

Question 1

- a)** List 3 possible pathophysiological changes in the lungs seen in asthma. (3 marks)

A 57-year-old female, who is known to have asthma, is having a laparoscopic cholecystectomy under general anaesthetic with endotracheal intubation.

- b)** Interpret her preoperative pulmonary function tests shown below. (2 marks)
Age: 57 Weight: 62 kg Height: 165 cm

	Predicted	Observed – pre-bronchodilator	% Predicted	Observed – post bronchodilator	% Predicted
FEV1 (L)	2.42	1.45	60	2.06	80
FVC (L)	3.26	2.75	90	3.10	95
FEV1 / FVC (%)		53%		67%	

- c)** List 6 factors that may cause her to develop bronchospasm during her general anaesthesia. (6 marks)
- d)** She does develop acute severe bronchospasm - what drugs, **including dosages** where applicable, can be used to treat this? (5 marks)
- e)** List 4 other actions you would take in the early management of this emergency. (4 marks)

Syllabus	General PR_IK_10, CI_BK_19, IO_BS_9
Question type	Easy: pass mark 13
Topic	Management of severe asthma, critical incident
Aim	Knowledge of severe asthma in the context of anaesthesia
Pass requirements	Should know precipitating factors and treatment for acute severe asthma.

Q	Answer	Mark	Guidance
a)	Chronic inflammation Mucosal oedema Excess mucous production Bronchial smooth muscle contraction and hypertrophy Infiltration of inflammatory cells	3	Accept epithelial damage, loss of cilia Don't accept airway hyper-reactivity (it's a consequence) Max 3 marks Accept mast cells, macrophages, eosinophils, goblet cells
b)	Reduced FEV ₁ /FVC ratio = obstructive Evidence of reversibility	1 1	1 mark (must say obstructive picture) 1 mark No mark for stating reduce FEV ₁
c)	Airway manipulation Anaphylactic/anaphylactoid reactions Histamine release from IV drugs Inadequate depth of anaesthesia Aspiration Administration of anti-cholinesterase reversal Administration of other drugs Pre-existing infection Preoperative non-compliance with asthma medication Use of desflurane	6	Accept use of ETT Accept surgical stimulation/pain if too light (only 1 mark for either statement) eg NSAIDs, beta-blocker
d)	Increase inhaled volatile concentration Salbutamol (8-10 puffs into circuit, 2.5-5mg neb, 250mcg slow IV) Aminophylline 5mg/kg slow IV Adrenaline 10-100mcg titrated Magnesium 1.2-2g IV Ketamine 1-3mg/kg/hr or 10-20mg bolus Hydrocortisone 100-200mg IV Ipratropium 500mcg neb.	5	No mark if says desflurane No mark for oxygen (does not treat bronchospasm) Accept 500mg No mark for antihistamine
e)	Call for help Alert surgeon/stop surgery/deflate abdomen Increase FiO ₂ Assess ventilation Adjust ventilation - increase I:E ratio, use pressure control ventilation Auscultate chest - exclude pneumothorax	4	Accept 100% O ₂ Accept manual ventilation Must state what adjustment is made, allow 1 mark if says increase RR

Question 2

a) List 2 of the main clinical features used to confirm a diagnosis of dementia. (2 marks)

b) Name 2 of the most common types of dementia in the UK. (2 marks)

c) You have been asked to see an 80-year-old man in the preoperative assessment clinic. He has a diagnosis of dementia and is taking rivastigmine, risperidone, memantine and ginkgo biloba.

Complete the table by identifying which of his drugs belong to which category. (2 marks)

Drug category	Drug name
1 Acetylcholine esterase inhibitors	
2 N-methyl-D-aspartate (NDMA)	
3 Herbal medicines	
4 Atypical antipsychotics	

d) Outline the potential adverse perioperative effects of each drug. (4 marks)

Drug	Potential adverse perioperative effect
1 Ginkgo biloba	
2 Risperidone	
3 Memantine	
4 Rivastigmine	

e) The patient is scheduled to undergo an operation under general anaesthetic.

