

Clinical Medicine and Public Health: Second-round Sample Tasks for the Open Doors Postgraduate Track

You will be asked to complete 40 tasks, including

- 24 entry-level tasks with one correct answer, each worth 1 point;
- 12 intermediate-level tasks with multiple correct answers, each worth 3–4 points;
- 4 advanced-level tasks requiring a constructed response, each worth 9 points.

Assessment criteria and standard answers are provided for the advanced tasks requiring detailed responses.

Anatomy and Morphology

Task 1

Entry level (1 point)

The groove of the ulnar nerve of the humerus is located:

- a) in front of the medial epicondyle.
- b) in front of the lateral epicondyle.
- c) behind the medial epicondyle.
- d) behind lateral epicondyle.

Answer: behind the medial epicondyle

Task 2

Entry level (1 point)

Which region originates at the pectoralis major?

- a) Head
- b) Clavicular
- c) Cervical
- d) Scapular

Answer: Clavicular

Task 3

Entry level (1 point)

Where is the pineal gland located?

- a) In the metathalamus region of the diencephalon
- b) Near the crossing of the optic nerves
- c) In the groove between the upper tubercles of the midbrain
- d) In the epithalamus of the diencephalon

Answer: In the groove between the upper tubercles of the midbrain

Task 4
Intermediate level (3 points)

Which cranial nerves are responsible for gustatory sensitivity?

- a) Trigeminal nerve (V)
- b) Facial nerve (VII)
- c) Glossopharyngeal nerve (IX)
- d) Vagus nerve (X)

Answer: Facial nerve (VII), Glossopharyngeal nerve (IX), Vagus nerve (X).

Physiology

Task 1
Entry level (1 point)

Which of the following is NOT included in biological motivation?

- a) Professional ambitions
- b) Hunger
- c) Fear
- d) Thirst

Answer: Professional ambitions

Task 2
Entry level (1 point)

Hypercapnia primarily affects respiration by stimulating which of the following?

- a) Carotid and aortic bodies receptors
- b) Central (medullary) chemoreceptors
- c) Arterial baroreceptors
- d) Hypoglossal nerve

Answer: Central (medullary) chemoreceptors

Task 3
Entry level (1 point)

Which of the following is a mediator in a synaptic contact between a somatic nerve and a skeletal muscle?

- a) Noradrenaline
- b) Acetylcholine
- c) Serotonin
- d) Glycine

Answer: Acetylcholine

Task 4
Intermediate level (3 points)

Which of the following are caused by norepinephrine's interaction with alpha1-adrenergic receptors?

- a) Vasoconstriction
- b) Pupil dilation
- c) Bronchial dilation
- d) Pupil narrowing

Answer: Vasoconstriction, Pupil dilation

Pathology

Task 1
Entry level (1 point)

Which of the following is caused by cell swelling?

- a) Increased inflow of Na⁺
- b) Increased inflow of K⁺
- c) Accumulation of lactic acid
- d) Accumulation of albumin

Answer: increased inflow of Na⁺

Task 2
Entry level (1 point)

Which of the following is NOT a characteristic pathologic feature of apoptosis?

- a) Nuclear chromatin condensation
- b) Nuclear fragmentation
- c) Cytoplasmic budding
- d) Swelling of organelles

Answer: Swelling of organelles

Task 3
Intermediate level (3 points)

Which of the following are secondary pyrogens?

- a) Interleukin-1
- b) Thromboxane a₂
- c) Lipopolysaccharide
- d) Interleukin-6

Answer: Interleukin-1, Interleukin-6

Task 4

Intermediate level (3 points)

Which of the following are found in a tuberculous granuloma?

- a) Plasma cells
- b) A focus of caseous necrosis
- c) Epithelioid cells
- d) Langhans giant cells

Answer: Focus of caseous necrosis, Epithelioid cells, Langhans giant cells

Pharmacology

Task 1

Entry level (1 point)

Which of the following is a non-opioid analgesic that has analgesic and antipyretic effects but virtually no anti-inflammatory properties?

- a) Ketamine
- b) Paracetamol
- c) Amitriptyline
- d) Carbamazepine

Answer: Paracetamol

Task 2

Entry level (1 point)

Which of the following statements is correct?

