Contents

Question 1

A 74 year old man is brought in from home by ambulance with a blood pressure of 75/40 mmHg. He is incoherent and delirious and can provide no further history. You perform a bedside ultrasound to assess the potential causes of shock.

Part a

List six (6) important diagnoses that you would seek on bedside ultrasound and state one (1) specific diagnostic ultrasound feature that would be consistent for each diagnosis and one specific treatment, with rationale, for each diagnosis.

Please note you cannot repeat the same ultrasound feature for two diagnoses.

Model Answer

Diagnosis **(6 marks)**	**US findings** **(6 marks)** ***Each finding can only be used once***	**Specific treatment with rationale** **(6 marks)**
Leaking/ruptured AAA	• Focal dilation of aorta (aneurysm) • Free intraperitoneal fluid; • Peri-aortic fluid /retroperitoneal fluid/haematoma • Small or normal IVC	• Hypotensive resuscitation with • blood/blood products • + urgent • EVAR/open surgical repair
Pericardial tamponade	• Pericardial effusion • Diastolic collapse of right ventricle (fairly specific); • Right atrial collapse (sensitive but less specific); • IVC dilation with loss of respiratory variation; • respiratory variation of mitral inflow velocity (sonographic version of pulsus paradoxicus)	Pericardiocentesis (often removal of small amount of fluid will improve haemodynamics) + O2/IV fluid With plan for Pericadial window/pericardotomy
PE	• right ventricular dilatation • Interventricular septa flattening; • McConnell's sign; • DVT (not as only feature) • Thrombus in right heart/thrombus in pulmonary trunk; • Hyperdynamic Left ventricle	Thrombolysis or thrombectomy Supportive care -O2/NIV/IV fluid +/-inotrope

Diagnosis **(6 marks)**	**US findings** **(6 marks)** ***Each finding can only be used once***	**Specific treatment with rationale** **(6 marks)**
	• tricuspid regurgitation and D-sign	
Cardiogenic shock	• Left ventricular dysfunction; • Prominent B lines on lung ultrasound in all fields (lung rockets) • Pleural effusion • Dilated IVC and/or IJV with absence of respiratory variability; dilated IJV	Depending on aetiology (Rate related/Valve Disorder/ischemic (eg.Right sided infarct/ STEMI/ NonSTEMI)/ Cardiomyopathy/Toxicologic Emergent Treatment: • ionotropes (dobutaine, milrinone) • pressures to achieve MAP>65 (NorAd superior to dopamine) • oxygenation support (most likely intubation) • optimize O^2 carrying capacity (Hb>10)

Tension pneumothorax

- No lung sliding;
- Dilated IVC and/or IJV;
- presence of a lung point or transition point
- bar code sign or lack of
- seashore sign on M mode;
- absence of normal comet tails/reverberation artefacts
- lung pulse" from cardiac vibrations transmitted to lung pleura in poorly aerated lung.
- stratosphere sign

Finger thoracostomy & large bore ICC + UWSD

Sepsis (only one source)

- Hyperdynamic left ventricle (early) or poor contractility (late or severe)
- Small or normal IVC;
- Potential source of sepsis (eg. Lung consolidation, features of appendicitis/ cholecystitis etc)

Crystalloid + Noradrenaline + BS antibiotic

AMI

- Regional wall motion abnormality
- Acute mitral regurgitation and/or papillary muscle rupture

Urgent reperfusion (PCI/lysis)

MI Rx- Aspirin/2nd antiplt agent/avoid GTN

Improve HR/BP

Hypovolemia

(with eg of cause)

- Small / Collapsible IVC or IJV;
- Hyperdynamic left ventricle;
- small LVEDA (<10cm2)

IV fluids + inotrope + Rx underlying cause

Thoracic aortic dissection

- Pericardial effusion;
- cardiac tamponade;
- Intimal flap;
- aortic root dilation;
- aortic regurgitation;
- Dilated IVC and/or IJV;
- regional wall motion abnormalities secondary to ostial occlusion by the intimal flap usually involving RCA

- Control HR and BP (aim for P 60-80 and

BP 100-120 SBP) eg IV beta blocker (propranolol, esmolol or labetalol) combined with vasodilators (e.g. GTN, labetalol, SNP)

start b-blocker first to avoid increased aortic wall stress from reflex tachycardia

- definitive Rx (type A – surgery; type B – medical Rx)

Trauma/haemorrhage

- Same findings as hypovolaemia (NB can't use same US as eg)

- Plus any trauma site specific findings eg Rib#/haemothorax Or free intraperitoneal fluid

Blood /MTP /TxA

Specific Rx if site specified

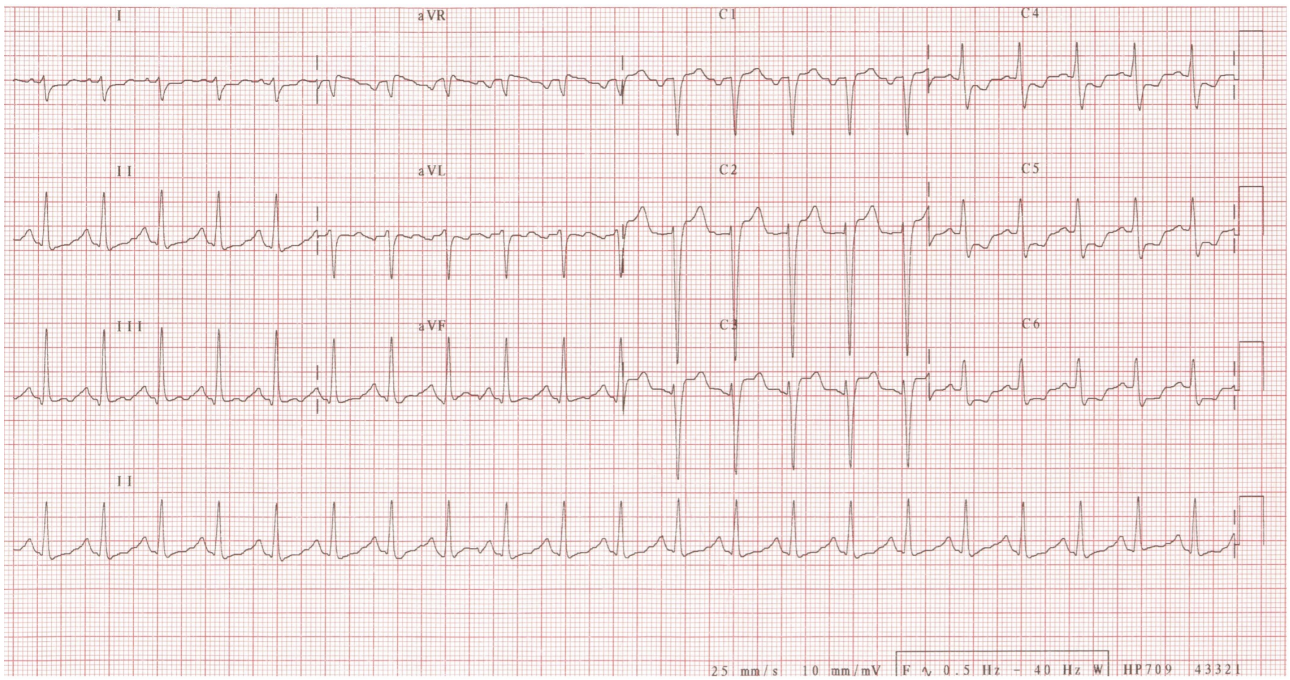
Eg ICC for haemothorax

IR or surgery if ruptured

kidney/spleen

Question 2

A 69 year old female presents to the Emergency Department with 12 hours of chest pain and shortness of breath. An ECG is taken on arrival:



Part a

List three (3) abnormal ECG findings.

Model Answer

1. ST elevation 3mm V2,3
2. ST depression V4-6 , I
3. Tachycardia rate 120

Part b

State a unifying diagnosis.

