

**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  
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September 1, 2023

**METHODICAL RECOMENDATION  
FOR ACADEMIC DISCIPLINE**

**«EMERGENCY MEDICINE. PRACTICAL ASPECTS. SIMULATION TRAINING»**

Faculty, course: International, 5 year

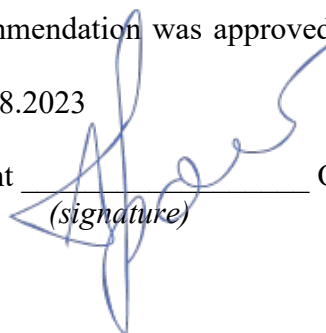
Educational Discipline: Emergency medicine. Practical aspects. Simulation training

**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)*

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## PRACTICAL CLASSES

### *Practical classes No. 1 — 3*

**Topic:** Basic life support. Simulation training.

**Purpose:** To form, master and practice:

1. principles and algorithms of basic life support;
2. the most common mistakes in basic life support;
3. possible complications and ways to prevent them;
4. airway obstruction;
5. use of AED.

**Basic concepts:** Indirect heart massage, AED, recovery position.

**Equipment:** dummy for CPR (Bryden, Super Chloe), training AED, gloves, valve masks.

**Plan:**

**1. Organizational measures** (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):

1. requirements for students' theoretical readiness to perform practical classes (know nosology and their treatment protocols);
2. questions (clinical situations) to check basic knowledge on the subject of the lesson:

Know:

1. Differential diagnosis.
2. Examination.
3. Making a preliminary diagnosis.
4. Provision of emergency care according to protocols.
5. Compliance with the action algorithm.

**3. Formation of professional skills and abilities:**

- Quick recognition of the patient's emergency condition.
- 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.
- Emergency assistance.
- Communication skills with staff and relatives in an emergency patient situation.

Content of tasks:

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

### *Indirect heart massage*

*Definition.* 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, shift 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 arms 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!*

a. 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.

b. 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 independently, after 2 breaths, you should perform 30 pressures on the sternum. In the presence of an assistant, one resuscitator provides inhalation, and the other - 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:

- ⌚ Attempts of the victim 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.

#### **4. Summary:**

After completing the lesson on the topic "Basic life support. Simulation training", students must:

Have formed and practiced professional skills in basic life support.

To learn the ability to independently use knowledge and skills when performing basic life support.

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

To have the formed competence of professional communication in the team when providing emergency care.

#### **5. List of recommended literature:**

Main:

1. Emergency and urgent medical care. In VI Vol. IV. Clinical routes (protocols) of the patient during the provision of emergency medical care at the pre-hospital stage: textbook for students. Higher Education Closed / Krylyuk V.O. etc. - Kyiv: Ozhiva. - 2020. - 300 p.
2. Emergency and urgent medical care: Study guide for students of higher educational institutions of the Ministry of Health of Ukraine. Recommended by the State Institution "Central Methodical Cabinet for Higher Medical Education of the Ministry of Health of Ukraine" / Shkurupii D.A. (ed.). - 2nd ed.— 2018. — 240 p., black and white, black and white.
3. Emergency military surgery. / trans. from English — Kyiv, Nash Format, 2022. — 576 p., illustrations.
4. Surgery: textbook / O.Yu. Usenko, G.V. Bilous, G.Y. Putintseva. - 5th edition. - K.: VSV "Medicine", 2021. - 416 p.
5. Anesthesiology, intensive care and intensive care: a study guide (University I-III) / A.A. Ilko - 2nd ed., revised. and add., "Medicine", Kyiv, 2018

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"
5. <http://www.nbuv.gov.ua/> — National Library of Ukraine
6. <https://gmka.org/uk/category/dlya-medykiv/nevidkladna-hirurgiya/> — Global Alliance for

### Medical Knowledge

7. [www.ama-assn.org](http://www.ama-assn.org) — American Medical Association
8. [www.who.int](http://www.who.int) — World Health Organization
9. [www.dec.gov.ua/mtd/home/](http://www.dec.gov.ua/mtd/home/) — State Expert Center of the Ministry of Health of Ukraine
10. <http://bma.org.uk> — British Medical Association
11. [www.gmc-uk.org](http://www.gmc-uk.org) — General Medical Council (GMC)
12. [www.bundesaerztekammer.de](http://www.bundesaerztekammer.de) — German Medical Association
13. <https://emergencymanual.stanford.edu/downloads/> — Stanford Handbook of Emergency Medicine
14. <https://www.futurelearn.com/courses/critical-care> — University of Glasgow Handbook of Emergency Medicine

**Topic:** Provision of emergency aid to victims at the scene.

**Goal:**

1. Complete the mission with minimal losses;
2. Take measures to prevent victims from receiving additional injuries;
3. Ensure maximum involvement of the response team in neutralizing the existing threat (for example, an active shooter, an unstable building, hazardous substances in a confined space, etc.);
4. Minimize harm to other civilians.

