>Eye/retina</i>	<i>Blurred vision</i>	<i>Fundoscopy with flare or papilloedema</i>
<i>brain</i>	<i>Headache</i>	<i>CT brain</i>
	<i>Syncope</i>	
	<i>Focal neurological signs</i>	
<i>O&G</i>	<i>Headache</i>	<i>U/A</i>
	<i>Increased reflexes</i>	<i>Uric acid</i>
		<i>pregnancy</i>

List 2 classes of medication, 2 examples of that class and the dose that can be used for the treatment of hypertensive emergencies. (4 marks)

Class of medication	example	Dose & frequency of treatment
Beta blockers	Metoprolol	5mg IV every 5 mins
	esmolol	0.5-1mg/kg bolus then infusion 50-300mcg/kg/min
vasodilator	Hydralazine	5-20mg IV every 30minutes
	SNiP or GTN	SNiP 0.25-10mcg/kg/min infusion GTN 50mg in 500ml commence 5mls/hr & titrate – 50-200mcg/kg/min

Question 36

A 40-year-old man with a past history of hypertension presents to your Emergency Department complaining of a gradual onset severe headache with associated drowsiness and vomiting. His initial nursing observations are:

BP 240/140mmHg Pulse 70b/min

GCS 13 (E3 eyes opening to speech; V4 confused; M6 obeying commands)

RR 26 with O₂ sats 94% on RA

Temp 36.5°C

Power 5/5 all 4x limbs and no facial asymmetry

A) What is the most likely diagnosis in this patient? (2 marks)

- Answer: Hypertensive crisis or Malignant Hypertension (1 mark) with Encephalopathy (1 mark)

B) List and justify the immediate investigations required for this patient (10 marks)

Answer: Any 3 of the following

Investigation	Justification
CT Brain	To investigate for intracranial haemorrhage vs encephalopathy
EUC	Check for acute kidney injury secondary to hypertension
Cardiac Troponin I	?NSTEMI or myocardial ischaemia secondary to hypertension

ECG	Looking for myocardial ischaemia and evidence of LVH
CXR	To assess for cardiomegaly, widened mediastinum and evidence of acute pulmonary oedema

Investigation	Justification
CT A Chest	Investigating for possible thoracic aortic dissection as a complication of hypertension.
Urine Analysis	Checking for proteinuria as part of acute kidney injury.
USS/Echocardiogram	Looking for LVH, evidence of myocardial dysfunction and APO.

C) What would be your top FIVE management priorities for this patient? (8 marks)

Answer:

- Analgesia (0.5marks): Fentanyl or Morphine (0.5 marks)
- Anti emetic (0.5marks): Ondansetron or equivalent (0.5 marks)
- Supplemental Oxygen to correct high RR and low O₂ saturations (1 mark)
- Immediate controlled reduction of blood pressure (1 mark) with the target of lowering initial MAP by 25% or diastolic to 110mmHg over the first hour (1 mark).
- Followed by a gradual decrease in blood pressure to 160/100 over the next 4-6hours (1mark).

Mention of medications used to facilitate the reduction in blood pressure: a B blocker (Labetolol or Esmolol) (1 mark) and either GTN or sodium nitroprusside (1 mark).

Total marks for Question: 20

Question 37

You have observed a trainee perform a physical exam on a 70-year-old gentleman who had a syncope walking up stairs. He has been breathless on exertion for 1 year.

Your trainee finds no abnormality on examination and considers that he is suitable for discharge if baseline blood tests, 12 lead ECG and a period of monitoring do not reveal any abnormality.

You decide to examine him yourself. You find a mid-systolic murmur, that radiates to the carotids and crepitations (crackles) to the midzones in both lung fields.

- a) What is your differential diagnosis of this murmur and the significance of each option? (8 marks)

Condition	Typical features on auscultation (half mark per point -total 1mark)	Clinical significance (1 mark)
Aortic stenosis	• Mid-systolic / ejection systolic murmur, • crescendo-decrescendo, • radiates to carotids; • if severe, also crackles / breathless / S4	Syncope and exertional dyspnoea suggest this would be severe AS
Aortic sclerosis	• Mid-systolic murmur, • crescendo-decrescendo, radiates to carotids as per AS	None (incidental finding)
Hypertrophic obstructive cardiomyopathy	• Mid-systolic murmur, • crescendo-decrescendo. • Active manoeuvres to DDx it from AS	Like the AS- if causing syncope this is significant!
Mitral regurgitation	• Pansystolic murmur so unlikely to be this- but can be mistaken. • Acute MR due to papillary rupture can be ejection systolic, but patient would be in extremis.	Like AS, the associated findings would suggest this is severe

--	--	--

- b) What is your advice to the trainee on this patient's disposition, including your rationale? (2 marks)

a. Your advice:

Admit under cardiology for inpatient workup eg TTE-. (or at the very least needs a cardiology consult while in ED and early followup arranged)
Avoid nitrates / diuretics.

b. Your rationale:

Previously undiagnosed AS most likely, and clinically this would be severe given the syncope, dyspnoea and crackles. Needs identification of severity of AS, commencement of treatment and monitoring.

- c) Your trainee had asked for this case to be a CEX but now doesn't want to because they did poorly. You become aware that other consultants have had the same issue regarding underperformance. As the DENT you decide to meet with the trainee and discuss a performance plan.

a) List 4 early warning signs of a trainee in difficulty (2 marks)

*++ Disappearing; not answering pagers; lateness; frequent sick leave;
++ Slow in performing procedures;
++ Reluctant to make decisions;
++ Difficulty in prioritising;
++ Failure to seek advice appropriately;
++ Lack of initiative;
++ Fellow trainees and nursing staff avoid seeking the trainee's opinion or help;
++ Not completing WBAs or ITAs;
++ Deferring tasks to others, avoiding tasks;
++ Lack of insight into limitations.*

b) List the parts of a performance plan. (4 marks)

- 1. Identify the performance area that needs improvement*
- 2. Provide specific examples of poor performance*
- 3. Discuss reasons that could be causing poor performance*
- 4. Create a performance action plan with a set of goals and time frames for next meetings and reviews*

Question 38

Answers:

Q1. (2 marks) 1/2
Atrial Flutter with variable 2:1 / 3:1 block. No ischemic features.