Model Answer

Anteroseptal STEMI

Part c

The patient is given appropriate initial treatment. While still in the Emergency Department she becomes hypotensive with a Blood Pressure of 70/40 mmHg.

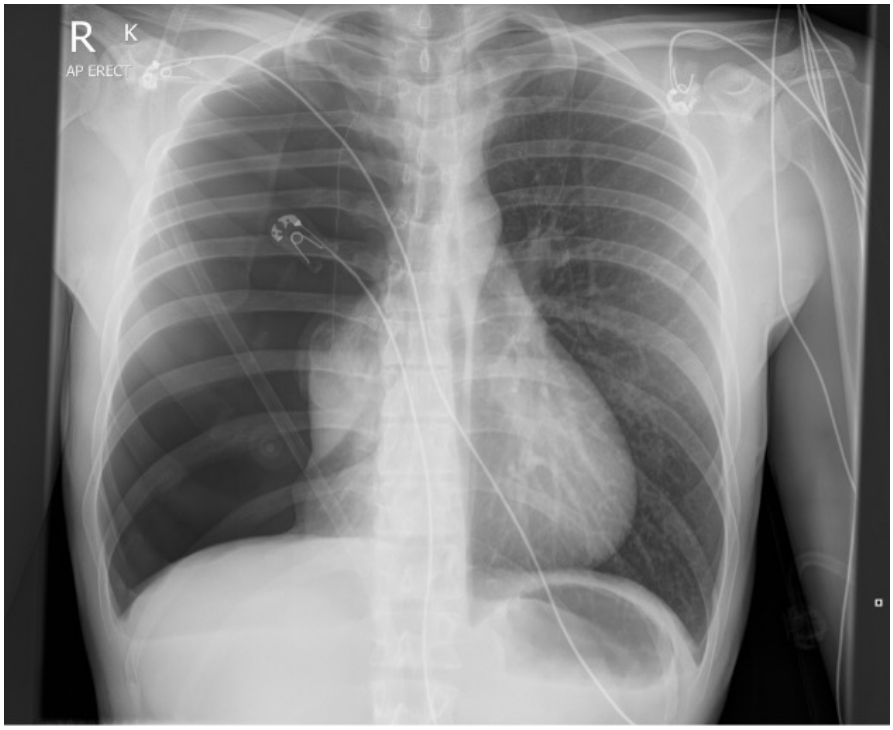
Complete the table by listing four (4) SPECIFIC complications of this patients condition that you would look for and for each list one (1) physical exam finding you would expect.

Model Answer

COMPLICATION	EXAM FINDING
Cardiogenic shock	Pulmonary oedema, POCUS B-lines
Septal rupture	New loud holosystolic murmur
Papillary muscle rupture (acute mitral regurgitation)	New systolic murmur
Arrythmia	Tachycardia, irregular Heart beat

Question 3

A 25 year old man presents to your Emergency Department complaining of pleuritic chest pain and shortness of breath. A chest-X-ray is obtained and shown below.



Part a

What is the diagnosis?

Model Answer

Large right-sided pneumothorax (must have side and estimate of size either descriptive or percentage > 70% for full mark)

(Case courtesy of Andrew Murphy, Radiopaedia.org, rID: 4649)

Part b

List four (4) abnormal findings seen in this CXR.

Model Answer

4 of the following:

- Shift to the left (“radiological tension” accepted)
- Flattened hemi-diaphragm right side
- Collapse involves all lobes
- Pneumomediastinum present
- Absence of lung markings
- Hemithorax radiolucent compared to the left

Part c

List seven (7) factors which may influence your choice of treatment.

Model Answer

Seven of the following:

- patient preference
- size of pneumothorax
- symptom duration
- Symptom severity
- Symptom progression
- Estimated degree of air leak
- Presence of haemothorax
- Primary versus secondary pneumothorax

Question 4

A 40 year old female patient presents to your Emergency Department with right upper quadrant pain. Despite normal laboratory tests, you still consider acute cholecystitis as the likely diagnosis.

You decide to perform a bedside ultrasound.

Part a

List four (4) positive findings to suggest Cholecystitis.

Model Answer

- stone (esp. if impacted), difficult if < 5 mm or in cystic duct
- GB wall thickness (> 3 mm)
- Pericholecystic fluid
- GB wall oedema (double line)
- sonographic Murphy sign

Part b

Please complete the table with two (2) reasons for false positive and false negative ultrasound findings that are **SPECIFIC** to cholecystitis.

Model Answer

False +ve	False -ve
Oedema state (CCF)	emphysematous cholecystitis
ascites	air in adjacent structures (e.g. duodenum)
local cancer	
non-fasting	

Part c

Ultrasound confirms cholecystitis and the patient is admitted to the ward for laparoscopic cholecystectomy.

List four (4) complications, specific to this procedure, that can potentially be a reason for the patient to re-present to the Emergency Department after surgical discharge.

Model Answer

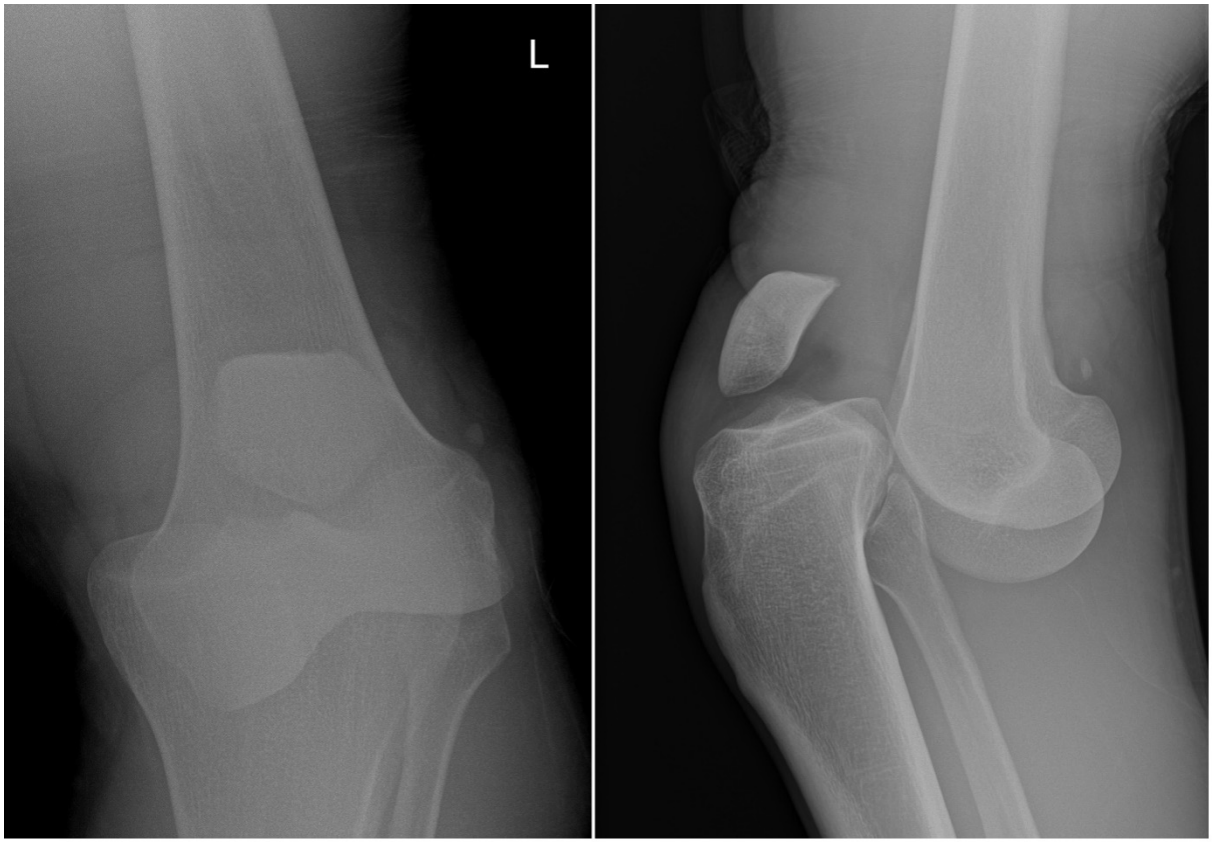
- injury to the biliary tract: (bile leak, biliary structure)
- outside biliary tract:: Bleeding (from liver, cystic artery,...) injury to stomach/ duodenum, ...
- Chronic Diarrhoea
- Pain: : Post cholecystectomy syndrome, normal Post operative pain
- Retained stone: Obstructed Jaundice, Infection
- laparoscopy site infection

Question 5

A 70 year old woman presents to your Emergency Dept. with knee pain after a fall from standing height. She has a past history of type 2 diabetes and obesity.

