

**MINISTRY OF HEALTH OF UKRAINE**  
**ODESA NATIONAL MEDICAL UNIVERSITY**

Faculty Medical №1

Department of simulation medical technologies

**CONFIRMED by**  
Vice-rector for scientific and pedagogical work  
**Eduard BURYACHKIVSKY**

September 1, 2023

**METHODICAL RECOMENDATION**  
**FOR INDIVIDUAL WORK OF HIGHER EDUCATION ACQUISITIONS IN THE**  
**ACADEMIC DISCIPLINE**

**«MEDICAL PRACTICE. SIMULATION TRAINING»**

Faculty, course: International, 5 year

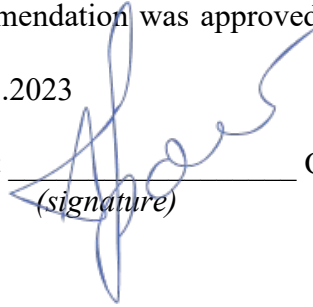
Educational Discipline: Medical practice. Simulation training

**Approved:**

The methodical recommendation was approved at the meeting of the department of simulation  
medical technologies

Protocol No. 1 of 28.08.2023

Head of the department



Oleksandr ROGACHEVSKYI

*(signature)*

Authors:

head of the department Oleksandr ROGACHEVSKYI

assistant of professor Olha YEHORENKO

associate professor, PhD Mykhailo PERVAK

associate professor, PhD Vasyl GLADCHUK

associate professor, PhD Yuriy PETROVSKIY

assistant of professor Viacheslav ONYSHCHENKO

assistant of professor Dmytro KARAKONSTANTYN

assistant of professor Svitlana TRISHCHENKO

assistant of professor Hennadii CHEREMNYKH

assistant of professor Andrii DOBROVOLSKYI

**Topic 1:** ECG interpretation in ACS, heart rhythm and conduction disturbances.

**Goal:**

- Acquire knowledge of a normal ECG and - the procedure for deciphering an electrocardiogram (ECG).
- Classification of arrhythmias and their most common forms in clinical practice.
- Mechanisms of violations of automaticity, excitability and conduction of the heart.
- Electrocardiographic signs of certain types of arrhythmias.

**Be able:**

- record an electrocardiogram and electrocardiogram recording technique.
- Writing the protocol of the ECG conclusion and clinical interpretation of the obtained data.
- To master the knowledge of ECG changes in the case of violations of the function of automatism, excitability and conduction.
- To study the ECG signs of hypertrophy of the heart, ECG changes in various clinical forms of coronary heart disease.

**ECG analysis algorithm.**

- 1) Determination of the rhythm of cardiac activity: a) assessment of the regularity of heart contractions; b) heart rate calculation; c) determination of the pacemaker.
- 2) Determination of the position of the electrical axis of the heart.
- 3) Estimation of voltage.
- 4) Determination of the transition zone.
- 5) Analysis of individual waves, intervals, segments, ECG complexes in different leads (diagnosis of hypertrophies, blockades, ischemia, necrosis, scars, etc.).
- 6) Electrocardiographic findings.

**Tasks for independent extracurricular work and questions for self-control:**

1. What electrophysiological functions of the heart are determined using the electrocardiography method?
2. Name the main leads in which the ECG is registered.

3. Name the main ECG waves and intervals, their values.
4. In what sequence should the ECG be decoded?
5. How to determine heart rhythm by ECG?
6. What are the different types of cardiac rhythm?
7. What is the correct sinus rhythm and what are its properties?
8. Name the main heart rhythm disorders determined by ECG.
9. How to determine heart rate by ECG?
10. What is the electrical axis of the heart?
11. What are the differences between the positions of the electrical axis of the heart and their diagnostic value?
12. What is ECG voltage and how is it determined?
13. What are the ECG signs of hypertrophy and overload of the right and left atria and ventricles?