Q2. (8 marks) 5/8

Factors favoring rate control	Factors favoring rhythm control
Age >65	Young patients
Asymptomatic	Severe symptoms
Longstanding AF / Persistent	Short duration of symptoms Or Heart failure due to AF
Left atrial enlargement	Mild or moderate left atrial enlargement only

Q3. (6 marks) 4/6
HAS BLED score – 4 = 4% chance bleed in 100 pt years

HTN
Abnormal renal or liver function
Stroke history
Bleeding history
Labile INR
Elderly >65
Drug use – aspirin, NSAID, steroid

Passmark: 10/16 Adjust to ../10 please

Question 39

1a) 12 lead ECG with irregular narrow complex tachycardia, rate of about 135bpm

1b)

- lung pathology
- thyroid pathology
- hypertension
- cardiovascular (anything that increases LA volume: mitral valve disease, cardiomyopathies)
- electrolytes
- alcohol binge ('holiday heart')

2) Beta blocker/ calcium blocker / digoxin (as sole agent questionable)

Article Navigation

Therapy	Acute intravenous rate control	Long-term oral rate control	Side effect profile	Comments
Beta-blockers*				
Bisoprolol	Not available	1.25–20 mg once daily or split.	Most common reported adverse symptoms are lethargy, headache, peripheral oedema, upper respiratory tract symptoms, gastrointestinal upset and dizziness. Adverse effects include bradycardia, atrioventricular block and hypotension.	Bronchospasm is rare – in cases of asthma, recommend beta-1 selective agents (avoid carvedilol). Contra-indicated in acute cardiac failure and a history of severe bronchospasm.
Carvedilol	Not available	3.125–50 mg twice daily.		
Metoprolol	2.5–10 mg intravenous bolus (repeated as required).	100–300 mg total daily dose (according to preparation).		
Nebivolol	Not available	2.5–10 mg once daily or split.		
Esmolol	0.5 mg/kg intravenous bolus over 1 min; then 0.05–0.25 mg/kg/min.			
Calcium-channel blockers				
Diltiazem	15–25 mg intravenous bolus (repeated as required).	60 mg 3 times daily up to 360 mg total daily dose (120–360 mg once daily modified release).	Most common reported adverse symptoms are dizziness, malaise, lethargy, headache, hot flushes, gastrointestinal upset and oedema. Adverse effects include bradycardia, atrioventricular block and hypotension (prolonged hypotension possible with verapamil).	Use with caution in combination with beta-blockers. Reduce dose with hepatic impairment and start with smaller dose in renal impairment. Contra-indicated in LV failure with pulmonary congestion or LVEF <40%.
Verapamil	2.5–10 mg intravenous bolus (repeated as required).	40–120 mg 3 times daily (120–480 mg once daily modified release).		
Cardiac glycosides				
Digoxin	0.5 mg intravenous bolus (0.75–1.5 mg over 24 hours in	0.0625–0.25 mg daily dose	Most common reported adverse symptoms are gastrointestinal	High plasma levels associated with increased risk of death. Check

3) CHA2DS2-VASc score

(see below table from Quick reference guide: Atrial fibrillation Information for the health practitioner, government of WA August 2014)

Table 2: CHA₂DS₂-VASc, a more precise stroke risk calculator

Major Stroke Risk Factors	Clinically relevant non-major stroke risk factors	
Previous stroke, transient ischaemic attack (TIA), or systemic embolism	Heart failure	
Age $\geq$ 75 years	Moderate to severe LV systolic dysfunction (LV EF < 40%)	
	Hypertension and /or Diabetes mellitus	
	Female sex and/ or Age 65–74 years	
	Vascular disease	
Letter	Risk Factor	Score
C	<u>C</u> ongestive heart failure/ left ventricular dysfunction	1
H	<u>H</u> ypertension	1
A	<u>A</u> ge $\geq$ 75	2
D	<u>D</u> iabetes mellitus	1
S	Previous <u>S</u> troke/ TIA/ thromboembolism.	2
V	<u>V</u> ascular disease (eg. prior myocardial infarction, peripheral artery disease, or aortic plaque)	1
A	<u>A</u> ge 65–74	1
Sc	<u>S</u> ex category (i.e. female sex)	1
Note: maximum score is 9 since age may contribute 0, 1, or 2 points		9

Adapted from Camm, Kirchhoff et al, 2010³**Annual Stroke Risk Based on CHA₂DS₂-VASC scoring system⁴**

The expected stroke risk rate is:

- 0.0%/yr in those people with a CHA₂DS₂-VASC of 0
- 1.3%/yr with score of 1
- 2.2%/yr or higher with score of 2 or more

CHA₂DS₂-VASc score=1: Due to the lack of clinical trial evidence for preferred antithrombotic treatment in patients with a CHA₂DS₂-VASc score of 1, the 2014 ACC/AHA/HRS guidelines⁶ recommend that no antithrombotic therapy or treatment with an OAC or aspirin may be considered in these patients. Further, female patients who are aged <65 years with lone AF will have a CHA₂DS₂-VASc score of 1 by virtue of their gender. They are generally at low risk and the option of no antithrombotic therapy should be considered⁴.

Treatment recommendations should always be based on an informed discussion with the patient taking into account the likely net clinical benefit of antithrombotic treatment.

Question 40(17 marks)

A 75 year old man has been resuscitated following an out-of-hospital cardiac arrest. He has been taken to a small regional Emergency Department. He was intubated at scene. His past history is unknown but paramedics have brought a bag of his normal medications: frusemide, aldactone, digoxin and warfarin.

THE PATIENT'S ECG IS SHOWN IN THE PROPS BOOKLET, PAGE 7

- i. What are the 3 main findings in this ECG? (3 marks)

- Inferior STEMI
- Complete heart block
- Widespread anterolateral ST depression

- ii. List 3 potential causes of the dysrhythmia in this patient (3 marks)

- Ischaemia/STEMI
- Electrolyte abnormality – especially K
- Digoxin toxicity

- iii. A retrieval team has been dispatched by helicopter with an estimated flight time of 2 hours. For the safe transfer of this patient, list the minimum monitoring modalities required (5 marks)

- Pulse oximetry
- Capnography
- Ventilation failure/disconnect alarm
- ECG/cardiac monitoring
- Invasive BP

- iv. Complete the following table, listing 3 common issues with the helicopter transport environment and their potential effects on patient assessment/management (6 marks)

Issue	Effects
Altitude	Decrease partial pressure → hypoxaemia (effect on patient & staff/crew), gas expansion (may worsen e.g. PTx, intracranial air)
Noise	Can't auscultate, unable to hear equipment alarms, can't communicate with patient
Movement/Vibration	Motion sick doctor, patient emesis, clinical signs obscured (e.g. pulses, pneumothorax), monitor (e.g. sats, NIBP) dysfunction, loose equipment items become missiles

Temperature

Ambient light

Question 41

1.

STEMI preceding cardiac arrest

STEMI on post-ROSC ECG

New LBBB on post ROSC ECG

2.

widespread ST depression

ST Elevation in aVR

3.

Global ischaemia – likely secondary to prolonged arrest

(note: not consistent with LMCO given absence of cardiogenic shock)

4.

Subarachnoid haemorrhage (Fisher IV; WFNS V given GCS 3)

5.

Loss of grey-white differentiation

Tonsillar herniation

Obstructive Hydrocephalus

Loss of sulci - increased pressure/diffuse oedema

6.

Tube displacement – RMB intubation on CXR – relocate to appropriate location >3cm above carina

Inadequate sedation/dyssynchrony- patient triggered breaths – increase sedation +/- paralysis

Bronchospasm – wheeze, hyperinflation/incomplete expiration – bronchodilator Rx (salbutamol 5mg nebules)

Tube obstruction – no chest expansion, inability to bag, pass suction catheter- suction or change tube

Tension PTX – hyperinflated chest, difficult to bag, hypotension, distended neck veins – decompression and ICC insertion

Anaphylaxis – rash, swelling, wheeze – IM adrenaline 0.5mg, stop inciting agent

Neurogenic pulmonary oedema – diffuse crackles bilaterally/CXR with APO – increase PEEP and pressure limits

Question 42

A 74yo woman presents with lightheadedness, lethargy and palpitations.