Part a

An x-ray of her knee is taken:



Please state your diagnosis.

Model Answer

Anterior knee dislocation - must state anterior

Part b

State five (5) steps in your initial treatment of her injury.

Model Answer

- Informed Consent for joint re-alignment
- Procedural Sedation/3 in 1 Fem. Nerve Block
- Joint re-alignment by longitudinal traction
- Immobilise in long leg posterior splint with knee in partial flexion (20o)
- Analgesia (femoral n. block or systemic)
- Orthopaedic consult for operative repair

Part c

List four (4) complications of this injury.

Model Answer

- Popliteal Artery injury
- Arthrofibrosis
- Joint instability/laxity
- Peroneal Nerve Injury (though mainly posterolat. dislocation)
- Compartment syndrome
- associated fracture or ligamentous injury
- DVT
- chronic pain

Part d

Other than a post reduction x-ray, list one (1) key investigation needed for this injury and provide the rationale.

Model Answer

Key Investigation	**Rationale**
• CT angiography	• assessment of common injury to popliteal vessel which requires emergent repair

Question 6

A 62 year old male is brought to your Emergency Department by ambulance with a presenting complaint of flaccid paralysis of all four of his limbs without a preceding history of trauma.

Vital signs are:

GCS	15/15
HR	84 bpm
BP	140/80 mmHg
RR	16/min
SaO2	94% on room air

You suspect he has suffered an acute spinal cord compression.

Part a

Complete the table below listing four (4) possible causes and one (1) risk factor for each that you would seek on history.

Model Answer

	Cause of Acute Cord Compression **(4 marks)**	**Risk Factor** **(4 marks)**
1	Metastatic	known hx of Ca (Lung, Prostate, Lymphoma)
2	Haematoma	Known coagulopathy (anticoagulant/antiplatelet medication) bleeding diathesis, liver failure
3	Acute Disc Herniation	Preceding myelopathy/radiculpathy Improvement when recumbent
4	Infection/Abscess	Fever, Immunosuppression (diabetes, chemotherapy, alcohol abuse IVDU
5	Rheumatoid Arthritis	known hx of this R.A
6	Osteoporosis	Previous crush #, long term use of corticosteroids, advanced age

Part b

Outline four (4) key steps you would take in managing this patient.

Model Answer

- spinal motion restriction (Cervical immobilisation, spinal precautions)
- monitor ventilation parameters
- urgent MRI
- inform spinal surgeon
- thorough documentation of neurological exam
- Corticosteroids/liaising with radiation oncologist
- Order path (coags, ESR, Blood culture)

Question 7

A 35 year old lady presents to your tertiary hospital emergency department with per vaginal bleeding. She is currently 32/40 gestation and G1P0. After taking a history and performing an examination, you suspect she has a placental abruption.

Part a

Apart from placental abruption, list four (4) other differential diagnoses that should be considered.

Model Answer

- placenta praevia
- vasa praevia
- premature rupture of membranes / preterm labour
- cervical lesions (polyps, ectropion, malignancy)
- vaginal lesions (malignancy, trauma including sexual assault, STI)

Part b

List four (4) risk factors for placental abruption.

Model Answer

- hypertension
- trauma
- smoking
- advanced maternal age
- drug and alcohol use (particularly cocaine)
- previous placental abruption
- previous caesarean section or other uterine surgery

Part c

The patient has increased PV bleeding and becomes hypotensive. Other than IV fluid resuscitation, outline 4 other steps in your immediate management for this patient.

Model Answer

1. resuscitate with blood: O negative followed by X-matched blood, consider MTP
2. reverse coagulopathy: FFP, cryoprecipitate, platelets
3. Steroids for foetal lung maturation: betamethasone 11.4mg IM OR dexamethasone 6mg IM
4. urgent obstetric consultation

** Will also accept - anti-D if patient is blood group negative*

Question 8

A 26 year old male was camping and fell asleep on the ground. On waking, he noted two small puncture marks to his ankle and was concerned about a possible snakebite. He had a pressure immobilisation bandage applied by his partner. On arrival to the ED, he has the following vital signs:

RR	16 bpm
Sa02	99% RA
HR	80 bpm
BP	130/70 mmHg
Temp	37.2

Part a

List four (4) signs on examination that would suggest he has been envenomed.

Model Answer

** Will accept any of the following. Would like specific symptoms, not just an overarching group.

Therefore, if writing “neurotoxicity” need to detail a couple of symptoms that you would look for to

get the marks

1. Early collapse/cardiac arrest
2. Non specific symptoms – headache, nausea, vomiting, abdominal pain
3. VICC – bleeding from bite site, venipuncture, gums, epistaxis, ICH
4. Neurotoxicity – ptosis, diplopia/ophthalmoplegia, respiratory or distal limb paralysis, seizures
5. Myotoxicity – local back pain, rhabdomyolysis, myoglobinuria

Part b

The patient has no signs on examination to suggest envenomation. List three (3) investigations you would perform at this stage.

Model Answer

1. FBE
2. UEC
3. CK
4. Coagulation profile
5. D-dimer

Part c

After the initial investigations, list two other specific timeframes when you would perform further tests for this patient.

Model Answer

**Will accept any two of the following (2 marks)

1. One hour post removal of pressure immobilization bandage
2. 6 hours post time of bite
3. 12 hours post time of bite

Part d

List three (3) criteria that would need to be met for this patient to be discharged.

Model Answer

**Need these specific three answers

1. Daylight hours – do not discharge overnight
2. No evidence of neurotoxicity at 12 hours post time of bite
3. Normal blood tests at 12 hours post time of bite

Question 9

A 40-year-old homeless man is brought to your Emergency Department with altered conscious state and vomiting. His medical history includes insulin-dependent diabetes mellitus.
His vital signs on arrival are:

HR	120 bpm
BP	85/55 mmHg
RR	26 breaths/minute
O_2 Sats	99 % (room air)
Temp	38.9 ^{0}C
GCS	10/15 (E2V3M5)

As part of his resuscitation in the Emergency Department, an Arterial Blood Gas and Urea & Electrolytes are performed. The results are as follows:

ARTERIAL BLOOD GAS
(room air)

		Reference Range
pH	7.31	7.35 - 7.45
pO_2	70 mmHg	75 - 100
pCO_2	56 mmHg	35 - 45
O_2 Sats	90 %	95 - 100
Bicarb	16 mmol/L	22.0 - 30.0
BE	-5	-3 - +3

BIOCHEMISTRY

		Reference Range
Na^+	148 mmol/L	135 - 145
K^+	3.0 mmol/L	3.5 - 4.5
Cl^-	112 mmol/L	95 - 110
Glucose	35 mmol/L	3.6 - 7.7
Urea	19 mmol/L	3.0 - 11.0
Creatinine	150 µmol/L	<90
Lactate	3.0 mmol/L	0.2 - 1.8
Ketones	<0.1 mmol/L	<0.1

Part a

Complete the following table with regard to the acid/base abnormalities demonstrated above.

