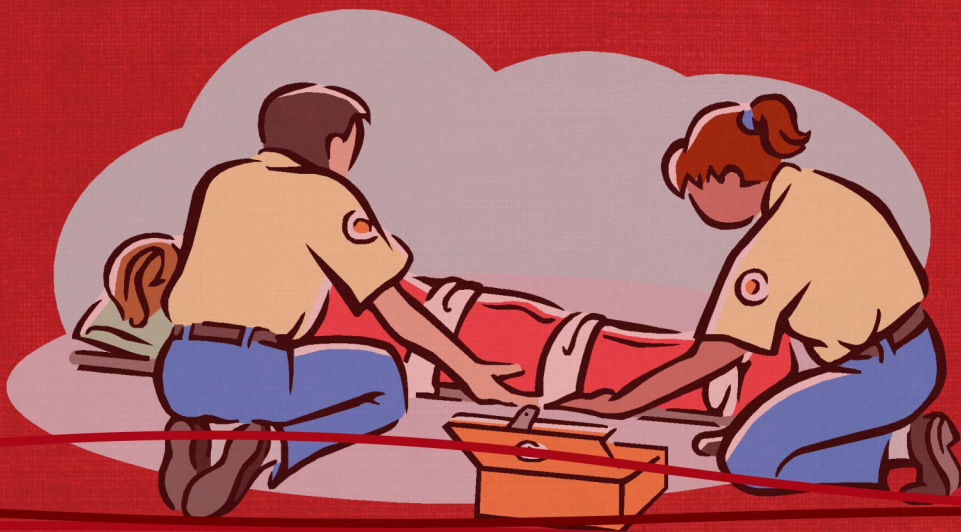


# IMPROVEMENT OF BEST PRACTICES IN THE PROVISION OF THE FIRST PRE-MEDICAL AID

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**Improvement of best practices in the provision of the first pre-medical aid**

Košice, 2019

**Improvement of best practices in the provision of the first pre-medical aid**  
Academic Textbook

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Annotation

Improving the best practices in the provision of the first pre-medical care is one of the priority areas of clinical medicine in most countries of the world. Despite the success in improving the provision of medical care at the level of FPMA and emergency medical care, it is the provision of skilled care at the earliest stages of the disease or emergency conditions that determines the quality of all medical care and the future of the patient.

When rendering emergency care to the sick and injured, the time factor is very important, it prevents irreversible disturbances in the body and creates a good help for the complete cure of the patient.

Textbook is designed to improve awareness of the importance of pre-medical aid to non-medical students in Central Asian countries.

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## **List of abbreviations**

ACLS	Advanced Cardiac Life Support
ACS	Acute Coronary Syndrome
AH	Arterial Hypertension
AHF	Acute Heart Failure
ARF	Acute Respiratory Failure
AVL	Artificial Ventilation of Lungs
BA	Bronchial Asthma
BLS	Basic Life Support
BP	Blood Pressure
ECG	Electrocardiography
CBV	Circulating Blood Volume
CNS	Central Nervous System
CPR	Cardiopulmonary Resuscitation
CVS	Cardiovascular System
PR	Peripheral Resistance
SBC	Stopping Blood Circulation
SVH	Stroke Volume of Heart
URT	Upper Respiratory Tract
VF	Ventricular Fibrillation
VT	Ventricular Tachycardia
WHO	World Health Organization

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# 1. INTRODUCTION

The first pre-medical care is a complex of urgent simple measures to save a person's life and prevent complications in domestic and industrial injuries, poisoning and other accidents, which are carried out at the scene by the victim himself or another person.

Carried out, as a rule, in extreme conditions, it involves a number of extremely serious diagnostic, practical and psychological difficulties.

In these conditions, the successful solution of the tasks facing the first pre-medical care is possible only on the basis of high theoretical and practical training.

The main thing is to learn how to act correctly in the first seconds after finding the victim, in order to save his life before the arrival of doctors.

The first qualified (first aid) assistance is provided by medical personnel at the scene of the accident, during transportation and in medical institutions before the arrival of the doctor.

Medical workers (pharmacists, laboratory technicians, nurses) perform more proficient resuscitation measures, use standard means for temporary stop of bleeding, inject drugs, impose standard transport tires, bandages on wounds, inject antidotes, etc. Great value in complex measures of the first pre-medical care has the correct and fastest transportation of the sick and injured.

Training of these most important practical skills of students is one of the most important tasks of the course of the first pre-medical care.

Students after studying the discipline "First pre-medical aid" should know the main issues of pathogenesis and clinical manifestations of pathological conditions that develop as a result of acute therapeutic, surgical, gynecological, nervous diseases in adults and children, which threaten the life of the patient (injured) and require urgent first-aid.

## 2. TERMINAL CONDITIONS

The critical level of the disorder of vital activity with a catastrophic drop in blood pressure (BP), a profound violation of gas exchange and metabolism is generally termed the terminal condition, and the moment of complete cessation of circulation and respiration is a clinical death. Widely distributed three-degree classification of the terminal condition: trauma, agony, clinical death.

Pre-conditioning state: general inhibition, confused consciousness, no BP is detected, pulse on peripheral vessels absent, but palpable on carotid and femoral arteries; respiratory disorders manifested by severe shortness of breath, cyanosis or pallor of the skin. Some authors distinguish the term “terminal pause” - a short-term arrest of the heart and respiration of a supposedly vagal genesis. Then the cardiac rhythm is restored.

Agonal condition is diagnosed on the basis of the following symptom complex: lack of consciousness and eye reflexes, undetectable blood pressure, sharp decrease in pulse on large arteries; at auscultation deaf cardiac tones are defined; on the electrocardiogram the expressed signs of a hypoxia and disturbances of a warm rhythm are registered. Clinical death is a condition in which there is a complete cessation of blood circulation and respiration. The causes of circulatory arrest are usually divided into two groups: cardiogenic and non-cardiogenic nature. The first include myocardial infarction and severe heart rhythm disturbance, embolism of the coronary vessels and a true heart rupture, in the cardio surgical clinic - a rough compression of the organ, a direct obstruction to the blood flow (thrombus, turnstile, surgeon's finger). The second group includes the primary catastrophe in non-cardiac systems: respiration, exchange, neuroendocrine sphere. Clinical death is the main indication for resuscitation.

Cardiopulmonary resuscitation is a system of urgent measures performed to remove from the terminal condition and the subsequent maintenance of life.

Isolated respiratory arrest also requires resuscitation (AVL), but without stopping the cardiac activity, it does not concern clinical death.



Immediately after stopping blood circulation and stopping breathing, the level of metabolic processes decreases sharply, but the metabolism does not stop completely due to the mechanism of anaerobic glycolysis. In connection with this, clinical death is a reversible condition, and its duration is determined by the time of the experience of cells of the cerebral cortex in the conditions of complete cessation of blood circulation and respiration. In most cases of sudden death of potentially healthy individuals, the average duration of anoxia by the brain is about 4-5 minutes, after which irreversible changes in the CNS develop. These terms are constantly revised downwards, which is determined by the desire not only to restore blood circulation and breathing as a result of revitalization, but also to return a person to life as a full-fledged person. The duration of the reversible condition increases significantly (up to 12-15 minutes) after cardiac arrest when drowning in icy water.

