

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

Faculty of Medicine No. 1

Department of simulation medical technologies

CONFIRMED by

Vice-rector for scientific and pedagogical work

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September 1, 2023

**METHODICAL RECOMENDATION
FOR PRACTICE**

«SIMULATION MEDICINE»

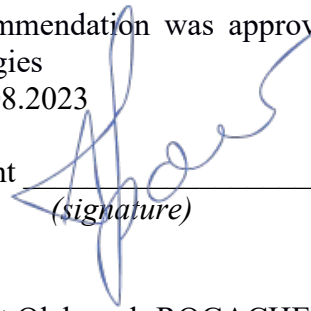
Faculty, course: International, 6 year

Educational Discipline: Simulation medicine

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



(signature)

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PRACTICAL TRAINING

Practical lessons No. 4 — 7

Topic: Emergency conditions in adults. Simulation training.

Purpose: To form, master and practice professional skills in providing emergency care for the most common emergency conditions in adults .

Learn the ability to independently use knowledge and skills in the diagnosis and treatment of the most common emergency conditions in adults .

C to form a clear idea of the sequence of actions in the algorithm for providing emergency care for the most common emergency conditions in adults .

To form the competence of professional communication in the team when providing emergency aid to adults .

Basic concepts: Diagnosis and assistance in emergency situations: asystole, BPEA, ventricular fibrillation, ventricular tachycardia without a pulse, OPC poisoning, opioid poisoning, anaphylactic shock.

Equipment: Brayden, HAL S3201, oxygen tank, computer with monitor and dummy software, mixing console, single-channel wireless system receiver, headset microphone, gooseneck microphone, single-channel wireless system receiver, broadcast video camera, projector (large screen), Ambu bag, pulse oximeter, functional bed, tripod, glucometer, equipment for neurological examination, peak flow meter, latex gloves, medical masks, syringes, solutions for injections.

Plan:

1 Organizational activities (greetings, verification of those present, announcement of the topic, purpose of the lesson, motivation of higher education seekers to study the topic).

2 Control of the reference level of knowledge (frontal survey) :

requirements for students' theoretical readiness to perform practical classes (know nosology and their treatment protocols);

questions (clinical situations) to check basic knowledge on the subject of the lesson:

For the following patient conditions (asystole, BPEA, ventricular fibrillation, ventricular tachycardia without a pulse, OPC poisoning, opioid poisoning, anaphylactic shock) know:

- 1 Differential diagnosis.
- 2 Examination.
- 3 Making a preliminary diagnosis.
- 4 Providing emergency care according to protocols.
- 5 Adherence to the algorithm of actions.

3 Formation of professional skills and abilities:

mastering skills:

- Quick recognition of an emergency in a patient.
- Be able to quickly give and receive commands to medical personnel depending on the critical situation (teamwork).
- To be able to quickly carry out a differential diagnosis of an emergency.
- Examination (physical methods, measurement of blood pressure, blood pressure, heart rate, SpO₂, thermometry, capnometry-graphy, glucometry, peak flowmetry, plan laboratory and instrumental studies).
- Determination of the treatment scheme based on theoretical knowledge of protocols obtained at previous departments.
- Assistance (introduction of IV injections and a catheter, oxygen supply, use of a functional bed, ECG recording and interpretation).
- Communication skills with staff and relatives in an emergency patient situation.

task content:

For each topic nosology:

- Briefing.
- Conducting a clinical simulation scenario.
- Debriefing.

recommendations (instructions) for performing tasks:

- It is mandatory to have theoretical knowledge on the topic obtained while attending classes at previous departments.
- Acquaintance with the methodical recommendations of the department before the class.
- Completion of the elective course of the department of simulation medical technologies "Professional communication skills in extreme situations".

requirements for work results and control materials for the final stage of the lesson:
 Passing a clinical scenario with a positive result for a simulated patient.