Model Answer

Acid/Base Abnormality	Likely Cause
1. RAGMA	1. Lactate (hypotension)
	2.Lactate (sepsis)
	3.Lactate (other: ischaemia, toxins)
2. Respiratory Acidosis (T2RF)	1.Central (obtundation)
	2.LRTI
	3.Other: aspiration, PE, toxins (opiates, EtOH)

Part b

State two (2) calculations you would apply to these pathology results to assist in your assessment and management.

Model Answer

1. **Corrected sodium: Measured Na^+ + ([Glucose – 5]/3)**
2. Osmolarity: [2 x Na^+] + Glucose + Urea
3. Anion Gap: Na + K - Cl
4. Delta ratio [AG – 12]/[24 – Bicarb]
5. Strong Ion Difference $Na^+ + K^+ - Cl^-$

Part c

List three (3) other abnormalities demonstrated in these pathology results.

Model Answer

1. Hypoxia
2. Severe hyperglycaemia
3. Hyperlactataemia
4. Mild hypokalaemia
5. Renal impairment (likely pre-renal)
6. Hyperchloremia

Part d

Outline the principles of your fluid management strategy in this patient. State four (4) points in your answer.

Model Answer

1. Initial resuscitation: boluses 500ml-1L 0.9% saline IV to aim SBP >90mmHg (or equivalent)
2. Ongoing fluid management: aim fluid replacement over 48-72 hours
3. Na^+ replacement: 1-2mmol/L, no more than 10-12 mmol/24 hours

Part e

There is no clear focal source of sepsis in this patient.

List three (3) antibiotic choices in this patient

Model Answer

1. Gentamicin
2. Flucloxacillin
3. Vancomycin

Question 10

Your junior doctor is caring for an elderly female patient who has sustained a fractured neck of femur following a fall at home.

The patient is 60kg, and currently has the following vital signs:

Temp	36.7 C
HR	88 bpm
BP	155/76 mmHg
Sats	96% on air
GCS	15

You have recommended a fascia iliaca compartment block for analgesia.

Part a

State three (3) contraindications to a fascia iliaca compartment block.

Model Answer

Anaphylaxis to local anaesthetic

Injection site infection or lesion

Anticoagulation/bleeding diatheses

Bradyarrhythmia (2^{nd} or 3^{rd} degree AV block)

Femoral bypass/graft near injection site

Patient refusal

Part b

List the nerves blocked by this procedure.

Model Answer

Femoral nerve

Obturator nerve

Lateral cutaneous nerve of the thigh (Lateral femoral cutaneous nerve acceptable)

Part c

Give the local anaesthetic and dose you would recommend.

Model Answer

Ropivacaine 0.5% plain 30-40ml (Other dilutions accepted- max 3mg/kg)

NB Bupivacaine not accepted as too cardiotoxic. Lignocaine not accepted as too short acting.

Part d

State three (3) symptoms or signs that portend systemic toxicity from the local anaesthetic.

Model Answer

Metallic teste, perioral numbness/tingling, tinnitus, dizziness/light-headedness, agitation, confusion, muscle twitching, loquaciousness, nystagmus, diplopia

Part e

State five (5) life threatening complications from systemic local anaesthetic toxicity.

Model Answer

Seizure,

coma,

respiratory depression/arrest,

bradycardia & malignant tachyarrhythmia,

cardiovascular collapse/hypotension,

methaemaglobinaemia

Part f

State your rescue therapy (drug and dose) for life threatening local anaesthetic toxicity resistant to standard resuscitation efforts.

Model Answer

Intralipid 20% 1.5ml/kg bolus. Repeat every 3 minutes followed by infusion.

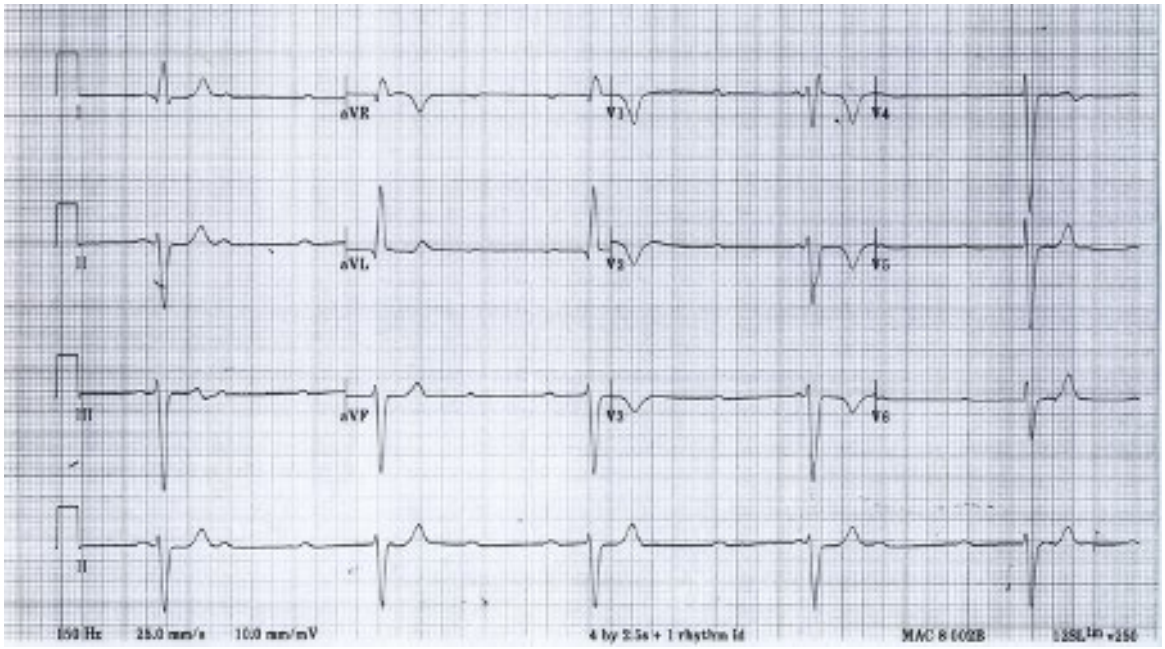
Question 11

A 72 year old man presents following a brief syncopal episode at home. He has a history of hypertension and diabetes. He is placed in a resuscitation cubicle with IV access and all monitoring applied.

His vital signs are:

BP	80/50 mmHg
RR	18/min
Temp	37 deg C
Sats	98% room air
GCS	15

An ECG is performed on arrival.



Part a

What are the two (2) MOST LIKELY underlying causes of this ECG abnormality?

Model Answer

Ischaemic heart disease

Medication (beta-blocker or CCB)

Part b

He does not respond to appropriate medications. A venous blood gas demonstrates normal electrolytes.

What is your next line of treatment for this patient?

Model Answer

transcutaneous pacing

Part c

State five (5) key steps you would take to initiate this treatment.

Model Answer

Consent/explanation

Analgesia and/or sedation

Apply pads ant-post position

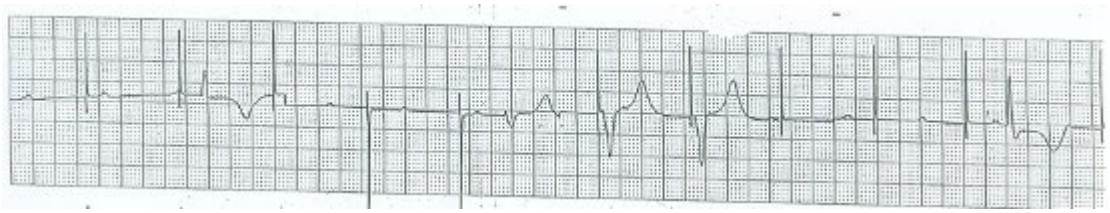
Set rate and energy level

Confirm electrical capture on monitor

Confirm mechanical capture by presence of pulse and signs improved cardiac output

Part d

Following initiation of your treatment, this is his rhythm strip. State four (4) actions you would take in response. (4 marks)



Model Answer

Confirm all wires/cables connected

Optimise pad placement

Increase energy level to achieve electrical capture

If no improvement, contact cardiology for urgent transvenous pacing wire insertion

Question 12

A 26 y.o lady has been referred to your Emergency Department by her child and maternal health nurse who is concerned about perinatal depression. She has a one month old baby and has been reluctant to get out of bed. She complains of recurrent abdominal pain. She has a background of having emigrated to Australia three years ago with her husband and his family, after an arranged marriage. She speaks minimal English.