At clinical death in patients, complete loss of consciousness, lack of breathing, circulation, atony, areflexia is determined. Sometimes before this, there are convulsions. The skin and lips have an ash-gray color, if there was no respiratory failure before stopping the heart, or a gray-blue color, if cardiac arrest was preceded by hypoxia. The signs of stopping the circulation and the time of their appearance are shown in the Table 1. In this case, one of the types of circulatory arrest is registered on the ECG or the screen of the cardiac monitor: ventricular fibrillation (VF) or ventricular tachycardia (VT) without pulse, asystole, electrical activity of the heart without pulse.

**Table 1:** Signs of circulatory arrest and time of their onset

Symptoms	Time of appearance
Lack of consciousness	10 seconds after cardiac arrest
Absence of a pulse on the carotid artery	Simultaneously with cardiac arrest
Lack of breath	Immediately after stopping the heart, breathing becomes agonizing, and after 30-60 seconds it stops
ECG signs	Simultaneously with heart failure
Lack of heart tones	Simultaneously with heart failure
Pupil dilatation	30-60 seconds after heart failure
Convulsions	Simultaneously with loss of consciousness or somewhat later

## DIAGNOSIS OF CLINICAL DEATH

Diagnosis of clinical death is based on a combination of the following symptoms:

- lack of consciousness (coma);
- stopping of blood circulation;
- agonal breathing (apnea).

In this case, a primary examination of the patient with an assessment of consciousness, breathing, circulation should be done quickly and take no more than 1 minute.

### **Assessment of the level of consciousness**

Lack of consciousness - one of the main symptoms that reflect the increasing brain hypoxia, usually develops within the first 10 seconds from the moment of blood circulatory failure. It is recommended to ask the victim if everything is all right with him, gently (implying possible damage to the cervical spine) to try to shake by the shoulders, apply a slight painful irritation in the face area (squeeze the earlobe).

### **Evaluation of breathing**

Evaluation of breathing is carried out in the following sequence:

Is the patency of the upper respiratory tract (URT) preserved?

- whether there is spontaneous breathing, and how much it is adequate;
- how real is the threat of the development of airway obstruction;
- and respiratory distress;
- whether the victim is able to take a deep breath.

Evaluation of breathing is carried out on the principle of “see - hear – feel”. “I see” the respiratory movements of the chest and/or the anterior abdominal wall; “I hear” breathing noises (ear listens to breathing at the victim's mouth); “I feel” the movements of the exhaled air with my skin. Apnea in adults often develops later than other symptoms by 10-15 seconds. Apnea is diagnosed on the basis of auditory and visual sensations (absence of exhalation at the level of the victim's mouth, absence of

chest excursion). The combination of the two symptoms listed above — apnea and lack of consciousness — is enough to state the diagnosis of “clinical death” and initiate CPR. In the absence of respiration, mechanical ventilation is immediately started using any available method.

### **Evaluation of blood circulation**

Evaluation of blood circulation begins with the determination of the pulse on large arteries (carotid or femoral). If there is a pulse on the large arteries, the pulse is determined on the peripheral ones and, when it is available, the time of capillary filling (the “pale spot” symptom) is determined. If the symptom of a “pale spot” is 3 seconds, this indicates a decrease in peripheral perfusion due to low cardiac output. The absence of a pulse on the carotid artery is the most reliable diagnostic sign of stopping blood circulation, it is preferred to such an unreliable sign as the absence of heart tones. The carotid artery is palpated with two fingers at the level of the cricoid cartilage. Palpate neatly, trying not to squeeze the artery completely. Palpation of the femoral artery is performed in patients in the horizontal position, in the inguinal fold, just below the inguinal ligament, approximately midway between the pubic articulation and the anterolateral iliac bone.

### 3. CARDIOPULMONARY RESUSCITATION



Currently, the CPR algorithm is constantly being revised and supplemented. A major role in this work is played by the European Council for Reanimation (ERC) and the American Heart Association. The latest CPR recommendations were published by ERS in 2015. The revitalization of the body consists of a series of successive events:

1. Primary resuscitation (basic life support) - the basic measures to maintain the vital functions of the body, which are in their logical sequence formulated in the rule “ABC”. After starting resuscitation, you should call for help from colleagues or other persons nearby.
2. Recovery of vital functions (ACLS - advanced cardiac life support) - measures to restore self-circulation and stabilize the activity of the cardiopulmonary system, including the introduction of pharmacological drugs, infusion solutions, electrocardiography and, if necessary, electrical defibrillation.
3. Intensive therapy of post resuscitative disease - prolonged measures to preserve and maintain adequate function of the brain and other vital organs.

## STAGES OF ELEMENTARY LIFE SUPPORT (BASIC LIFE SUPPORT - BLS)

Primary or elementary resuscitation involves three stages:

“C” (circulation his blood)

- the artificial maintenance of blood circulation by cardiac massage;

“A” (air way open)

- recovery and control of airway patency;

“B” (breath for victim)

- artificial ventilation of the lungs (AVL) of the victim.

### **Stage 1**

First, it is necessary to give the patient the appropriate position: to lay on his back on a hard surface; the head, neck and thorax should be in the same plane, and the legs should be raised. Indirect (closed) chest compressions is done to maintain and restore blood circulation. The essence of closed massage is the compression of the heart between the sternum and the spine, the evacuation of the chambers of the heart into the trunk (aorta and pulmonary artery) vessels and the subsequent filling of the chambers of the heart from the venous channel of the large and small circle of blood circulation.

*The maximum compression* should fall on the lower third of the sternum - by 2 transverse fingers above the xiphoid process in the center of the sternum. *The depth of pressure* on the sternum should be about 30% of the anteroposterior size of the thorax. Optimum in adults is considered the depth of compression is not less than 5, but not more than 6 cm.

It is necessary to follow the full expansion of the chest. It is very important to minimize interruptions between external cardiac massage and other specific activities. The technique of indirect heart massage in adults: pressing on the chest with both hands, fingers are pressed against each other. Shoulders should be directly above the closed hands, hands in elbows should be kept straight.







## **Stage 2**







Tilting the head, extending the lower jaw and opening the mouth constitute a “*triple intake on the airway*” (Safar). The incorrect position of the head or lower jaw is the most common cause of ineffective mechanical ventilation. You should also clear the mouth and oropharynx from mucus and foreign bodies, if necessary. Checking the mouth for the presence of foreign bodies is carried out if there is no ventilation.

Lifting the chest. You need to perform 2 slow breaths using the “mouth-to-mouth” or “mouth-to-mouth and nose” method.

## **Stage 3**

Ventilation by the method of active injection of air (oxygen) into the lungs of the victim. Ventilation is carried out by mouth-to-mouth or mouth-and-mouth. It is better to carry the ventilation through the duct using a face mask and an “Ambu” bag. When carrying out ventilation it is necessary to monitor the airway patency of each respiratory cycle, focusing on the presence of a chest excursion. It is important to provide long-lasting breathing cycles with an inhalation duration of at least 1 s. The time between the first and second breath is not more than 5 seconds. When ventilation is carried out by mouth-to-mouth or with a facial mask, one should not forget about the problem of hyperventilation of the stomach with air or a gas mixture, which is produced by mechanical ventilation and the risk of regurgitation. Ventilation through the airway, facial mask with the Ambo bag or through the intubation tube is performed with 100% oxygen for the entire period of time until the recovery of the spontaneous rhythm. The presence of the endotracheal tube allows to ensure the safety of the airways, to control ventilation (volume, depth, pressure), as well as to provide the possibility of endotracheal administration of medications. When using artificial ventilation, it is desirable to use capnography to confirm intubation of the trachea and prevent hyperventilation.