Her vital signs are BP 100/60, HR 124/min, temp 37, SaO2 99% on room air.

She has a past medical history of type 2 diabetes, hypertension and has a pacemaker for heart block. Her pacemaker card indicates she has a DDD pacemaker.

Describe the DDD function of her pacemaker (2 marks)

- a. Dual (atrial and ventricular) chamber pacing. (0.5)
- b. Dual (atrial and ventricular) chamber sensing. (0.5)
- c. Dual response to sensing in that it will trigger or inhibit pacing depending on the underlying rhythm. (1)

Her ECG is enclosed.

Describe her ECG (2 marks)

- i. Broad complex tachycardia (HR 120/min) with a ventricular pacing spike before every complex. (1)
- ii. Absence of p wave before each ventricular pacing spike indicating that the pacemaker is not triggered by a native atrial rhythm. (1)
- iii. Absence of atrial spike before each ventricular pacing spike indicating that there is no atrial pacing. (1)

List 2 differential diagnoses (2 marks)

- i. Pacemaker mediated tachycardia (PMT). A re-entry tachycardia is created by the pacemaker forming an anterograde pathway and the AV node acting as a retrograde pathway. The retrograde p wave is sensed as native atrial activity and further ventricular pacing is propagated causing the inappropriate tachycardia. (1)
- ii. Sensor-induced tachycardia. The sensor may misfire from 'noise' such as vibrations, loud noises, hyperventilation, surgical electrocautery, etc. (1)
- iii. Lead displacement dysrhythmia. A dislodged pacemaker lead may be irritating the myocardium. (1)

List 4 management steps you would initiate for her (4 marks)

- a. Urgent cardiology referral and pacemaker interrogation. (1)
- b. Apply a magnet over the pacemaker which will inhibit sensing and activate asynchronous ventricular pacing at the preset demand rate. This will block the anterograde circuit and can terminate PMT. (1*)

- c. Vagal manoeuvre (carotid sinus, vasalva) can block AV conduction to terminate PMT. (1)
- d. Adenosine or verapamil can block AV conduction to terminate PMT. (1)
- e. CXR looking for fractured or displaced pacemaker leads. (1)
- f. EUCs looking for hyper/hypokalaemia, hypomagnesaemia. (1)

Question 43

A 74 year old female patient presents to your ED with central chest pain, dyspnoea and feeling lightheaded. This came on 1 hour ago whilst resting on the couch at home.

Her background history includes a pacemaker which was inserted for slow AF.

Her vital signs are:

GCS 15/15

BP 85/50

SpO2 94% RA

Her ECG is shown below:

I. State the key findings of her ECG and how they may be relevant to her presentation. (4 marks)

Paced rhythm at rate 130/min

Pacing spikes after every QRS

Retrograde P waves (Seen best in Leads 1, V1, V2, V5, V6)

Likely pacemaker mediated tachycardia causing rate related ischaemic symptoms

II. Outline your immediate management priorities for this patient in the ED. (6 marks)

Cardiac monitoring and defibrillation pads applied

Supplemental O2 to maintain SpO2 >94%

Fluid bolus 250mL N/saline aiming for MAP < 70

Analgesia – Fentanyl 25-50mcg IV for chest pain

Apply magnet to pacemaker

Discussion with Cardiology and interrogation of pacemaker.

III. What is the role of a magnet in managing pacemaker dysfunction? (2 marks)

When applied converts to asynchronous pacing which turns off the sensing mode of the pacemaker and allows the pacemaker to pace the atria & ventricles asynchronously.

Question 44 Answers

1.

Pacing spikes – ventricular pacing rate about 70 (1 mark)

Very broad QRS, almost sine wave (1 mark)

Tall/broad T waves (1 mark)

Consistent with *severe* (1 mark) hyperkalaemia in a paced pt (1 mark)

2.

Treat hyperK

- Ca gluconate 10% 20-30mL
- Insulin 10U actrapid / dextrose 50mL 50%
- Na HCO₃ - 100mmol
- Salbutamol nebs 5mg
- (resonium 30g)
- Diuretics frusemide (reasonable dose)
- Consider for dialysis if unable to achieve diuresis

Question 45 ANSWERS

Describe the main features of this 12 lead ECG (4 marks)

Tachycardia – rate ~260

Narrow complex

Regular R-R intervals

No clear sinus P waves

What is the likely diagnosis? (1 mark)

Supraventricular tachycardia

Describe the escalating management options for this child (4 marks)

Simple manoeuvres – e.g. ice pack on face

Adenosine 100mcg/kg IV

Repeat adenosine 200mcg/kg then 300mcg/kg

(Verapamil IV is an option, not <1yr, still controversial <5yrs)

DC cardioversion (under sedation): 1J/kg , then 2J/kg

Candidate Name: _____

Question 46 8/12

1.

Unheralded

Seated or supine

Exertional

Fam Hx of sudden cardiac death

Personal History of prior unexplained syncope

Congenital cardiac disease

2.

Heralded Syncope (lightheadedness, diaphoresis)

Inciting event (ie visual, pain, fear)

Post syncopal vagal symptoms – diaphoresis, nausea/vomiting

History of similar events

3.

ECG – suspected arrhythmogenic syncope

Chem20/ (or potassium) – suspected eating disorder

CXR – murmur or signs of cardiac failure

Hb/ FBE – History of menorrhagia/ signs of anaemia

Urine MCS – history of fever or dysuria or equivalent

CT Head – only if signs of trauma indicating possible TBI ie signs of BOS fracture complicating fall OR lateralising neurology/signs of raised ICP

Question 47

1

Atrial fibrillation

Rapid ventricular response

2

Metoprolol 25mg po or 2.5mg boluses up to 15mg IV – has normal BP, minimal/no CCF, no C/I such as asthma, aim for rate control

Ca channel blocker – eg IV verapamil 2.5mg boluses up to 15mg – for rate control, avoid in hypotension and current CCF, avoid if co-prescribed beta blocker

Digoxin 500mcg slow infusion – use for rate control when low BP or presence of CCF, slow onset action

Flecainide 2mg/kg oral / IV – for cardioversion – structurally normal heart when AF is less than 48hr onset

Amiodarone 5mg/kg slow IV – for cardioversion – when flecainide C/I and less than 48 hr onset AF

MgSO₄ – 10-20mmol slow IV – may aid in rate control, care with hypotension

Question 48

1.

Carditis

Sydenham's chorea

Erythema marginatum

Rheumatic nodules

Arthritis

2.

System not enough doctors, too busy for adequate supervision of junior staff,

Process no policy for senior discussion of each case, lack of education around rheumatic fever in indigenous population

Individual junior doctor / inexperienced, any sort of personal problem

QUESTION 49 (21 marks) – DOUBLE QUESTION

A 70 year old man presents with ischaemic-sounding chest pain on a background of longstanding, poorly controlled hypertension. His 12-hour troponin is normal.