Give six ways in which intraoperative anaesthetic care can help to prevent him developing postoperative delirium. (6 marks)

f) Why is it important to avoid postoperative delirium in this patient? (4 marks)

Syllabus	PR_IK_20; POM_IS_01
Question type	Hard: pass mark 10
Topic	Neurocognitive decline
Aim	Management of patient with dementia in relation to anaesthesia
Pass requirements	Should know the classes of drugs and potential interactions. Should also be aware of ways of avoiding postoperative delirium and the importance of doing so.

Q	Answer	Mark	Guidance
a)	<ul style="list-style-type: none"> ■ loss of cognitive function ■ memory loss ■ loss of social competence 	Any 2	Accept loss of executive functions or loss of frontal control
b)	<ul style="list-style-type: none"> ■ Alzheimer's disease ■ vascular dementia ■ dementia with Lewy Bodies 	Any 2	Accept multi-infarct dementia
c)	1 Rivastigmine 2 Memantine 3 Ginkgo Biloba 4 Risperidone	2	No half marks so 1 mark for 2 correct answers
d)	Potential adverse effect 1 Interferes with platelet function 2 Enhances risk of vasodilation and hypotension with anaesthetics 3 Enhances side effects of anticholinergics and dopaminergic agonists 4 Prolongs the effect of depolarising and reduce or reverse the effect of non-depolarising muscle relaxants. Enhanced cholinergic effects	4	
e)	<ul style="list-style-type: none"> ■ BIS guided anaesthesia to reduce dosage ■ multimodal analgesia ■ use of supplemental regional blocks ■ avoid benzodiazepines ■ avoid anticholinergics ■ keep well hydrated ■ ensure physiological normality, eg, BP 	4	Accept: <ul style="list-style-type: none"> ■ minimum possible dose of anaesthetic to avoid awareness instead of BIS ■ avoid opiates instead of multimodal analgesia No marks for recovery as this is not intraoperative
f)	Prolongs hospital stay Increases complications Increases mortality Increases the progress of dementia	4	Accept: Increases falls or increases pneumonia instead of increases complications

Question 3

You are called to the emergency department to assist with the management of a 34-year-old gentleman who has sustained an **isolated** head injury following a road traffic accident, he requires an urgent CT scan. Upon arrival you find him to be restless, no eye opening to pain, making incomprehensible sounds and extending to pain. His blood pressure is 120/70 mmHg and heart rate 80bpm. He weighs 70kg.

a) What is this man's Glasgow coma score? (1 mark)

b) Why does he need intubation and ventilation? (2 marks)

c) Describe how you would achieve intubation and ventilation. (5 marks)

d) This is the result of the arterial blood gas analysis performed prior to transfer to the CT scanner, he is on an FiO₂ of 0.5 –

PaO ₂	16.3 kPa
PaCO ₂	6.8 kPa
H+	48 nmol/l
pH	7.31

Explain the most important reason why these results are unsatisfactory for this patient. (3 marks)

e) He is admitted to the intensive care unit. His intracranial pressure (ICP) is measured at 30 mmHg, mean arterial blood pressure (MAP) is 83 mmHg and central venous pressure (CVP) is 7 mmHg. What is his cerebral perfusion pressure (CPP)? (1 mark)

f) Give 6 treatment options available to improve this patient's cerebral perfusion pressure. (6 marks)

g) List 2 intracerebral pathophysiological changes associated with secondary brain injury. (2 marks)

Syllabus	MT_IK_04, NA_IK_20, NA_IK_04
Question type	Moderate: pass mark 13
Topic	Head injury
Aim	Understanding of immediate and ICU management of closed head injury and its pathophysiology.
Pass requirements	Must know management in ED, physiological goals, some pathophysiology, CPP calculation and target.