**Practical works (tasks) that will be performed during the lesson:**

No. 1. A 49-year-old man complains of shortness of breath of a mixed nature, cough, swelling of the lower legs, an enlarged abdomen due to ascites. He has been suffering from chronic bronchitis for over 20 years. Objectively: mixed cyanosis, edema. Pulse - 92 in 1 minute, blood pressure - 120/70 mmHg, blood pressure - 24 in 1 minute. Accent II tone over the pulmonary artery. Above the lungs - percussive box sound, auscultatory dry rales over the entire surface of the lungs. On the ECG:  $R_{III} > R_{II} > R_I$ , "p" wave in leads II, III 7 mm, "-T" in leads II, III, aVF, V1-V3, single right ventricular extrasystoles.

What kind of heart disease is there?

- A. Infarction of the lower wall of the left ventricle.
- B. Chronic pulmonary heart.
- C. Dilated cardiomyopathy.
- D. Atherosclerotic cardiosclerosis
- E. Alcoholic cardiomyopathy.

No. 2. A 47-year-old man underwent a bicycle ergometric test to rule out coronary artery disease. During the second stage of exercise, he complains of chest discomfort, and the ECG showed a horizontal depression of the ST segment in the chest leads.

How should these changes be evaluated?

- A. Detraining of the patient.
- B. Norma.
- C. Myocardial ischemia as a manifestation of coronary insufficiency.
- D. Metabolic changes.
- E. Electrolyte disorders.

No. 3. The patient, 62 years old, was hospitalized in the cardiology department with a diagnosis of coronary heart disease, stable angina pectoris III FC. During the daily ECG monitoring, episodes of depression of the ST segment by 2 mm during 0.08 in V4-V6 were detected, which was not clinically accompanied by pain syndrome.

What do the ECG monitoring data most likely indicate?

- A. Episodes of painless ("silent") myocardial ischemia.
- B. Metabolic changes of the myocardium.
- C. Prinzmetal's angina pectoris.
- D. Systolic overload of the left ventricle.
- E. Blockade of the left leg of the bundle of His

### **Test tasks for self-control:**

No. 1. The patient, 58 years old, complains of sudden palpitations, dizziness, noise in the head, heaviness in the area of the heart, nausea. The pulse is rhythmic, 160 per 1 min. Blood pressure - 95/60 mm Hg. Art. On the ECG: cardiac activity is rhythmic, 160 per 1 min., normal QRS complexes. Carotid sinus massage interrupted the attack.

What heart rhythm disturbance occurred?

- A. Regular form of atrial flutter.
- B. Paroxysm of atrial fibrillation.
- C. Supraventricular paroxysmal tachycardia.
- D. Ventricular paroxysmal tachycardia.
- E. Paroxysm of ventricular flutter.

No. 2. The patient, 62 years old, felt pronounced pain behind the sternum, shortness of breath. Abno: sick pale, cold sticky sweat, acrocyanosis. ChD - 28 in 1 min., orthopnea, blood pressure - 100/60 mmHg. Wet rales in the lungs on both sides. On the ECG: heart rate 220 in 1 min., P wave is not determined, R-R are the same, QRS – 0.16 sec.

Specify the diagnosis and the most effective management tactics for this patient.

- A. Atrial flutter. Metoprolol.
- B. Atrial fibrillation. Digoxin.
- C. Paroxysm of supraventricular tachycardia. Vagus tests.
- D. Paroxysm of ventricular tachycardia. Electric cardioversion.
- E. Sinus tachycardia. Corvalol.

No. 3. A 68-year-old patient with a history of small focal myocardial infarction complains of palpitations and shortness of breath during moderate physical exertion. Objectively: the rhythm of cardiac activity is irregular, HR-96/min., heart tones are weakened, the pulse is arrhythmic, with waves of different filling and tension, 88/min; ChD-16/min. ECG: absence of P waves in all leads, different R-R intervals, f-waves are best expressed in VI.

What heart rhythm disturbance should be considered?

- A. Incomplete blockade of the right leg of the bundle of His
- B. Atrioventricular block
- C. Atrial fibrillation (atrial fibrillation)
- D. Ventricular extrasystole
- E. Atrial extrasystole

No. 4 A patient, 60 years old, who was waiting in line to see a doctor, complained of a feeling of increased heartbeat and heart failure, shortness of breath, tight pain behind the sternum. Objectively: cardiac activity is arrhythmic, HR-125/min., heart tones are weakened, pulse is arrhythmic, with waves of different filling and tension, 112/min. AT-150/75 mmHg On the ECG taken by SMD: different R-R intervals, different height of R waves, missing P waves, oblique-ascending shift of the ST interval and a negative T wave in leads V5-V6. Average HR-120 for 1 min.