Part a

List five (5) factors on history that you would seek in your **risk assessment** of this patient.

Model Answer

Answer: any 5

- Personal past history of depression of psychosis
- family history of any mental health disorder
- history of a chronic physical health problems/injuries
- quality of interpersonal relationships
- poor living conditions and social isolation
- any history of domestic violence or sexual abuse
- uncertain or challenging employment and immigration status.
- belonging to an at-risk cultural/racial group

Part b

List three (3) features in your assessment that would make you concerned for post-partum psychosis.

Model Answer

Answers : any 3 combination of following

- Disorganization/Confusion
- Depersonalization
- Abnormal thought content (delusions and/or hallucinations)
- Abnormal mood (mania or agitation; depression; mixed)

Part c

After further history taking you are concerned there may be a risk of self-harm or harm to the baby.

Outline four (4) points of management that are **specific** for **this patient**.

Model Answer

Use of independent interpreter services for all discussions.

Investigate and treat underlying cause of abdominal pain with provision of analgesia.

Urgent referral to Specialist Mental health unit for either close outpatient management or admission with psychosocial supports and drug therapy as needed.

Arrange review and follow-up of baby with involvement of paediatric team and notification to DHHS.

Question 13

A 26 year old woman has presented with one day history of headache and abdominal pain. She is confused with a GCS of 14.

A non-contrast CT Brain has been obtained.

Part a

List four (4) abnormal findings demonstrated on this CT scan.

Model Answer

Hydrocephalus (or dilated ventricles)

Compression of the sulci (or evidence of raised pressure)

Tip of a ventricular shunt in position

Shunt reservoir

Part b

List two (2) possible causes SPECIFIC to this patient for her presentation today.

Model Answer

Meningitis secondary to peritonitis

Shunt malfunction

Some others may be accepted

Part c

What other imaging should be ordered for this patient?

Model Answer

CT Abdomen or CT Chest depending upon the shunt type.

shunt series 1/2 mark

Part d

List two (2) abnormalities that you would look for in this subsequent imaging.

Model Answer

Shunt malposition

Broken shunt

Septic focus

Part e

Approximately how much effective radiation exposure has the patient received from her CT brain?

Model Answer

Approximately 2mS or the equivalent of one year of background radiation

Question 14

An 11 year old girl presents to your rural emergency department after a car accident. An Xray of the left femur is shown.

Part a

List one (1) important abnormality on the Xray.

Model Answer

Comminuted fracture of midshaft of femur left

Part b

List two (2) immediate concerns relevant to this injury.

Model Answer

High risk of neurovascular injury - pudendal N (10%) femoral N rare

compartment syndrome

Associated with a high mechanism injury

Haemorrhage

Part c

List two (2) long term complication associated with this injury?

Model Answer

Leg length discrepancy

Malunion

Osteonecrosis

Muscle weakness

Part d

You are to provide a medical escort for her transfer to your local paediatric trauma centre 45 minutes away.

List three (3) specific modalities to provide analgesia for the transfer?

Model Answer

Thomas splint or backslab

Femoral nerve block

Opioid analgesia IV

Part e

Her vital signs are as follows:

HR	140
BP	85/50
RR	25
T	36

Describe her haemodynamic state.

Model Answer

Haemorrhagic shock- must be specific

Part f

Initial resuscitation is carried out and it is decided to prepare for transfer.

List four (4) steps you will take to prepare for an uncomplicated transfer.

Model Answer

Carry Blood for the journey

Evaluate for other injuries

Communicate with receiving hospital to Organise a RAPID transfer

Medications

Notes/imaging

Question 15

ACEM's quality framework has 5 domains which are considered to encompass the priorities of each Emergency Department.

Part a

From the domain "Clinical Profile", list five (5) audits which should be undertaken by Emergency Departments.

Model Answer

Regular clinical audits (examples):

• high volume or high risk clinical conditions

• documentation standards

• clinical guideline compliance/variance

• consultant sign-off for high risk patients

• time to critical interventions

• time to analgesia • triage • clinical handover

•written discharge instructions

• unplanned returns to emergency department

(c) Audit of procedural complications

(d) Audit of medical imaging (examples • appropriateness • turnaround time • results checking

(e) Audit of pathology (examples): • appropriateness • turnaround time • results checking

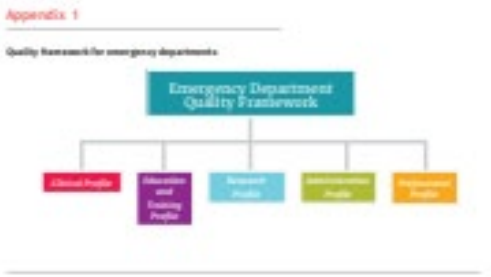
(f) Audit of medication errors

(g) Regular mortality and morbidity meetings

Part b

Complete the following table listing three (3) other Domains of Quality recommended by ACEM and for each domain, give one (1) example of ED work that would fall in that domain.

Model Answer



Part c

State one (1) role of this quality framework.

Model Answer

The Quality Standards for Australian Emergency Departments and other Hospital-Based Emergency Care Services aim to provide guidance and set expectations for the provision of equitable, safe and high quality emergency care in Australian EDs and other hospitalbased emergency care services.

The Standards:

- encourage a proactive focus on quality and safety
- provide defined processes to continuously review and improve quality of care
- illustrate the optimal requirements for running a high quality emergency care service
- offer aspirational criteria for EDs and other hospital-based emergency care services to work towards achieving, thus strengthening the quality improvement culture within emergency departments.

Question 16

A 50 year old woman is referred to the emergency department by her general practitioner with unintended loss of weight and a serum calcium level of 3.9 mmol/L.

Part a

Aside from spurious and malignancy-related causes, name three (3) other causes of hypercalcaemia.

Model Answer

Hyperparathyroidism (primary or tertiary)

Adrenal insufficiency

Thyrotoxicosis (usu mild)

Drugs (eg thiazides – usu mild)

Granulomatous diseases (eg sarcoidosis, TB)

Milk-alkali syndrome

Hypervitaminosis (A or D)

Immobility

Part b

Complete the table below listing three body systems (NOT cardiovascular) that may be affected by this patient's calcium level. For each system list one (1) clinical feature that may be found on history or examination.

Model Answer

Gastrointestinal nausea/vomiting, anorexia, constipation, abdominal pain

Neurological hypotonia, lethargy, confusion, (coma)

Musculoskeletal muscle weakness, bone pain

Renal polyuria, stones-related symptoms

Part c

List two (2) ECG changes that may occur in hypercalcaemia.

Model Answer

QT shortening

Osborn waves

ST elevation

VT/VF

Part d

List four (4) treatment options for this patient in the emergency department, with a brief description of how each treatment lowers serum calcium.

