

**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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**METHODICAL RECOMENDATION
FOR PRACTICE**

«SIMULATION MEDICINE»

Faculty, course: International, 6 year

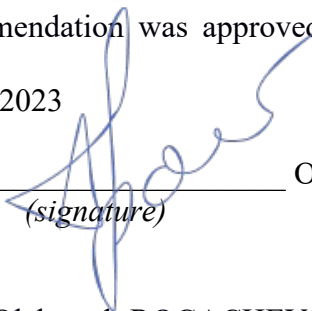
Educational Discipline: Simulation medicine

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



Oleksandr ROGACHEVSKYI

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PRACTICAL TRAINING

Practical classes No. 1 — 3

Topic: Basic life support. Simulation training .

Purpose: To form, master and practice professional skills of basic life support.

To learn the ability to independently use knowledge and skills during the execution of the basic life support algorithm.

C to form a clear idea of the sequence of actions in the basic life support algorithm.

To form the competence of professional communication in the team during the implementation of the basic life support algorithm.

Basic concepts: Asystole, ventricular fibrillation, indirect heart massage, artificial lung ventilation, lateral stable position.

Equipment: Brayden, Ambu bag, automatic external training defibrillator, latex gloves, medical masks.

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 nosologies and their treatment protocols);

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

3 Formation of professional skills and abilities:

- mastering skills:

1 Quick recognition of an emergency in a patient.

2 Be able to quickly give and receive commands to medical personnel depending on the critical situation (teamwork).

3 To be able to quickly carry out a differential diagnosis of an emergency.

4 Examination (checking consciousness and vital functions).

5 Assistance (restoring airway patency, performing basic cardiopulmonary resuscitation, performing defibrillation using a manual automatic defibrillator-cardioverter, performing Heimlich administration).

6 Communication skills with staff and relatives in an emergency patient situation.

- task content:

For each topic nosology:

1 Briefing.

2 Conducting a clinical simulation scenario.

3 Debriefing.

- recommendations (instructions) for performing tasks:

1 It is mandatory to have theoretical knowledge on the topic obtained while attending classes at previous departments.

2 Acquaintance with the methodical recommendations of the department before the class.

3 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.

Basic life support

Action algorithm for out-of-hospital cardiac arrest:

- ensure a safe approach to the victim;
- check the victim's reactions (carefully shake the shoulder, ask: "Can you hear me?");
- call for help;
- ensure the patency of the respiratory tract;
- check breathing;
- call 103 or 112;
- perform 30 chest compressions;
- take 2 breaths;
- connect ADS and following voice prompts;
- repeat 30 chest compressions and 2 breaths;
- if the victim started to breathe normally, he should be placed in a lateral stable position.

Indirect heart massage

Definition of .

Indirect cardiac massage is an artificial restoration of blood circulation, which is used in case of sudden and sudden cardiac arrest, carried out by rhythmic pressure on the chest.

Necessary equipment. No special equipment is required.

Place and method of implementation . The victim should be placed on a solid base. Ensure the patency of the respiratory tract. Being on the side of the victim's body, the resuscitator should place the base of the hand of one hand on the middle of the chest so that the fingers are raised up and located perpendicular to the sternum. The brush of the other hand should be applied from above and rhythmically pressing, move the sternum in the sagittal direction to a depth of 5-6 cm. The frequency of pressing is 100-120 per minute.

Mandatory condition: when pressing the fingers, the hands should be raised upwards to prevent complications, the hands should be straightened at the elbow joints. Heart massage, thus, will be carried out by the mass of the resuscitator's body. Artificial lung ventilation and heart massage should be carried out in a ratio of 30:2.

Machinery:

1. Kneel on the side of the victim.
2. Put the brush of one hand on the middle of the chest.

WARNING!

- 1 It is impossible to move the hand below - to the place where the sternum passes into the xiphoid process, because this can lead to its fracture.
- 2 You should not move your hand away from the middle line of the body - pressure on the ribs quite often leads to their fractures. The brush should be located perpendicular to the sternum.
3. Put the brush of the second hand on top of the first to increase the pressure.

4. Begin the massage — rhythmic thrusts only in the wrist area. Fingers should not press on the ribs. The hands should be kept maximally extended in the elbow joints, this allows you to use not only the strength of the hands, but also the weight of the body for pressing.

5. After each push, you should not take your hands off the chest, while the sternum should return to its original position.