Algorithm for performing CPR in ASSYSTOLE/BPEA

by students of the 6th year to take the OSKI exam

1. Put on gloves before starting the task.

2. Assess for hazards and for the patient to be on a flat, hard surface.

3. Approach the patient and check his condition:

a. consciousness - speak loudly to the patient, tangibly pat the patient on the shoulders.

b. breathing - perform a triple reception according to Safar: stretching the head, bringing out the lower jaw, opening the mouth. After that, raise your ear to the patient's open mouth and act according to the rule "I hear, feel, see" - monitor the movements of the chest wall, feel and hear breathing. Normally, a person breathes 2-4 times in <10 seconds.

c. blood circulation - palpate the pulse on the carotid artery.

NB!!! It takes no more than 10 seconds to assess the patient's condition! It is rational to perform the breath check and palpation of the pulse at the same time.

4. Call the personnel for help, report the case of circulatory arrest.

5. Request a device for ECG assessment (preferably an Autonomous External Defibrillator with the possibility of rhythm assessment).

6. At the same time as calling for help, start performing CPR with chest compressions:

a. in the middle of the chest, place the base of the palm of the supporting hand, the fingers of which are parallel to the patient's ribs and do not touch the chest; the brush of the other hand is placed arbitrarily on top. The torso is bent forward so that the horizontal axis of your shoulders coincides with the axis of the victim's sternum. Hands are straight.

b. pressure on the chest is performed with a frequency of 100-120 per minute, a depth of 5-6 cm; the ratio of compressions and inhalations is 30:2.

7. Inhalations to the patient are performed with an Ambu bag, or if personal protective equipment is available, by the "mouth to mouth" method, while re-providing patency with the help of a triple Safar intake. The duration of inhalation should not be more than 6-8 seconds, watch for the rise of the chest.

8. In the absence of positive indicators - continue CPR.

9. For 2 minutes, it is necessary to give a command to the nurse to inject Adrenaline (Adrenaline hydrochloride) intravenously in a dose of 1 mg every 3-5 minutes.

NB!!! Adrenaline injection should be verbalized loudly, for example, "Sister, inject 1 mg of adrenaline immediately!". In the absence of verbalization - not completed.

10. Simultaneously with the continuation of compressions and after the introduction of adrenaline, the need to assess the rhythm with the help of an ECG should be verbalized.

NB!!! Conducting an ECG evaluation should be verbalized loudly, for example, "Sister, take an ECG!". In the absence of verbalization, the ECG will not be provided. **IMPORTANT:** No more than 10 seconds are given to evaluate the ECG! If you are unsure of the diagnosis based on the ECG, continue compressions.

11. After the sound signal "One minute left":

a. continue CPR in volume 1 cycle;

b. reassess the patient's vital functions;

c. verbalize possible causes of cardiac arrest according to the "4D and 4T" rule.

Don't forget to pick up your route sheet and personal belongings when you're done.

Algorithm for performing CPR with FSH/SHT without a pulse

by students of the 6th year to take the OSKI exam

1. Put on gloves before starting the task.

2. Assess for hazards and for the patient to be on a flat, hard surface.

3. Approach the patient and check his condition:

a. consciousness - speak loudly to the patient, tangibly pat the patient on the shoulders.

b. breathing - perform a triple reception according to Safar: stretching the head, bringing out

the lower jaw, opening the mouth. After that, raise your ear to the patient's open mouth and act according to the rule "I hear, feel, see" - monitor the movements of the chest wall, feel and hear breathing. Normally, a person breathes 2-4 times in <10 seconds.

c. blood circulation - palpate the pulse on the carotid artery.

NB!!! It takes no more than 10 seconds to assess the patient's condition! It is rational to perform the breath check and palpation of the pulse at the same time.

4. Call the personnel for help, report the case of circulatory arrest.

5. Request a device for ECG assessment (preferably an Autonomous External Defibrillator with the possibility of rhythm assessment).