THE PATIENT'S ECG IS SHOWN IN THE PROPS BOOKLET, PAGE 11

- i. List 4 abnormalities in this ECG (4 marks)

- Markedly increased LV voltages: huge precordial R and S waves that overlap with the adjacent leads
- LVH
- LV strain pattern with ST depression and T-wave inversions in I, aVL and V5-6
- ST elevation in V1-3
- Prominent U waves in V1-3
- Left axis deviation

- ii. List 5 causes of ST segment elevation other than myocardial ischaemia (5 marks)

- Pericarditis
- Benign early repolarization
- Left bundle branch block
- Left ventricular hypertrophy
- Ventricular aneurysm
- Brugada syndrome
- Ventricular paced rhythm
- Raised intracranial pressure

- iii. The patient is noted to have a systolic heart murmur. List 6 differential diagnoses of a systolic murmur (6 marks)

- Aortic stenosis
- Mitral valve prolapse
- Mitral regurgitation
- Pulmonary stenosis
- Tricuspid regurgitation
- VSD
- ASD
- HOCM

- iv. You suspect this patient has aortic stenosis. What are the physical signs that suggest severe aortic stenosis? (4 marks)

- Slow rising pulse
- S4
- Paradoxical splitting of the second heart sound
- Aortic thrill
- Length and harshness of murmur
- LVH – displaced apex beat
- LVF – a late sign

- v. Your registrar wants to commence a nitrate infusion for this man's angina. Outline your concerns about this plan (2 marks)

- In severe AS, vasodilators are (relatively) contraindicated – cardiac output is preload dependent (filling the thickened, stiff ventricle)

Question 50

1.

Acute STEMI

- Presence of ST elevation with reciprocal depression in I and aVL
- Q waves in V1 and V2
- STE III > II

- RWMA on echo would support STEMI

Acute pericarditis / myocarditis

- Widespread STE not conforming to one anatomical region
- Saddle shaped STE

- No RWMA, presence of pericardial effusion

Question 51

1.

Main Pathology:

Inferolateral STEMI

Supportive Findings:

STE in inferior leads (II, III, aVF with STE III>II suggestive of proximal RCA)

STE in lateral leads V4-6

Q wave in III

ST depression in I and aVL (reciprocal change)

2.

Main Complication:

Monomorphic VT

Supportive Features:

Wide complex tachycardia, regular, rate 200/min

Fusion beat

QRS concordance

AV dissociation

Will accept capture beat (2nd last one)

3.

Analgesia: titrated opiates (cautious GTN probably ok)

Aspirin 300mg

Other antiplatelet drug (clopidogrel or ticagrelor)

Heparin (any type, appropriate dose)

Cardiology referral for PCI

4.

Amiodarone 5mg/kg

Lignocaine 1-2mg/kg

Question 52 (14 marks)

You are working in a tertiary emergency department and have an ECG transmitted to you by the ambulance service. The patient is a 45 year old male who has had central chest pain for the last 20 minutes. The estimated time of arrival in your ED is 10 minutes.

A 12 LEAD ECG IS SHOWN IN THE PROPS BOOKLET, PAGE XX

- i. Describe and interpret the critical abnormalities on this ECG? (4 marks)

Hyper acute t wave antero-septal (de Winter)

Up sloping ST segment V3-V6

ST elevation I, aVL

ST depression III, aVF

➔ *Proximal LAD occlusion*

➔ *Treat as STEMI – lysis or urgent PCI*

- ii. What advice would you offer the paramedics who are transferring the patient? (4 marks)

O2 to maintain sats 92-96%

Aspirin 300mg oral

GTN buccal

Fentanyl/morphine if pain still not controlled

Transfer directly to cath lab (if available) full monitoring including defib pads in transit

- iii. The cath lab is unavailable for 2 hours and a decision is made to give a fibrinolytic. List two (2) fibrinolytic agents that could be used and provide a dosing regime for each (4 marks)

Alteplase: more than 65 kg: 15 mg intravenous bolus, followed by 50 mg by intravenous infusion over 30 minutes, then 35 mg over the next 60 minutes.

65 kg or less: 15 mg intravenous bolus, followed by 0.75 mg/kg by intravenous infusion over 30 minutes, then 0.5 mg/kg over the next 60 minutes

OR

Retaplast: 10 units intravenous bolus, repeat once after 30 minutes

OR

Tenectaplast:

less than 60 kg: 30 mg (6000 units) intravenous bolus

60 to 69 kg: 35 mg (7000 units) intravenous bolus

70 to 79 kg: 40 mg (8000 units) intravenous bolus

80 to 89 kg: 45 mg (9000 units) intravenous bolus

90 kg or more: 50 mg (10 000 units) intravenous bolus.

iv. Outline a suitable peri-fibrinolysis anti-coagulant regime (2 marks)

Unfractionated heparin 60 units/kg (up to 4000 units) intravenous loading dose, followed by 12 units/kg/hour (up to 1000 units/hour) by iIV infusion, adjusted according to APTT OR

Enoxaparin

< 75 years: 30mg loading dose then 1mg/kg SCI 12 hly (24 hly if CrCl low)

> 75 years: no loading dose, variable SCI dose/interval depending on CrCl

Candidate number _____

QUESTION 53 (19 marks)

A 47 year old male presents with epigastric pain for the past 45 minutes.

- i. Describe and interpret the ECG (4 marks)

A 12 LEAD ECG IS SHOWN IN THE PROPS BOOKLET, PAGE 5

- STE > 2mm in the inferior leads
- STE III>II
- ST depression V2, I, AVL
- Pathological q wave III
- Inferior STEMI with RV infarct
- RV infarction is associated with 40% of inferior STEMI's

- ii. Describe and justify your immediate pharmacological treatment (4 marks)

- Aspirin 300mg PO
- Analgesia – any sensible dose of morphine or fentanyl
- Other anti-platelet and anti-coagulant medications – any of clopidogrel, ticagrelor, heparin, enoxaparin in appropriate doses/regimens
- It is recommended that supplementary oxygen is only administered if there is evidence of hypoxia (Sats < 90% measured by pulse oximeter), aiming for oxygen saturations of 94-98% (Nikolaou 2015). Hyperoxia was associated with increase in infarct size. Physiological data suggests that hyperoxia leads to oxygen free radical generation and a reduction in coronary flow, and increased coronary vascular resistance, ultimately adding insult to the already infarcted myocardium (Farquhar 2009).

Candidate number _____

- RV infarcts are pre-load dependent, and administration of nitrates causes systemic venodilation and therefore a reduction in venous return. The subsequent reduction in preload, reduces cardiac output and BP, this could ultimately worsen the ischaemia.
- iii. His pain settles with aliquots of fentanyl but the ECG changes persist. You are 90 minutes away from a PCI centre. Describe and justify your reperfusion plan (3 marks)

- Thrombolyse
 - He needs thrombolysis. He presented within an hour of his symptoms, and therefore should undergo PCI within 60mins. As this is not achievable; recommendations advise he should receive thrombolysis, as long as there are no contraindications.
- iv. List 5 absolute contraindications to fibrinolysis (5 marks)

2013 ACCF/AHA Guideline for the Management of ST-Elevation Myocardial Infarction

Absolute contraindications

- Any prior ICH
- Known structural cerebral vascular lesion (eg, arteriovenous malformation)
- Known malignant intracranial neoplasm (primary or metastatic)
- Ischemic stroke within 3 mo
- Suspected aortic dissection
- Active bleeding or bleeding diathesis (excluding menses)
- Significant closed-head or facial trauma within 3 mo
- Intracranial or intraspinal surgery within 2 mo
- For streptokinase, prior treatment within the previous 6 mo