**Basic concepts:** tactics, turnstile

**Equipment:** Super Chloe mannequin, turnstiles, harnesses.

**Plan:**

**1. Organizational measures** (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** (written work, written testing (if necessary):

- requirements for students' theoretical readiness to perform practical classes (knowledge requirements, list of didactic units);
- questions (test tasks, problems, clinical situations) to check basic knowledge on the subject of the lesson.

**3. Formation of professional skills and abilities** (mastery of skills, supervision):

*1. Applying a tourniquet*

- a) Consider the option of using the "primary, spare, reserve, emergency" method (PACE — Primary, Alternative, Contingency, Emergency)
- b) Commercially available tourniquets
- c) tourniquets made from improvised means

*2. Tactical movement and extraction of victims*

*3. Quick placement in a convenient position*

Content of tasks (tasks, clinical situations)

- ⌚ Establish a tactical advantage and postpone in-depth relief efforts if they are associated with an ongoing direct threat (eg, extinguishing an open fire, collapse of an unstable building, dynamic post-explosion scenario, etc.).
- ⌚ Threat minimization methods significantly reduce the risk to victims and medical personnel. They



should include methods and tools for quick access to victims and their evacuation.

🕒 Triage should be deferred until a later phase of care. The priority of extracting the victims is determined by the available resources and the tactical situation.

🕒 Carry out minimal measures to provide assistance in case of injuries.

🕒 Consider the option of taking measures to stop bleeding

- Applying a tourniquet is the primary medical intervention that should be used in situations of immediate threat.

- The victim should be instructed to clamp the wound directly if there is no tourniquet, or its application is not practical from a tactical point of view.

🕒 Consider the option of quickly changing the patient's position or instructing the patient to change the position to one that ensures protection of the respiratory tract.

🕒 recommendations (instructions) for performing tasks (professional algorithms, orientation maps for the formation of practical skills and abilities, etc.)

🕒 Minimize the threat and move the victim to a safer place (eg, return fire, use non-lethal technology, take a position of overwhelming force, pull the victim from under structures about to collapse, etc.).

🕒 Instruct the casualty to continue participating in the tactical operation (if appropriate).

🕒 Give the victim instructions to move to a safer place and, if possible, to help himself.

🕒 Extraction of victims

- If the victim can move to a safe place, he should be instructed accordingly.

- If the casualty is unresponsive, the field commander or team leader must weigh the risks and benefits of a rescue attempt in terms of personnel and likelihood of success. Measures should be taken regarding remote medical examination.

- If the victim is responsive but unable to move, a tactically feasible rescue plan should be developed.

- Determine the dynamics of threats and whether they will be ongoing and require ongoing assessment.

🕒 Stop life-threatening external bleeding if tactically possible:

- Instruct the casualty to apply a working tourniquet if they are able to do so

- Place the tourniquet over the clothing as close (high on the limb) as possible.

- tighten the tourniquet until the bleeding stops and move the victim to a safe place. If the situation requires it, consider moving the victim to a safe place before applying the tourniquet.

- First responders should carry a harness that can be reached with either hand

- Instruct the victim to compress the wound if there is no tourniquet, or if it is tactically impractical to apply it

- Consider rapid repositioning of the casualty or instruct him to change position to one

that provides airway protection (if tactically appropriate)

- 🕒 requirements for work results, including to registration;
- 🕒 control materials for the final stage of the lesson: tasks, tasks, tests, etc. (if necessary).

#### 4. Summary:

After completing the lesson on the topic "Providing emergency care to victims at the scene", students should:

- To carry out the mission with minimal losses;
- Take measures to prevent victims from receiving additional injuries;
- Ensure maximum involvement of the response team in neutralizing the existing threat (for example, an active shooter, an unstable building, hazardous substances in a confined space, etc.);
- Minimize harm to other civilians.

#### 5. List of recommended literature:

Main:

1. Emergency and urgent medical care. In VI Vol. IV. Clinical routes (protocols) of the patient during the provision of emergency medical care at the pre-hospital stage: textbook for students. Higher Education Closed / Krylyuk V.O. etc. - Kyiv: Ozhiva. - 2020. - 300 p.
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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"
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6. <https://gmka.org/uk/category/dlya-medykiv/nevidkladna-hirugiya/> — Global Alliance for Medical Knowledge
7. [www.ama-assn.org](http://www.ama-assn.org) — American Medical Association
8. [www.who.int](http://www.who.int) — World Health Organization
9. [www.dec.gov.ua/mtd/home/](http://www.dec.gov.ua/mtd/home/) — State Expert Center of the Ministry of Health of Ukraine

10. <http://bma.org.uk> — British Medical Association
11. [www.gmc-uk.org](http://www.gmc-uk.org) — General Medical Council (GMC)
12. [www.bundesaerztekammer.de](http://www.bundesaerztekammer.de) — German Medical Association
13. <https://emergencymanual.stanford.edu/downloads/> — Stanford Handbook of Emergency Medicine
14. <https://www.futurelearn.com/courses/critical-care> — University of Glasgow Handbook of Emergency Medicine

*Practical classes No. 7 — 10*

**Topic:** Provision of pre-medical and first aid in case of injury. Simulation training.

**Purpose:** Stabilize the victim (if necessary) to ensure safe transfer to a special treatment facility or medical evacuation location.