What is the most likely diagnosis?

- A. Paroxysm of atrial fibrillation (atrial fibrillation)
- B. Atrial fibrillation (atrial fibrillation), tachysystolic form
- C. Paroxysm of supraventricular tachycardia
- D. Polytopic extrasystole.
- E. Sinus tachyarrhythmia.

No. 5. A dentist, 42 years old, called the emergency room with complaints of squeezing and burning pain in the area of the heart with radiation to the left shoulder and left scapula. The pain

syndrome arose for the first time in my life after emotional overstrain, lasts about 20 minutes. Objectively: pulse - 98 per 1 min, rhythmic. Blood pressure - 130/80 mm Hg. Art. Heart sounds are weakened, there are no murmurs. On the ECG: depression of the ST segment in leads I, aVL, V1-V4. The pain syndrome disappeared 4-5 minutes after taking nitroglycerin and aspirin 325 mg sublingually, the ECG normalized. What is the most correct diagnosis?

- A. CHD: Tension angina.
- B. CHD: Angina at rest.
- C. CHD: Unstable angina (angina that occurred for the first time).
- D. Acute coronary syndrome without S-T elevation
- E. Small focal myocardial infarction.

No. 6. A 62-year-old patient suddenly became ill while waiting in line at the dentist: he complains of intense squeezing chest pain, numbness of the left hand. Sublingual nitroglycerin and validol did not have the usual effect. The patient is pale, BP-115/70 mmHg, heart rate-96/min. On the ECG taken by the cardiology team of the Medical Center, depression of the ST segment and a high T wave in leads I, aVL, V4-V6 are observed.

What is the most likely diagnosis?

- A. CHD: Angina that occurred for the first time.
- B. CHD: Angina at rest.
- C. CHD: Unstable angina.
- D. Acute coronary syndrome without S-T elevation
- E. Small focal myocardial infarction.

#### **List of recommended literature (main, additional, electronic information resources):**

##### **Main:**

1. Surgery: textbook / O.Yu. Usenko, G.V. Bilous, G.Y. Putintseva. - 5th edition. - K.: VSV "Medicine", 2021. - 416 p.
2. Emergencies in the practice of a therapist and family doctor / under the editorship Yepishyna A.V. — ISBN: 978-966-673-122-0. Ukrmedknyga 2019 p. 380 pages
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4. Pediatric Emergency Medicine, Second edition, illustrated clinical cases, © 2019 by Taylor & Francis Group, LLC / International Standard Book Number-13: 978-1-4822-3029-1 (Paperback) 978-1-138-34649-9 ( Hardback). 436 pages.
5. Mechanical Ventilation in Emergency Medicine. by Susan R. Wilcox & Ani Aydin & Evie G. Marcolini. ISBN 978-3-319-98409-4 ISBN 978-3-319-98410-0 (eBook). <https://doi.org/10.1007/978-3-319-98410-0/2019> . 122 pages.
6. Acute Medicine: A Practical Guide to the Management of Medical Emergencies, 5th Edition / David C. Sprigings (Editor), John B. Chambers (Editor) - ISBN: 978-1-118-64428-7. July 2017 Wiley-Blackwell, 784 Pages.

##### **Electronic information resources:**

1. <https://www.c-tecc.org/our-work/guidance> — Committee on Tactical Emergency Relief
2. <https://zakon.rada.gov.ua/laws/show/z0356-22#n42> — Order of the Ministry of Health of Ukraine No. 441 dated 09.03.2022 "On approval of procedures for providing pre-medical assistance to persons in emergency situations"
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**Topic 2:** FGDS: concepts, indications, contraindications, technique, algorithm and complications

**Purpose:** teaching the educational discipline "Instrumental methods of functional diagnostics", in particular FGDS

**Be able:**

- - Justify the indications and contraindications for conducting FGDS.
- To justify the specifics of patient preparation for FGDS.
- Analyze the principles of providing emergency care in case of complications during FGDS.