6. The number of movements during massage should be within 100-120 per minute.

Note:

When carrying out artificial respiration and closed heart massage on your own, after 2 breaths, you should perform 30 pressures on the sternum. If an assistant is present, one resuscitator provides inhalation, and the other provides indirect cardiac massage. It is impossible to carry out mechanical ventilation and indirect heart massage at the same time.

Cycles of resuscitation actions must be repeated until: the arrival of "ambulance", before the recovery of cardiac activity and breathing, before the appearance of a threat to the environment, if the person performing resuscitation is maximally tired and has no strength to continue.

The effectiveness of efforts is confirmed by the following signs:

- The victim's attempts to breathe on their own;
- The appearance of a pulse on the carotid or femoral artery;
- Normalization of skin color;
- Narrowing of the pupils;
- Spontaneous movements of the larynx.

After restoring the pulse and breathing, the victim should be returned to a stable lateral position.

Complication:

1. *Fractures of ribs, sternum; ruptures of the sterno-costal joints.*

Prevention: strict adherence to the rules of manipulation. The correct position of the resuscitator's palms on the chest.

Tactics: check the location of the hands and correctness of resuscitation — continue indirect heart massage with further consultation of the surgeon in case of successful resuscitation.

2. *Damage to internal organs (heart, lungs, stomach, liver, spleen).*

Prevention: strict adherence to the rules of manipulation.

Tactics: check the location of the hands and correctness of resuscitation — continue indirect heart massage with further consultation of the surgeon in case of successful resuscitation.

Suction of sputum and removal of foreign bodies from the mouth and throat. Duct insertion.

Definition.

Introduction of an airway is a manual method of restoring the patency of the respiratory tract with the help of special tubes (airways).

Types of air ducts:

1. The oropharyngeal (oropharyngeal) airway consists of a bent oropharyngeal part, a limiting plate that prevents the passage of the airway into the mouth, and a reinforced area that protects it from biting.

The shape of the bend of the air duct repeats the anatomical shape of the oropharyngeal space in order to protect the tongue and soft pharyngeal structures from sinking.

Structure:

1. Performance;
2. Bite block;
3. Stent;
4. Air channel.

2. Nasopharyngeal - is a soft rubber or plastic tube that ensures the patency of the respiratory tract between the nasal passages and the pharynx.

I. Introduction of the airway through the mouth.

Indication:

1. Support of gas exchange in case of violation of the patency of the respiratory tract due to:
 - taking drugs that suppress the respiratory center;
 - disturbance of consciousness;
 - brain injuries;
 - damage to the respiratory tract.
2. Clenched jaws in unconscious patients.
3. The need for aspiration from the oropharynx.
4. Complete or partial obstruction of the respiratory tract, not related to aspiration of foreign bodies (swelling of the larynx, sinking of the tongue, etc.).

Contraindication:

1. Fractures of the bones of the facial skull, jaws or teeth.
2. History or acute period of bronchospasm.
3. Presence or suspicion of damage to the cervical spine, in which case this manipulation may worsen the patient's condition.

Position: Lying on your back or side.

Conducting technique:

1. Before manipulation in the presence of a poorly fixed denture, the latter should be removed.

2. Open the patient's mouth, press the base of the tongue with a spatula, bring the tongue forward from the pharynx.

3. Insert the air duct into the mouth with the concave side to the chin so that its distal end goes straight, but does not reach the back wall of the oropharynx; the flange of the air duct should protrude by 1-2 cm through the cutters.

4. Bring out the lower jaw, which will ensure that the tongue rises from the wall of the pharynx.

5. Press the air duct and push it 2 cm into the mouth so that its bend rests on the base of the tongue.

6. As an option, the air duct can be inserted with the concave side to the palate. After its end reaches the tongue (in this case, the spatula is not used); turn the air duct 180 ° and further push it out of the tongue. This method is not recommended if the patient has loose teeth or oral trauma, as the rotation of the airway may cause the teeth to shift or increase bleeding.

Complications and their elimination :

1. *Development of bronchospastic reaction.*

Tactics: removal of the airway with subsequent therapy of bronchospasm.

2. *Nausea or vomiting*

Prevention: application of local anesthetics in the form of a spray when the airway is inserted.

Tactics: turn the patient's head to the side and perform aspiration of vomitus.

3. *Increased obstruction of the respiratory tract due to the incorrect location of the airway.*

Prevention: clear implementation of manipulation stages.

Tactic: remove the duct and reinsert it if necessary.

4. *Damage to the teeth by the air duct.*

Prevention: clear implementation of manipulation stages.

