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# Question Papers

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# Paper 1

## MTF Question 1

With regard to measurement of humidity, which of the following statements are correct?

- a) Most instruments measure absolute humidity
- b) Regnault's hygrometer has a silver tube containing ether
- c) Absolute humidity can be measured by transducers
- d) The hair hygrometer works on the principle that hair shortens as humidity increases
- e) The wet and dry bulb hygrometer relies on the cooling effect by loss of latent heat of vaporisation for its function

## MTF Question 2

Which of the following statements regarding ketamine are true?

- a) Ketamine causes analgesia through its activity at opioid receptors
- b) NMDA receptor antagonism is the main mechanism of ketamine effect
- c) Ketamine blocks the release of glutamate in the CNS
- d) Ketamine blocks activity at muscarinic receptors in the central nervous system
- e) Like all general anaesthetic agents, ketamine has activity at the GABA<sub>A</sub> receptor

## MTF Question 3

Causes of hypokalaemia include:

- a) Pyloric stenosis
- b) Villous adenoma of rectum
- c) Conn's syndrome
- d) Theophylline poisoning
- e) Renal tubular acidosis

## MTF Question 4

The physiological features of severe anorexia nervosa include:

- a) Cardiomyopathy
- b) Proteinuria
- c) Bradycardia

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- d) Gastric dilation
- e) Panhypopituitarism

**MTF Question 5**

Regarding the use of targeted temperature management after cardiac arrest:

- a) The ideal target temperature is 30 °C
- b) J waves are a common finding on the ECG of a patient at 31 °C
- c) At the end of the cooling period, passive rewarming should be allowed
- d) A heart rate of 38 beats per minute when the patient's temperature is 32 °C is an indication for rewarming
- e) Shivering should preferentially be treated with a non-depolarising neuromuscular blocking drug (NMBD)

**MTF Question 6**

Regarding gabapentin, which of the following statements are true?

- a) Gabapentin is an agonist at the  $\gamma$ -aminobutyric acid (GABA)<sub>A</sub> receptor
- b) Gabapentin is metabolised by the CYP3A4 isoenzyme
- c) Gabapentin is available in a transdermal drug delivery patch
- d) Gabapentin can be used for the treatment of acute pain
- e) Gabapentin enhances the action of morphine

**MTF Question 7**

Regarding the neuromuscular junction:

- a) The synaptic cleft is 5 nanometres wide
- b) There are 10 acetylcholine receptors for every molecule of acetylcholine released in a conducted impulse
- c) Nerve fibres converge on the motor end-plate of the muscle fibre
- d) The terminal portion of the motor neurone is unmyelinated
- e) Prejunctional acetylcholine receptors have the same morphology as the postjunctional ones

**MTF Question 8**

Regarding the porphyrias:

- a) They are rare acquired disorders of haem biosynthesis
- b) They are rare genetic disorders of haem breakdown
- c) Acute intermittent porphyria presents with neurovisceral crises and cutaneous manifestations
- d) Urine porphobilinogens are not raised between attacks in acute intermittent porphyria
- e) Treatment of an acute attack includes a low-carbohydrate diet

**MTF Question 9**

Regarding urinary tract infection:

- a) Gram-negative organisms are usually involved
- b) It rarely causes sepsis
- c) More than 100 000 organisms/mm<sup>3</sup> on urinary microscopy is significant

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- d) Urinary catheterisation is rarely associated
- e) Treatment should include urinary catheterisation

### MTF Question 10

Which of the following statements regarding pharmacology in renal failure are true?