**Basic concepts:** wound tamponade, decompression, evacuation.

**Equipment:** computer, TV, smoke machine, stroboscope, full-sized mannequins, set of artificial wounds, tourniquets, occlusive bandages, decompression needles, bandages, bandages (bandage bags), stretchers.

**Plan:**

**1. Organizational measures** (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** (written work, written test, frontal survey, etc.) (if necessary):

- requirements for students' theoretical readiness to perform practical classes (knowledge requirements, list of didactic units);

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

**3. Formation of professional skills and abilities** (mastery of skills, supervision):

*Stop the bleed:*

applying a tourniquet;

direct clamping;

applying a compression bandage;

wound tamponade;

applying a hemostatic agent.

*Airways:*

performing manual manipulations (lifting the chin, extending the lower jaw, moving to a comfortable position);

installation of a nasopharyngeal airway;

installation of suprapharyngeal devices (LMA, King-LT, Combitube, etc.);

tracheal intubation;

surgical cricothyrotomy.

*Breath:*

applying effective occlusive dressings to the chest;

artificial ventilation of the lungs using an Ambu bag;

oxygen therapy;

application of occlusive bandages;

carrying out needle decompression of the chest.

*Blood circulation:*

obtaining intravascular access;

use of a plug-port of a venous catheter;

intravenous and intravenous administration of drugs and solutions;

administration of blood products.

*Treatment of wounds:*

applying a protective shield to the eye;

applying a bandage to prevent evisceration;

placing a splint on the limb;

application of a pelvic bandage;

initiation of basic burn treatment;

treatment of brain injury.

*Preparation of the victim for evacuation:*

moving the victim (pulling, carrying, lifting);  
application of spinal immobilization devices;  
fixation of the victim on a stretcher;  
prevention of hypothermia.

*Other skills:*

rapid detoxification;  
initiation of ongoing monitoring of the victim;  
organization of a collection point for victims.

Content of tasks:

- ⌚ Maintain tactical advantage and complete the overall mission.
- ⌚ If necessary, take care of the safety of both the response service personnel and the victims by neutralizing weapons and (or) additional tactical equipment (flash grenades, gas canisters, etc.).
- ⌚ Carry out a special examination of the patient and start appropriate life-saving measures in accordance with the description given in the recommendations. DO NOT delay the extraction/evacuation of the victim in order to carry out measures that are not aimed at saving life.
- ⌚ Consider the option of organizing a collection point for the victims, if there are several victims
- ⌚ With the exception of the stationary point of collection of victims, triage in this phase should be limited to the following categories:
  - Patients who are not injured and (or) are able to leave the scene on their own
  - Dead / hopeless victims
  - All other victims
- ⌚ Contact the combat unit and/or the control unit and request or confirm the start of casualty extraction/evacuation.
- ⌚ Prepare the victims for extrication and document the care provided to ensure the subsequent provision of appropriate medical care.

Recommendations (instructions) for performing tasks (professional algorithms, orientation maps for the formation of practical skills and abilities)

*1. Weapons of injured law enforcement officers should be neutralized after neutralizing the threat and (or) in case of a change in their mental state.*

*2. Bleeding:*

a. Perform an examination for undetected bleeding and establish all sources of heavy bleeding. If not already done, use a tourniquet or apply an appropriate compression dressing with tight tamponade of the wound bed to control life-threatening external bleeding, taking into account the anatomical location of the wound.

- Place the tourniquet over clothing as proximal to the wound as possible (high on the limb) or, if it is possible to completely expose and assess the wound, place the tourniquet directly on the skin 5-7cm above the wound (DO NOT APPLY THE TOURNIQUET OVER A JOINT)

- In case of traumatic full or partial amputation, a tourniquet should be applied regardless of the intensity of bleeding.

b. Hemostatic agents: in the event of bleeding from vessels that cannot be pressed, which cannot be stopped by applying a tourniquet for anatomical reasons, or additionally after removing the tourniquet (if the evacuation time is expected to be more than two hours), apply a hemostatic agent according to the instructions for use and apply a compression bandage.

c. Stopping Nodal Bleeding: If the bleeding site is anatomically impossible to tourniquet, the bleeding does not stop after direct clamping and the application of hemostatic agents/bandages, and a nodal tourniquet is available, immediately apply a nodal tourniquet according to its instructions.

d. Re-examine all tourniquets that were applied in previous phases of medical care. Expose the wound and try to determine if a tourniquet is needed.