Tactics: in case of extraction and destruction of the tooth immediately after the removal of the air duct, measures (including X-ray methods) should be carried out to find it in the oral cavity and oropharynx. The tooth is removed from the lower respiratory tract using fibrobronchoscopy.

5. *Aspiration pneumonia* occurs in case of aspiration of stomach contents.

Prevention: prevention of aspiration of gastric contents, implementation of the tactics of item 2.

Tactics: in accordance with the treatment protocol of the Ministry of Health of Ukraine.

II. Insertion of the airway through the nose

Indication:

1. Obstruction of the upper respiratory tract in patients with preserved consciousness.

2. Trauma to the teeth or oropharynx.
3. Inadequate opening of the respiratory tract after the introduction of an oral airway.

Contraindication:

1. Occlusion of the nasal cavity.
2. Fractures of the nose and base of the skull.
3. Distortion of the nasal septum.
4. Coagulopathy.
5. Leakage of cerebrospinal fluid from the nose.
6. Transsphenoidal hypophysectomy in history.
7. Formation of a posterior pharyngeal flap to close a craniofacial defect in the anamnesis.
8. Pregnancy (due to vascular congestion in the nasal cavity after the first trimester).

Position: lying on the back, on the side, sitting.

Conducting technique:

1. Visually assess the degree of patency of the nostril (relative size, presence of bleeding or polyps) or perform the following test: it is necessary for the patient to exhale through the nose onto a small mirror or onto the blade of a laryngoscope - a larger condensation spot indicates a more patency of the nostril.

2. To provide local anesthesia and vasoconstriction in the nasal passages, use a mixture of the following composition: 10 mg of phenylephrine in 10 ml of 2% lidocaine gel.

3. Insert a tampon into the selected nostril and wait for the onset of local anesthesia.

4. Carefully successively insert tampons deeper into the nostril until three tampons are at the same time at the level of the back wall of the nose, without causing significant inconvenience to the patient.

5. After using this method of tamponade, it is usually possible to pass a 7.5 mm air duct through the nasal cavity.

6. If it is impossible to use tampons, the lidocaine-phenylephrine mixture can be injected directly into the nasal cavity with a syringe.

7. Carefully insert the air duct into the nose with the concave side facing the hard palate.

8. Pass the air duct into the nose under the lower concha, parallel to the palate.

9. If there is resistance in the back pharynx, carefully turn the air duct 60-90° and continue inserting it into the pharynx; turning the airway 90° counterclockwise and then returning it to its original position after passing through the throat may also help .

10. If the air duct does not pass with medium effort, use an air duct with a smaller gauge.

11. If the duct does not advance, pull it out 2 cm, pass a small catheter through it for aspiration, then try to introduce the duct using the catheter as a guide.

12. If this does not lead to success, re-process the nasal cavity or try to enter the air duct from the other side after the appropriate treatment.

Complication:

1. *Epistaxis* in case of damage to the mucous membrane.

Prevention: the use of an air duct of the appropriate size, the use of a lubricant and the clear execution of the stages of manipulation.

Tactics: anterior tamponade in case of superficial bleeding, consultation of an ENT doctor if posterior tamponade is necessary.

2. *Perforation of the mucous membrane with the formation of a submucosal channel.*

Prevention: the use of an air duct of the appropriate size, the use of a lubricant and the clear execution of the stages of manipulation.

Tactic: removal of the duct.

Carrying out artificial lung ventilation by the simplest methods

Definition. Artificial lung ventilation (Controlled mechanical ventilation - CMV) is a method that restores and supports impaired lung functions - ventilation and gas exchange. Many methods of mechanical ventilation are known - from the simplest ("mouth to mouth", "mouth to nose", with the help of a breathing bag, manual) to complex - mechanical ventilation with precise regulation of all breathing parameters. The most widespread methods of mechanical ventilation, in which a gas mixture with a given volume or with a given pressure is injected into the patient's airways with the help of a respirator. In emergency conditions, mouth-to-mouth or mouth-to-nose artificial respiration is most often used.

Indication:

7 Absolute:

- a) apnea;
- b) pathological types of breathing;
- c) hypoventilation;

8 Relative:

- a) pulmonary edema;
- b) deep coma;
- c) decompensated circulatory, cardiac or respiratory failure .

Contraindications to mouth-to-mouth ventilation:

- 1. Lack of a special mask and reluctance of the resuscitator.
- 2. Damage to the lips, lower jaw, tongue;
- 3. Inability to achieve sealing during mouth-to-mouth breathing;

4. Inability to spread the jaws .

Necessary equipment: special mask, air duct.