- a) In acute kidney injury (AKI), the loading dose of a drug which undergoes excretion via the renal tract may need to be increased
- b) The commonest reason for AKI caused by aminoglycosides is that they cause an interstitial nephritis
- c) Imipramine is a cause of obstructive (post-renal) AKI
- d) Acetazolamide is a cause of obstructive (post-renal) AKI
- e) When using ketamine for analgesia, the dose should be reduced in patients with AKI

### MTF Question 11

Regarding the role and location of central chemoreceptors in the control of breathing:

- a) The central chemoreceptors are located near the dorsal surface of the pons
- b) Central chemoreceptors respond rapidly to changes in carbon dioxide tension in the blood
- c) Central chemoreceptors respond rapidly to changes in oxygen tension in the blood
- d) The pH of cerebrospinal fluid is slightly acidic compared with plasma
- e) Respiratory acidosis causes a greater increase in ventilation than metabolic acidosis

### MTF Question 12

With regard to the cardiovascular complications associated with obesity, which of the following statements are correct?

- a) Renal blood flow is increased in obesity
- b) Cardiac arrhythmias can be caused by fatty infiltration of the conduction system
- c) Obese individuals have an increased cardiac output predominantly due to an increased heart rate
- d) Absolute blood volume is increased
- e) Systemic hypertension is 2 times more prevalent than in the non-obese population

### MTF Question 13

With regard to critical care outreach services (CCOS), which of the following are true?

- a) There is no evidence that it reduces the number of patients who have received cardiopulmonary resuscitation (CPR) prior to ICU admission
- b) There is strong (level 1A) evidence that it reduces ICU mortality
- c) CCOS was introduced into the NHS without formal prospective evaluation processes
- d) Early warning scores may form part of the track and trigger approach
- e) Education of ward staff and junior doctors commonly forms part of its remit

### MTF Question 14

Which of the following are true of hyperosmolar non-ketotic coma (HONK)?

- a) It is the same as hyperosmolar hyperglycaemic state

- b) It is more common in type 1 diabetes than in type 2 diabetes
- c) It presents with a mild ketosis
- d) It presents in the absence of coma
- e) Severe hyperglycaemia causes a functional thrombocytopenia

**MTF Question 15**

Which of the following are recognised treatment options used in confirmed cyanide poisoning?

- a) Dicobalt edetate
- b) Hydroxocobalamin
- c) Gastric lavage
- d) Sodium nitroprusside
- e) Sodium thiosulphate

**MTF Question 16**

Functional residual capacity (FRC):

- a) Can be measured using Fowler’s method
- b) Is the sum of the residual volume and the expiratory capacity
- c) Is a fixed volume
- d) Exceeds the closing capacity in the elderly
- e) May be reduced by restrictive lung disease

**MTF Question 17**

Which of the following statements are true regarding Turner syndrome?

- a) Patients often suffer from menorrhagia
- b) Common clinical features include short stature
- c) It only affects females
- d) Mental retardation is common
- e) Coarctation of the aorta occurs in 10% of patients

**MTF Question 18**

Regarding psychological techniques in pain management:

- a) There is no evidence to support psychological support in chronic pain patients
- b) Psychological management is helpful to cure chronic pain conditions
- c) Cognitive behavioural therapy challenges maladaptive thinking patterns
- d) Encouraging patients to pace their activity facilitates coping with chronic pain
- e) Psychological techniques encourage malingering behaviour

**MTF Question 19**

Which of the following statements regarding community-acquired pneumonia (CAP) are true?

- a) A chest radiograph is necessary to make the diagnosis
- b) Urea and electrolytes (U&E) offers important prognostic information

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- c) The white blood cell (WBC) count is an important prognostic determinant in non-immunosuppressed patients
- d) *Staphylococcus aureus* is the most common causative organism
- e) Macrolides should be discontinued in patients admitted to intensive care if the atypical pneumonia screen is negative

### MTF Question 20

The following are true of the use of clonidine in critical care:

- a) It is predominantly a postsynaptic  $\alpha_2$ -adrenoreceptor agonist
- b) It has an oral bioavailability approaching 100%
- c) On starting the medication it may cause initial, short-lived, hypertension
- d) It can be stopped abruptly without a reducing dosage regime
- e) It is the first-line treatment for agitation in a recently extubated patient with traumatic brain injury and established acute alcohol withdrawal

### MTF Question 21

Regarding current religious rulings and cultural attitudes to brainstem death in the UK, which of the following statements are true?