	<p>At the scene of the incident, the first aid participant should assess the safety for himself, the victim (s) and others.</p>
	<p>Further it is necessary to check the presence of consciousness in the victim.</p>
	<p>In the absence of consciousness it is necessary to call for help ...</p>
	<p>... and open the respiratory tract of the victim.</p>
	<p>For this, one hand is put on the forehead ...</p>
	<p>... 2 fingers under the chin ...</p>

	<p>... and throws back his head.</p>
	<p>After opening the airway, you should check his breathing.</p>
	<p>To do this, it is necessary to bend to the mouth and nose of the victim and within 10 seconds try to hear normal breathing, feel the exhaled air with a cheek, see the movement of the chest.</p>
	<p>If there are no signs of breathing, the rescuing person should arrange an emergency medical call, involving an assistant.</p>
	<p>When calling an ambulance, you need to tell the dispatcher that the person is not breathing, to give the address of the scene.</p>
	<p>The participant of the first aid at this time starts to compress the chest. In this case, the base of the palm rest is placed on the middle of the chest of the victim.</p>





... hands are taken to the castle, hands are straightened in the elbow joints and 30 pressure is applied to the sternum



After carrying out of compression, it is necessary to carry out inhalations of artificial ventilation of lungs. When holding breaths, open the patient's respiratory tract (tilt head) ...



clamp his nose with two fingers ...



... and perform exhalation in the respiratory tract of the victim within 1 s. Then you should continue resuscitation, alternating 30 chest compressions with 2 breaths of artificial ventilation.

## 4. WOUNDS AND DESMURGY

An injury is any damage, accompanied by a violation of the integrity of the integument (skin, mucous membranes). By origin, wounds are divided into operating and casual.

Operative wounds are applied with a therapeutic purpose in special conditions, minimizing the risk of wound complications.

Casual wounds: domestic, industrial, combat, criminal. The common thing is that all of them are applied against the will of the wounded, are always contaminated with microorganisms, and there is always the risk of wound complications.

In terms of the number of single and multiple.

By the nature of the damaging factor, wounds are divided into: mechanical, thermal, chemical, radiation, combined (in the presence of several types of damaging factors) and trophic ulcers (arise from violation of arterial or venous blood supply, from local pressure and are chronic wounds).

By localization, the wounds of the head, neck, trunk and extremities, internal organs and combined - are wounds of several internal organs.

By the nature of the wound channel, mechanical wounds are divided into through, blind and tangents.

By the nature of the damage:

- *Cutting* - are applied with a sharp object, can be deep, but the surrounding tissues are damaged slightly, the edges are even. Are characterized by a moderate pain syndrome, gaping and marked bleeding. Can heal with a primary tension even without suturing, when the edges are separated from each other by less than 1 cm.

- *Stitched* - are applied with a narrow sharp object, have a small area and great depth, there is no gaping, surrounding tissues are not damaged, but damage to deep structures (nerves, vessels, organs), internal bleeding is possible. External bleeding and pain are usually minor. Stab wounds are dangerous because of the high risk of anaerobic infection.

- *Ragged* - are formed with a sliding blow with a blunt object. Characteristic uneven edges, detachment and necrosis of the skin - sometimes on a large area

- *Bruised* - are applied with a blunt object. Typical is a wide zone of damage to surrounding tissues with the development of necrosis, a pronounced pain syndrome. External bleeding is small, large vessels and nerves are rarely damaged. The bruised wounds heal, as a rule, by secondary tension.

- *Chopped* - are applied with a heavy sharp object and combine the properties of cut and bruised wounds. Characterized by deep and extensive damage to surrounding tissues, bone fractures, crushing of the edges, severe pain and yawning, mild bleeding.

- *Crushed* - are formed when a blunt object strikes with great force. All the signs of bruised wounds are characteristic, but the necrosis zone is even greater, crushing of deeper tissues, fractures of bones occurs.

- *Bitten* - arise as a result of a bite of an animal or a person. They can have a significant depth with a small area of damage and are always highly contaminated with a virulent microflora, often accompanied by the development of purulent or putrefactive infection, possibly entering into the wound of animal toxins, rabies virus.

- *Gunshot* - have significant differences from other wounds. For gunshot wounds is characterized by the presence of three zones of damage: the zone of destruction (wound channel), the zone of direct traumatic necrosis (contusion of surrounding tissues from the impact of side impact energy) and the zone of molecular shaking.

By degree of dissemination:

- *Aseptic* - is, as a rule, only operational wounds with “clean” operational benefits. They heal with a primary tension.

- *Contaminated* - are wounds infested with microflora, but without signs of suppuration. These include all accidental injuries with very few exceptions and part of the surgical wounds.

- *Infected* - wounds with signs of a purulent-inflammatory process. They are divided into primary - formed after surgery for acute purulent processes and secondary - wounds festering in the healing process.

Clinical signs of wounds - the presence of a defect in the skin or mucous membranes, bleeding, pain.

First aid for wounds includes:

- temporary stop of bleeding
- bandage application
- transport immobilization

(Do not wash the wound, remove foreign bodies from it, etc.)





## GENERAL DESMURGY

Desmurgy - the doctrine of bandages and the methods of imposing them. Under the bandage it is necessary to understand everything that is applied for healing purpose to the wound, burn, fracture or other damage and diseases. The dressing consists of dressing material applied directly to the damaged area. This material in medical institutions is often impregnated with medicinal substances: antiseptics, sulfonamides, antibiotics in the form of ointments, solutions, powders. The dressing material includes gauze napkins, cotton-gauze tampons, gauze balls, turundas, cotton wool, lignin. In the absence of a dressing material, you can use improvised means: a clean, ironed hot cotton cloth. An important component of the dressing is the fixative means, which fix the dressing on the surface of the body. The fixing means include: scarf, bandage, glue, adhesive plaster, mesh tubular bandage (retaliast). Depending on the purpose, the appointment of dressings is the most diverse: protection of affected areas from external factors, stopping of bleeding, keeping the damaged part of the body in a fixed position with a fracture.

The dressing material applied to the wound or burn surface must be sterile. The dressing is aseptic in this case.

Aseptic dressing prevents secondary infection of the wound, stops bleeding, creates a rest to the damaged organ, reduces pain, psychologically favorably affects the victim. Bandages can be soft (scarf, glue, bandage, retilaist, sticking plaster) and hard (tire, plaster, plastic).

*For the intended purpose*, several types of dressings are distinguished: reinforcing - keep dressing on the wound; pressing - used to stop bleeding and immobilizing - ensure immobility in fractures, extensive and deep burns and wounds of the extremities. They create favorable conditions for healing and reduce pain during transportation. Bandages with extension (extensional) - are imposed in hospital conditions for bone fractures in order to restore the original length of the limb.