- Hastily applied tourniquets in the open phase, which have been determined to be necessary and effective to stop bleeding, are not removed if it is possible to quickly evacuate the victim for definitive medical care.

- If bleeding control is effective, or if evacuation for medical care is likely to be delayed, fully expose the wound, identify an appropriate site 5-7 cm above the injury, and apply a new tourniquet directly to the skin. A properly applied previous tourniquet can be loosened.

- Before removing a tourniquet from a victim who has received aggressive intravenous infusion therapy for hemorrhagic shock, ensure a positive response to resuscitation measures (for example, an improvement in the level of consciousness and the presence of a normal peripheral pulse).

- If a tourniquet is not needed, use other methods of bleeding control and remove the tourniquet.

e. If time and tactical situation permit, a distal pulse should be checked on each extremity to which the tourniquet is applied. If the distal pulse is still present, consider tightening the existing one or using a second tourniquet (next to the first) to eliminate the distal pulse.

f. Expose the wound and clearly mark all places where the tourniquet was applied, indicating the time of its application.

## *2. Ensuring patency of the respiratory tract:*

a. An unconscious victim without airway obstruction:

- raising the chin or protruding the lower jaw;
- nasopharyngeal airway;
- placing the patient in a comfortable position;

b. Victim with existing or potential airway obstruction:

- i. lifting the chin or protruding the lower jaw;
- ii. nasopharyngeal airway;
- iii. acceptance by the victim of a position that in the best way ensures patency of the respiratory tract, including sitting;
- iv. placement of the unconscious patient in a comfortable position.

c. If the previous measures were not successful, the application option should be considered:

- i. suprapharyngeal agents (eg, King LT, Combitube, or LMA) according to protocol;
- ii. surgical cricothyroidotomy (with lidocaine anesthesia, if the victim is conscious).
- iii. Oro-/nasotracheal intubation;

## *3. oxygen therapy (if possible).*

## *4. Breathing:*

- a. All lesions in the form of a penetrating chest wound / air-absorbing wound should be immediately closed with an occlusive dressing of waterproof and airtight material.
- b. Monitor the victim for the possible development of further tension pneumothorax (eg, with progressively increasing respiratory failure, hypoxia, and/or hypotension in the setting of confirmed or potential trunk trauma).
- c. If a tension pneumothorax is observed or develops, chest decompression should be performed on the side of the injury. Needle decompression should be performed with a needle/catheter of at least 14 gauge and 8 cm long. Potential decompression methods include:
  - i. introduction in the second intercostal space along the middle subclavian line. It is necessary to ensure that the needle is inserted into the chest lateral to the nipple line, and not in the direction of the heart.
  - ii. If there is adequate training and if it meets the requirements of an approved local protocol, consider lateral decompression at the 4th to 5th intercostal space, anterior to the midaxillary line on the side of the injury. The needle should be inserted perpendicular to the chest wall.
  - iii. Removal of the occlusive bandage and physical "gas release" from the wound.

*5. Intravenous (IV) access:*

- a. Insert an 18-gauge IV catheter with a plug-port (if indicated)
- b. If resuscitation measures are required and intravenous access is not possible, use the intraosseous (IV) route (according to the institution's protocol).

*6. Tranexamic acid:*

If it is anticipated that the victim will require a significant blood transfusion (eg, for hemorrhagic shock, one or more amputations, penetrating trauma to the trunk, or signs of profuse bleeding), consider administering 1 g of tranexamic acid in 100 mL of isotonic solution as soon as possible (IR) or Ringer's lactate (LR). Do not enter it later than 3 hours after the injury.

*7. Aggressive infusion therapy:*

- a. Examination for hemorrhagic shock.
  - i. Altered mental status (in the absence of head injury) and a weak/absent peripheral pulse are the clearest field indicators of shock.



ii. Deviation of the main indicators of the body's condition from the norm (for example, systolic blood pressure (SBP) <90 mm Hg and heart rate >100 beats/min, or shock index >1 (HR/SBP).

b. If there is no shock:

i. IV infusion is not required

ii. You can give liquids to drink if:

- The victim is conscious, able to swallow and has no injuries requiring potential surgical intervention

- A long delay in evacuation for medical assistance is confirmed

c. If the victim has a shock:

i. Administer an appropriate IV bolus infusion (500 mL IR/LR) and reexamine the victim. If the patient is still in shock, repeat the bolus infusion every 30 minutes.

ii. If blood products are available, consider the option of resuscitation measures using plasma (FRP) and erythrocyte mass (PRBC — packed red blood cells) in a 1:1 ratio.

iii. If a casualty with altered mental status due to potential TBI has a weak or absent peripheral pulse, administer the necessary resuscitation measures to maintain the desired systolic blood pressure of 90 mmHg. or a strong palpable pulse on the radial artery.

