

Illawarra Shoalhaven Local Health District Emergency Medicine Fellowship Program



Topic-Based Quiz: Qs and As

MEDICINE 3

Candidate Instructions

- Duration = 30min
- Props are included within the examination booklets
- Allocated marks for each question are shown
- Each mark is of equal weight
- There is no negative marking
- Write answers CLEARLY, and cross out any errors
- Answer within space provided
- Do not begin until instructed
- You may take examination book home with you



Good Luck!

Acknowledgement: Thank you to the trainees who have written these SAQs with the hope of making their colleagues sweat, but ultimately gain more exposure to exam practice. Good job.

Question 1

You are the ED consultant working in a Regional Emergency Department. You have been asked to assess a 45 year old woman with a background of Non-Hodgkin's Lymphoma and suspected febrile neutropenia following Chemotherapy last week.

What is the definition of Febrile Neutropenia? (2 marks)

She is currently hemodynamically stable. Provide 2 options for empirical antibiotic therapy (2 marks)

After administration of your empirical antibiotic therapy your patient develops septic shock. List 2 further antibiotic therapies and justify your decision for choosing these antibiotics

(4 marks)

ANTIBIOTIC	DOSE	JUSTIFICATION
1.		
2.		

Question 2

A 40 year old lady is referred to your ED by a GP, with ongoing lethargy for months. She has no significant past medical history and has not visited a GP for >20 years.

FBC results from GP:

Hb 65 (115-165)
WCC 4 (6-11)
PLT 90 (150-400)
RBC 2.5 (3.8-5.8)
MCV 98 (80-100)
MCH 30 (27-32)
MCHC 400 (300-350)
RDW 16.5 (11.9-15.5)

Give 2 causes of microcytic, normocytic and macrocytic anaemia. Include MCV values. (6 marks)

Microcytic anaemia	MCV	
Normocytic anaemia	MCV	
Macrocytic anaemia	MCV	

You received a phone call from the pathology lab about the following tests:

- Peripheral blood film shows irregularly fragmented red cells and helmet cells
- Reticulocytes 3.6% (0.5-2%)

What is your diagnosis in view of the process that has caused the anaemia? (1mark)

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State 2 clinical features that you may find during examination of this patient. (2marks)

List 4 potential causes of this condition. (4 marks)

Question 3

A 27-year-old male presents to your emergency room with nausea, vomiting, diarrhea, anorexia, lethargy and generalised abdominal cramps. Three days ago he started intensive chemotherapy for adult acute lymphoblastic leukemia.

What are the risk factors for the development of tumour lysis syndrome (2 marks)

You order an extended electrolyte panel given your suspicion of tumour lysis syndrome.

What is the most common electrolyte derangement in TLS and the mechanism by which it occurs (1mark)

Acute renal failure is a common complication of TLS, what factors contribute to its pathogenesis (2 marks)

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His electrolyte panel is called down from the biochemistry lab and is detailed below. Outline your immediate treatment priorities (4 marks)

Na	145	mmol/L
K	7.6	mmol/L
Cl	115	mmol/L
Ca	0.9	mmol/L
Mg	1.1	mmol/L
Phosphate	1.45	mmol/L
Uric acid	481	micromol/L
Ur	61	
Creatinine	840	

Question 4

An 18 year old man with a background of sickle cell disease is brought in by ambulance after a syncopal episode trying to get out of the bed. He had been feeling generally unwell for the past 24 hours with fatigue, SOB and chest pain.

His vital signs are:

GCS 14

HR 130

BP 80/40

T: 37.7

SaO₂ 90% (15L/min via non-rebreather mask)

He has palpable spleen and his chest auscultation: bilateral crackle.

List 3 differential diagnoses relating to sickle cell disease and 3 other differential diagnoses to consider in this patient (6 marks)

The man's haemoglobin level is 78 and his chest X ray shows multilobar infiltration.