**Tasks for independent extracurricular work and questions for self-control:**

1. Indications for esophagogastroduodenoscopy.
2. Esophagogastroduodenoscopy options.
3. Contraindications for esophagogastroduodenoscopy.
4. How to prepare for esophagogastroduodenoscopy.
5. Interpretation of esophagogastroduodenoscopy data.
6. Complications of esophagogastroduodenoscopy.

Indications for carrying out EFGDS for diagnostic, but also for therapeutic purposes.

- Stomach ache;
- Pain under the spoon that occurs after eating;
- Heartburn;
- Disturbance of swallowing;
- Pain when swallowing;
- Vomiting of food taken the day before;
- Vomiting blood;
- Black feces (ground);
- Pronounced weight loss;
- Removal of foreign bodies;
- Clarifying the localization of the pathological process (erosions, ulcers, polyps, neoplasms);
- Biopsy of affected areas (ulcers, neoplasms);
- Monitoring the effectiveness of the treatment.

Contraindications to EFGDS today, all contraindications to this procedure are divided into 2 large groups:

- absolute (that is, diseases in which EFGDS should not be mentioned in principle);
- relative (diseases in which gastroscopy should be postponed until the moment of recovery, or those in which the expediency of the study is assessed only by the doctor).

### **Conducting technique**

EFGDS is performed in a specially equipped office of a polyclinic or hospital. The patient must come with an empty stomach, it is recommended to refrain from eating and even liquids for eight hours before the manipulation. That is, if the procedure is scheduled for the morning, you should try to have the last meal before eight o'clock in the evening, and not eat or drink anything in the morning. Drinking alcohol the day before is a very bad decision. This can increase the vomiting reflex during gastroscopy. Some time before the procedure, the patient is given a sedative, most



often seduxen. In approximately 20-30 minutes, the doctor conducts premedication with cholinolytics (atropine sulfate or platyphylline solution). Five minutes before the manipulation, the patient is given local anesthesia. For this, the back wall of the pharynx, as well as the root of the tongue, is treated with a 1-2% lidocaine solution by irrigation. And after that, the patient is asked to swallow so that the anesthetic reaches the esophageal opening. After five minutes, the patient feels numbness in the throat, difficulty swallowing, which means that the anesthesia has already taken effect. The patient is placed on the prepared table on the left side. Legs are usually brought to the stomach, arms along the body. An oilcloth is placed under the person's head. The doctor faces the patient, gives him a lip balm and asks him to clamp it with his teeth. An endoscope is inserted into the oral cavity through the supralabial. The patient is asked to inhale and swallow, at this moment the doctor carefully advances the endoscope. As the patient makes swallowing movements, the endoscope is advanced into the esophagus. Gradually advancing the device, the doctor examines the condition of the mucous membrane of the esophagus, then the stomach, and the duodenum. The duration of EFGDS is usually ten to fifteen minutes. If necessary, medical manipulations can be performed during gastroscopy: removal of a polyp, stopping bleeding, then the procedure will take a little longer. After a detailed study of the condition of the mucous membrane of the organs of the digestive tract, the doctor carefully removes the endoscope. Gastroscopy can be performed under general anesthesia, thanks to which the patient does not feel discomfort during the manipulation. Anesthesia is carried out using modern short-acting drugs. That is, the patient is under anesthesia only during the manipulation, and after it ends, he regains consciousness. Carrying out the procedure under anesthesia is also called "sleep gastroscopy".

Remember: the less the patient resists, the easier and faster the gastroscopy goes.

### **Complication**

Modern devices for EFGDS make it possible to conduct research with a minimal risk of developing complications.

1. Flexible thin tube does not make breathing difficult.
2. Complaints about non-intense pain in the throat.
3. Possible breakthrough of the wall of the esophagus or stomach by the tube of the gastroscope.
4. Bleeding.