- a) M-cholinoblockers cause arterial hypertension.
- b) M-anticholinergics reduce the secretion of exocrine glands by blocking parasympathetic influences on the glands.
- c) M-cholinoblockers cause relaxation of the radial muscle of the iris.
- d) M-anticholinergics increase intraocular pressure by increasing the production of intraocular fluid.

Answer: M-anticholinergics reduce the secretion of exocrine glands by blocking parasympathetic influences on the glands.

Task 3

Intermediate level (3 points)

Which of the following does the concept of “pharmacokinetics” include?

- a) Mechanisms of drug action
- b) Distribution of drugs in the body
- c) Pharmacological effects
- d) Drug metabolism

Answer: Distribution of drugs in the body, Drug metabolism

Task 4
Intermediate level (3 points)

Which of the following are contraindications for the use of cardiac glycosides?

- a) Heart failure
- b) Tachyarrhythmic forms of atrial fibrillation
- c) Atrioventricular block
- d) Bradycardia

Answer: Atrioventricular block, Bradycardia

General and Internal Medicine

Task 1
Entry level (1 point)

Which of the following is a manifestation of pneumonia in elderly and senile patients?

- a) Unexplained falls
- b) Hectic fever
- c) An acute beginning
- d) Abundant purulent sputum

Answer: Unexplained falls

Task 2
Entry level (1 point)

In the NYHA classification, which distance covered in a 6-minute walk corresponds to Class II chronic heart failure?

- a) 301–425 meters
- b) 151–300 meters
- c) Less than 150 meters
- d) 426–550 meters

Answer: 301–425 meters

Task 3
Entry level (1 point)

Which of the following characterizes chronic hepatitis C?

- a) Predominance of ALT over AST

- b) Predominance of AST over ALT
- c) Isolated increase in ALT
- d) Isolated increase in AST

Answer: Dominance of AST over ALT

Task 4

Intermediate level (4 points)

Which of the following are recommended for the prevention of bleeding from varicose veins?

- a) Prescription of non-selective beta-blockers
- b) Endoscopic ligation of varicose veins esophagus
- c) Prescription of super-selective beta-blockers
- d) Ligation of hemorrhoidal veins

Answer: The prescription of non-selective beta-blockers, Endoscopic ligation of varicose veins esophagus

Task 5

Advanced level (9 points)

A 20-year-old patient reported weakness, reduced physical and mental performance, unpleasant sensations in the muscles, and episodic pain in both small and large joints during movement.

Past medical history: the patient reported being ill for two weeks, with the first symptoms appearing after work-related stress. The symptoms have been progressively worsening. Despite taking multivitamins to alleviate the symptoms, there was no improvement, which led her to seek medical help.

Life history: the patient is single and lives in an apartment. She works in an office with an “irregular” schedule and describes her work as “stressful.” The patient does not smoke, drink alcohol, or use substances. She occasionally takes multivitamins. Two months ago, she underwent a medical examination that included visits to a general practitioner, gynecologist, neurologist, and otorhinolaryngologist, as well as fluorography, general blood and urine tests, and biochemical blood tests. No pathology was detected. The patient is physically active and exercises regularly. There is no history of hereditary or chronic illnesses, and no epidemiological history of diseases. She has been vaccinated according to the recommended schedule for her age.

Examination: The patient's condition is relatively satisfactory. She has an asthenic physique, with a height of 178 cm and a weight of 62 kg. The skin and mucous membranes are of normal color. The joints are normal, and there are no pathologies in the respiratory or circulatory systems. The abdomen is of normal size, soft to palpation, and painless throughout. The liver and spleen are not enlarged, and there is no dysuria.

Laboratory examination:

A general blood test showed an increase in ESR up to 30 mm / h;

HBsAg, HCV Ab, and HIV 1 and 2 antibodies, as well as the HIV 1 and 2 antigen (HIV Ag/Ab Combo), are negative.

Biochemical blood test: ALT was within the upper limit of normal (ULN); AST-15 ULN; total and direct bilirubin levels were normal; ALP-1.5 ULN; GGT: 2 ULN; INR-1.30 (norm 0.8-1.2); total protein-88 g / l (the norm up to 83); albumin-30 g/l (the norm of 35–52); alpha 1 and 2 levels, beta globulins were normal; gamma globulin level was 22 g/l (ULN is 15.2); M-gradient was not detected on electrophoresis when assessing immunoglobulin levels; a slight increase in IgA, IgM levels and an increase in IgG levels up to 2 ULN were noted.