Depending on the *type of dressing material*, there are: gauze dressings (bandage, without bandage); bandages from fabrics (scarf, clothes); plaster casts; tire bandages (transport and medical tires); special bandages (zinc-gelatinous bandage Unna).

## **Bandages**

Bandage is a long ribbon of gauze or other fabric. It is intended for strengthening soft bandages, and also for fixing immobilizing agents.

A bandage rolled up in a roll has a head (roll) and a free part is a beginning. Gauze bandages are available in widths from 5 to 14 cm and lengths of 5-7 m. There are narrow, medium and wide bandages. Depending on the volume of the bandage area, bandages of different widths are used. So, for example, narrow bandages are used for applying bandages to fingers and a brush, wide - for bandaging of the chest, abdomen, pelvis.

Bandage should meet the following requirements: be simple, comfortable, neat and cosmetic beautiful; completely cover the damaged area of the body (wound, burn, inflammation); permanently and permanently hold the dressing on the damaged

area; Do not squeeze the bandage part of the body so as not to disturb the venous outflow and thus prevent the swelling of the limb and not cause pain.

Rules for the imposition of bandages: take a bandage of the desired width, depending on the bandage part of the body; ensure a comfortable position for the victim and accessibility of the bandaged area from all sides; to give the limb a functionally advantageous position or position that is necessary for treatment; when bandaging the chest, abdomen, pelvis and upper third of the thigh, the victim should be in a horizontal position; when rendering assistance, it is necessary to observe the condition of the victim; the bandage is rolled from left to right, for which the head of the bandage is taken in the right hand, and the beginning - in the left hand, so that the bandage roll is placed on top, an exception is made for bandages on the right side of the face and chest; the bandaged part of the victim's body should be found approximately at the level of the breast of the caregiver; bandaging, as a rule, leads from the periphery to the center, starting with fixing circular tours (moves); the head of the bandage should be pointed upwards; the bandage is rolled over the bandage surface, without tearing it off and evenly stretching it.

To bandage it is necessary to use two hands: one - unroll a head of a bandage, another - straighten its rounds; when applying a bandage, each new bandage tour closes the previous one by half or two-thirds of its width; the bandage must not be twisted; the dressing ends in round tours; the end of the bandage is broken longitudinally and one tape goes along the bandage, and the other - on the contrary; tape tie a knot on the side opposite to the damage.

Variants of bandage: The nature of the bandaging is determined by the shape of the part of the bodies on which the dressing is applied (conical, cylindrical), the degree of musculature, the presence of joints. Given these anatomical features, the following variants of bandage dressings have been developed: circular, spiral, creeping (serpentine), cruciform (eight-shaped), spiky, turtle, returning. Knowing the basic versions of bandage dressings and combining them among themselves, you can put a bandage on any part of the body.

Circular dressing. Bandage is applied circularly. All tours of the bandage fall one on another and completely close each other. This is the beginning and this ends many bandages. Self-circular bandage is used on areas of the body of a cylindrical shape and small in length (wrist joint, shoulder). To ensure that the dressing does not rotate around the place of application and more firmly holds the dressing material, the beginning of the bandage must be turned obliquely. The angle of the bandage, therefore, will protrude by 2-3 cm beyond the border of the alleged bandage. After imposing the first round, this protruding corner of the bandage is folded and fixed by subsequent circular tours.

Spiral bandage. Apply it to the limbs and trunk, when it is required to close a large extent of damage. Begin it with two or three circular rounds away from the affected area, and then the bandage tours, moving  $1/2$  or  $2/3$  of the width, go spirally from the periphery to the center. Finish bandaging with circular tours. On the conical parts of the body impose a spiral bandage with kinks. All kinks of the bandage are made on the side opposite to the damage, and on one line.

Creeping (serpentine) bandage. Apply it when it is necessary to quickly fix the dressing over a considerable length (with burns) or fix the tire. Creeping dressing is not basic, but preliminary before applying a spiral or other bandage. It eliminates the need for a helper. Bandaging begins with circular tours, and then the bandage goes screw-like so that each new tour does not come into contact with the previous one, but is at some distance. After fixing the bandaging material or the buses go to a spiral bandage.

Cross-shaped (eight-shaped) dressing. Apply it for bandaging the occipital region, the back surface of the neck, chest, wrist and ankle joints. Begin bandage with circular tours, and then go on to cross, which alternate with circular.

A cross is usually located over the affected area. The bandage resembles the outline of the figure eight - hence its name.

A spicate bandage. This bandage is applied to the area of the shoulder and hip joints, the first finger of the hand. It is a kind of eight. Bandage tours, crossing, are



shifted by  $\frac{2}{3}$  of the width of the bandage up or down, close a sufficiently large area. The bandage pattern resembles an ear.

Tortoise bandage. Apply on the area of the elbow and knee joints, similar to the eight-shaped. There are 2 ways of applying a dressing: convergent and divergent. To apply a bandage, the limb must be bent: the elbow joint at right angles, the knee joint - under the blunt.

The dressing fixes the dressing and reliably holds the limb in a bent position. With the convergent method, the dressing begins with circular alternating tours above and below the joint. Successively alternating between the bandages (shoulder - forearm) and each time shifting half its width to the center of the joint, close the entire damaged area. Crossed tours on the flexor side of the joint. The divergent method differs from the first by the sequence. They begin with circular tours through the center of the joint, and then the tours of the bandage fan out in a fan-like manner and alternating (shoulder-forearm) gradually shift above and below the joint, completely closing it.

Returning bandage. They impose it on the spherical parts of the body (head, limb stump), on the hand, on the foot. Begin a blindfold from the circular tours, and then the longitudinal returning rounds going from front to back and back, consistently cover the entire surface to be bandaged. From the top, returning tours are fixed with spiral turns of bandage.

Arachnid bandage. Place on the protruding parts of the head (nose, lips, chin) and the perineum. A piece of bandage or cloth tape (about 1 m) is cut along from both sides. The middle, uncut, part (10-20 cm), together with the dressing material, is applied to the wound. The ends of the sling cross (the upper tape goes down, and the lower one - upwards) and connects from behind.

## CHEST INJURIES

Symptoms: blood flows from the wound with air bubbles (frothy blood); frequent, sometimes hoarse breathing; blue lips.

Emergency care for chest injuries:

1. Press the palm of your hand against the wound to close air in it and seat the wounded;
2. Treat adjacent skin areas with disinfectant (iodine, alcohol);
3. Cover the wound with a clean cloth, completely covering the edges of the wound;
4. If the air is sucked into the wound, place the rubberized shells of the PPI with a clean inner side or other airtight materials (oilcloth, plastic bag, sticking plaster) under the napkin, pretreated with iodine or alcohol;
5. Bandage or attach the bandage with adhesive plaster. Make sure that the dirt does not get into the wound and on the dressing;
6. Conduct anesthesia. If there are no painkillers, use alcohol;
7. Transportation to a medical institution is carried out only in the “sitting” or “half-sitting” position.