Relative contraindications

- History of chronic, severe, poorly controlled hypertension
- Significant hypertension on presentation (SBP >180 mm Hg or DBP >110 mm Hg)

Candidate number _____

- History of prior ischemic stroke >3 mo
- Dementia
- Known intracranial pathology not covered in absolute contraindications
- Traumatic or prolonged (>10 min) CPR
- Major surgery (<3 wk)
- Recent (within 2 to 4 wk) internal bleeding
- Noncompressible vascular punctures
- Pregnancy
- Active peptic ulcer
- Oral anticoagulant therapy

v. What constitutes failure of fibrinolysis, suggesting need for a rescue PCI (3 marks)

- Failure of ST elevation to reduce by (50% - 75%) at 90 minutes post lysis
- Persistent pain
- The absence of chest pain following thrombolytic therapy does not imply reperfusion; however persistent ischaemic chest pain indicates failure (de Belder 2001). Cardiogenic shock may occur because of the already infarcted myocardium.

Question 54

1.

(accelerated) Junctional rhythm, rate 75/min, axis normal

Pass 3 of 3

2.

Inferior STEMI – ST elevation II, III, aVF, reciprocal depression lateral leads (I, aVL)

Probable R sided involvement – STE III>II

ST depression V1 – V5 – reflects possible posterior involvement or else this too is reciprocal

Pass 2 of 3

3.

Fluid load – IV N/S 500mL, aiming for BP >90mmHg

Analgesia – IV morphine aliquots 2.5mg

Aspirin 300mg

Clopidogrel (or other) 300-600mg

Heparin bolus 4000-5000U

Urgent consultation with interventional cardiologist to arrange PCI for reperfusion

(Marking all or nothing ie must have step and dose correct (no ½ marks))

Pass 4 of 6

Total pass 9/12 corrects to **7.5/10**

Question 55

1.

Infero-lateral STEMI (1 mark)

- **ST elevation II, III, aVF also V5,6 (1 mark)**
- **Reciprocal depression aVL, V1 and V2 (1 mark)**
- STE III > II suggestive of RV MI (1 mark)

RBBB (1 mark)

- broad complex QRS with RSR in V1, normal axis (1 mark)

Q waves in anterior leads V1-3 (1 mark)

- suggestive of old anterior MI (1 mark)

Bold to score => 0;

2.

Aspirin 300mg po

Clopidogrel 300mg / ticagrelor 180mg

Heparin 4000-5000U depending on weight

IV opiate appropriate dose – titrated to pain

IV Tenecteplase – weight based dose if no C/I to thrombolysis

Acknowledgment of RV specific strategies

question 56

You are undertaking a locum shift in a regional emergency department. A 63-year-old male has presented reporting recurrent chest pains for the past week. The pain was initially intermittent, but became constant after eating dinner last night, roughly 12 hours ago. He has a history of gout, takes allopurinol and has no allergies. He has been placed in the resus bay and been connected to cardiac monitoring. His ECG is shown **in the props booklet**.

a) Please describe and interpret the ECG (**see image in props booklet**) (4 Marks)

- Inferior STE - marginal for meeting the criteria for STEMI
- ST depression in V2 and/or aVL may represent posterior or RV involvement
- 1mm STE in lateral leads indicates probable lateral involvement
- Q waves indicate evidence of infarct more than a few hours old OR acute infarction and previous old inferolateral MI
- Borderline upright T wave in V1 suggestive of ischaemia

b) List four (4) additional investigations that might clarify the extent of the patient's problem and explain how they may help to do so. (4 marks)

- Cardiac biomarkers Troponins +/- CKMB – pattern of elevation will indicate whether MI acute or recent
- Echocardiography – may show features of RV or posterior hypokinesis (as well as inferior)
- RV and posterior ECG leads – may indicate features of RV or posterior involvement.
- CXR – showing pulmonary congestion/pleural effusions suggests significant myocardial dysfunction

c) List four (4) medications (with routes of administration and doses) you will prioritise in your management of this patient. (4 Marks)

- Aspirin 300mg orally
- 2nd anti-platelet agent: Ticagrelor 180, Prasugrel 60mg or Clopidogrel 300mg orally

- Enoxaparin 1mg/kg SC BD or Unfractionated IV heparin 60-70 units/kg bolus and 12-15 units/kg/hour aiming for aPTT 1.5-2.5 x control. (Other reasonable doses are acceptable)
- Cautious GTN (either SL or infusion with appropriate doses) avoiding hypotension, titrated to reduce pain
- Titrated opioid analgesia (with reasonable doses), if other therapies fail or patient severely distressed by the pain.

References:

National Heart Foundation of Australia & Cardiac Society of Australia and New Zealand: Australian Clinical Guidelines for the Management of Acute Coronary Syndromes 2016

Question 57

Passmark = 12/16

- 1. List four major abnormalities on the ECG and state their significance in the table below. (8 marks)**

ECG abnormality	Significance
ST elevation lead III	Inf STEMI requiring urgent revascularisation
ST dep/Tw inv leads I, aVL	Reciprocal changes to inf STEMI
ST dep V2-V4	Suggests posterior STEMI
Complete heart block	Rhythm disturbance likely contributing to hypotension, likely caused by ischaemia of AV node – requires urgent management with Isoprenaline or pacing

- 2. List 8 measures in this patient's Emergency Department management. (8 marks)**

- Urgent call to Cath lab to arrange emergent PCI
- Aspirin 300mg PO
- Ticagrelor 180 mg PO (or Clopidogrel 600mg PO)
- Fentanyl 25-50 mcg IV cautiously titrated to pain (Fail if give GTN in setting of hypotension)
- Heparin 5000 units IV
- Bolus of 0.9% saline 500mLs IV to SBP >90 mmHg
- Trial of atropine 300-600 mcg IV to HR >60 bpm or Isoprenaline infusion
- Consider transcutaneous pacing until patient is in Cath lab

N.B Fail this part of the question (8 marks) if give GTN in setting of hypotension in an inferior STEMI.

Question 58 (11 /18)

1.

Infero-lateral STEMI

2.

ST elevation inferior (II, III, aVF) and lateral leads (V5 V6)

ST depression V1 – V3 posterior STEMI

Reciprocal depression I aVL

Sinus bradycardia ~55/min

STE III>II c/w RV infarction

3.

IV fluid bolus N/S 500mL to improve preload RV

Urgent cardiology referral for rescue angioplasty given failed reperfusion

Analgesia – IV morphine 2.5mg aliquots for pt comfort

4.