#### *8. Hypothermia warning:*

a. Minimize the impact of environmental factors on the victim. The victim must wear or carry protective equipment (if possible).

b. If possible, replace wet clothes with dry ones. Place the victim on an insulated surface as soon as possible.

c. Cover the victim with professional heating devices, dry blankets, poncho liners, sleeping bags, or anything that will retain heat and keep the victim dry.

d. If IV infusion is necessary, it is better to introduce warm solutions.

#### *9. Penetrating eye injury:*

a. If there is an obvious or potential penetrating wound to the eye, protect the eye from external pressure and stabilize the injury so that it remains immobile during extrication.

#### *10. Re-examine the victim:*

- a. Re-examine to check for additional injuries. Examine and bandage the discovered wounds that have not yet been bandaged.
- b. Consider splinting confirmed/potential fractures, including using a pelvic brace if pelvic fractures are suspected.

#### *11. Analgesia:*

- a. If necessary, provide the victim with the necessary anesthesia.
  - i. If opiates are administered, have naloxone ready.
  - ii. Monitor for side effects such as respiratory depression or hypotension.
- b. For operational staff:
  - i. If the employee can continue the mission:
    - Consider non-narcotic oral medications such as Tylenol.
    - In trauma victims, avoid nonsteroidal anti-inflammatory drugs (eg, aspirin, ibuprofen, naproxen, ketorolac, etc.) because these drugs disrupt platelet function and may increase bleeding.
  - ii. If the employee cannot continue the mission:
    - Consider oral non-narcotic medications for mild to moderate pain.
    - Consider the option of narcotic drugs (hydrocodone, oxycodone, transmucosal fentanyl citrate, etc.) and/or ketamine in analgesic doses for moderate to severe pain.
    - Consider the option of taking antiemetic drugs at the same time.

#### *12. Antibiotics:*

- a. If evacuation of victims with open wounds and penetrating eye injuries for definitive medical care is significantly delayed or impossible. This is usually determined during the mission planning phase and requires medical supervision.

#### *13. Burns:*

- a. Facial burns, especially those sustained indoors, may be associated with inhalation injury. In such patients, closely monitor airway and oxygen saturation and consider early definitive airway management for respiratory failure or decreased oxygen saturation.

b. Inhalation of smoke, especially in a confined space, can lead to severe carbon monoxide and cyanide poisoning. Patients with signs of inhalation of a significant amount of smoke:

i. Severe symptoms of carbon monoxide poisoning should be treated with high-flow oxygenation if available.

ii. In case of severe symptoms of cyanide poisoning, it may be necessary to administer a cyanide antidote

c. Estimate the total body surface area (TBSA) burned to the nearest 10% using an appropriate locally approved burn area calculation formula.

d. Cover the burn area with dry, sterile material and take measures to prevent heat loss and hypothermia.

e. If the area of burns is more than 20% of the total surface area of the body, aggressive infusion therapy under the supervision of a doctor should be started immediately after establishing IV (IV) access. If hemorrhagic shock is also noted, resuscitation for hemorrhagic shock takes priority over resuscitation for burn shock according to guidelines.

f. All of the above procedures can be performed on/through the skin of a burn victim.

g. Analgesic drugs can be administered in accordance with the recommendations.

h. Take intensive measures to prevent hypothermia in the case of burns with an area of more than 20%.

#### *14. Monitoring:*

a. Use appropriate monitoring devices and/or diagnostic equipment (if available). Measure and record the main indicators of the body's condition.

#### *15. Prepare the victim for transportation:*

a. Determine whether environmental factors are conducive to safe and rapid evacuation.

b. Fix the victim on the transport device (if available).

c. If vertical extrication, ensure that the casualty is secured using seat belts, assembly equipment and designated anchorage points.

#### *16. Maintain a conversation with the victim, if possible.*

a. Reassure the patient, reassure him that everything is fine, explain to him all the manipulations that are being performed.

#### *17. Cardiopulmonary resuscitation:*

a. A victim with a penetrating blast or gunshot injury who has no pulse, breathing, or other signs of life will not be successful in this operational-tactical setting and should not be administered CPR.

i. However, in patients with truncal trauma or polytrauma who are not breathing or pulsed, consider bilateral needle decompression to ensure that a tension pneumothorax does not lead to cardiac arrest before medical assistance is withdrawn.

b. In certain circumstances, such as electrocution, drowning, non-traumatic cardiac arrest, or hypothermia, CPR may be useful and considered a tactical option.

#### *18. Documentation of assistance measures:*

a. Document the clinical examination, treatment and changes in the victim's condition in accordance with local protocol. This documentation should accompany the victim during transfer to the next level of medical care.

b. Consider using a casualty care card that can be completed quickly and easily by non-medical responders.

#### **4. Summary:**

After completing the class on the topic "Providing pre-medical and first aid in case of injury. Simulation training", students must:

Stabilize the victim (if necessary) to ensure safe transfer to a special treatment facility or medical evacuation location.