### **Practical works (tasks) that will be performed during the lesson:**

1. The most informative method of diagnosing chronic gastritis is:
  - a) FGDS with mucosal biopsy;
  - b) Ro-scopy of the stomach;
  - c) Urease breath test;
  - e) Autoantibodies to parietal cells.
2. What research methods should be prescribed to a patient suspected of chronic gastritis?:
  - a) Fibrogastroduodenoscopy with biopsy;
  - b) Roentgenoscopy with BaSO<sub>4</sub>;
  - c) ultrasound of abdominal organs;
  - e) All of the above.

### **Test tasks for self-control:**

No. 1.

A 36-year-old man has been complaining of dizziness, general weakness for 2 days. He has been suffering from duodenal ulcer for 8 years. Objectively: BH - 22 in 1 min, pulse - 100 in 1 min, blood pressure - 95/60 mm Hg. The skin and mucous membranes are pale.

Which study is most likely to confirm bleeding in this patient?

- A. Colonosopia
- B. EFGDS
- C. Rectoromanoscopy
- D. Irigscopy

## E. Roentgenoscopy

No. 2

A 24-year-old patient complains of chest pain during sleep, which is sometimes accompanied by heartburn. Abdomen is soft, painless. The liver and spleen are not enlarged.

Which of the following studies is most informative?

- A. ECG
- B. pH-metry
- C. Esophagogastroduodenoscopy
- D. Roentgenoscopy of the stomach
- E. Ultrasound examination

No. 3

A 35-year-old woman complains of heartburn and pain when swallowing.

Which of the following studies is most informative?

- A. Colonoscopy
- B. pH-metry
- C. Ultrasound examination
- D. Roentgenoscopy of the stomach
- E. Esophagogastroduodenoscopy

No. 4

A 20-year-old employee developed pain in the epigastrium accompanied by heartburn. Eating relieves pain. Often takes soda, which relieves the condition for a short period of time.

Which of the listed methods is the most informative for diagnosis:

- A. Fractional study of gastric contents
- B. Roentgenoscopy of the gastrointestinal tract
- C. Fibroesophagogastroduodenoscopy
- D. pH-metry of the stomach
- E. Duodenal probing

No. 5

Patient M., 32 years old, has been abusing alcohol for the past 10 days. 5 hours ago, he accidentally drank a liquid, the origin of which he does not know. There was vomiting with blood in the reception department.

Is urgent endoscopic examination indicated?

- A. It must be shown.
- B. Not shown
- C. Shown after gastric lavage
- D. Indicated after premedication
- E. It is shown after the subsidence of inflammatory changes of the mucous membrane

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**Topic 3.** X-ray examination of the chest and abdominal organs: concepts, indications, contraindications, technique,

**Goal:**

1. Highlight the history of the development of various x-ray methods of radiation diagnostics.
2. To learn the principles of image formation in various radiological methods of radiation diagnostics.
3. To learn the main terms used in radiological diagnostics.
4. Show the diagnostic value of x-ray research methods.
5. To teach students to navigate in the choice of radiological method of research of this or that organ or system of organs, depending on the data of the anamnesis and visual examination.
6. To build an algorithm for sequential radiation examination of this or that organ or system of organs depending on the localization and course of the pathological process.
7. To teach students to evaluate and analyze the received diagnostic images in various pathological processes.

**Be able to:** learn and know the types of X-ray examination of the chest and abdominal organs, how they differ from each other, the method of conducting, the rules for performing this or that type of X-ray.

**Specific goals:**

To know, to learn

- the principle scheme of obtaining an X-ray and CT image;
- the need to use x-ray contrast methods for obtaining an x-ray image;
- the need to use tomographic, digital methods of obtaining an X-ray image.
- properties of X-rays;
- structure of the X-ray tube, X-ray and CT devices;
- types of X-ray and CT devices;
- artificial contrast of organs, types of contrast agents.

**Tasks for independent extracurricular work and questions for self-control:**

1. Indications for X-ray examination of chest and abdominal organs.
2. Contraindications and contraindications for X-ray examination of the chest and abdominal organs.
3. How to prepare for an X-ray examination of the chest and abdominal organs.
4. Complications during X-ray examination of the chest and abdominal organs.