6. At the same time as calling for help, start performing CPR with chest compressions:

a. in the middle of the chest, place the base of the palm of the supporting hand, the fingers of which are parallel to the patient's ribs and do not touch the chest; the brush of the other hand is placed arbitrarily on top. The torso is bent forward so that the horizontal axis of your shoulders coincides with the axis of the victim's sternum. Hands are straight.

b. pressure on the chest is performed with a frequency of 100-120 per minute, a depth of 5-6 cm; the ratio of compressions and inhalations is 30:2.

7. Inhalations to the patient are performed with an Ambu bag, or if personal protective equipment is available, by the "mouth to mouth" method, while re-providing patency with the help of a triple Safar reception. The duration of inhalation should not be more than 6-8 seconds, watch for the rise of the chest.

8. In the absence of positive indicators - continue CPR.

9. For 2 minutes, it is necessary to give a command to the nurse to inject Adrenaline (Adrenaline hydrochloride) intravenously in a dose of 1 mg every 3-5 minutes.

NB!!! Adrenaline injection should be verbalized loudly, for example, "Sister, inject 1 mg of adrenaline immediately!". In the absence of verbalization - not completed.

10. Simultaneously with the continuation of compressions and after the introduction of adrenaline, the need to assess the rhythm with the help of an ECG should be verbalized.

NB!!! Conducting an ECG evaluation should be verbalized loudly, for example, "Sister, take an ECG!". In the absence of verbalization, the ECG will not be provided. **IMPORTANT:** No more than 10 seconds are given to evaluate the ECG! If you are unsure of the diagnosis based on the ECG, continue compressions.

11. When diagnosing FSH/ST without a pulse:

a. verbalize defibrillation ("Everyone move away from the patient! Attention, discharge!"), the first discharge of a biphasic defibrillator is 200 J, a single-phase defibrillator is 360 J. All subsequent discharges are 360 J.

b. amiodarone 300 mg IV after the third ineffective discharge and after 150 mg of the fifth ineffective discharge.

12. After the sound signal "One minute left":

a. continue CPR in volume 1 cycle;

b. reassess the patient's vital functions;

c. verbalize possible causes of cardiac arrest according to the "4D and 4T" rule.

Don't forget to pick up your route sheet and personal belongings when you're done.

Emergency aid for OPC and opioid poisoning

Algorithm for help with OPC poisoning

by students of the 6th year to take the OSKI exam

1. Put on gloves before starting the task.

2. Call for help, inform about the probable diagnosis and distribute responsibilities.

3. Verbalize giving oxygen through a face mask.

4. Assess the condition:

a. consciousness - speak loudly to the patient, tangibly pat the patient on the shoulders.

b. breathing - perform a triple reception according to Safar: stretching the head, bringing out the lower jaw, opening the mouth. After that, raise your ear to the patient's open mouth and act according to the rule "I hear, feel, see" - monitor the movements of the chest wall, feel and hear breathing. Normally, a person breathes 2-4 times in 10 seconds.

c. blood circulation - palpate the pulse on the carotid artery.

NB!!! The patient's condition corresponds to the conditions of the task, i.e. heart rate and blood pressure match the specified values.

Begin catheterization of a peripheral venous catheter.

NB!!! Be sure to perform and speak the main components of the manipulation: puncture site,

tourniquet application site, skin treatment, position of hands and catheter, placement of needle section, control of access to the vein, advancement of the catheter and removal of the needle, control and flushing of the catheter, fixation of the catheter.

6. Start the continuous administration of the antidote Atropine 0.1% in the form of a bolus of 2 ml and with an orientation to the size of the pupils and the heart rate of the patient every 4-5 minutes. **NB!!!** Select the syringe/vial labeled "Atropine 0.1%" and place it in the catheter port. Administration must be verbalized, indicating the route of administration, dose and frequency. Physical introduction of the solution is not performed!