Questions and tasks:

1. What is the most probable diagnosis? Explain your answer.
2. Create a plan for an additional patient examination and explain your choices.
3. What therapy would you prescribe for this patient, including regimen, diet, and medication?

Answer:

1. Highly active autoimmune hepatitis. The diagnosis is based on the detected cytolysis syndrome, with ALT and AST levels considerably above the ULN and moderately elevated ALP and GGT levels. The lack of markers for hepatotropic infections in the blood, no history of alcohol abuse or hepatotoxic drug use, no family history of liver diseases, combined with severe hypergammaglobulinemia and polyclonal gammopathy with a predominant increase in IgG levels, and the absence of physical and laboratory signs of cirrhosis, suggest an autoimmune nature of hepatitis. A tenfold increase in ALT and AST compared to the norm makes it possible to classify hepatitis as acute.

2. Considering the previous examinations, an ultrasound of the abdominal organs is necessary to exclude focal liver pathology, bile duct and gallbladder diseases, portal hypertension, and abdominal cavity lymphadenopathy. The patient has a clinical and biochemical picture of acute hepatitis. The tests performed are insufficient to completely rule out the viral nature of hepatitis. To exclude acute hepatitis C, HCV RNA should be tested in the blood; for acute hepatitis A and E, anti-HAV IgM and anti-HEV IgM should be tested; and for infectious mononucleosis, EBV DNA and antibodies to the early EBV antigen should be determined. There is no need to exclude acute hepatitis B, since the patient has been vaccinated against HBV. The level of immunity should be assessed by a quantitative anti-HBs test. To confirm the diagnosis of autoimmune hepatitis, it is necessary to determine a-nuclear antibodies (ANA), smooth muscle antibodies (SMA), and antibodies to liver and kidney microsomes type 1 (anti-LKM-1), liver nocturnal cytosolic protein (anti-LC-1), soluble hepatic antigen (anti-SLA), and hepatic-pancreatic antigen (anti-LP). It is also crucial to conduct screening for Wilson's disease by testing serum ceruloplasmin and hemochromatosis-ferritin.

3. No special health regimen is required. The diet should be rich in protein (a high-protein diet). Recommended medications include glucocorticosteroids (prednisolone, methylprednisolone, budesonide) and immunosuppressants (azathioprine, 6-mercaptopurine, cyclophosphamide)

Assessment criteria:

Question 1

1. A correct, complete, and logically justified diagnosis is worth 3 points.
2. A diagnosis that is correct but incomplete or insufficiently justified is worth 2 points.

Question 2

1. A correct, complete, and logically justified examination plan is worth 3 points.
2. An examination plan that is correct but incomplete or insufficiently justified is worth 2 points.

Question 3

1. A correct, complete, and logically justified treatment plan is worth 3 points.
2. A treatment plan that is correct but incomplete or insufficiently justified is worth 2 points.

Surgery

Task 1

Entry level (1 point)

Within which method is a polypropylene mesh prosthesis used in hernioplasty?

- a) Lichtenstein
- b) Shouldice
- c) Bossini
- d) Marcy

Answer: Lichtenstein

Task 2

Entry level (1 point)

Which of the following is Murphy's ultrasound symptom in acute cholecystitis?

- a) Pain on probe pressure in the right subcostal region
- b) Thickening of the gallbladder wall
- c) Increase in the size of the gallbladder
- d) Sludge in the gallbladder lumen

Answer: Pain on probe pressure in the right subcostal region

Task 3

Entry level (1 point)

Abdominal effusion in colon perforation is:

- a) Fecal.
- b) Hemorrhagic.

- c) Fibrinous.
- d) Chylous.

Answer: Fecal

Task 4
Intermediate level (4 points)

Which of the following is acute cholecystitis characterized by?