#### **5. List of recommended literature:**

Main:

1. Emergency and urgent medical care. In VI Vol. IV. Clinical routes (protocols) of the patient during the provision of emergency medical care at the pre-hospital stage: textbook for students. Higher Education Closed / Krylyuk V.O. etc. - Kyiv: Ozhiva. - 2020. - 300 p.
2. Emergency and urgent medical care: Study guide for students of higher educational institutions of the Ministry of Health of Ukraine. Recommended by the State Institution "Central Methodical Cabinet for Higher Medical Education of the Ministry of Health of Ukraine" / Shkurupii D.A. (ed.). - 2nd ed.— 2018. — 240 p., black and white, black and white.

3. Emergency military surgery. / trans. from English — Kyiv, Nash Format, 2022. — 576 p., illustrations.
4. Surgery: textbook / O.Yu. Usenko, G.V. Bilous, G.Y. Putintseva. - 5th edition. - K.: VSV "Medicine", 2021. - 416 p.
5. Anesthesiology, intensive care and intensive care: a study guide (University I-III) / A.A. Ilko - 2nd ed., revised. and add., "Medicine", Kyiv, 2018

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"
5. <http://www.nbuv.gov.ua/> — National Library of Ukraine
6. <https://gmka.org/uk/category/dlya-medykiv/nevidkladna-hirugiya/> — Global Alliance for Medical Knowledge
7. [www.ama-assn.org](http://www.ama-assn.org) — American Medical Association
8. [www.who.int](http://www.who.int) — World Health Organization
9. [www.dec.gov.ua/mtd/home/](http://www.dec.gov.ua/mtd/home/) — State Expert Center of the Ministry of Health of Ukraine
10. <http://bma.org.uk> — British Medical Association
11. [www.gmc-uk.org](http://www.gmc-uk.org) — General Medical Council (GMC)
12. [www.bundesaerztekammer.de](http://www.bundesaerztekammer.de) — German Medical Association
13. <https://emergencymanual.stanford.edu/downloads/> — Stanford Handbook of Emergency Medicine
14. <https://www.futurelearn.com/courses/critical-care> — University of Glasgow Handbook of Emergency Medicine

**Topic:** Provision of pre-medical and first aid during evacuation measures and in the conditions of the reception department. Simulation training.

**Goal:**

1. Further implementation of rescue measures carried out in the phases of the UF/UC
2. Ensuring quick and safe extraction of victims to provide assistance of the appropriate level
3. Prevention of additional preventable causes of death

**Basic concepts:** wound tamponade, decompression, evacuation.

**Equipment:** computer, TV, smoke machine, stroboscope, full-sized mannequins, set of artificial wounds, tourniquets, occlusive bandages, decompression needles, bandages, bandages (bandage bags), stretchers.

**Plan:**

**1. Organizational measures** (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** (written work, written test, frontal survey, etc.) (if necessary):

- requirements for students' theoretical readiness to perform practical classes (knowledge requirements, list of didactic units);

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

**3. Formation of professional skills and abilities** (mastery of skills, supervision):

1. Familiarity with advanced monitoring methods.

2. Familiarity with transfusion protocols.

3. Skills of artificial lung ventilation and knowledge of advanced methods of ensuring the patency of the respiratory tract.

Content of tasks:

*1. Re-evaluate all measures taken in previous phases of medical care.* If there are several victims, perform an initial sorting by priority AND destination.

*2. Ensuring patency of the respiratory tract:*

a. The principles of ensuring patency of the respiratory tract in the evacuation phase are similar to the principles used in the phase of DNZ, with additional extended use of suprapharyngeal devices and endotracheal intubation.

b. Unconscious casualty without airway obstruction: the same measures as in the phase of UC

c. Victim with existing or potential airway obstruction:

i. At first, the same measures as during the installation of a nasopharyngeal airway in the phase of UC

ii. If previous measures have failed, it is reasonable to consider using suprapharyngeal devices (King LT, Combitube, LMA, etc.), endotracheal intubation/rapid sequence intubation, or surgical cricothyroidotomy (with lidocaine anesthesia if the victim is conscious).

d. If the patient is intubated and on a ventilator, consider a lung protection strategy and reassess patients with potential pneumothorax for worsening respiratory function.

e. Consider the mechanism of injury and the need to immobilize the spine. Spinal immobilization is not necessary for victims with penetrating trauma unless the patient has neurological damage. Particular attention should be paid to victims aged 65 and over with a traumatic contusion injury. Also, patients may have clinical contraindications for spinal immobilization according to a locally approved protocol if they lack:

- painful sensitivity of the middle part of the cervical spine;
- neurological disorders;
- change in mental state;
- trauma with the effect of distracting attention;
- intoxication.