7. Start daily administration of the antidote Pralidoxime in the form of a bolus of 1 g every 1 hour and focusing on the size of the pupils, heart rate, BP and the presence of wheezing in the patient.

8. Order a repeat analysis of the patient's acetylcholinesterase activity.

9. Reassess the patient's condition (hemodynamics, consciousness, breathing). 10. Verbalize the transfer of the patient to the intensive care unit for further treatment. Don't forget to pick up your route sheet and personal belongings when you're done.

Algorithm of help in case of opioid poisoning

by students of the 6th year to take the OSKI exam

1. Put on gloves before starting the task.

2. Call for help, inform about the probable diagnosis and distribute responsibilities.

3. Verbalize giving oxygen through a face mask.

4. Assess the condition:

a. consciousness - speak loudly to the patient, tangibly pat the patient on the shoulders.

b. breathing - perform a triple reception according to Safar: stretching the head, bringing out the lower jaw, opening the mouth. After that, raise your ear to the patient's open mouth and act according to the rule "I hear, feel, see" - monitor the movements of the chest wall, feel and hear breathing. Normally, a person breathes 2-4 times in 10 seconds.

c. blood circulation - palpate the pulse on the carotid artery.

NB!!! The patient's condition corresponds to the conditions of the task, i.e. heart rate and blood pressure match the specified values.

5. Provide in\in access. To do this, as part of the exam, say: "Sister, install a peripheral

intravenous catheter on the patient!".

6. Begin intravenous administration of the antidote Naloxone 1 mg in the form of a bolus slowly, focusing on the patient's consciousness, heart rate, and BP, with possible re-administration after 30 minutes.

NB!!! Select the syringe/vial labeled "Naloxone" and attach it to the catheter port. Administration must be verbalized, indicating the route of administration, dose and frequency. Physical introduction of the solution is not performed!

7. Reassess the patient's condition (hemodynamics, consciousness, breathing).

8. Verbalize the transfer of the patient to the intensive care unit for further treatment. Don't forget to pick up your route sheet and personal belongings when you're done.

Emergency care for asystole, pulseless tachycardia, ventricular fibrillation, BPEA.

Asystole, as a type of circulatory arrest, occurs much less frequently than FS and has an unfavorable prognosis. Asystole can be the result of ventricular fibrillation, can be a consequence of progressive bradyarrhythmia, for example, with the toxic effect of drugs, myocardial infarction, severe general hypothermia, syncopal type of drowning, etc.

Ventricular fibrillation causes uncoordinated contraction of the ventricles with no effective contraction. Clinical picture of ventricular fibrillation:

sudden onset;

15-20 seconds after the start of ventricular fibrillation, the patient loses consciousness;

after 40-50 seconds — a one-time tonic contraction of skeletal muscles develops;

the pupils dilate;

breathing slows down and stops after 2-4 minutes.

The diagnosis is clarified only in the process of conducting CPR according to the ECG

Anaphylactic shock (AS) — this is an allergic reaction of an immediate type, accompanied by life-threatening clinical manifestations (a sharp drop in blood pressure, impaired activity of the central and peripheral nervous systems, endocrine disorders, respiratory failure, etc.). The main causes of anaphylactic shock are drug and insect allergies.

Clinical manifestations of anaphylactic shock:

- hemodynamic disorders;

- breathing disorders (shortness of breath, bronchospasm, dyspnea);

- disorders of the gastrointestinal tract (nausea, vomiting, diarrhea);

- skin rash (hives, other exanthems, Quincke's edema).

Drug-induced anaphylactic shock (MASH) is the most severe generalized manifestation of MA, caused by the course of the I-th type immunological reaction and the release of a large number of cytokines, which is accompanied by pronounced disturbances in the activity of various organs and systems (cardiovascular, nervous, respiratory, etc.). Most often, MAS develops after administration of X-ray contrast diagnostic drugs, penicillins, pyrazolone derivatives, group B vitamins. With parenteral administration of drugs, MAS develops immediately, with oral administration - after 30-60 minutes.

