Royal College of Anaesthetists

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.

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

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3……

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: 62kg Height: 165cm

	Predicted	**Observed - pre bronchodilator**	**% Predicted**	**Observed – post bronchodilator**	**% Predicted**
FEV_1 (L)	2.42	1.45	60	2.06	80
FVC (L)	3.26	2.75	90	3.10	95
FEV_1 / FVC (%)		53%		67%	

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c)
List 6 factors that may cause her to develop bronchospasm during her general anaesthesia. (6 marks)

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d)
She does develop acute severe bronchospasm - what drugs**, including dosages** where applicable, can be used to treat this? (5 marks)

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e)
List 4 other actions you would take in the early management of this emergency? (4 marks)

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4……

Q	Answer		Guidance
a	Chronic inflammation Mucosal oedema Excess mucous production Bronchial smooth muscle contraction & 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 FEV1/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 i.v.drugs Inadequate depth of anaesthesia Aspiration Administration of anticholinesterase reversal Administration of other drugs Pre-existing infection Pre-op 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) e.g. NSAIDs, B blocker

d	Increase inhaled volatile concentration Salbutamol (8-10 puffs into circuit, 2.5 - 5mg neb, 250mcg slow i.v. Aminophylline 5mg/kg slow i.v. Adrenaline 10-100mcg titrated Magnesium 1.2-2g i.v. Ketamine 1-3mg/kg/hr or 10-20mg bolus Hydrocortisone 100-200mg i.v. Ipratropium 500mcg neb.	5	No mark if says desflurane No mark for oxygen (does not treat bronchspasm) Accept 500mg No mark for anti-histamine
e	Call for help Alert surgeon/stop surgery/deflate abdomen Increase F_iO_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

Syllabus	PR_IK_20; POM_IS_01
Question type	Hard :pass mark 10
Topic	**Perioperative management of cognitive dysfunction**
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.

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

1. ……

2. ……

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

1. ……

2. ……

c)
You have been asked to see an 80 year old man in the pre-operative assessment clinic. He has a diagnosis of dementia and is taking Rivastigmine, Risperidone, Memantine and Ginko 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. NMDA receptor antagonists	
3. Herbal medicines	
4. Atypical antipsychotics	

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

Drug	Potential adverse perioperative effect
1. Ginko Biloba	
2. Risperidone	
3. Memantine	
4. Rivastigmine	

e)
The patient is scheduled to undergo an operation under general anaesthetic
Give 6 ways in which intraoperative anaesthetic care can help to prevent him developing post-operative delirium. (6 marks)

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

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Q	Marking Guidance	Mark	Comments
a	• Loss of cognitive function • Memory loss • Loss of social competence	Any 2	Accept loss of executive functions or loss of frontal control
b	• Alzheimer's disease • Vascular dementia • Dementia with Lewy Bodies	Any 2	Accept multi-infarct dementia
c	1.Rivastigmine 2. Memantine 3. Ginko Bilboa 4. Risperidone	2	No half marks so 1 mark for 2 correct answers
d	Potential adverse effect 1. Interfere with platelet function 2. Enhances vasodilatation and hypotension caused by anaesthetic 3. Enhance side effects of anticholinergics and dopaminergic agonists 4. Prolong the effect of depolarising and reduce or reverse the effect of nondepolarising muscle relaxants. Enhanced cholinergic effects.	4	

e	• BIS guided anaesthesia to reduce dosage • Multimodal analgesia • Use of supplemental regional blocks • Avoid benzodiazepines • Avoid anticholinergics • Keep well hydrated • Ensure physiological normality e.g. BP	6	Accept: • 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

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.

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)

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

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

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d)

This is the result of the arterial blood gas analysis performed prior to transfer to the CT scanner, he is on an FiO_2 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)

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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)

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

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

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Q	Marking Guidance	Mark	Comments
a	GCS 5	1	Accept E1, V2, M2 Do not accept individual parts
b	To protect his airway As his GCS <8 To prevent secondary brain injury	1 1 1	No mark for “needs CT scan”
c	Rapid sequence induction Mention cervical spine control Use of emergency intubation checklist Induction agent – any appropriate one Muscle relaxant Addition of opiate to obtund hypertensive response to laryngoscopy	1 1 1 1 1 1	Accept “modified” Propofol Thiopentone Ketamine Suxamethonium or rocuronium No mark for lignocaine or beta blocker
d	Hypercapnoea Causes cerebral vasodilatation/increased cerebral blood flow Results in raised ICP Results in reduced CPP	1 1 1 1	Accept raised $PaCO_2$ as a result of under ventilation. No mark for acidosis. Accept any 3 points

e	46 mmHg	1	
f	Ensure adequate sedation – reduces CBF Optimise CO_2 – low end of normal – 4.0-4.5 kPa Nurse slightly head up – avoids venous congestion Consider use of mannitol Consider vasopressor to increase MAP Discuss with neurosurgeons – consider decompressive craniectomy Consider thiopentone to reduce ICP (bolus or infusion)	1 1 1 1 1 1 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
g	Focal areas of cerebral ischaemia Disruption of the blood-brain barrier Cerebral oedema/hyperaemia Impaired cerebral autoregulation Release of high levels of oxygen free radicals following injury Cellular inflammatory response - increased excitatory amino acids (glutamate, aspartate) Cell death and apoptosis	1 1 1 1 1 1 1	No marks for Monro-Kellie/closed box, or simply stating raised ICP –must give an explanation of why ICP rises

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.