What is the most likely diagnosis? (1 mark)

Outline your management priorities in this case (4 marks)

List 2 SCD-related indications for blood transfusion (2 marks)

Question 5

In the table below list 2 of the common organisms and the empirical antibiotics for the following infectious disease states in adults without drug allergies. (12 marks)

Source	Common Organisms	Empirical Antibiotics
Urinary Tract Source		
Pneumonia (CAP)		
Cellulitis		
Meningitis		
Intrabdominal/Biliary		
Female Genital Tract Source		

You are treating a patient with suspected urosepsis. What are the risk factors for infection with a multidrug-resistant gram-negative bacterium? (2 marks)

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Although the patient is suspected to have urosepsis, the source of infection has not yet been identified. In the table below list the empirical antibiotics (including doses) for sepsis of unclear source for the following age groups in patients admitted from the community without drug allergies (3 marks)

Age Group	Empirical Antibiotics
Neonate	
Child (2 months +)	
Adult	

ANSWERS

Question 1

What is the definition of Febrile Neutropenia? (2 marks)

Febrile Neutropaenia

- A single temperature measurement $\geq 38.5^{\circ}\text{C}$, or a sustained temperature $\geq 38^{\circ}\text{C}$ for more than 1 hour
- In a patient with a decreased absolute neutrophil count (ANC) of either $< 0.5 \times 10^9/\text{L}$, or $< 1 \times 10^9/\text{L}$ with a predicted nadir of $< 0.5 \times 10^9/\text{L}$ over the subsequent 48h

She is currently hemodynamically stable. Provide 2 options for empirical antibiotic therapy (2 marks)

- Piperacillin-tazobactam 4.5g IV Q8h (Q6h if septic shock/ critically ill) OR
- Cefepime 2 g (child: 50 mg/kg up to 2 g) IV q8h OR
- Ceftazidime 2 g (child: 50 mg/kg up to 2 g) IV q8h

After administration of your empirical antibiotic therapy your patient develops septic shock. List 2 further antibiotic therapies and justify your decision for choosing these antibiotics

(4 marks)

ANTIBIOTIC	DOSE	JUSTIFICATION
Gentamicin	4-7mg / kg IV IBW	- Gram negative coverage
Vancomycin	25 - 30 mg / kg IV actual BW loading dose	- MRSA coverage - Suspected line-associated sepsis

Question 2

Give 2 causes of microcytic, normocytic and macrocytic anaemia. Include MCV values. (6 marks)

Microcytic anaemia	MCV < 80	<ul style="list-style-type: none"> ● Iron deficiency ● Thalassemia ● Sideroblastic anaemia ● Multiple myeloma ● Lead poisoning
Normocytic anaemia	MCV 80-100	<ul style="list-style-type: none"> ● Chronic systemic disease – chronic inflammation/infection/CTD/malignancy/renal failure ● Haemolysis ● Myelodysplastic syndrome ● Bone marrow infiltration

		<ul style="list-style-type: none">• Congenital – Fanconi's syndrome
Macrocytic anaemia	MCV >100	<ul style="list-style-type: none">• Vit B12 deficiency• Folate deficiency• Chronic alcoholism• Chronic liver disease

What is your diagnosis in view of the process that has caused the anaemia? (1mark)

Haemolytic anaemia

State 2 clinical features that you may find during examination of this patient.

- Jaundice
- Splenomegaly
- Haemoglobinuria
- RUQ tenderness/Gallstones (in persistent haemolysis)
- Leg ulcers
- VTE (hypercoagulability in warm autoimmune hemolytic anaemia and hereditary spherocytosis)
- Tachycardia/Tachypnoea – due to anaemia

List 4 potential causes of this condition. (4 marks)

Corpuscular defects

- Membrane defects – spherocytosis, elliptocytosis
- Haemoglobinopathies – thalassaemia (major), HbS
- Enzyme defects – G6PD deficiency, paroxysmal nocturnal haemoglobinuria

Extra-corpuscular

- Autoimmune – incompatible blood tx, SLE, R.arthritis, UC, lymphoma, CLL, mycoplasma infection, IM
- Mechanical trauma – long-distance runners, prosthetic valves, microangiopathic haemolytic anaemia

What are the risk factors for the development of tumour lysis syndrome (2 marks)

Any four of:

- Large tumour burden
- LDH > 1500 IU
- Extensive marrow involvement
- High tumour sensitivity to chemotherapeutic agents
- ALL
- Burkitt lymphoma
- Chemotherapy: cisplatin, etoposide, fludarabine, intrathecal methotrexate, paclitaxel, rituximab, radiation, interferon, corticosteroids, tamoxifen

What is the most common electrolyte derangement in TLS and the mechanism by which it occurs (1mark)

Hypocalcaemia is the most common electrolyte abnormality, usually due to release of phosphorus from dying cells binding free calcium

Acute renal failure is a common complication of TLS, what factors contribute to its pathogenesis (2 marks)