Model Answer

Saline IV fluids Promotes diuresis / renal excretion of Ca2+

Loop diuretics (after rehydration) Decrease resorption of Ca2+ at loop of Henle

Bisphosphonates Inhibits osteoclasts, promotes osteoblasts

Calcitonin Inhibits osteoclastic activity

Corticosteroids* Inhibits vit D effects, inhibits osteoclasts

* in vit D toxicity, haematological malignancy, granulomatous diseases only

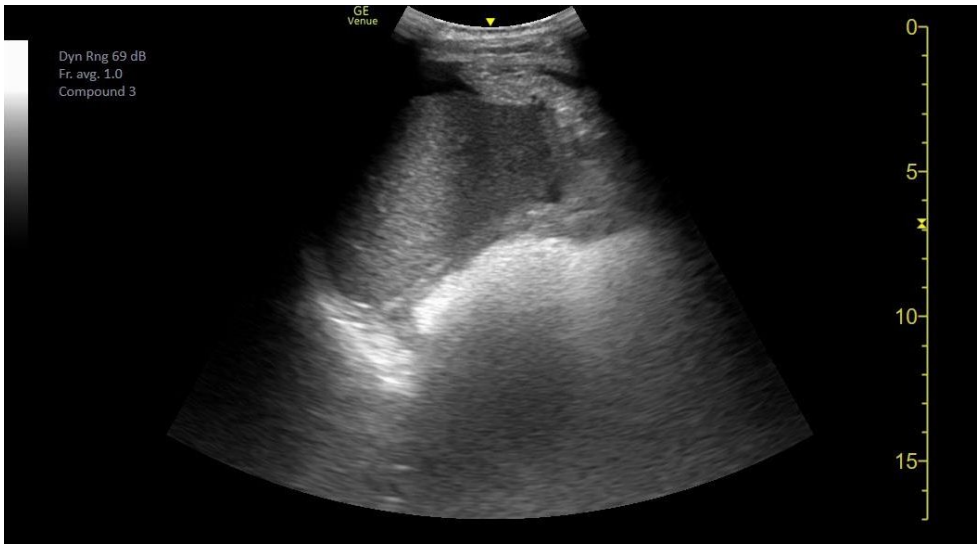
Question 17

A 25 yo male is brought into ED following a high speed MVA. He was wearing a seat belt and has no apparent head or neck injuries.

Vital signs are:

BP	130/85
HR	115 reg
Oxygen Saturation	95% RA
Temperature	37.0
GCS	15

Your junior registrar indicates that there is no intrabdominal pathology based on the FAST scan they have just performed. You review one of their images, see below:



Part a

List two (2) adjustments you would make to optimise the image.

Model Answer

decrease gain

decrease depth

Part b

List three (3) reasons for a false negative RUQ scan in the setting of a patient with abdominal trauma.

Model Answer

pelvic / encapsulated /retroperitoneal

small volume ie < 100 ml

operator ability

patient bowel gas

patient obesity

Part c

State two (2) issues you would raise with the junior registrar regarding the ultrasound following the resuscitation?

Model Answer

No Model Answer

Part d

List three (3) strategies for reducing transmission of infection when using an ultrasound machine

Model Answer

No Model Answer

Question 18

A 7 year old boy is brought into your Emergency Department having a generalised tonic clonic seizure that started 15 minutes ago. No medications have been given. He has had no previous seizures and has no significant past medical history. He was well before the seizure started. The patient's weight is 25kg.

Part a

PRESCRIBE, in the order you would give them, three (3) DIFFERENT medications you would use to terminate the seizure

Model Answer

Note: PRESCRIBE indicates that route and dose must be stated

Midazolam IM or IV 0.1mg/kg (or buccal 0.3mg/kg) and repeat dose in 5 mins

Levetiracetam 40mg/kg over 5 mins (20mg/kg would be acceptable too)

Phenytoin 20mg/kg over 20mins

Phenobarbitone 20mg/kg over 20 mins

Part b

Despite the above measures he continues to seize. You decide to intubate and ventilate him. List four (4) drugs you would prepare prior to intubation and give a justification for each.

Model Answer

Ketamine- safe induction agent in ED, familiarity, maintains BP etc (other agents eg

thiopentone, propofol would be accepted if justified)

Sux or roc- short acting paralysis

Adrenaline- in case of hypotension

Morphine/ midaz infusions- ongoing sedation for on ventilator

Vecuronium (or similar)- ongoing paralysis once intubated for transfer

Part c

Five minutes after intubation, the patient's oxygen saturations drop to 88%. List four (4) adjustments you could make to the VENTILATOR SETTINGS to improve oxygenation?

Model Answer

Increase FiO2

Increase IT

Increase PEEP

Increase PIP

Note Disconnect from ventilator and handbag and Check for DOPES are not adjustments to the ventilator settings and are not accepted answers here.

Question 19

A 37 year old female presents to the ED four hours after ingesting 100 ferro-gradumet (ferrous sulphate 325mg) tablets.

Part a

List two (2) local and two (2) systemic features of iron toxicity.

Model Answer

Bold answers mandatory

LOCAL:

Vomiting, diarrhoea, abdo pain

GI hameorrhage -> Haematemesis, PR bleeding

SYSTEMIC:

HAGMA / Lactic acidosis

Shock

Acute renal failure

Acute liver failure: jaundice, coagulopathy, coma

Part b

List four (4) investigations you would perform on presentation and one justification for each.

Model Answer

Vbg – looking for raised anion gap or lactic acidosis

Serum iron – will inform need for chelation

Blood group and antibody screen – in anticipation of GI haemorrhage

AXR – radio-opaque tablets - may confirm ingestion and monitor decontamination

LFTs - hepatotoxicity

Glucose – hypoglycaemia seen in significant ingestions

FBE – monitor Hb. WBC may be non-specifically elevated in significant Fe poisoning

Part c

List two (2) contraindications for whole bowel irrigation.

Model Answer

signs of bowel obstruction

GI haemorrhage

Unable to control vomiting

Part d

List two (2) indications for the administration of desferrioxamine.

Model Answer

peak serum iron >90 micromol/l (5mg/L)

significant systemic toxicity (HAGMA, shock, GI haemorrhage, altered mental status)

Part e

State the mechanism of action of desferrioxamine.

Model Answer

Chelates Fe+++ -> **Binds** free iron,

Makes a water soluble **inert** chelate that is **excreted in the urine**

Part f

List four (4) criteria that must be met for safe discharge home from ED.

Model Answer

Clinically well 6 hours after ingestion for IR or 12 hours after ingestion for XR iron preparation.

Peak serum iron concentration is less than 90 micromol/L (5 mg/L),

No evidence of metabolic acidosis

Mental health risk assessment undertaken

Question 20

A 3 month old boy is brought to the ED with his mother. She gives a history of him rolling off the change table, landing on the side of his chest. He has been crying since the fall.

A CXR is shown below:

Part a

State one (1) significant finding on this chest x-ray and the most likely diagnosis.

Model Answer

Finding:

Multiple healing rib fractures (must be identified to get at least 1 mark)

Dx:

NAI

Part b

List five (5) physical examination findings you will specifically assess for and one justification for each.

Model Answer

Length, weight, nutritional status

Evidence of neglect

Conscious state / neurological status

Intracranial haemorrhage / head injury

Abdominal pain / tenderness

Intra-abdominal injury

Limb pain, tenderness, reduced range of motion

Fractures

Signs of bruising / bleeding

Coagulopathy vs additional injuries

Genitalia

Evidence of sexual abuse (rare!)

Development (social interaction, vision, head control)

Emotional abuse / neglect / head injuries

Obvious injuries (scars, burns, lacerations, bite marks, traumatic alopecia)

Other evidence of physical abuse

Question 21

A 76 year old man has been bought to the ED from nursing home with increasing confusion and agitation. He has assaulted another resident.

Part a

List two (2) medications and the dose range you would consider for managing his agitation in ED and list two (2) potential adverse effects for each drug.

Model Answer

- IV Midazolam 1-2mg. Respiratory depression, hypotension
- IV Droperidol 2.5mg /Haloperidol 1-2mg. Extra pyrimidial symptoms, hypotension, prolonged QT
- IVOlanzapine 2.5mg Orthostatic hypotension, extra pyrimidial symptoms
- Po Rispiridone 1-2mg Orthostatic hypotension, extra pyrimidial symptoms

Part b

List three (3) elements of the history that may help to distinguish delirium from dementia.