Consent / explanation

Place pads – AP or antero-lateral

Sedation / analgesia (reasonable agents / doses)

Set **demand** pacing rate 60-80, current enough to get capture

Ensure electrical and mechanical capture

Question 59

Q1

LBBB

Concordant ST elevation I,aVL,V4

Concordant ST depression inferior leads

Excessively discordant ST elevation V2,3

Q2

Acute MI with LBBB, meets Sgarbossa criteria/STEMI equivalent, for reperfusion

Q3

Pre-oxygenate sitting up

Add 15L O2 via NP to standard BVM (or use NIV to preox)

Reduce dose of induction agent

Use of adrenaline prior to induction (either infusion running or 50mcg dose or so with induction)

Bag pt through apnoea

(probably some others)

Question 60

1f Detail, in point form, your preparations for her

arrival. Answer:

(15 marks)

PREPARE AREA—RESUSCITATION AREA WITH FULL NON-INVASIVE MONITORING

PREPARE TEAM and ROLES (AT LEAST 2 doctors 2 nurses)—

- team leader (YOU)

- doctor for primary survey/access

- Nurse for monitoring/equipment/access

- Nurse for documentation

PREPARE EQUIPMENT—

- Defibrillator

- ACLS drugs

- Adenosine 6mg

PREPARE PLAN—

- If conscious then—

- Attach defib

- Gain access

- Primary survey

- Defib if unstable

- If SVT then Vagal then Drugs if stable

- If unconscious/no output then—

- CPR and advanced life support algorithm

2- On arrival the patient is normotensive, GCS 15/15 and complains of palpitations.

Her ECG is reproduced on the next page.

2- List 7 important features of this ECG:

(7 marks)

Answer:

Tachycardia rate 150–170

No P waves visible

Normal axis

Narrow complex QRS 80ms

QT interval > $\frac{1}{2}$ RR interval

Just/almost meets criteria for LVH largest praecordial R + S > 45mm

Lateral & inferior ST depression with variable ~1mm ST elevation aVR

3- List 5 differential diagnoses for the cardiac rhythm depicted:

(5 marks)

Atrial flutter

AV Node re-entrant tachycardia

Atrial tachycardia

Junctional tachycardia

AV re-entrant tachycardia

4- Attempts to cardiovert the patient's rhythm using vagal manoeuvres and appropriate doses of adenosine have been unsuccessful.

State another drug including route and dosing you will use to attempt cardioversion of this rhythm.

(3 marks)

Verapamil 1mg/min iv up to 15mg

Verapamil 5mg slow iv, repeat up to 15mg total if no effect >5 minutes later

Consider other agents (iv flecainide, beta blocker, amiodarone, digoxin) if really well

described, but verapamil is the only way to get 3 marks.

Question 61 (14 marks)

A 41 year old man presents with a brief syncopal episode. He has no significant past medical history, medications or allergies. On examination he is alert and cardio-respiratory exam is normal.

Vital signs	HR	96 bpm
	BP	135/80 mmHg
	RR	12 bpm
	SaO2 RA	96%
	Temp	36.5 deg C
	BSL	5 mmol/L

- i. Describe the most significant finding on this ECG and state the most concerning diagnosis given the clinical setting (2 marks)

A 12 LEAD ECG IS SHOWN IN THE PROPS BOOKLET, PAGE 9

- Brugada Syndrome
- ST elevation ≥ 2 mm followed by negative T wave in V1-2 or coved ST elevation > 2 mm in V1-2; in association with syncope, this is diagnostic of Brugada syndrome

- ii. List 4 differential diagnoses for this ECG pattern (4 marks)

- Atypical RBBB
- Myocardial ischaemia/infarction
- Benign Early Repolarisation
- PE
- Myo/pericarditis
- Athletes
- Pectus excavatum
- RV outflow obstruction or other RV abnormality

iii. List 4 relevant questions you would ask the patient (4 marks)

- Family history of sudden cardiac death < 45 years of age
- Triggers such as any fever? Drugs? eg Na ch blocker, CCB, BB, nitrates, alpha agonist, cocaine, alcohol
- Exertion related
- Nocturnal agonal respirations
- Others

iv. Outline the important components of his disposition, follow-up and ongoing management (4 marks)

- Admit for monitoring – explain concern for serious dysrhythmia
- Cardiology referral and regular follow up will be required; consideration for ICD
- Family screening is strongly recommended in first-degree relatives (autosomal dominant inherited disease); genetic counselling/testing if available (but low diagnostic yield)
- Avoid drugs/triggers eg as mentioned above

Question 62

A 64 year old man has been brought to your tertiary hospital Emergency Department with a history of syncope.

His observations are:

HR 110 /min

RR 28 /min

SaO₂ 93% RA

BP 105/70 mmHg

GCS 15/15

There are no arrhythmias, heart blocks or signs of Acute Coronary Syndrome on his ECG.

a) List five (5) ECG features that would suggest arrhythmia as a cause of his syncope. **(5 marks)**

- Epsilon waves- arrhythmogenic rt ventricle
- Prolonged QT- Torsades
- Short PR/delta waves- WPW
- RSR and ST elevation in v1/V2- Brugada
- Deep Q/T inversion- HOCM
- ECG features of severe hyper or hypokalaemia
- ECG features of severe Na channel blockade

The patient deteriorates and his observations are now:

HR 125 /min (sinus rhythm)

RR 32 /min

SaO₂ 93% RA

BP 70/50 mmHg

GCS 13/15

BGL 6.2 mmol/L

- b) Complete the following table for causes of non-arrhythmic cardiogenic shock and provide specific management for each. **(8 marks)**

Cause	Management
ACS	Revascularisation PTCA/+/- Thrombolysis depending on location CAGS
Papillary muscle rupture	Mechanical assistance devices/Inotropes/ Surgery
Tamponade	Drain
Takotsubo	Inotropes/ Levosimendan
Ventricle rupture	Mechanical assistance devices / ECMO/Surgery
B blocker/ca channel OD	High dose Insulin/dextrose
Na channel blocking agents	HCO ₃ / hyperventilation
Acute myocarditis	Supportive/ Mechanical assistance devices Steroids if immune mediated

- Pass mark 4+5= 9/13

Question 63

1.

Complete heart block (1 mark)

Broad complex QRS – ventricular escape [bigeminy] (1 mark)

Vent rate approx. 40/min (1 mark)

Atrial rate approx. 100/min (1 mark)

AV dissociation (1 mark)

2.

Aiming for BP>90 systolic, pulse >50/min (1 mark)

Trial atropine 1mg aliquots to 3mg (1 mark)

Electrical pacing (2 marks)

- Sedation midazolam 1mg aliquots until light sedation
- Pace 60/min

Chemical pacing – isoprenaline infusion / adrenaline infusion with appropriate doses (1 mark)

Correct reversible causes – eg hyperK, reperfusion if STEMI becomes apparent on return sinus rhythm (1 mark)

Fluid bolus acceptable 500ml N/S, repeat if needed depending on volume assessment (1 mark)

Question 64 – (13 marks)

Describe the main ECG findings of importance (4 marks)

Severe bradycardia, rate 20

AV dissociation / complete heart block

Broad complex escape – likely ventricular

Peaked T waves

What is the likely diagnosis? (1 mark)

Complete heart block with ventricular escape

What are 3 potentially reversible precipitants of this condition? Give examples where appropriate (3 marks)

Hyperkalaemia

Myocardial ischaemia / infarction

Drugs: Ca channel blockers / beta blockers / digoxin . . .