Q	Answers	Mark	Guidance
a)	GCS 5	1	Accept E1, V2, M2 Do not accept individual parts
b)	To protect his airway	1	No mark for 'needs CT scan'
	As his GCS <8	1	
	To prevent secondary brain injury	1	
c)	Rapid sequence induction	1	Accept 'modified' Propofol Thiopentone Ketamine Suxamethonium or rocuronium No mark for lignocaine or beta blocker
	Mention cervical spine control	1	
	Use of emergency intubation checklist	1	
	Induction agent – any appropriate one	1	
	Muscle relaxant	1	
	Addition of opiate to obtund hypertensive response to laryngoscopy	1	
d)	Hypercapnoea	1	Accept raised PaCO ₂ as a result of under ventilation. No mark for acidosis. Accept any 3 points
	Causes cerebral vasodilatation/increased cerebral blood flow	1	
	Results in raised ICP	1	
	Results in reduced CPP	1	
e)	46 mmHg	1	
f)	Ensure adequate sedation – reduces CBF	1	Accept 4.5-5.0 kPa No mark for avoid ETT ties – not a treatment Hypertonic saline/furosemide acceptable Accept EVD/CSF drainage In addition to adequate sedation
	Optimise CO ₂ – low end of normal – 4.0-4.5 kPa	1	
	Nurse slightly head up – avoids venous congestion	1	
	Consider use of mannitol	1	
	Consider vasopressor to increase MAP	1	
	Discuss with neurosurgeons – consider decompressive craniectomy	1	
	Consider thiopentone to reduce ICP (bolus or infusion)	1	
g)	Focal areas of cerebral ischaemia	1	No marks for Monro-Kellie/closed box, or simply stating raised ICP – must give an explanation of why ICP rises
	Disruption of the blood-brain barrier	1	
	Cerebral oedema/hydraemia	1	
	Impaired cerebral autoregulation	1	
	Release of high levels of oxygen free radicals following injury	1	
	Cellular inflammatory response - increased excitatory amino acids (glutamate, aspartate)	1	
	Cell death and apoptosis	1	

Question 4

A 38-year-old man is admitted to the intensive care unit critically ill with a diagnosis of suspected acute severe pancreatitis.

a) List 3 common causes of acute pancreatitis in the United Kingdom. (3 marks)

b) Two out of three diagnostic criteria must be met in order to confirm the diagnosis of acute pancreatitis. What are the three criteria? (3 marks)

c) What is the single most important aspect of the medical management of a patient with acute pancreatitis? (1 mark)

d) Give 3 reasons why enteral nutrition would be preferred over parenteral nutrition in this patient. (3 marks)

e) When should enteral nutrition be commenced? (1 mark)

The patient becomes increasingly hypoxic requiring intubation and ventilation. A suspected diagnosis of acute respiratory distress syndrome (ARDS) is made.

f) What are the 4 criteria of the Berlin definition of ARDS? (4 marks)

g) Give the pathophysiological mechanism whereby acute severe pancreatitis may cause ARDS. (1 mark)

h) Despite a FiO_2 of 1.0, lung protective ventilation and maximal positive end expiratory pressure he remains hypoxic. What additional strategies are available in an attempt to optimise his **ventilation**? (4 marks)

Syllabus	Annexe F 3.8, 3.1
Question type	Moderate: pass mark 12
Topic	ITU management of patient with severe acute pancreatitis and ARDS
Aim	To test knowledge of the diagnosis and management of conditions seen commonly in ITU
Pass requirements	The candidate should know the common causes of pancreatitis and how to diagnose it. They should be able to explain the rationale for using enteral nutrition. They should know the diagnostic criteria for ARDS and alternative ventilatory strategies.