### ***Remember! You must not!***

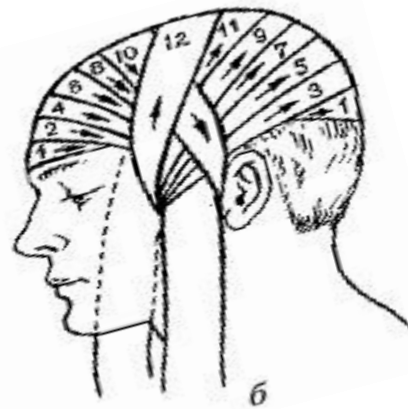
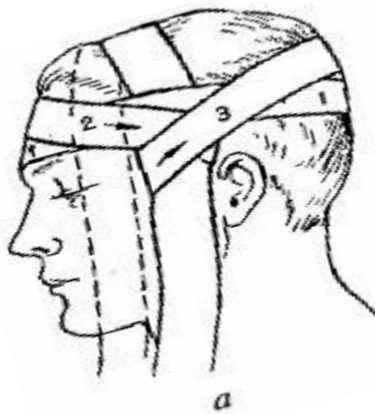
Remove foreign objects from the wound at the scene. They should be fixed with rollers from bandage and plaster. A knife, a screwdriver, a fragment, clothing, remaining in the wound, restrain internal bleeding.

## INJURIES OF ABDOMEN

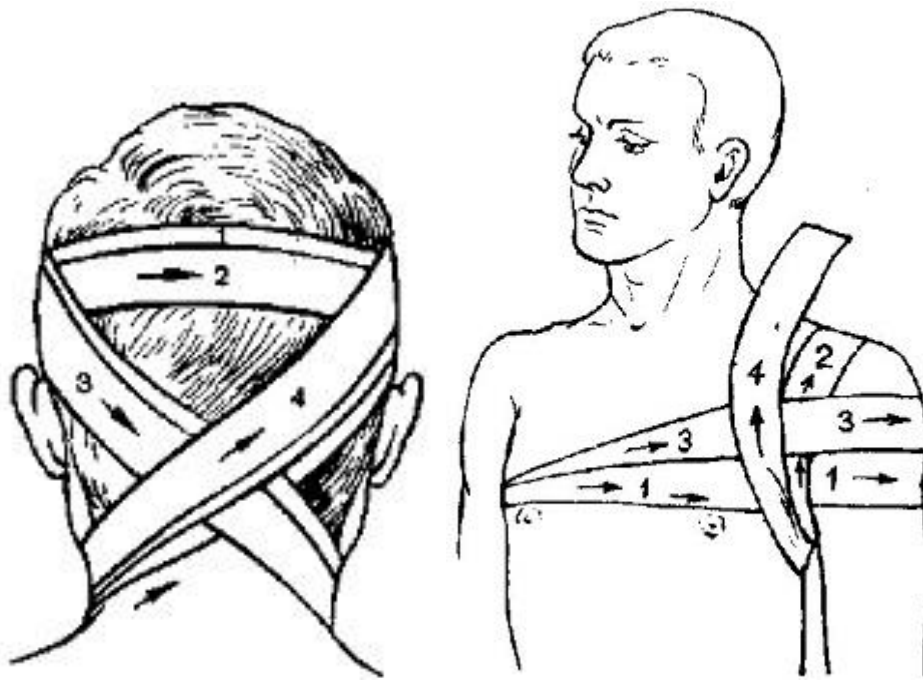
Scheme of emergency care in cases of injuries of the abdomen:

1. Fully cover the wound and the fallen internals with any clean cloth;
2. Carefully, without touching the wound, lubricate with iodine or alcohol the skin around the wound;
3. Attach the napkin with a band-aid or bandage. It is impossible to set the fallen internals so that pathogenic microbes do not enter the abdominal cavity;
4. Bend the injured person in the knees, place the roller under the knees, unbutton the clothes and waist belt;
5. Put the cold on your stomach (a plastic bottle or a bag of ice, snow, water). Wet your lips with water;
6. Cover the victim;
7. Waiting for help and transportation to the medical institution only in the "on the back" position with the legs raised and bent at the knees.

**Remember! You must not!**  
Fix the fallen organs. Give to drink and eat.

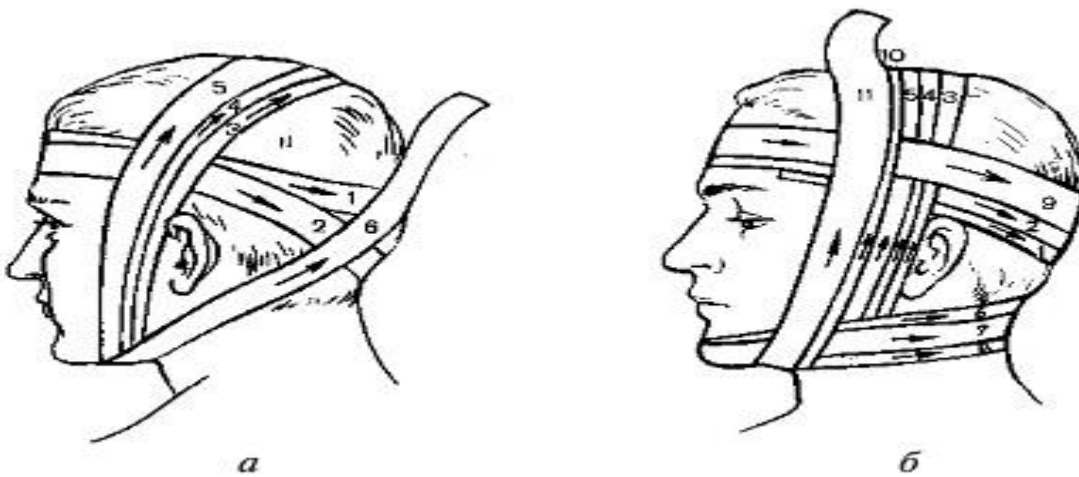


Overlapping the headband in the form of a "cap"



Applying a cruciform bandage to the back of the head

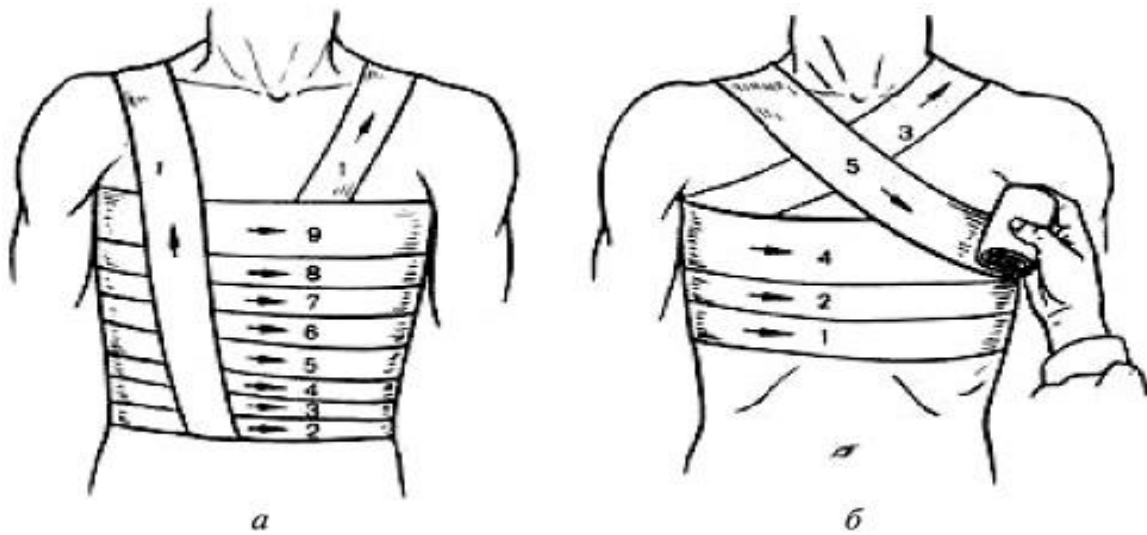
Applying a bandage to the shoulder joint