**Theoretical questions for the lesson:**

1. What are X-rays, how do they arise?
2. What are the properties of X-rays.
3. What is an X-ray method of research?
4. What is the basic scheme of obtaining an image using X-rays?
5. Name the components of an X-ray machine.
6. What types of X-ray machines do you know?
7. What is conventional tomography?
8. What is the difference between analog and matrix X-ray imaging?
9. What is radiography?
10. What is computed tomography?
11. What is fluorography?
12. What is tomography?
13. What is radiography?
14. What is digital radiography?
15. Why should we use contrast agents to obtain an image of some organs?
16. What contrast agents exist?

Opportunities have the following properties:

1. penetrate through opaque bodies (compared to light, UV and infrared rays);
2. cause the glow of some chemical compounds;
3. decompose silver halide compounds;
4. change the electrical conductivity of semiconductor plates;
5. form ions.
6. these properties are widely used in obtaining a medical image.
7. X-ray research method is a method of studying the structure and functions of various organs, based on the quantitative and qualitative analysis of a beam of X-rays that penetrated the human body.

The principle scheme of obtaining an image with their help consists of:

- generation of rays in an X-ray tube;
- directing the rays at the patient;
- obtaining an invisible X-ray image after various absorption and scattering of rays when passing through the object;
- obtaining a visible image.

X-ray machines are divided into:

1. universal, with the help of which it is possible to carry out radiography and radiography in different positions of the patient;
2. special purpose devices used in neurology, stomatology, mammology, urology and angiology;
3. mobile devices - theaters and operating rooms;
4. for examination of children;
5. mass checking studies - fluorography.

The following means of obtaining an X-ray image are distinguished:

1. X-ray examination on a fluorescent screen;
2. X-ray television X-ray radiography - on the TV screen using an X-ray electronic-optical converter;
3. radiography - on X-ray film;
4. electroradiography - on a selenium semiconductor plate, and then on paper;
5. digital means of radiography and fluoroscopy using an electronic-optical converter and an analog-digital converter on a TV screen or photographic film and paper;
6. computer tomography using a dosimetric sensor (scintillation, gas discharge, or semiconductor) on a TV screen or photographic film and paper.

**Materials for self-control:**

1. Learn how X-ray and CT images are obtained
2. To study the schematic diagram of an X-ray and CT machine

3. To study in which cases x-ray research methods are indicated
4. To learn in which cases x-ray research methods are contraindicated
5. To learn how to prepare a patient for an x-ray research method
6. Procedure for describing radiographs.

### Tasks for self-control:

1. You need to get an image of the stomach cavity. What X-ray contrast liquid will you use?
2. You examine the state of the urinary tract. Which radiopaque agent will you choose?

3. You plan to conduct an examination of the bronchi to detect bronchiectasis. What radiopaque material will you use?

*Answers to situational problems:* 1. barium sulfate; 2. verographin; 3. iodolipol;

4. On the computer tomogram of the liver in the 6th segment, an area of decreased density of +150H of a rounded shape with clear boundaries is determined. This formation displaces the bile duct. What syndrome do these changes correspond to?

*Answer:* "bulky formation" syndrome

5. On the computer tomogram, the liver is enlarged in volume, its density is uniformly reduced, the edges are even. What syndrome do these changes correspond to?

*Answer:* . "diffuse damage" syndrome

6. On the computer tomogram of the brain, the volume of the ventricular system is significantly increased. What syndrome does this correspond to?

*Answer:* "Fluid outflow disorder" syndrome

7. An additional homogeneous structure with a density equal to the density of water is determined in the pleural cavity on a CT scan of the chest. The liquid is also placed in the projection of naturally existing slits, displacing the mediastinum in the healthy direction. What syndrome do these changes correspond to?

*Answer:* "free fluid accumulation" syndrome

8. On a CT scan of the abdominal cavity, the liver has an uneven contour. Its structure is heterogeneous due to areas of irregular shape with a density of +80 units, the same structure is found near the liver in the abdominal cavity.

What syndrome does this correspond to?

*Answer:* "Injury" syndrome

### List of recommended literature (main, additional, electronic information resources):

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