- a) Nausea and vomiting
- b) Pain in the RUQ
- c) Leukocytosis
- d) Irradiation of pain to the perineum

Answer: Nausea and vomiting, Pain in the RUQ, Leukocytosis

Task 5
Advanced level (9 points)

A 38-year-old woman was brought to the emergency department with recurrent episodes of severe, sharp abdominal pain in the right upper quadrant with repeated nausea and vomiting. The patient's height was 170 cm, weight 72 kg, BMI 24.9 kg/m². Her temperature was 38.0 °C (100.4 °F), pulse 99 beats per minute, blood pressure 120/80 mmHg, respiratory rate 22/min. On palpation, the abdomen was moderately tense in the right subcostal region. Peristalsis was audible. ECG discovered sinus tachycardia. According to the abdominal ultrasound, the pancreas and liver show no abnormalities, the common bile duct measures 6 mm, the gallbladder is enlarged and contains multiple concrements, having a layered wall up to 8 mm thick, and there is perivesical fluid with gas bubbles.

Questions and tasks:

1. List the syndromes seen in the patient.
2. What is the most likely diagnosis?
3. Propose a treatment algorithm.

Answer:

1. Abdominal pain syndrome. Systemic inflammatory response syndrome (tachycardia, tachypnoea, fever). Dyspepsia.
2. The diagnosis is acute cholecystitis.
3. Surgical treatment is recommended; cholecystectomy is indicated due to signs of destructive cholecystitis, including wall thickening up to 8 mm and perivesical fluid with gas bubbles.

Assessment criteria:

Question 1

1. Syndromes indicated correctly and completely are worth 3 points.
2. Syndromes indicated correctly but incompletely are worth 2 points.

Question 2

A correctly indicated diagnosis is worth 3 points.

Question 3

1. A correct, detailed treatment algorithm that includes all necessary treatment measures is worth 3 points.
2. A correct but incomplete treatment algorithm is worth 2 points.

Dentistry and Oral Surgery

Task 1

Entry level (1 point)

Which of the following is an oral manifestation of chronic poisoning by heavy metals?

- a) Black line along the gingival margin
- b) Periodontal pockets
- c) Overgrowth of gingival papilla
- d) Oral candidiasis

Answer: Black line along the gingival margin

Task 2

Entry level (1 point)

In chronic odontogenic sinusitis, which wall of the maxillary sinus is primarily affected?

- a) Medial
- b) Lower
- c) Back
- d) Top

Answer: Lower

Task 3

Intermediate level (4 points)

Which of the following are pathological processes in oral leukoplakia?

- a) Hyperkeratosis
- b) Acanthosis
- c) Acantholysis
- d) Necrosis

Answer: Hyperkeratosis, Acanthosis

Task 4
Intermediate level (4 points)

Which of the following are facial lymph nodes?

- a) Buccal
- b) Molar
- c) Submandibular
- d) Mastoid

Answer: Buccal, Molar

Infectious Diseases

Task 1
Entry level (1 point)

Which of the following is the ability of a population to resist the damaging effects of a disease pathogen?

- a) immunity
- b) Incidence
- c) Susceptibility
- d) Contagiousness

Answer: Herd immunity

Task 2
Entry level (1 point)

Which of the following describes the advantage of live vaccines over inactivated vaccines?

- a) More robust immunity
- b) Fewer adverse effects
- c) Do not require maintaining the cold chain
- d) Do not cause allergic reactions

Answer: More robust immunity

Task 3
Entry level (1 point)

Seasonal rises of morbidity are characteristic of:

- a) The majority of infectious diseases.
- b) Some noncommunicable diseases.
- c) All noncommunicable diseases.
- d) All diseases, regardless of their origin.

Answer: The majority of infectious diseases

Task 4

Intermediate level (3 points)

Which natural factors influence the intensity of an epidemic process?

- a) Living and working conditions
- b) Migration
- c) Climate
- d) Virulence of the pathogen

Answer: Climate, Virulence of the pathogen

Task 5

Advanced level (9 points)

During a continuous descriptive epidemiological study conducted in European Russia's cities of A and B, the former more populous than the latter, researchers identified features of the long-term incidence of influenza and ARVI. It was revealed that, over the past 5 years, the incidence of influenza and ARVI in city A has consistently exceeded that in city B. Additionally, the incidence in city A shows a trend of increasing, whereas in city B, the incidence remains relatively stable.

Questions:

1. What epidemiological indicators should be calculated to compare the incidence in these populations?
2. What social factors could explain the observed features of the epidemic process? Please provide examples.
3. What natural factors could explain the observed features of the epidemic process? Please provide examples.