### 3. *Breathing:*

a. All injuries in the form of a penetrating chest wound/air-absorbing wound should be closed immediately with an occlusive dressing. Observe the victim for possible development of further tension pneumothorax. A tension pneumothorax should be treated as described in the NEP phase.

b. Re-examine victims who have had occlusive dressings or needle decompression for a chest injury. If there are signs of further or progressive respiratory failure:

i. Consider the option of repeated needle decompression. If this improved the clinical condition of the patient, decompression can be repeated several times.

ii. If the health care provider is experienced and consistent with approved local protocol, consider placement of a pleural drainage tube if decompression fails to relieve respiratory distress and if prolonged air transport is anticipated.

c. The use of oxygen can be beneficial for all trauma patients, especially for the following types of victims:

- with a low level of oxygen saturation according to the results of pulse oximetry;
- with injuries associated with impaired oxygenation;
- unconscious;
- TBI victim (oxygen saturation should be maintained at >90%);
- victim with shock;

- injured at height;
- victims with pneumothorax.

#### 4. *Bleeding:*

- a. Completely expose the wounds to re-examine for undetected bleeding and identify any sources of heavy bleeding.
- b. If not already done, use a tourniquet or apply an appropriate compression dressing with tight tamponade of the wound bed to control life-threatening external bleeding, taking into account the anatomical location of the wound.
  - i. Place the tourniquet directly on the skin 5-7 cm above the wound.
  - ii. In case of traumatic full or partial amputation, a tourniquet should be applied regardless of the intensity of bleeding.
- c. Re-examine all tourniquets that were applied in previous phases of medical care. Expose the wound and determine if a tourniquet is needed.
  - i. Hastily applied tourniquets in earlier phases, which were determined to be necessary and effective in stopping bleeding, are not removed if it is possible to quickly evacuate the victim for definitive medical care.
  - ii. If bleeding control is ineffective, or if evacuation to medical care is likely to be delayed, identify an appropriate site 5 to 7 cm above the injury and apply a new tourniquet directly to the skin. A properly applied previous tourniquet can be loosened.
  - iii. If a delay in providing definitive medical care is anticipated for more than 2 hours, and the anatomical location of the wound to which the tourniquet was applied allows for this, attempt to deflate the tourniquet as described in the DNP phase.
- d. The distal pulse should be checked on each extremity on which the tourniquet is applied. If the distal pulse is still present, consider tightening the existing one or using a second tourniquet (next to the first) to eliminate the distal pulse.
- e. Expose the wound and clearly mark all places where the tourniquet was applied, indicating the time of its application. Use a permanent marker.

#### 5. *Tranexamic acid*

If it is anticipated that the victim will require a significant blood transfusion (for example, for hemorrhagic shock, one or more amputations, penetrating trauma to the trunk, or signs of profuse



bleeding), consider administering 1 g of tranexamic acid in 100 mL of isotonic solution as soon as possible ( IR) or Ringer's lactate (LR). Do not administer tranexamic acid more than 3 hours after injury. Begin a second infusion of 1 g tranexamic acid after initial resuscitation.

6. *Aggressive infusion therapy*: reassess for hemorrhagic shock (change in mental status in the absence of brain injury, weak or absent peripheral pulse, and/or change in pulse pattern). If ongoing BP control is possible, maintain a target systolic BP of 80–90 mmHg.

a. Establish intravenous or intraosseous access if this was not done in the DNP phase

b. Carrying out resuscitation measures as in the phase of the NICU with the following additions:

i. If the patient is in shock and blood products are not available or not approved according to local protocols (including if the medical staff lacks the appropriate experience), perform resuscitation measures as in the NPR phase.

ii. If the patient is in shock, blood products are available, the healthcare professional has the appropriate experience, and if approved by medical protocol:

- Resuscitate with 2 units of plasma (CPL) and 2 units of red blood cell mass (PRBC) in a 1:1 ratio.

- If therapy with blood components is not available, but the staff has appropriate training, appropriate tests and protocols have been developed, consider the option of transfusion of freshly collected donor blood.

- Continue infusion therapy as long as necessary to maintain the target blood pressure or improve the clinical picture.

iii. If a casualty with altered mental status due to potential TBI has a weak or absent peripheral pulse, administer the necessary resuscitation measures to maintain the desired systolic blood pressure of 90 mmHg. or a palpable pulse on the radial artery.

iv. If TBI is suspected and the victim is not in shock, elevate the victim's head 30 degrees.

7. *Prevention of hypothermia*:

a. Minimize the impact of environmental factors on the victim. If possible, move the patient to a medical facility, vehicle, or insulated building. The victim must wear or carry protective equipment (if possible).

b. If possible, replace wet clothes with dry ones. Place the victim on an insulated surface as soon as possible.

c. Cover the victim with professional heating devices, dry blankets, poncho liners, sleeping bags, or anything that will retain heat and keep the victim dry.

d. If IV infusion is necessary, it is better to introduce warm solutions.

#### 8. *Monitoring*

a. If possible, provide electronic monitoring, including pulse oximetry, cardiac monitoring, end-tidal CO<sub>2</sub> monitoring (if intubated), and blood pressure monitoring.

b. Measure and record the main indicators of the body's condition.