The technique of mouth-to-mouth or mouth-to-nose artificial respiration involves:

- 4 Throwing the head back (if a fracture or dislocation in the cervical spine is suspected, throwing the head back is not performed),
- 5 Protruding the lower jaw forward, opening the mouth - restoring the patency of the upper respiratory tract.
- 6 For mouth-to-mouth artificial lung ventilation (CPR), the resuscitator inhales air and tightly covers the victim's mouth (or nostrils) with his lips.
- 7 Exhalation of air into the lungs of the victim with visual control of the excursion of the chest (at the same time, the patient's nose is pinched with the hand).
- 8 With effective ventilation, the victim's chest noticeably expands during air insufflation.
- 9 Exhalation passes independently. Mouth-to-mouth ventilation is greatly facilitated when an airway is inserted into the oral cavity.
- 10 During mechanical ventilation from the mouth to the nose, blowing is made into the nasal passages of the victim, while his mouth is closed with the palm of his hand or the lower lip is pressed against the upper one with the fingers.

Artificial ventilation of the lungs with an Ambu bag and with the help of an S-shaped tube

Indications: To provide adequate spontaneous ventilation by performing controlled, assisted, or positive pressure ventilation in patients with respiratory distress, apnea, or unconscious patients.

Contraindication:

1. Vomiting or penetration of a foreign body into the respiratory tract;
2. Increased intragastric pressure due to excessive ventilation

Necessary equipment:

Individual protective equipment, oro- and nasopharyngeal airways (S-shaped tubes), suction device, mask-bag device, stethoscope, oxygen.

Machinery:

1. Take the necessary steps to protect yourself from the patient's biological material.
2. Stand next to the patient's head and, performing the technique of "throwing the head, lifting the chin", open the airways.
3. If necessary, enter the air duct.
4. Choose a mask of the appropriate size. The mask should be transparent, with an air cushion that fits the patient's face.

5. Place the narrow part of the mask on the back of the nose, and its wide part on the fold between the lower lip and chin.

6. With the thumb and forefinger of one hand, hold the mask around its collar (C - grip), tightly pressing the mask to the patient's face, while simultaneously lifting the lower jaw with the little finger, ring finger and middle finger up to the mask (E - grip). With the other hand, compress the bag, having previously connected it to the mask connector.

7. Carry out artificial ventilation by slowly squeezing the bag for 1 second, and seeing that the patient's chest has risen, release the bag.

8. Make sure that the chest falls and rises accordingly. Observe the patient's respiratory movements as an indicator of proper ventilation. Continue artificial ventilation for 30 seconds before applying oxygen.

9. Prepare the oxygen tank and oxygen regulator. Connect the oxygen tube to the regulator and the bag mask. Start the oxygen supply and adjust the oxygen supply regulator to a maximum of 10 L/min.

10. Allow the bag to fill with oxygen before taking the first breath.

WARNING!

Preference is given to the technique of artificial lung ventilation, which is performed by two people: one holds the mask on the patient's face with both hands and, lifting the chin, ensures the opening of the airways, while the assistant squeezes the bag.

Complication:

- 4 *Insufficient ventilation* due to the reduced tightness of the mask on the face of the victim (especially in persons with a large beard)

Prevention: strict adherence to the rules of manipulation technique

Tactic: use of duct

- 5 *Filling the stomach with air* , and as a result excessive stretching of the stomach

Prevention: strict adherence to the rules of the manipulation technique, throwing the victim's head back

Tactics: use of an airway, decompression of the stomach using a naso- or orogastric tube, tracheal intubation

- 6 *Regurgitation and aspiration of gastric contents*

Prevention: strict adherence to the rules of the manipulation technique, throwing the victim's head back

Tactics: use of an airway, decompression of the stomach using a naso- or orogastric probe, tracheal intubation. .

4 Summary:

After completing the class on the topic " Basic life support. Simulation training ", students should:

Have formed and practiced professional skills of basic life support.

Master the ability to independently use the knowledge and skills to perform the basic life support algorithm.

Have a well- formed and clear idea of the sequence of actions in the basic life support algorithm.

To have the formed competence of professional communication in the team during the execution of the basic life support algorithm.

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

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. <http://moz.gov.ua> - Ministry of Health of Ukraine
2. <https://www.cprguidelines.eu/> - European Resuscitation Council
3. <https://www.c-tecc.org/our-work/guidance> - Committee on Tactical Emergency Relief
4. <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"