- Multi-factorial, at least 4 of:
 - Volume depletion
 - Cytokine mediated reduction in renal perfusion
 - Ischaemic ATN
 - Precipitation of uric acid crystals
 - Calcium phosphate nephropathy

His electrolyte panel is called down from the biochemistry lab and is detailed below. Outline your immediate treatment priorities (4 marks)

Na	145	mmol/L
K	7.6	mmol/L
Cl	115	mmol/L
Ca	0.9	mmol/L
Mg	1.1	mmol/L
Phosphate	1.45	mmol/L
Uric acid	481	micromol/L
Ur	61	
Creatinine	840	

- Identify profound dehydration and need to replete intra-vascular volume
 - 1000ml hartmanns bolus, with careful fluid resuscitation titrating to urine output and/or US guided fluid responsiveness
 - Appreciate that UO may be compromised given severe AKI
- Identify critical hypocalcaemia / ECG risk stratification
 - 60mmol calcium gluconate
- Identify hyperkalaemia and treat accordingly / ECG risk stratification
 - Calcium (above) assist with cardioprotection
 - Insulin / Salbutamol
 - Recognise this may be refractory give TLS and subsequent AKI, may need to consider insulin infusion and early dialysis
- Identify severe AKI, given multifactorial pathogenesis will need to consider
 - Renal tract imaging (US & CT renal)
 - Early discussion with nephrology

- Early consideration of dialysis

Question 4

List 3 differential diagnoses relating to sickle cell disease and 3 other differential diagnoses to consider in this patient (6 marks)

- Aplastic crisis
- Splenic sequestration syndrome
- Acute chest syndrome
- Pneumonia
- PE
- Spontaneous pneumothorax (T 37.7 less likely so last DDX)

The man's haemoglobin level is 78 and his chest X ray shows multilobar infiltration. What is the most likely diagnosis? (1 mark)

- Acute Chest Syndrome

Outline your management priorities in this case (4 marks)

- Analgesia: Morphine 10 mg IV+ paracetamol 1g PO
- Hartmanns 10 ml/kg IV bolus
 - Avoid overhydration with crystalloid because makes pulmonary oedema worse and avoid 0.9% NaCl as hyperchloremic metabolic acidosis promotes sickling
- Empiric antibiotics: Amoxicillin 1 gr QID IV + Gentamicin 7 mg/kg IV
- Admit under haematology service with view to plasmapheresis

List 2 SCD-related indications for blood transfusion (2 marks)

- Aplastic crisis (low Hb, low reticulocytes)
- Splenic sequestration syndrome (low Hb , high reticulocytes)

Question 5

In the table below list 2 of the common organisms and the empirical antibiotics for the following infectious disease states in adults without drug allergies. (12 marks)

Below is summary from Up to Date and eTG

Reasonable approach – see detailed answer below (this degree not required)

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Infectious Disease/Location	Common Organisms Up to Date	Empirical Antibiotics eTG
Urinary Tract Source	E.coli Klebsiella spp. Proteus spp. Pseudomonas Enterococci Staph (MSSA/MRSA)	Gentamicin 4-5mg/kg in noncritically ill or 7mg/kg in critically ill adults at 24 hourly 3 doses at 0, 24 and 48 hours + amoxicillin 2g Q6H IV OR ampicillin 2g Q6H IV
Pneumonia (CAP)	Strep pneumoniae Haemophilus influenzae Mycoplasma pneumoniae Chlamydia Pneumonia Legionella Staph Aureus Virus (Influenza/RSV/Parainfluenza)	Mild: Amoxicillin 1g TDS +/- Doxycycline 100mg BD Moderate: BenPen 1.2g Q6H + Doxycycline 100mg BD Severe: ceftriaxone 2g daily OR cefotaxime 2g Q8H + azithromycin 500mg daily
Cellulitis	MSSA MRSA B- hemolytic streptococci	Benzylpenicillin 1.2g Q6H if streptococcus pyrogenes is suspected OR Flucloxacillin 2g Q6H if staph aureus suspected If MRSA suspected ADD Vancomycin as per dosing principles
Meningitis	Strep Pneumoniae Neisseria Meningitidis Listeria Monocytogenes	Ceftriaxone 2g Q12H OR Cefotaxime 2g Q6H + dexamethasone 10mg IV Q6H for 4 days For patients over 50 who are immunocompromised, pregnant or debilitated to treat Listeria add Benzylpenicillin 2.4g Q4H
Intrabdominal/Biliary	e.coli Bacteroides Fragilis Klebsiella spp. Proteus spp. Enterobacter spp. Streptococci Enterococci	Gentamicin 4-5mg/kg up to -7mg/kg in critically unwell 24 hourly for 3 doses + metronidazole 500mg Q12H + amoxicillin 2g Q6H IV OR ampicillin 2g Q6H IV
Female Genital Tract Source	Chlamydia trachomatis Neisseria gonorrhoeae Mycoplasma genitalium Gardnerella vaginalis	Non severe: Ceftriaxone 500mg IV + Metronidazole 400mg BD for 14 days + Doxycycline 100mg BD for 14 days OR azithromycin 1g orally repeated 1 week later Severe: Ceftriaxone 2g IV daily OR cefotaxime 2g IV Q8H + metronidazole 500mg Q12H