Outline your management of this patient (5 marks)

Seek and treat precipitant e.g. hyperkalaemia (calcium gluconate is reasonable empirically)

Medical Mx:

Atropine is likely to fail, so poor answer

Adrenaline 25-50mcg IV bolus' at bedside is reasonable

Isoprenaline / Adrenaline infusion with dose / rate is reasonable

Electrical Mx:

Transcutaneous Pacing with reasonable description / analgesia is reasonable

Disposition: Referral to Cardiology for Emergent Transvenous Pacemaker is essential

Candidate Name: _____

Question 65 (10/14)

1.
Complete heart block
AV nodal escape
2.
AV dissociation
Narrow complex QRS
P rate approx. 80, QRS rate approx. 35
3.
Hyperkalaemia
Cardiac ischaemia
Drugs eg beta-blockers
Cardiac fibrosis
Infiltrative diseases
4.
Explanation/consent
Pad position – AP or anterior apex/base
Sedation eg midazolam 1mg boluses
Select energy level – titrate to capture
Ensure electrical and mechanical capture

Question 66 (12 marks)

A 60-year-old man presents with a syncopal episode whilst at work. He is unable to describe any preceding symptoms and recalls upon waking up his colleagues standing around him. He is currently asymptomatic.

His ECG is shown in the Props Booklet (Figure 6)

a) List 4 abnormalities found on his ECG (4 marks)

Bradycardia at approximately 45bpm
Irregular rhythm/Sinus Arrhythmia
Left Axis Deviation/Left Anterior Fascicular Block
1 st degree AV block
Right bundle branch block
Bifascicular block

must state Bifascicular block OR both Right bundle branch block with Left Anterior Fascicular block to score any marks

After your initial assessment your patient deteriorates and becomes markedly bradycardic.

His formal vitals are:

GCS	13
HR	28 bpm
BP	70/40 mmHG
SaO ₂	88% on room air
RR	28breaths/min
Temperature	36.5 degrees Celsius

b) List 2 reversible causes of his bradycardia (2 marks)

Drugs; B-Blockers, Calcium Channel Blockers (not the dihydropyridines), digoxin, amiodarone, Clonidine, Organophosphates
Electrolytes; Potassium
Ischaemia
Myocarditis

Hypothyroidism

c) List 6 steps in management for this patient (6 marks)

Place patient on 15L O2 via non-rebreathing mask, aim SaO2 >94%
Atropine IV 600mcg every 3-5 minutes to max total dose of 3mg. Aim for HR > 60 and BP >90mmHg or MAP >65mmHg
2 nd line drug therapy either Adrenaline IV infusion (2-10mcg/min). Aiming for HR> 60 and BP >90mmHg or MAP >65mmHg OR Isoprenaline IV infusion (2-5mcg/min). Aiming for > 60 and BP >90mmHg or MAP >65mmHg
Correct underlying causes; optimise electrolytes K > 4 Mg >1
Specific toxicology therapy: B-Blockers/Calcium Channel blockers; high dose insulin, glucagon, Digoxin; Digibind
Ischaemia; PCI/Thrombolysis
Failure to respond to pharmacotherapy will require external cardiac pacing at 70bpm aiming for both electrical and mechanical capture at BP >90mmHg or MAP >65mmHg. Analgesia with pacing; fentanyl IV 25mcg aliquots q5 mins to comfort; Sedation with pacing; midazolam IV 1mg q5mins to comfort
Admission under cardiology for consideration of pacing wire/pacemaker

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Bradycardias
- Life In The Fast Lane, Bradycardia.
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<https://lifeinthefastlane.com/resources/bradycardia-ddx/>
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Guideline 11.9 Managing Acute Dysrhythmias

Question 67

1.

Long QT – risk of Torsades de Pointes

Q waves – evidence of previous MI with structural disease, risk of VT

“tri-fascicular block” / bifascicular block with 1st degree HB – risk of complete HB

Pre-excitation / delta waves – WPW syndrome

RBBB with ST elevation V1-3 – Brugada syndrome, risk VT/VF

Negative T waves V1-2, epsilon waves – ARVD – risk VT/VF

Broad QRS >120ms – risk of VT due to structural disease

(others may be acceptable but must correlate with stem – ie normal vital signs)

2.

CXR – SOB with focal examination findings eg crackles

FBC – any clinical finding suggests anaemia, but will not accept “baseline” or look for anaemia

Electrolytes – lots of possible answers but must be JUSTIFICATION

CT head – focal neurological abnormalities / head trauma from fall / headache / anti-coagulation

Question 68 16 marks)

A 17 year old male is brought your district ED by his nurse mother after feeling dizzy and unwell and appearing 'pale' on the football field. He was reluctant to attend as he felt 'fine'. Presenting blood pressure 115/60. Saturations 99% on room air. RR 14. Afebrile. Triage ECG performed.

- i. Describe and interpret his ECG (5 marks) **SEE PROPS BOOKLET – IMAGE G**

1 mark for -

- SR approx 50 bpm
- Leftward axis 1 positive 2 equiphasic 3 negative
- PR interval – ok if described short (borderline – 30% assoc. with WPW)

3 marks for–

- Q waves – dagger Q's V1-5 (with narrow complex QRS)
- LVH by voltage
- Diffuse ST/T changes with T wave inversion chest leads V2-5

Interpretation – 1 mark

- Highly suspicious for HCM (or HOCM)

- ii. List up to 5 questions you would like to ask on history, regarding symptoms (5 marks)

- Exertional – presyncope or syncope
- Lung symptoms – dyspnoea rest and exertional, PND, orthopnea. Etc
- Palpitations - atrial and vent. Dysrhythmia
- Chest pain - anginal
- Family hx - cardiac sudden death/known HCM
- (?prior Ix/Echo)

iii. List and justify up to 3 initial investigations you would like to perform (3 marks)

- Bedside serial ECG for dynamic changes
- Bloods troponin - ischaemia (+/_ serial)
- CXR cardiomegaly, pulmonary congestion
- Cardiac Echo ?hypertrophy ?dynamic outflow obstruction, wall motion abnormality etc
- Can have one of fbc.tft.bsl (something sensible) – alternative dx for symptoms

iv. Prior to any further investigation, he tells you he wants to discharge against your advice. List your management priorities now (3 marks)

- Counsel patient as to ddx and possible severity/ramification e.g. sudden death
- Mother/responsible guardian involvement as technically minor under 18 (but could give valid consent to treatment being over 16)
- ?capacity assessment - retain, understand etc.
- (Other colleague involvement early e.g. expedite cardio r/v/Echo if able)
- Documentation
- Something sensible!