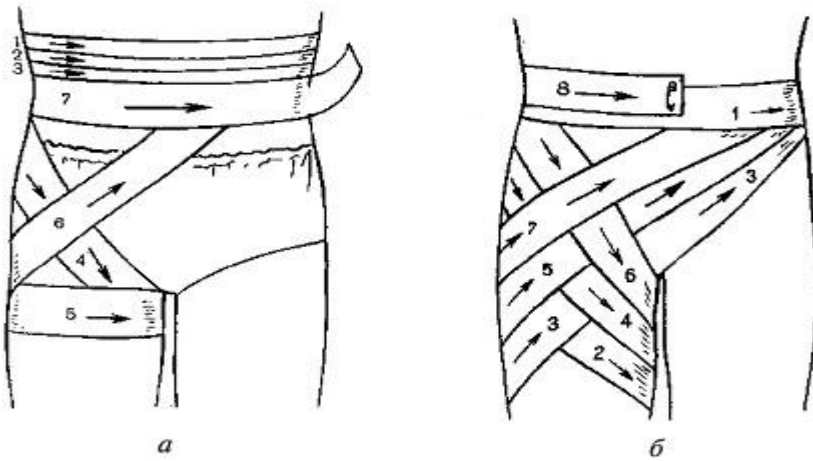
Applying a bandage to the head in the form of a “bridle”



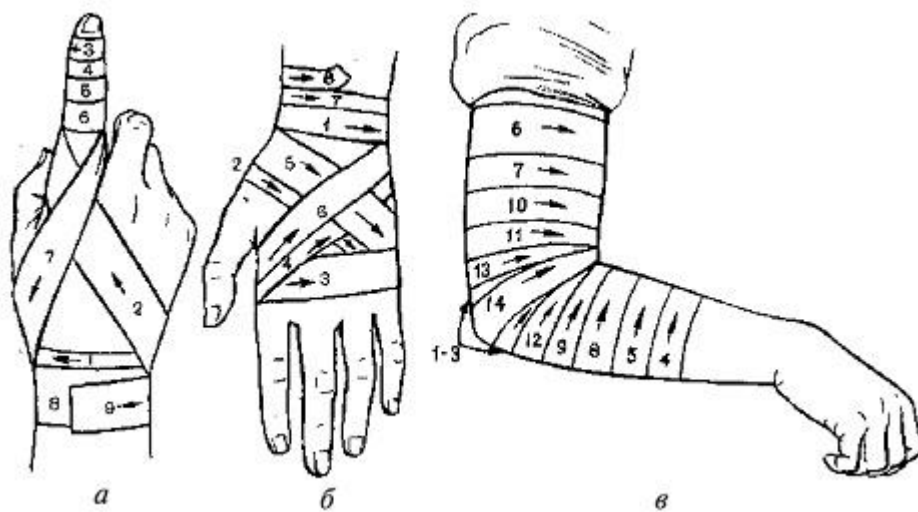
Sling-like dressings: a - on the nose; b - on the forehead; c - on the chin



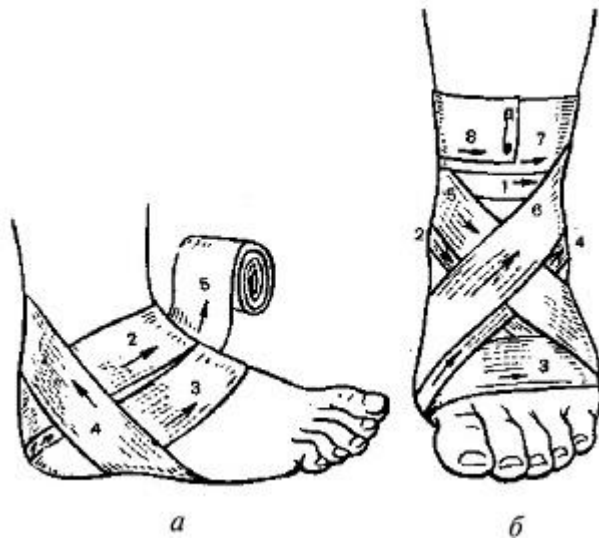
Applying a bandage to the chest: a - spiral; b – crosswise



Overlapping of the spicate bandage: a - on the lower abdomen; b - on the inguinal area



Bandages on the upper limbs: a - spiral on the finger; b - crosswise to the wrist; c - spiral on the elbow joint



Bandages on the heel (a) and ankle (b)

## **5. INJURIES, TRANSPORT IMMOBILIZATION**

Traumatology (Greek trauma, traumatos injury, damage + logos teaching) is a medical discipline that studies the diagnosis, treatment and prevention of pathology of the musculoskeletal system of traumatic origin. Traumatology is the science of injuries. Trauma is the impact on the body of an external factor that causes anatomical and functional abnormalities in tissues and organs that are accompanied by a local and general reaction.

Trauma is the sudden impact of the external environment on tissues, organs or the body as a whole. Injuries result in anatomical and physiological changes, accompanied by a local and general reaction of the body.

Trauma - a set of injuries that are repeated under certain circumstances (ice, industrial accidents, car accidents and others) in a group of people for a certain period of time (month, quarter, year). Traumatism is divided into production (associated with industrial activities in industry, agriculture, construction) and non-productive (household).

### **Classification of injuries by the result of the action of the damaging factor**

Isolated trauma - damage to one organ or injury within one segment of the musculoskeletal system (for example, liver rupture, hip fracture, shoulder fracture).

Multiple injury - a series of similar injuries of the limbs, trunk, head (simultaneous fractures of two or more segments or parts of the musculoskeletal system, multiple wounds). Out of all the variety of combined and multiple injuries, the predominant one is “dominant trauma”, which is very important for determining the medical tactics in the acute period.

Combined trauma - injuries to the musculoskeletal system and one or more internal organs, including the brain (fracture of the pelvic bones and liver rupture, fracture of the thigh and bruise of the brain).

Combined trauma - damage caused by mechanical and one or more nonmechanical factors - thermal, chemical, radiation (broken bones in combination with burns, wounds, burns and radioactive injuries). According to the presented terminology, bone fracture with simultaneous damage to blood vessels or nerves within this segment should be considered an isolated trauma (for example, a shoulder fracture complicated by damage to the brachial artery). Fractures of several bones of the foot and hand, fractures of the same bone on several levels should be considered not as multiple injuries, but as different types of isolated damage.