In connection with the predominant inclusion of certain pathogenetic mechanisms, the course of MAS may vary. There is a typical form of MASH, as well as variants: hemodynamic, asphyxic, cerebral and abdominal.

With a **typical form** of MASH, patients sometimes do not have time to report a worsening of their well-being, they can indicate a feeling of heat, occasionally - nausea, vomiting. An objective examination shows hyperemia or paleness of the skin, a rash, swelling of the lips, eyelids. Patients often develop convulsions of the limbs, and subsequently - uncontrolled urination and defecation. The pulse, as a rule, is weak, frequent, heart sounds are dull. In most cases, breathing is shallow, frequent, with distant wheezes. During auscultation, whistling rales can be heard, which sometimes disappear against the background of increasing shortness of breath.

With **the hemodynamic variant** of MASH, the symptoms of cardiovascular system dysfunction come to the fore, spasm (pallor) or expansion (hyperemia) of peripheral vessels is observed. Blood pressure is reduced.

The asphyxic variant of MASH is manifested by acute respiratory failure, which is caused by bronchospasm, edema of the mucous membrane of the bronchi.

The cerebral variant of MASH is characterized by a predominance of disturbances in the activity of the central nervous system: psychomotor agitation, disturbances of consciousness, seizures, epileptiform attacks, less often – symptoms of swelling of brain tissue.

In **the abdominal variant** of MASH, the main symptoms are sharp pain in the abdomen, symptoms of peritoneal irritation. The appearance of chest pain simulating a myocardial infarction is possible.

Treatment

Treatment measures for anaphylactic shock of any origin should be based on the main mechanisms of its pathogenesis and should include:

1. Stopping the allergen (AG) from entering the patient's body.

In the case of parenteral administration of antihypertensives (medicine, insect venom for stings), a tourniquet should be applied above the injection site for 25 minutes. (every 10 minutes, the tourniquet should be loosened for 1-2 minutes), apply ice to this place for 15 minutes; apply 0.3-0.5 ml of 0.1% adrenaline solution with 4.5 ml of isotonic sodium chloride solution to the sting site. In the case of oral administration of hypertension, it is advisable to try to remove or bind it (gastric lavage, introduction of sorbent - activated carbon, aerosol, polyphapan), in the future to prescribe relaxing, cleansing enemas.

2. Measures aimed at restoring acute disorders of blood circulation and breathing. A 0.1% adrenaline solution is injected subcutaneously in a dose of 0.1-0.5 ml (if necessary, repeat the injection after 20-40 minutes under blood pressure control). In case of unstable hemodynamics with an immediate threat to life, intravenous administration of adrenaline is possible. At the same time, 1 ml of 0.1% adrenaline solution is dissolved in 100 ml of isotonic sodium chloride solution and injected at an initial rate of 1 µg/min (1 ml per min.). If necessary, the rate of introduction can be increased to 2-10 µg/min. Intravenous administration of adrenaline is carried out under pressure

control.

In addition, it is advisable to "hydrate" the patient by including polyionic solutions in the infusion "cocktails".

3. Compensation of the adrenocortical insufficiency that has arisen. For this purpose, glucocorticosteroids are administered intravenously - hydrocortisone (4 mg/kg), prednisolone (1-2 mg/kg) every 6 hours.

4. Neutralization and inhibition of allergic reaction mediators in the blood.

For this purpose, plasmapheresis and enterosorption are performed.

5. Support of vital functions of the body or resuscitation in extremely serious conditions or clinical death.

First pre-hospital aid

1. Immediately stop the administration of the allergen. Lay the patient down (the head should be placed below the level of the feet), turn the head to the side, extend the lower jaw, remove the removable dentures.

