

Question 1 (12 marks)

A 34 year old woman is brought to the emergency department by ambulance. The patient was found by her husband sitting on a chair unable to talk or walk. On examination she is found to have aphasia and right sided weakness.

Her GCS is 11 (E4, V1, M6), otherwise her observations are within normal limits.

You suspect an ischaemic stroke.

a) List four (4) non-stroke conditions that could give this clinical interpretation. (4 marks)

- Intracerebral bleed (primary or secondary)
- Trauma, extradural/subdural haemorrhage
- Space occupying lesion (neoplasm/abscess)
- Postictal/Todd's paralysis
- Migraine
- Conversion disorder
- Hypoglycaemia
- Dissection involving the carotid circulation
- SAH

You call a CODE stroke.

b) List the three (3) cerebral CT scan modalities that should be ordered, giving the rationale for each modality by completing the table. (6 marks)

	Cerebral CT Scan Modality (3 marks)	Rationale (3 marks)
1.	Plain CT (non-contrast CTB)	Exclude haemorrhage/ space occupying lesions
2.	CT angiogram (CTA)	Identify clot / embolus and exact site of this
3.	CT Perfusion scan (CTP)	Establish degree of ischemic penumbra in order to further inform the decision to clot retrieve / thrombolyse Accept – identifies salvageable vs infarcted brain tissue

The onset of symptoms is estimated to have been 8 hours previously.

- c) List 2 (two) important CT findings that would prompt consideration of clot retrieval in this patient. (2 marks)
- Basilar artery clot on CT angiogram
 - Occlusion to a large anterior circulation vessel and a large ischaemic penumbra on CT perfusion scan

Question 2 (18 marks).

A 32 year old man presents to your emergency department with pneumonia. He has severe respiratory distress and requires intubation. He is morbidly obese.

He has a BMI of 42, his actual weight is 130 kg and his ideal body weight is 70 kg.

- a) With relevance to RSI, list three (3) **physiological** effects of obesity on the respiratory system and two (2) **physiological** effects on other organ systems. (5 marks)

Respiratory Effects:

- High incidence of resting hypoxaemia
- High incidence of resting hypercarbia
- Increased oxygen consumption
- Increased carbon dioxide production
- Inefficient respiratory muscles
- Increased airway resistance
- Reduced TLC
- Reduced VC
- Decreased expiratory reserve volume (from collapse of the small airways)
- Reduced FRC (declines exponentially as BMI increases)
- Increased work of breathing especially supine

Non-Respiratory effects:

- Increased intra-abdominal pressure
- Increased incidence of hiatus hernia
- Increased gastroesophageal reflux
- Increased gastric volume
- Higher volume of distribution
- Increased carbon dioxide production

- b) Provide the appropriate dose or volume for the listed interventions. (5 marks)

Intervention	Calculated Dose or Volume
Propofol induction dose (1-2mg/kg)	70-140 mg (ideal BW)
Suxamethonium dose (1-2 mg/kg)	130-260 mg (total BW)
Tidal volume (6-8mL/kg)	420-560 mL (ideal BW)
Midazolam infusion for sedation (0.05-0.2mg/kg/hr)	3.5-14mg/hr (ideal BW)
Vecuronium maintenance dose (0.1mg/kg)	7mg (ideal BW)

c) Outline five (5) strategies that can be implemented to improve the safety of endotracheal intubations for all patients in the emergency department. (5 marks)

- **Standardised pre-RSI checklist**
- **Standardised difficult airway algorithm instituted**
- RSI performed by only by adequately experienced operators
- Standardised equipment availability including video-laryngoscopy equipment.
- Mandated the use of nasal prong apnoeic diffusion oxygenation
- Mandated use of a bougie or stylet for all intubation attempts
- Regular training of staff
- Provision of part task training and cadaveric workshops

Bolded answers are mandatory for full marks in this section

d) After a successful intubation, list three (3) interventions to decrease the risk of a patient developing a ventilator associated pneumonia. (3 marks)

- New circuit for a new patient
- Semi recumbent position 30-45°
- Maintenance of endotracheal cuff pressure of about 20 mmHg
- Subglottic suctioning
- Mouth cares
- Avoidance of flushing of condensate into lower airway

Question 3 (12 marks)

You are the consultant in charge of a regional emergency department (ED).

A previously well 35 year old woman presents to the ED with an 8 day history of lethargy, anorexia and vomiting. She is now drowsy, confused and clinically jaundiced.

Vital signs are:

HR 110 bpm
BP 100/70 mmHg
RR 16 /min
Temp 36.9 °C
GCS 12 (E3, V4, M5)

Her pathology results are presented.