Model Answer

Any of:

Acute onset

Fluctuating conscious state

History of fever or infective symptoms

Recent medication change

Recent head trauma

Part c

The patients biochemistry is shown below:

		Reference Range
Na	112 mmol/L	(135-145)
K	4.0 mmol/L	(3.5-5.2)
Cl	79 mmol/L	(95-110)
Bic	21 mmol/L	(22-32)
Urea	3.1 mmol/L	(2.8-7.2)
Crea	61 umol/L	(45-90)
eGRF	80 ml/min	>90)
BSL	6.3 mmol/L	(3 – 7.7)

List three (3) investigations that would help determine the cause of the electrolyte imbalance above.

Model Answer

Plasma osmolality- determine if pseudo or real - should be hypo-osmolar if real

Urine Na

Urine osmolalaity

Urine urea/ creatinine concentration

Question 22

A previously healthy, not sexually active 14 year old girl was referred by her GP, with a 2 day history of right iliac fossa pain for evaluation of suspected appendicitis. She has had no vomiting but has had one episode of diarrhea.

Her vital signs on arrival:

Temp	37.5 °C
HR	64 bpm
BP	116/70 mmHg

She is tender in the right lower quadrant of her abdomen with no guarding or rebound.

Part a

List four (4) differential diagnoses apart from acute appendicitis.

Model Answer

UTI, renal stone, ruptured ovarian cyst, torsion ovary, menstrual cramps, endometriosis, epiploic appendagitis, appendocolith, mesenteric adenitis, inflammatory bowel disease, terminal ilietis, caecal perforation, irritable bowel ,colitis, constipation, hernia, internal/ external oblique muscle strain.

(chronic PID / pelvic pain, STD, ectopic, adhesions – no marks)

Part b

List three (3) Examination findings in any patient that are suggestive of acute appendicitis.

Model Answer

Guarding in the RIF

Rebound tenderness

Fever

Part c

List four (4) Ultrasound findings supportive of acute appendicitis.

Model Answer

- aperistaltic, non compressible dilated appendix>6mm outer diam

- distinct thickened appendiceal wall layers >3mm but if necrotic/gangrenous there will be loss of wall stratification

- may show abscess/collection if perforated

- echogenic, prominent periappnediceal fat, increased vascularity

- target appearance in axila section

- increase free fluid (more than physiological amount)

Part d

State two (2) utilities (usefulness) of performing an abdominal/pelvis US in this patient.

Model Answer

May confirm the diagnosis of acute appendicitis if appendix is visualized.

If appendix is not visualized (eg.retrocaecal appendix) still cannot exclude

diagnosis of acute appendicitis will need to rely on clinical presentation and

progression.

May demonstrate alternate diagnosis : ovarian pathology, ilietis, renal hydronephrosis.

(MUST include at least one of the above to pass)

Its also simple, repeatable and does not expose patient to ionising radiation- these are not consultant level answers.

Question 23

An 80 year old male from a residential agent care facility (RACF), is referred to your ED by his GP with increasing confusion and fevers of up to 38.5 degrees Celsius for IV antibiotics for a suspected urinary tract infection.

He denies dysuria or frequency; however, he does have suprapubic tenderness and staff report malodorous and cloudy urine.

Part a

State the diagnostic definition of a Urinary Tract infection in older adults.

Model Answer

the purpose of this question is to reinforce the important of geriatrics within ACEM Fellowship

Urinary tract symptoms (e.g. suprapubic tenderness, costovertebral angle pain or tenderness, urinary urgency or frequency or dysuria) - ONE symptom

AND

isolation of a urinary pathogen at ≥105 colony forming units/mL in a freshly voided mid-stream urine specimen. (will accept isolation of urinary bacteria in sample ; without colony forming units)

Reference :

Therapeutic Guidelines page on UTI in aged-care facility residents:

https://tgldcdp.tg.org.au/viewTopic?topicfile=urinary-tract-infection-aged-care&guidelineName=Antibiotic&topicNavigation=navigateTopic#MPS_d1e129

https://acem.org.au/getmedia/996eb3b5-e3e7-41bd-9452-d2af97640e80/Burkett_et_al-2019_EMA

Candidates only need to describe one type of symptom (dysuria etc)
If they don't describe symptoms – no marks
We needs to keep the words "urinary tract infection in older adults"
Concept of asymptomatic bacteuria is very important

Part b

What is the most commonly isolated organism in urine cultures from both community-dwelling older persons and Residential Aged Care residents?

Model Answer

E. Coli (no need to write full Escherichia)

Part c

With the exception of diabetes, list three (3) features of a patient's past medical history that will increase their risk for a UTI.

Model Answer

Immune compromised states (generic or example is fine)

Cognitive impairment (or dementia)

Immobility

Impairment of ADLS

Frailty

Part d

With the exception of renal stones, list three (3) features of a patient's past UROLOGICAL history that will increase their risk for a UTI.

Model Answer

Prior antibiotics treatment for UTI

Urinary incontinence

Recent instrumentation of Urinary tract (or surgery)

Prostatic hypertrophy

Cystocoeles

Part e

With the exception of a 'Urinary tract infection' state one (1) possible cause for chronic dysuria in this patient.

Model Answer

Chronic prostatitis

Bladder malignancy

Part f

The nursing staff are concerned that the patient is confused. You decide to use a delirium screening tool.

List ONE (1) example of a validated delirium screening tool which can be used in the emergency department.

Model Answer

either of:

4AT

or

Confusion Assessment Method (CAM)

Part g

The ACEM policy Care in Elderly Patients in ED recommends screening of delirium in the emergency department for all patients older than 75 years. You are tasked to choose to implement this validated tool.

State TWO features this tool should have to be effective and achieve its stated aim.

Model Answer

Developing screening tools - for candidates give examples on how on the floor screening tools could be effective (easy question) – I would have thought as everyone will write "simple to use"

Easy / Simple to use

Valid in ED populations

Consistently used amongst inpatient colleagues too (4AT)

No special training required

Can be used for all patients

Reference :

https://www.the4at.com/

https://acem.org.au/getmedia/08528262-4da1-4049-9234-91ae6abed4a4/emm12639(1)-acute-geriatric-series-delirium.aspx

Question 24

A 14 year old girl is referred to your tertiary ED by her GP with concerns for a new diagnosis of an eating disorder.

Part a

List three (3) important features on history.

Model Answer

Weight profile (1)

Current weight

Premorbid weight

% loss and timing of weight loss

Psychosocial assessment (1)

Assess risk of suicide and self harm (HEADDS screen)

Body image

Dietary habits, eating behaviours, weight control measures, menstural Hx, symptomatic (dizzy – standing, collapse) (1)

1 mark for something about weight, 1 for psychosocial and 1 for diet/behaviours

Part b

List and justify three (3) essential investigations.

Model Answer

ECG - arrhythmia, bradycardia, prolonged QT, hypoK

Blood tests

BSL – significant risk of hypoglycaemia

U+E – hypoK

FBE – anything reasonable

LFT – hypoalb malnutrition

PO4- refeeding

Other with appropriate justification : TFT, ESR, Ca/Mg, Fe/B12/folate/VitD, Zinc/serum Rhubarb

Need ECG and BSL to pass

Part c

List three (3) findings that would warrant admission to hospital.

Model Answer

Resting HR <50, postural HR increase >30

Postural SBP drop >20, resting SBP <80

Hypothermia

hypoglycaemia

Electrolyte disturbance (K<3)

Arrhythmia or prologed QT

Ongoing weight loss despite maximal community management

Need something about HR, something about BP and 1 other

Question 25

A 45 year old man with chronic pancreatitis and chronic liver failure frequently presents to your emergency department requesting analgesia for abdominal pain. The intern has reviewed the patient today, and is concerned 'something is really wrong'. The gastroenterology registrar has refused to see the patient as they discharged him just last week after 'another pointless admission'. The patient is becoming increasingly belligerent.

Part a

State three (3) initial priorities in responding to this situation.

Model Answer

- Review the patient yourself to exclude immediately life threatening conditions
- Address the patient's concerns and provide analgesia as required
- Staff safety
- Call the gastroenterology registrar and instruct them to see the patient.