QUESTION 69 (12 marks) - Contact Person - Dr Mee Ling

(i) 4 marks

Features Favouring Syncope:

- Rapid Neurological Recovery / no post ictal period
- No neurological symptoms
- Postural symptoms
- Pre-syncope symptoms
- An absence of seizure like movements

(ii) 8 marks

A. **MUST Say ECTOPIC PREGNANCY**

-positive FAST

B. Pericardial effusion +/- tamponade (autoimmune stuff can happen in the younger population)

-bedside echo showing fluid/RA diastolic collapse

C. Aortic dissection (marfans in young)

bedside echo showing intimal flap

Bedside abdo u/s showing aortic hematoma

CT aortogram, CXR

D. PE

-bedside echo, ecg, ABG, CTPA

E. anything else that the marker thinks is reasonable

Other answers (BOLD FOR ACCEPTABLE)

- Cardiac - **MI, Dissection, Pericardial Effusion, Arrhythmia** (Brady or Tachy)
- Respiratory - **PE**
- Abdominal - Ovarian Torsion, AAA (unlikely)
- Neurological (CVA, **SAH**, Seizure)
- Other - Vasovagal, **Vertebral Dissection**/insufficiency, carotid sinus

Question 70:

A 68-year old female presents to ED following a brief syncopal event at church. She is now asymptomatic.

i. List five (5) features on history that would suggest a specific cause of syncope (5 marks)

<u>Historical Feature</u>	<u>Diagnosis</u>
Orthostatic dizziness	? postural hypotension
Prolonged standing	? vasovagal
Preceding palpitations	? dysrhythmia
Pacemaker in situ	? pacemaker dysfunction
Antihypertensive therapy	? medication related
Diarrhoea, reduced oral intake	? dehydration / hypovolaemia
Melaena	? GI bleed
Chest pain / SOB / leg swelling	? PE

Any sensible answer – should include postural hypotension and medication-related syncope.

ii. List five (5) physical signs that you would examine for (2.5 marks)

- BP – lying and standing
- Heart rate - ? dysrhythmia, bradycardia ?increased on standing
- Volume status - ? dehydrated
- Pallor suggesting anaemia / blood loss

- **PR for melaena**
- **Presence of pacemaker**
- **SaO₂ – e.g. hypoxia in content of PE (unlikely if patient now asymptomatic)**

iii. List and justify five (5) investigations for this patient. (2.5 marks)

- **ECG – dysrhythmia, AV block, PPM dysfunction**
- **Blood sugar - ?hypoglycaemia**
- **Electrolytes / VBG - ?electrolyte dysfunction**
- **Urea & creatinine - ?evidence of dehydration**
- **Hb - ?anaemia, MCV - ?evidence of chronic blood loss (low MCV)**
- **Pacemaker check**
- **Holter monitor – could be arranged on discharge if concerns re dysrhythmia**
- **CT brain – if severe headache (e.g. ?SAH) or concerns that this was a seizure rather than syncope – unlikely given clinical stem.**

Question 71

Answers:

1. Describe the rhythm and give your differential diagnosis?
(3 marks) 2/3

Narrow complex regular rhythm at a rate of 85

Flutter waves seen in V1 and V2

Likely atrial flutter with 2:1 or 3:1 block

Ddx Sinus rhythm although can't see p waves

2. Describe 3 abnormalities on the ECG and explained how each may lead to syncope.
(6 marks) 4/6

- Long QT - $>1/2$ R-R interval – could have caused Torsades
- Evidence of HOCM – ‘dagger-like’ Q waves in aVL and Leftward axis
- Outflow tract obstruction or arrhythmia related to HOCM (this patient actually has HOCM)
- Atrial flutter
Could have caused syncope with 1:1 conduction and rapid ventricular response causing syncope

3. List the components of the San Francisco Syncope Rule and describe its utility.
(6 marks) 4/6

The five criteria used in the SFSR are:

C	Congestive Heart Failure
H	Haematocrit $<30\%$
E	Abnormal ECG
S	SOB
S	Triage SBP <90

If there is no other cause found for syncope in the ED workup and the patient has none of these 5 criteria, they are at low risk ($<2\%$) of an adverse outcome

Passmark: 10/15 Adjust to ../10 please

Question 72

(13 marks)

A 23 year old lady presents to your ED following an episode of 'feeling faint' with subsequent collapse and brief loss of conscious with spontaneous recovery. Her observations at triage are normal, she is afebrile and alert. An ECG is performed

A 12 LEAD ECG IS SHOWN IN THE PROPS BOOKLET, PAGE XXX

i. What is your ECG diagnosis? (2 marks)

Long QT (concerning for an arrhythmia syncope cause)

ii. Outline 5 questions on history that you would like to ask (5 marks)

- History of prior syncope or pre-syncope
- Syncope in the setting of inciting event such as exercise. Swimming, emotional event etc
- Hx of palpitations/chest pain
- Family hx of sudden death esp. age under 30
- Confirmed relative with congenital Long QT.
 - Personal or family hx of deafness (Jervell, Lang-Nielson)
 - Medication use/substance ingestion (e.g. Thiazides, Opiates, (Quinidine, Quinolone) Risperidone, Sotalol, Antihistamine, ant-Depressants TCA, Erythromycin (macrolides) SSRI)
 - Anything sensible affecting electrolytes (eating disorder, vomiting illness etc.)

iii. List and justify initial bedside ED investigations (5marks)

Bloods – including EUC, CMP, May do VBG (hypoK/Ca/Mg as cause) LFT renal/hepatic impairment as risks for long QT

- (TSH, BSL, BHCG) - alternative cause
- Serial ECG (?dynamic changes) and continuous monitoring (monitor for arrhythmia)
- Postural BP
- Consider bedside Echo ?alternate cause (PE, effusion, etc although clinically unlikely)

iv. What is your disposition plan for this lady? (1 mark)

Admit to monitored bed under cardiology

Question 73 7/11

1

Vasovagal

Situational syncope – micturition, defaecation, cough

Carotid sinus syncope

2

Drug related – vasodilators

Volume depletion of any cause

autonomic dysfunction eg DM

3

Bifascicular block

Pre-excitation (delta waves)

Prolonged or short QT

Brugada pattern – RBBB with ST elevation V1-3

Findings of ARVC – epsilon waves, negative T waves right precordial leads

Question 74 (14 marks)

What is the primary abnormality seen on the above ECG (1 mark)

- Prolonged QT interval
- QT interval > 0.6mS

List 5 pharmacological causes (each from a different class of drug) that may cause the above abnormality (5 marks)

Drugs Associated with QT Prolongation and TdP				
Antiarrhythmics	Antimicrobials	Antidepressants	Antipsychotics	Others
Amiodarone	Levofloxacin	Amitriptyline	Haloperidol	Cisapride
Sotalol	Ciprofloxacin	Desipramine	Droperidol	Sumatriptan
Quinidine	Gatifloxacin	Imipramine	Quetiapine	Zolmitriptan
Procainamide	Moxifloxacin	Doxepin	Thioridazine	Arsenic
Dofetilide	Clarithromycin	Fluoxetine	Ziprasidone	Dolasetron
Ibutilide	Erythromycin	Sertraline		Methadone
	Ketoconazole	Venlafaxine		
	Itraconazole			

List 3 non-pharmacological causes or risk factors for the above abnormality (3 marks)

- Age, Female gender
- Congenital QT prolongation
- Left ventricular failure
- Recent cardioversion
- Metabolic abnormalities
 - Hypomagnesemia
 - Hypokalemia
 - Hypocalcemia
- Hepatic dysfunction

What is the abnormality seen on the rhythm strip? (1 mark)

- Torasdes de pointes (polymorphic VT)

Discuss your management of this man (4 marks)

- Resuscitation with respect to ABC
- Correct abnormalities and administer electrolytes
 - Intravenous magnesium sulfate (appropriate dosages)
 - Treatment of hypokalemia – if any. (appropriate dosages)
- Consideration of acute cardiac pacing
- Monitoring

Question 14 (15 marks)

What is the minimal level of monitoring would you require, in order to conduct a safe procedural sedation? (3 marks)