The provision of trauma care consists of the following links: first medical aid, outpatient and inpatient treatment, rehabilitation. The first medical aid should be provided by a doctor, mid-career medical personnel or other people in order of self-help and mutual assistance. When providing first aid at the scene of the accident, it is necessary to conduct transport immobilization, anesthesia, impose a bandage, stop bleeding and conduct the basic cardiopulmonary resuscitation. To provide qualified medical assistance, the victim is taken to a medical institution. When transporting the injured person, it is necessary to properly pack it and quickly deliver it to the emergency department or traumatology department. Outpatient treatment of a traumatological patient is performed in specialized trauma centers. Here X-ray examination, primary surgical treatment of wounds, application of usual and plaster bandages, as well as complex treatment and post-treatment of patients after discharge from the hospital.

Inpatient treatment of traumatological patients is performed in specialized departments of urban and regional hospitals, in clinics at the Departments of Traumatology and Orthopedics of Medical Universities, in the Research Institute of Traumatology and Orthopedics.



## **BONE FRACTURES**

Fracture - complete or partial violation of the integrity of the bone under the influence of external force. Distinguish traumatic fractures (with impact, shock, falling or falling into the bone of any abandoned object) and pathological (for tuberculosis, osteomyelitis, etc.)

Characteristic common symptoms of fracture of any bone: deformity and shortening of the limb; the mobility of the bone at the site of injury; feeling of bone crunch when feeling the place of fracture; pain in the injured area; impaired limb function; swelling of tissues in the fracture region

In addition, a significant part of the fractures is accompanied by a violation of the general condition of the victim, as a fracture can lead to acute blood loss and as a result - shock.

Signs of an open limb fracture: the presence of a wound, often with bleeding; in the wound visible bone fragments; limb is deformed and edematous. Signs of closed fracture of the extremities: severe pain in the movement or with the load on the limb along the axis; deformity and edema of the limb; cyanotic skin color; mobility of the limb in an unusual place; the unnatural position of the limb.

Signs of damage to the bones of the skull: the discharge of blood or colorless fluid from the ears and nose; loss of consciousness.

### **Emergency care:**

1. Place the victim on the stomach and turn the head in the direction with which more fluid is released;
2. Apply a sterile bandage on your head (loose). Put the cold;
3. Provide peace, warmth to the feet;
4. Watch for pulse and breath before the arrival of the doctor or delivery to a medical institution;
5. Transportation is carried out only lying in the semi recumbent position.

### **Provision of emergency care for fractures of limb bones:**

1. Release limbs from the effects of traumatic factors;
2. Stop bleeding;
3. Give as soon as possible anesthetic (2 tablets of crushed analgesic put under the tongue, promedol intramuscularly);
4. Apply bandages to the wounds;
5. Fix the limb with a tire or a tool (branch, board) over the clothes. With open fractures, first apply a bandage to the wound and only then - the tire;
6. Cover the victim, especially in cold weather;
7. Ensure delivery to a hospital.

### **Immobilization in fractures**

Immobilization is understood as the creation of immobility of the damaged part of the body.

Basic principles of transport immobilization:

1. The tire should grasp two joints - above and below the fracture;
2. With immobilization, it is necessary to give the limb a physiological position, if this is not possible, then this is the position that is least traumatic;
3. With open fractures, the direction of the fragments is not produced, but a sterile bandage is applied;
4. It is impossible to impose a tire on the body, it is necessary to put clothes, cotton wool, a towel;
5. During the transfer of the victim to a stretcher (or from a stretcher), the injured limb must be kept in addition.

### **BRUISES**

Bruises occur when falling, blows with a blunt object. In this case, soft tissues are damaged, small blood vessels are ruptured - a bruise (bruise) is formed.

Symptoms: pain, swelling, bruising after several hours or days (with deep trauma).

**Emergency care:**

Apply a pressure bandage, lift the site of the injury, apply cold to the site of the injury, ensure the immobility of the bruised place, provide peace and warm drink, after 3-4 days you can apply warm baths, compress and massage.

Signs of a concussion, a bruise of the brain: stunning, nausea, vomiting, noise in the ears, loss of consciousness and memory.

**Emergency care:**

Provide peace in the “lying” position (in the absence of consciousness - on the stomach), apply cold to the head, restrict in drinking, call a doctor, monitor the condition of the victim and help with the situation.

**BREAKDOWN**

Dislocation is the separation (displacement) of the articulating ends of the bones of the fingers, arms, legs, lower jaw (after impact, fall, sudden movement).

Symptoms: severe pain, swelling, displacement of the axis and changes in the length of the limb, its forced position.

Dislocations should be managed by a doctor. Only in the absence of it or in the field, small dislocations can be corrected by yourself, but without the use of force.

**Emergency care:**

Fix the damaged limb (with the help of a tire), take it to a medical institution.

**Scheme of first aid in case of traumatic shock:**

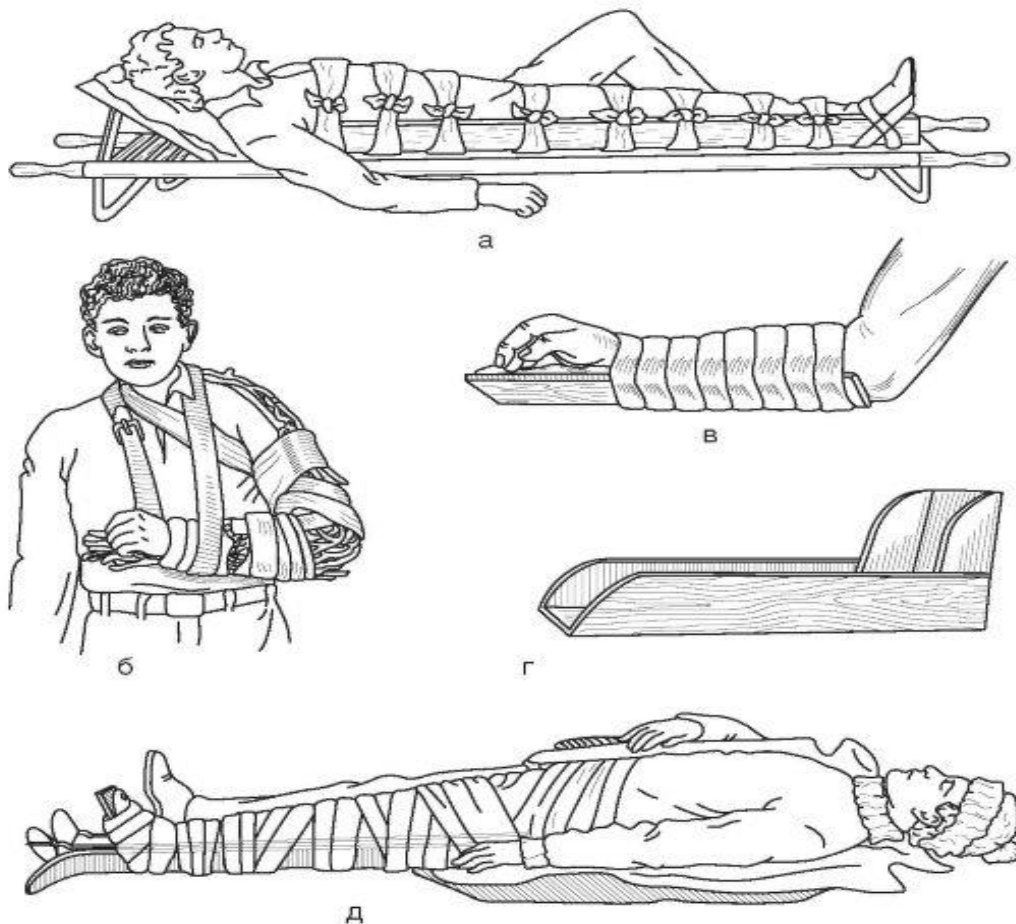
1. In case of bleeding - immediately apply hemostatic tourniquets and tight pressure bandages.
2. In case of shock injuries (fractures of the bones of the extremities, pelvis, ribs, spine, penetrating wounds of the thoracic and abdominal cavity), even in the absence of complaints of pain, anesthesia should be carried out as soon as possible (3-4 tablets of analgin); treat wounds and apply sterile