2. Surround the injection site with 0.3-0.5 ml of 0.1% adrenaline solution with 4.5 ml of 0.9% sodium chloride solution.

3. Apply ice or a heating pad with cold water to the injection site for 10-15 minutes.

4. Inject 0.3-0.5 ml of 0.1% adrenaline solution into the limb (0.15-0.3 ml for children).

5. Immediately call a doctor.

First medical aid

If items 1-5 are completed and there is no positive effect, it is necessary:

1. Inject 0.3-0.5 ml (children 0.15-0.3 ml) of 0.1% adrenaline solution subcutaneously at intervals of 5-10 minutes. The frequency of administration and the dose of adrenaline are determined by the severity of the reaction and blood pressure indicators. In case of severe anaphylactic shock, adrenaline solution should be administered intravenously in 20 ml of physiological solution. The total dose of adrenaline should not exceed 2 ml (children - 1 ml) of 0.1% solution. It should be remembered that repeated administration of small doses of adrenaline is more effective than single administration of a large dose.

2. If the blood pressure does not stabilize, it is necessary to immediately start intravenous drip administration of norepinephrine (or mesaton) 0.2-1.0-2.0 ml per 500.0 ml of 5% glucose solution, and also "irrigate" the patient with polyionic solutions.

3. Intramuscularly or intravenously inject glucocorticosteroid drugs: prednisone 60-120 mg (for children 40-100 mg), dexamethasone 8-16 mg (for children 4-8 mg) or hydrocortisone succinate or hemisuccinate 125-250 mg (for children 25- 125 mg).

4. Intramuscularly inject 2.0 ml (children 0.5-1.5 ml) of Tavegil 0.1% or Suprastin 2.5% solution under blood pressure control.

5. For bronchospasm, 10.0 ml (2-8 ml for children) of a 2.4% solution of Euphilin in a 0.9% solution of sodium chloride or dexamethasone (20-40 mg) is administered intravenously.

6. Cardiac glycosides, respiratory analeptics (strophanthin, corglycon, cordiamine) are administered according to indications.

7. If necessary, the airways should be freed from mucus, vomitus and oxygen therapy should be carried out.

8. All patients with anaphylactic shock should be hospitalized, and emergency care should be given to them as a priority. Transportation of patients is carried out after removing them from a

threatening condition by an ambulance or resuscitation team, since during the evacuation, a repeated drop in blood pressure and the development of collapse are possible.

4. Summary:

After completing the lesson on the topic " Emergencies in adults. Simulation training ", students should:

Have formed and practiced professional skills in providing emergency care for the most common emergency conditions in adults.

Learn the ability to independently use knowledge and skills in the diagnosis and treatment of the most common emergency conditions in adults.

Have a well -formed and clear idea of the sequence of actions in the algorithm for providing emergency care for the most common emergency conditions in adults.

To have the competence of professional communication in a team when providing emergency care to adults .

5. List of recommended literature:

Main:

1. Anesthesiology, intensive care and intensive care: a study guide (University I-III of the Russian Academy of Sciences) / A.A. Ilko - 2nd ed., revised. and add., "Medicine", Kyiv, 2018
2. 30 Emergency conditions in therapy: a study guide: edited by Prof. Yu.M. Mostovoy Vinnytsia, 2017
3. Order of the Ministry of Health of Ukraine dated December 30, 2015 No. 916 "Unified clinical protocol of emergency, primary, secondary (specialized) and tertiary (highly specialized) medical care for drug allergy, including anaphylaxis"

Additional:

1. Order of the Ministry of Health of Ukraine dated June 5, 2019 No. 1269 "Emergency medical care: new clinical protocol"
2. Anesthesiology, intensive care and emergency conditions: textbook: edited by Prof. Vladyki A.S. Odesa: ONMedU, 2016

Electronic information resources:

1. <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 "
2. <https://www.futurelearn.com/courses/critical-care> – University of Glasgow Handbook of Emergency Medicine
3. <http://moz.gov.ua> - Ministry of Health of Ukraine
4. <https://www.cprguidelines.eu/> – European Resuscitation Council