		Units	Reference Range
Haemoglobin	122	g/L	115 - 160
Platelets	185	/nL	160 - 420
WCC	13	/nL	3.5 - 11.0
Sodium	132	mmol/L	135 - 145
Potassium	3.7	mmol/L	3.5 - 5.2
Urea	3.5	mmol/L	2.7 - 7.8
Creatinine	68	mmol/L	45 - 90
Bilirubin	143	micromole/L	(<25)
ALP	184	U/L	(30 - 110)
GGT	104	U/L	(<90)
ALT	7800	U/L	(<65)
AST	7220	U/L	(<50)
Albumin	30	g/L	(32 - 50)
Glu	2.0	mmol/L	(3.0 - 6.0)
INR	4.8		(0.9 - 1.3)

- a) State your overall conclusion regarding her presentation. Justify this conclusion using her pathology results. (2 marks)

Conclusion (1 mark)	Justification (1 mark)
Acute/ fulminant liver failure	Consultant level justification: • coagulopathy • predominantly transaminitis • elevated bilirubin • low albumin • encephalopathy • hypoglycaemia • no evidence of haemolysis • no renal impairment

- b) What is your immediate next step after receiving the pathology results? (1 mark)

- Give parenteral glucose (any safe dose acceptable)

- c) List five (5) most likely aetiologies for this presentation. (5 marks)

- **Viral hepatitis**
- Drug overdose/toxins (e.g. **Paracetamol**, mushroom ingestion, alcohol related)
- Idiosyncratic drug reaction
- Autoimmune hepatitis
- Hepatic vein thrombosis due to thrombophilia (Budd-Chiari Syndrome)
- Inherited/genetic – Wilson’s disease
- Sepsis (e.g. meningitis/ encephalitis)

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- d) List four (4) additional investigations you would arrange for this patient in the emergency department. (4 marks)

- Paracetamol level
- Blood gas analysis (arterial or venous)
- Ammonia level
- Hepatitis serology
- Ascitic fluid tap if present
- Ultrasound of liver
- Other septic screen (e.g. CXR, Blood cultures, Urinalysis, CSF analysis)
- Other pathology/ autoimmune/metabolic (e.g. Alcohol level, serum or bedside ketones, Beta-HCG, Urinary copper/caeruloplasmin)
- CT for complications /causes (e.g. CTB for decreased GCS, CT abdo IV contrast for cirrhosis, Budd Chiari)

Question 4 (12 marks)

A 3 year old girl is brought to the emergency department by her parents with a 6 day history of diarrhoea. Her parents are concerned that she is lethargic and has had reduced urine output for the previous 24 hours.

Blood tests show:

		Reference Range
Na ⁺	135	134 – 143 mmol/L
K ⁺	5.7	3.4 – 5.0 mmol/L
Cl ⁻	100	96 – 106 mmol/L
HCO ₃ ⁻	16	22 – 26 mmol/L
Urea	20	2.5 – 6.5 mmol/L
Creatinine	315	<90 µmol/L
Glucose	4.6	4.0 – 7.8 mmol/L
Hb	90 g/L	(105 – 140 g/L)
WCC	12.6 X 10 ⁹ /L	(6.0 – 17.5 X 10 ⁹ /L)
Platelets	85 X 10 ⁹ /L	(150 – 400 X 10 ⁹ /L)

- a) Regarding the blood tests and clinical scenario above, what is the most likely diagnosis? (1 mark)

- Haemolytic Uraemic Syndrome

- b) List four (4) other laboratory tests that would be important in supporting the above diagnosis. Give a reason for each test. (8 marks)

Note to Candidates: There must be four (4) different reasons in your answer.

	Test (4 marks)	Rationale for testing (4 marks)
	Blood film / microscopy	• Signs of red cell fragmentation ○ Identifies haemolysis • Identifies schistocytes • Identifies spherocytosis
	Biochemical evidence of haemolysis - Raised AST, Bili (unconj), LDH, raised retic count, decreased haptoglobin, Coombs – ve: non – immune mediated	• Identifies haemolysis
	Shiga toxin assay OR Stool culture for O157 E coli	• Identifies organism
	Coagulation studies	• Differentiation from DIC as cause of thrombocytopenia
	Venous blood gas	• Acid – base state measurement / confirmation
	Urine microscopy / spun urinary sediment (protein/casts/dysmorphic RBC)	• Evidence of renal injury

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- c) List three (3) indications where urgent dialysis may be required in a child with this clinical condition. (3 marks)
- Fluid overload with pulmonary oedema unresponsive to diuretics
 - Severe hyperkalaemia or rapidly rising
 - Severe metabolic acidosis
 - Severe oligo/anuria refractory to medical treatment
 - Very high urea/ severe azotaemia (NB values for urea and creatinine are NOT required as these vary with age)
 - Uraemic complications (encephalopathy, pericarditis, myopathy, neuropathy)