Q	Answers	Mark	Guidance
a)	Gallstones	1	Max 3 but must include gallstones and alcohol
	Alcohol related	1	
	Idiopathic	1	
	Post endoscopic procedure	1	
	Infection	1	
b)	Abdominal pain consistent with disease	1	Accept epigastric or generalised, not just 'abdominal pain'
	Raised serum amylase or lipase	1	Give mark if say imaging not needed if first 2 criteria met
	Characteristic findings from abdominal CT/MRI/USS imaging	1	
c)	Adequate fluid resuscitation	1	Accept goal directed fluid therapy
d)	Maintains gut integrity	1	Accept prevents bacterial translocation
	Reduced infection	1	Accept reduced incidence of sepsis/line infection
	Reduces morbidity/mortality	1	Accept reduced incidence of organ failure/pancreatic necrosis
e)	Within 48-72 hours	1	
f)	Acute onset within 1 week	1	Must say within 1 week to get mark
	Bilateral opacities on CXR	1	
	$PaO_2/FiO_2 \leq 300$ (39.9kPa)	1	No need to include PEEP in definition but do not penalise if included
	Not fully explained by cardiac failure or fluid overload	1	
g)	Production and excretion of inflammatory mediators causing damage to the alveolocapillary membrane	1	May get mark if mentions destruction of pneumocytes or decreased surfactant. No mark for sepsis as a cause
h)	Neuromuscular paralysis	1	Must give an example, eg, APRV, BIPAP, high frequency Accept open lung ventilation No marks for NO or ECMO as they are not ventilatory strategies
	Prone positioning	1	
	Inverse ratio	1	
	Alternate modes of ventilation	1	
	Recruitment manoeuvres	1	

Question 5

A 25-year-old woman who is 37 weeks pregnant is admitted to your labour ward with a blood pressure of 180/115mmHg and proteinuria. A diagnosis of severe pre-eclampsia is made.

a) What is the main reason that urgent blood pressure control is needed? (1 mark)

b) What associated symptoms might this patient have? (4 marks)

c) Give 2 drugs you would use to treat this patient's blood pressure. (2 marks)

d) Why would magnesium sulphate be indicated in this patient (1 mark) and what dosing regimen would be used? (2 marks)

The patient's blood pressure has settled to 150/90mmHg. She has been started on magnesium treatment and is being managed on the labour ward with a view to delivery within the next 24 hours as the continuous cardiotocograph (CTG) recording is currently normal.

e) What monitoring does she require? (5 marks)

f) The patient has had a caesarean section. She has lost 500mls of blood and has had adequate, appropriate fluid replacement. How would you manage ongoing fluid balance in the postoperative period? (4 marks)

g) Why would this patient be particularly susceptible to pulmonary oedema? (1 mark)

Syllabus	OB_IK_01, OB_BK_05
Question type	Easy: pass mark 14
Topic	Management of a pre-eclamptic patient
Aim	Understanding of management of complicated obstetric patient
Pass requirements	Must understand reason for blood-pressure control, how and why to use magnesium, and the importance of fluid management. Must also know symptoms to look out for in worsening pre-eclampsia.

Q	Answers	Mark	Guidance
a)	To prevent intracranial haemorrhage	1	Accept: to prevent CVA or stroke
b)	Headache Visual disturbance Abdominal pain Vomiting Worsening of oedema of face, hands or feet	4	Any 4 of list – Accept: Blurred/double vision/flashing lights Upper quadrant/liver pain Nausea Swelling but must specify location
c)	Labetalol Nifedipine Hydralazine	2	Need labetalol PLUS one other to be awarded 2 marks
d)	Magnesium is effective in preventing seizures 4g bolus over 5–10 minutes followed by 1g/hr infusion	1 1 1	No marks for stating reduction in blood pressure Allow 5-20 minutes for bolus
e)	ECG Hourly non-invasive blood pressure Pulse oximetry Respiratory rate Fluid input / urine output Hourly reflexes and ankle clonus every hour	5	Accept arterial line Accept fluid balance monitoring Accept either Do not give a mark for plasma magnesium levels unless candidate states that there is renal impairment
f)	Restrict all IV fluids to 80-100mls/hr in total Ideally stop IV fluids and give oral fluid Record fluid input and output accurately If urine output <0.5mls/kg/hr give fluid challenge If no response consider invasive monitoring	4	No marks for restrict IV fluids – accept 1-1.5ml/kg/hr Accept no IV fluids and free oral fluid Must mention figures for required output (accept 25-30mls/hr or 100mls over 4 hours)
g)	Leaky capillaries Low serum albumin	1	Accept low oncotic pressure instead of low proteinv