Part b

The gastroenterology registrar does review the patient, and is concerned they may have spontaneous bacterial peritonitis. You agree to assist them in arranging an abdominal paracentesis.

List three (3) factors that would help you determine whether the intern could perform this procedure without direct supervision.

Model Answer

- Experience (no. procedures performed; credentialing)
- Any previously witnessed procedures by yourself/other personal knowledge of the doctor
- intern's ability to adequately describe procedure including anatomy and complications, need for sedation

Part c

The patient is admitted under the gastroenterology unit however dies during this admission. Significant delays to care in the ED are identified during a case review.

State four (4) steps you could take to evaluate the cause of these delays to care?

Model Answer

- Audit the patient's medical and nursing chart
- Create a timeline of events from presentation to discharge to ward
- Interview involved medical and nursing staff
- Review policies for referral and ED assessment by inpatient teams
- Review policies for supervision of junior medical staff.

Part d

List two (2) potential benefits of a management plan for complex patients.

Model Answer

Reduces variation in care

Assists prompt decision making by junior medical staff

Reduces over-investigation and inappropriate prescribing

Assists with managing patient expectations

Question 26

You are examining a 26 year old male with the forearm wound pictured below:

Part a

Complete the table listing how you would examine the motor and sensory components of each of the nerves supplying the hand.

Model Answer

Nerve	Motor	Sensory
Median	L ateral two lumbricals flex index finger MCP with extended IP jts O pponens pollicis - OK sign A bductor pollicis brevis - abduct thumb to touch pen test F lexor pollicis brevis – flexion thumb MCP	Palmar surface distal index finger
Ulnar	cross-fingers or abduct fingers against resistance, paper between thumb and index finger	Distal little finger
Radial	inability to extend wrist, MCP joints, thumb IP joint Note- PIP and DIP can still be extended via intrinsic function (ulnar n.)	Anatomic snuff box

Part b

Describe how you examine for Flexor Digitorum Profundus and Flexor Digitorum Superficialis injuries in the fingers.

Model Answer

FDP is assessed by stabilising the PIP joint and testing ability to flex the distal phalanx(DIP jt) with and without resistance

FDS is assessed by stabilising the MCP joint and testing ability to flex the finger(PIP and DIP jts) with and without resistance

Ref: https://www.racgp.org.au/afp/2012/april/hands,-fingers,-thumbs/

Part c

Complete the following table regarding tetanus wound management.

Model Answer

History of tetanus vaccination	Time since last dose	Type of wound	DTPa, DTPa combinations, dT, dTpa, as appropriate	Tetanus immunogolulin
≥3 doses	<5 years	All wounds	No	No (unless person has immunodeficiency)[a]
≥3 doses	>10 years	All wounds	Yes	No
<3 doses or uncertain	Uncertain	Clean, minor wounds	Yes	No
<3 doses or uncertain	Uncertain	Contaminated or major wound	Yes	Yes

Question 27

A previously well 35 year old male without any allergies, is brought by ambulance to your rural ED. You are 90 km away from the nearest trauma centre. General Surgery and Anaesthesia services are onsite. He has suffered an isolated head injury.

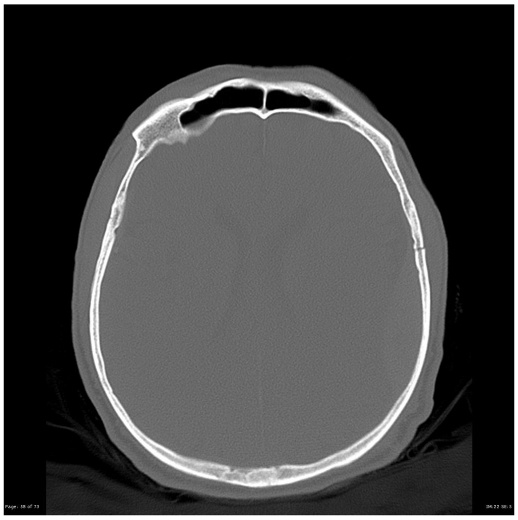
On arrival the patient is alert and complains of a headache. He is amnestic to the events, repeatedly asking staff what had happened. He has no significant neurological deficits.

His vitals are:

HR	90 bpm
BP	130/85 mmHg
SpO2	98% RA
Temp	36.5 °C
GCS	14 (E4, V4, M6)

After your initial assessment, the patient is taken for CT of his brain and C-spine.

Two single slices of the CT scans are provided below:



Part a

List three (3) MOST IMPORTANT findings.

Model Answer

1. Moderate left lateral convexity epidural haematoma, measuring 18 mm in maximal depth.
2. Associated undisplaced left temporoparietal fracture.
3. Mild mass effect - local sulcal effacement and approximately 4 mm of midline shift to the right.
4. Swirl sign - represents unclotted fresh blood which is of lower attenuation - ongoing active bleeding, potential for rapid deterioration.
5. No hydrocephalus.

Part b

Shortly after the CT scan, the patient deteriorates. His GCS falls to 10 (E2, V3, M5). His pupils remain equal. You decide to intubate him.

State five (5) MOST IMPORTANT peri-intubation considerations SPECIFIC to this patient.

Model Answer

1. Anticipated difficult intubation - in-line immobilisation and collar - Get help!
2. Neuroprotective Care:
    1. During intubation -
        - Blunt sympathetic response from laryngeal manipulation Fentanyl / propofol etc. (will not accept lignocaine).
        - Maintain CPP - have metaraminol / vasopressors ready.
    2. Post intubation neuroprotective care -
        - Tilt bed to 30 degrees
        - Loose ETT ties
        - Maintain low-normocarbia
    3. Post RSI care -
        - Sedation
        - ?Paralysis - qualify why or why not.
        - IDC
        - NGT/OGT
        - Fluids
        - Normothermia
3. Call general surgeon in - if deteriorates after intubation for burr holes.
4. Contact trauma centre / activate HEMS.
5. Correct coagulopathy or other AN if exist.

Part c

Under your expert care, the intubation progresses uneventfully.

List three (3) important considerations for the patient's ongoing management.

Model Answer

- Potential for deterioration (swirl sign).
- Needs Neurosurgery - expertise not available at hospital.
- Safest option - Burr Hole by general surgeon in hospital.
- Needs retrieval to trauma service - time critical.
- HEMS transfer vs road - weather considerations / platform availability.

Part d

20 minutes later, the patient becomes bradycardic (HR 54) and hypertensive (BP - 200/110). His left pupil becomes dilated.

State four (4) immediate actions for this deterioration in the patient's condition.

Model Answer

1. Neurosurgical emergency - need EDH evacuation NOW - inform team.
2. Hyperventilate
3. Sedate / optimise / paralyse
4. Manitol or 3% saline - give doses / endpoints.
5. Call in general surgeon and OT staff - for immediate burr-hole.
6. If surgeon unable to do burr-holes, check if other local expertise (EP) / surgeon able to do this.
7. Advise trauma centre / receiving neurosurgeon / Retrieval Service / HEMS
8. Family

Part e

A junior registrar who has been assisting you manage the patient, bursts out crying and leaves the resuscitation cubicle.

State three (3) actions you would take to manage this situation.

Model Answer

- Continue managing patient - is time critical.
- Seek assistance from other registrar to continue managing patient while you coordinate care.
- Assign senior staff member to check on JR and ensure their safety - ?gender equivalent - likely to be a senior nursing colleague or other senior doctor.
- Arrange for JR to be relieved - time off floor or go home. Reassign their patients to other doctors.
- Once able, meet with JR off the floor (if opposite gender - chaperone). In non-confrontational manner discuss / try to understand circumstances and causes of behaviour.
- Further discussions regarding expectations, professionalism, responsibilities, may need to be delayed for a later time - preferentially by DMET / Mentor.
- Advise DEMT / DEM about events.
- Discuss events with doctor's Mentor.