#### 9. *Re-examine the victim:*

a. Re-examine to check for additional injuries. Examine and bandage the discovered wounds that have not yet been bandaged.

b. Determine the method and destination of evacuation for the provision of definitive medical care.

c. Splint confirmed/potential fractures and recheck pulse.

d. In case of suspicion of fractures of the pelvic bones, it is necessary to apply a pelvic bandage.

10. *If there is an obvious or potential penetrating eye wound, protect that eye from the outside pressure and stabilize the site of injury so that it remains immobile while extricating the victim.*

11. *If necessary, provide analgesia.*

a. In case of mild pain:

i. Consider the option of using non-narcotic drugs for oral administration.

ii. In trauma victims, avoid nonsteroidal anti-inflammatory drugs (eg, aspirin, ibuprofen, naproxen, ketorolac, etc.) because these drugs disrupt platelet function and may increase bleeding

b. In case of moderate to severe pain:

Consider the option of narcotic drugs (hydrocodone, oxycodone, transmucosal fentanyl citrate, morphine, etc.) and/or ketamine (in analgesic doses)

*12. Burns:*

- i. Consider the option of simultaneous administration of antiemetic drugs
  - ii. If opiates are administered, have naloxone ready
  - iii. Monitor for side effects such as respiratory depression, hypotension
- a. Care for burns follows the principles described in the NPR phase.
  - b. Inhalation of smoke, especially in a confined space, can lead to severe carbon monoxide and cyanide poisoning. Patients with signs of inhalation of a significant amount of smoke:
    - i. Severe symptoms of carbon monoxide poisoning should be treated with high-flow oxygenation if available.
    - ii. In case of severe symptoms of cyanide poisoning, it may be necessary to administer a cyanide antidote
  - c. Be careful with gasses from a patient in an ambulance if chemical exposure (eg, cyanide) is suspected as a result of a fire.
  - d. Consider an early airway if a prolonged period of evacuation is expected and the patient shows signs of significant thermal airway damage (eg, burnt facial hair, oral edema, carbonaceous material on the posterior pharyngeal wall, and labored breathing).

*13. Traumatic brain injury (TBI):* prevention of hypotension and hypoxia plays a very important role in the treatment of TBI. During phasing and evacuation, medical personnel must use the appropriate equipment described above for monitoring and conducting medical measures.

*14. Prepare the casualty for transport:* determine whether environmental factors facilitate safe and rapid evacuation. Fix the victim on the transport device (if available). If vertical extrication, ensure that the casualty is secured using seat belts, assembly equipment and designated anchorage points.

*15. Communicate with the victim* (if possible) and maintain contact with the receiving institution. Reassure the patient, reassure him that everything is fine, explain to him all the manipulations that are being performed.

*16. Cardiopulmonary resuscitation (CPR)* can play a decisive role during evacuation for victims of electrocution, hypothermia, non-traumatic cardiac arrest, and drowning. In trunk trauma or polytrauma patients who are not breathing or have a pulse, consider bilateral needle

decompression to ensure that a tension pneumothorax does not lead to cardiac arrest until medical care is withdrawn.

*17. Documentation of Care:* Continue or begin documenting clinical examinations, treatment provided, and changes in casualty status according to local protocol. This documentation should accompany the victim during transfer to the next level of medical care.

#### **4. Summary:**

After completing the lesson on the topic "Providing pre-medical and first aid during evacuation measures and in the conditions of the reception department. Simulation training", students should: be able to carry out further rescue measures, which were carried out in the phases of the UF/UC; ensuring quick and safe extraction of victims to provide assistance of the appropriate level; prevent additional preventable causes of death.

#### **5. List of recommended literature:**

Main:

1. Emergency and urgent medical care. In VI Vol. IV. Clinical routes (protocols) of the patient during the provision of emergency medical care at the pre-hospital stage: textbook for students. Higher Education Closed / Krylyuk V.O. etc. - Kyiv: Ozhiva. - 2020. - 300 p.
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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"
5. <http://www.nbuv.gov.ua/> — National Library of Ukraine
6. <https://gmka.org/uk/category/dlya-medykiv/nevidkladna-hirugiya/> — Global Alliance for Medical Knowledge
7. [www.ama-assn.org](http://www.ama-assn.org) — American Medical Association

8. [www.who.int](http://www.who.int) — World Health Organization
9. [www.dec.gov.ua/mtd/home/](http://www.dec.gov.ua/mtd/home/) — State Expert Center of the Ministry of Health of Ukraine
10. <http://bma.org.uk> — British Medical Association
11. [www.gmc-uk.org](http://www.gmc-uk.org) — General Medical Council (GMC)
12. [www.bundesaerztekammer.de](http://www.bundesaerztekammer.de) — German Medical Association
13. <https://emergencymanual.stanford.edu/downloads/> — Stanford Handbook of Emergency Medicine
14. <https://www.futurelearn.com/courses/critical-care> — University of Glasgow Handbook of Emergency Medicine