The patient in question is suspected to have urosepsis. What are the risk factors for infection with a multidrug-resistant gram-negative bacterium? (2 marks)

2 of the following from below table

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Risk factors for infection with a multidrug-resistant Gram-negative bacterium (Box 2.30)

A patient with one or more of the risk factors below is at increased risk of infection with a multidrug-resistant Gram-negative bacterium (such as an ESBL-producing bacterium). However, patients at increased risk will not necessarily be infected or colonised with a resistant bacterium.

Consider whether to modify empirical therapy for the individual patient, taking into account the severity of infection. Culture results are particularly important to guide ongoing therapy.

Risk factors for infection with a multidrug-resistant Gram-negative bacterium include:

- recent stay in hospital or a long-term care facility (eg within 12 months) in a country with a high prevalence of multidrug-resistant Gram-negative bacteria [NB1] [NB2] or an Australian facility with a known outbreak [NB2]
- recent overseas travel (eg within 6 months) to an area with a high prevalence of multidrug-resistant Gram-negative bacteria, particularly if associated with antibiotic use or medical care [NB2]
- previous colonisation or infection with a multidrug-resistant Gram-negative bacterium, particularly if recent or associated with the current episode of care
- frequent stays, or a current prolonged stay, in a hospital with a high prevalence of multidrug-resistant Gram-negative bacteria, particularly if associated with antibiotic exposure
- residence in an aged-care facility with a high prevalence of multidrug-resistant Gram-negative bacteria, particularly if the patient has had multiple courses of antibiotics.

Local policies should address the role of routine rectal screening in patients with risk factors for multidrug-resistant Gram-negative bacteria.

ESBL = extended-spectrum beta-lactamase

NB1: This risk factor is associated with the highest risk of infection with a multidrug-resistant Gram-negative bacterium.

NB2: This risk factor also applies in neonates born to mothers with this risk factor.

Although the patient is suspected to have urosepsis, the source of infection has not yet been identified. In the table below list the empirical antibiotics including doses for sepsis of unclear source for the following age groups in patients admitted from the community without drug allergy (6 marks)

Age Group	Empirical Antibiotics
Neonate	<p>Gentamicin 5mg/kg + Amoxicillin 50mg/kg IV (neonates <7 days 12 hourly, >7 days Q8H) OR Ampicillin 50mg/kg IV (neonates <7 days 12 hourly, >7 days Q8H)</p> <p>If meningitis is suspected or severely unwell Cefotaxime 50mg/kg + Amoxicillin 100mg/kg IV (neonates <7 days 12 hourly, >7 days Q8H) OR Ampicillin 100mg/kg IV (neonates <7 days 12 hourly, >7 days Q8H)</p> <p>If herpes simplex is suspected then add Aciclovir 20mg/kg IV Q8H</p> <p>In neonates at risk of MRSA add vancomycin 15mg/kg IV (neonates <7 days 12 hourly, >7 days and 45 weeks gestation Q6H)</p>
Child (2 months +)	<p>Cefotaxime 50mg/kg Q6H OR Ceftriaxone 50mg/kg Q12H + Gentamicin 7.5mg/kg IV If at risk of MRSA add vancomycin</p>

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	If at risk of herpes simplex encephalitis add acyclovir 500mg/m ² Q8H or if the child is older than 12 years 10mg/kg Q8H
Adult	Gentamicin 4-5mg/kg up to 7mg/kg IV Q24H for 3 doses + Flucloxacillin 2g Q4H + vancomycin if at risk of MRSA + ceftriaxone 2g IV Q12H or cefotaxime 2g Q6H if N. meningitidis suspected