- a) It is considered *haraam* (forbidden) for Muslims to become heart-beating organ donors
- b) Orthodox Jewish law, *Halacha*, accepts brainstem death as comparable to cardiorespiratory death
- c) *Shariah* (Islamic) law representatives in the UK consider brainstem death to be a true definition of death
- d) Buddhist doctrine does not accept brainstem death to be a true definition of death
- e) Brainstem death is still considered legal in the UK even if the patient's family reject the diagnosis on religious grounds

### MTF Question 22

Concerning the pipeline medical gas supply to theatres:

- a) Medical oxygen is supplied at a pressure of 4 bar via a white coloured hose
- b) Air is supplied via a black and white hose at a pressure of either 4 or 7 bar
- c) The pipeline gas distribution network upstream of the wall terminal outlets is made of reinforced PVC with an antistatic core
- d) Each Schrader valve has a similar external diameter irrespective of the gas pipeline that ends at it
- e) By law it must be possible to disconnect a hose from a Schrader valve using one hand only

### MTF Question 23

Which of the following statements regarding local anaesthetics are true?

- a) Ester and amide local anaesthetic agents have exactly the same mechanism of action
- b) Local anaesthetic agents are weak acids
- c) A local anaesthetic agent with a low pKa will have a fast onset of activity
- d) Local anaesthetic agents only work after being 'trapped' inside nerve cells
- e) Local anaesthetic agents preferentially bind to sodium channels in their open state

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### MTF Question 24

Which of the following statements about the intercostal nerves are correct?

- a) The intercostal nerves contain sensory, motor and autonomic fibres
- b) The intercostal nerves supply the skin over the sternum and over the spine
- c) The intercostal nerves run between the internal intercostal muscle and the transversus thoracic muscle
- d) Paravertebral block will provide adequate analgesia for a rib fracture
- e) A chest drain should be inserted at the inferior aspect of the intercostal space

### MTF Question 25

The following are features suggestive of carcinoid syndrome:

- a) Diarrhoea
- b) Hypertensive episodes
- c) Facial flushing
- d) Dementia
- e) Wheeze

### MTF Question 26

When performing an arterial blood gas, which of the following are true?

- a) Excess heparin in the syringe will make the sample more acidic
- b) Carbon dioxide levels are measured by changes in electrode pH
- c) Air bubbles in the sample increase the carbon dioxide partial pressure
- d) A pH of 7.4 is equivalent to 40 mmol/L of hydrogen ions
- e) A sample kept at room temperature has a lower hydrogen ion concentration

### MTF Question 27

Which of the following statements regarding the Glasgow Coma Scale (GCS) are true?

- a) A decorticate response to stimulus will score 2 on the motor component
- b) Moaning in pain will score 2 on the voice component
- c) A sternal rub is an appropriate painful stimulus
- d) With asymmetrical limb movement, the best limb should be scored for the motor component
- e) The original Glasgow Coma Scale was scored out of 14

### MTF Question 28

Which of the following cause a rise in end-tidal carbon dioxide?

- a) Pulmonary embolism
- b) Hypovolaemia
- c) Hyperthermia
- d) Sepsis
- e) Flow rates of less than 150 mL/kg/min using a coaxial Mapleson D circuit during spontaneous ventilation



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### MTF Question 29

Regarding renin:

- a) Renin is released from the macula densa in response to a decrease in circulating volume
- b) Release is inhibited by angiotensin II
- c) Sympathetic stimulation, via activation of  $\alpha$ -adrenoreceptors, stimulates renin release
- d) Release is stimulated by atrial natriuretic peptide
- e) Renin directly stimulates the release of vasopressin

### MTF Question 30

Regarding magnesium:

- a) Magnesium is the second most abundant extracellular cation
- b) Magnesium antagonises *N*-methyl-D-aspartic acid (NMDA) receptors in the central nervous system
- c) The biggest stores of magnesium in the body are in the skeleton
- d) Magnesium is a cofactor for  $\text{Na}^+/\text{K}^+$ -ATPase
- e) Hypomagnesaemia may produce cardiac arrhythmias similar to those caused by hypokalaemia

### MTF Question 31

With regard to the diagnosis and treatment of gestational hypertension:

- a) Oral hydralazine should be commenced as first-line treatment
- b) Gestational hypertension is defined as a sustained sitting blood pressure  $> 140/90$  mmHg occurring after 20 weeks gestation
- c) Gestational hypertension is defined as an increase in systolic blood pressure  $\geq 30$  mmHg or diastolic blood pressure  $\geq 15$  mmHg occurring after 20 weeks gestation
- d) Oral labetalol at a dose of 50–100 mg twice daily is appropriate initial treatment unless there are contraindications
- e) Amlodipine is an acceptable alternative to nifedipine to treat gestational hypertension

### MTF Question 32

Regarding the cranial vault in a healthy adult:

- a) The mass of a human brain is approximately 1000 g
- b) Brain parenchyma occupies 85% of the cranial volume
- c) Volume of cerebrospinal fluid in the cranial vault is 150 mL
- d) Blood occupies 7% of cranial vault volume
- e) Early compensation for raised intracranial pressure (ICP) includes reduced production of cerebrospinal fluid

### MTF Question 33

Regarding pyloric stenosis:

- a) It is more common in females
- b) Metabolic acidosis is common
- c) Surgery must be performed immediately upon diagnosis

- d) It usually presents in the first week of life
- e) Blood results typically show a hypokalaemic, hyperchloraemic metabolic alkalosis

**MTF Question 34**

Which of the following statements about desflurane are true?

- a) Desflurane has a lower blood: gas partition coefficient than nitrous oxide
- b) Desflurane increases the risk of haemorrhage during obstetric procedures
- c) Desflurane increases respiratory secretions and may cause bronchospasm
- d) Desflurane is likely to cause bradycardia if used at high concentrations
- e) Desflurane requires a special vaporiser because it is unstable at room temperature

**MTF Question 35**

Regarding Duchenne muscular dystrophy (DMD):

- a) DMD presents from early childhood and is progressive
- b) DMD occurs equally in both sexes
- c) Genetic counselling is recommended
- d) Calf hypertrophy with lower motor neurone signs and restrictive lung function deficit are indicative of DMD
- e) Diagnosis is confirmed by response to steroid therapy and plasmaphoresis or immunoglobulin infusion

**MTF Question 36**

Which of the following statements regarding the internal jugular vein are correct?

- a) The internal jugular vein drains the sigmoid sinus
- b) The internal jugular vein joins the subclavian vein posterior to the clavicle
- c) The internal jugular vein begins at the foramen lacerum at the base of the skull
- d) Horner’s syndrome is a recognised complication of attempted cannulation of the internal jugular vein
- e) The internal jugular vein is valveless

**MTF Question 37**

A 17-year-old girl is admitted to the emergency department with collapse following a 2-day history of vomiting. On examination she is slim, with patches of vitiligo. She is currently haemodynamically stable. Blood tests reveal sodium 129 mmol/L, potassium 6.9 mmol/L, urea 5.2 mmol/L, creatinine 89 µmol/L. ECG shows sinus rhythm with peaked T waves. Ideal initial management should include:

- a) Intravenous hydrocortisone
- b) Salbutamol nebuliser
- c) Short adrenocorticotrophic hormone (ACTH) stimulation test
- d) Calcium gluconate
- e) Intravenous glucose and insulin infusion

**MTF Question 38**

Which of the following statements relating to an amniotic fluid embolism (AFE) are correct?