Answer:

1. To compare incidence in populations with differing sizes, it is essential to calculate intensive indicators such as incidence and prevalence. Comparing absolute numbers alone is inadequate because it does not account for differences in population size.
2. Social factors influencing the intensity for anthroponoses of epidemic processes with an aerosol transmission mechanism may include: economic factors, sanitary and communal amenities, urbanization and overcrowding, national and religious characteristics, periods of social instability, quality of medical care, vaccination coverage, and public awareness of the disease and preventive measures. In addition, the incidence rate may depend on the quality of disease registration and diagnosis.
3. Natural factors influencing the intensity for anthroponoses of epidemic processes with an aerosol transmission mechanism are as follows: climatic conditions (temperature, humidity, etc.), characteristics of circulating microbial strains (virulence, contagiousness).

Assessment criteria:

Question 1

Correctly listed indicators, with their use justified, are worth 3 points.

Indicators that are not listed correctly, but whose meaning is explained and use justified, are worth 2 points.

Question 2

Social factors listed correctly, with the features of the epidemic process and transmission mechanism specified and examples provided, are worth 3 points.

Social factors listed correctly but lacking either examples or features of the disease are worth 2 points.

Question 3

Natural factors listed correctly, with the features of the epidemic process and transmission mechanism considered and examples provided, are worth 3 points.

Natural factors listed correctly but lacking either examples or features of the disease are worth 2 points.

Public Health

Task 1

Entry level (1 point)

Which of the following is a criterion of tertiary prevention effectiveness?

- a) Number of deaths in patients
- b) Incidence
- c) Index of health
- d) Percentage of people older 50 years in the population

Answer: Number of deaths in patients

Task 2

Entry level (1 point)

Which of the following is an integral medico-demographic rate?

- a) Infant mortality rate
- b) Death rate
- c) Population size
- d) Immigration level

Answer: Infant mortality rate

Task 3

Entry level (1 point)

Which statistical test should be used to compare numerical variables in three or more independent groups with non-normally distributed data?

- a) Kruskal–Wallis H-test
- b) Pearson's χ^2 -test
- c) Variation coefficient
- d) Unpaired Student's t-test

Answer: Kruskal–Wallis H-test

Task 4

Intermediate level (3 points)

The main characteristics of individual strategies of prevention:

- a) Are used at the level of medical organizations.
- b) Are aimed at identifying specific risk factors for every person.
- c) Provide results not earlier than in 5–10 years.
- d) Are aimed at reducing risk factors in population groups with high risk of diseases.

- i. **Answer:** Are used at the level of medical organizations; Are aimed at identifying specific risk factors for every person.

ii.

Task 5

Advanced level (9 points)

A study was conducted to assess the self-reported quality of life and associated social factors among residents of city K with the view to developing social programs for health protection.

Questions and tasks:

1. What are the objectives of the research?
2. What are the research program elements (observation unit, studied characteristics with their types specified).
3. Outline the research plan (research object, place of study, type of study by period, type of study by scope).

Answer:

1. Research objectives:
 - to study the social environment of city K;
 - to analyze the self-reported quality of life of residents of K;
 - to develop social programs for health protection.

2. Research program elements. The unit of observation is an adult resident of K. Studied characteristics: gender (nominal), age (continuous), living conditions (nominal), social class (ordinal), self-assessed quality of life (continuous).

3. Research plan elements. Object of study: residents of K. Place of study: city K. Type of study by period: cross-sectional. Type of study by scope: selective.

Assessment criteria:

Question 1

Correctly formulated research objectives, with details indicated and the objectives logically reflecting the sequence of necessary research steps, are worth 3 points.

Broadly outlined research objectives logically reflecting the sequences of necessary research steps are worth 2 points.

Question 2

3 points are awarded for a correctly formulated unit of observation, provided that examples of studied characteristics are provided and their types specified.

2 points are awarded for a correctly formulated unit of observation if examples of studied characteristics are given, but their types are not specified.

Question 3

3 points are awarded when all elements of the research plan are noted correctly, including the object of study, place of research, type of research by time, and type of research by volume.

2 points are awarded when 2–3 elements of the research plan are noted correctly.