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

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

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2……

3……

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)

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2……

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

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

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3……

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

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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)

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

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h)
Despite an F_iO_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)

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Q	Marking Guidance	Mark	Comments
a	Gallstones Alcohol related Idiopathic Post endoscopic procedure Infection	1 1 1 1 1	Max 3 but must include gallstones and alcohol
b	Abdominal pain consistent with disease Raised serum amylase or lipase Characteristic findings from abdominal CT/MRI/USS imaging	1 1 1	Accept epigastric or generalised, not just “abdominal pain” Give mark if say imaging not needed if 1st 2 criteria met
c	Adequate fluid resuscitation	1	Accept goal directed fluid therapy
d	Maintains gut integrity Reduced infection Reduces morbidity/mortality	1 1 1	Accept prevents bacterial translocation Accept reduced incidence of sepsis/line infection Accept reduced incidence of organ failure/pancreatic necrosis
e	Within 48-72 hours	1	
f	Acute onset within 1 week Bilateral opacities on CXR $PaO_2/FiO_2 \leq 300$ (39.9kPa) Not fully explained by cardiac failure or fluid overload	1 1 1 1	Must say within 1 week to get mark No need to include PEEP in definition but do not penalise if included

g	Production & 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 Prone positioning Inverse ratio Alternate modes of ventilation Recruitment manoeuvres	1 1 1 1 1	 Must give an example e.g.APRV, BIPAP, high frequency Accept open lung ventilation No marks for NO or ECMO as they are not ventilatory strategies

Syllabus	PM_IK_04, PM_IK_06, PM_IK_08
Question type	Moderate: pass mark 12/20
Topic	**CRPS**
Aim	To explore understanding of this chronic pain condition
Pass requirements	Candidates should basic knowledge of how to diagnose and treat CRPS

A 54 year old woman is referred to the pain clinic with a possible diagnosis of complex regional pain syndrome (CRPS). You undertake an assessment of her.

a)
Give three risk factors for the development of CRPS. (3 marks)

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2……

3……

b)
Give 8 features you might find on clinical examination that would help confirm the diagnosis of CRPS. (8 marks)

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6……

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8……

A diagnosis of CRPS is made. Her GP has commenced her on simple analgesics and a tricyclic antidepressant.

c)
What further drug treatments could she be offered? (4 marks)

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d)
Her pain persists. Give 5 non-drug treatments that may be offered? (5 marks)

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4……..……
5……

Q	Marking Guidance	Mark	Comments
a	Trauma Female gender Period of immobilisation Other inciting event (weaker)	1 1 1 1	Accept fracture, crush injury, sprain Have to give example – CVA, brain/spinal injury, MI, pregnancy, VCV infection, neoplasm, surgery Max 3
b	Allodynia Hyperalgesia/ hyperaesthesia Pain radiating beyond the initial area dermatomal distribution / stocking or glove distribution Oedema/abnormal sweating Increased hair growth/brittle nails/skin atrophy Erythema/bluish appearance/pallor/Temperature asymmetry Muscle weakness/tremor Dystonic posturing Contractures/reduced range of movement	Max 8	 Accept sudomotor changes Accept trophic changes Accept vasomotor changes
c	Corticosteroids with/without mannitol Bisphosphonate Topical local anaesthesia/capsaicin IV ketamine Oral baclofen Gabapentin/pregabalin Vasodilator (Ca channel or alpha blocker) Calcitonin	Max 4	Prednisiolone/methylprednisolone or dexamethasone & mannitol Alendronic acid/disodium pamidronate

d	TENS Spinal cord/peripheral nerve stimulator Sympathetic block/sympathectomy/IV regional anaesthesia Somatic nerve blocks/epidural infusions Trigger point injections Cognitive Behavioural therapy/ pain management programme/MDT referral Physiotherapy/occupational therapy	Max 5	Accept if say no longer recommended Accept: mirror therapy /desensitisation therapy/ weight bearing

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

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)

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

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

1. ……

2. ……

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

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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)

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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 post-operative period? (4 marks)

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g)

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

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Q	Marking Guidance	Mark	Comments
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	4	No marks for restrict IV fluids – accept 1-1.5ml/kg/hr Accept no IV fluids and free oral fluid
	If urine output <0.5mls/kg/hr give fluid challenge If no response consider invasive monitoring		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 protein