dressings; carry out transport immobilization with improvised means; as soon as possible, call an ambulance to provide medical assistance at the scene of the accident (introduction of plasma-replaceable fluids, correction of acidosis and improvement of microcirculation).

3. If it is impossible to call an ambulance to decide on the methods of transportation for hospitalization of the victim to the hospital, and in case of massive arterial hemorrhage, try to implement it yourself.

***Remember! It is unacceptable!***

- To alarm and force the victim to move without emergency.
- Move the injured person with fractures of the limb bones without applying transport tires.
- Do not apply a tourniquet or do not compress the damaged vessel with massive bleeding.



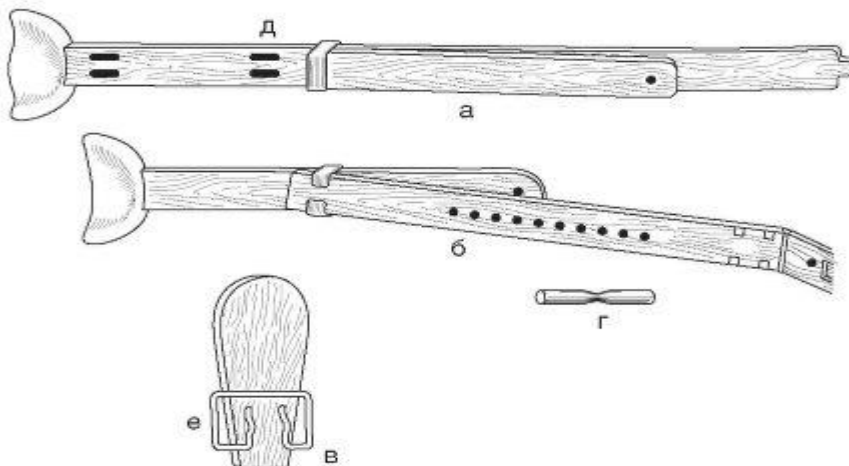
Immobilization with improvised tires: a - of boards; b - from brushwood; c - from plywood; g - of cardboard; d - from skis and ski poles.



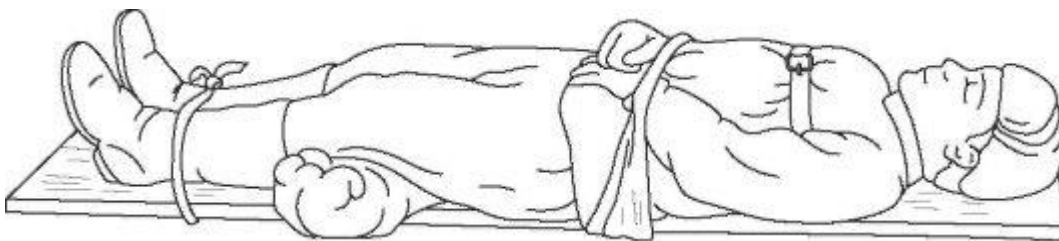
Plywood tire



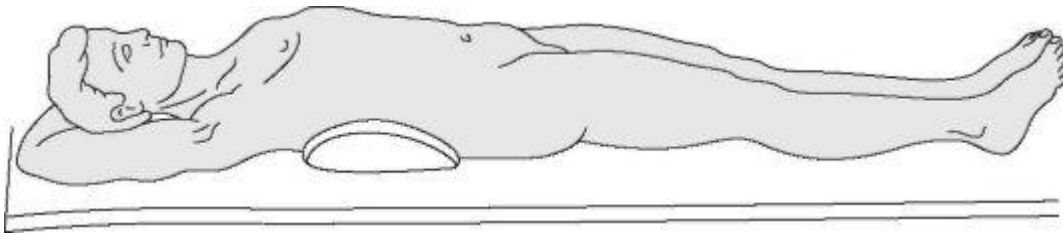
Stairway tires



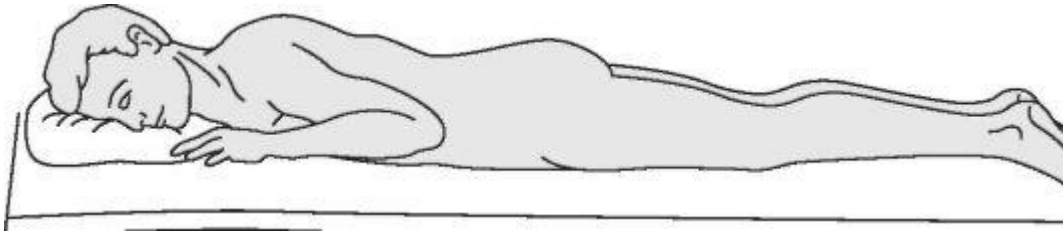
Transport bus for the lower extremity (Dieterichs): a - outer lateral extension; b - inner lateral extension; c - plywood sole with wire frame; г - wand twist with recess; d - paired slits in the upper wooden slats of the side brunches; e - rectangular ears of the wire frame of the sole



Transport immobilization with damage to the thoracic and lumbar spine with a wide board



Position of the victim on the shield in case of damage to the spine



Position of the injured person with a spinal cord injury when transported on a stretcher without a shield

## 6. BLEEDING

With every injury, blood vessels are damaged, so it is accompanied by bleeding. Depending on which vessels are damaged, bleeding may be insignificant or very plentiful, life-threatening. There are arterial bleeding that occurs with damage to the arteries, venous - with damage to the veins, capillary - with damage to small blood vessels.

In addition to external bleeding, in which blood pours out, there are internal bleeding, in which the blood flowing from the wound vessel or organ accumulates in any internal cavity (abdominal, thoracic).

### Arterial bleeding

**Signs:** the blood from the wound flows with a gushing stream or jerks; a large blood stain on clothes or a pool of blood near the victim.

#### Scheme of emergency care for arterial hemorrhage:

1. Immediately stop bleeding with your fist or finger. Do not waste time to take off your clothes.
2. Apply a hemostatic tourniquet (handkerchief, belt) or pressure bandage.
3. After stopping the bleeding, treat the skin surface adjacent to the wound with iodine and apply a sterile bandage.
4. In the cold (frost), wrap the injured limb to prevent subcooling (frostbite).
5. Cover the victim so that he is warm. Give a warm sweet tea (if there is no damage to the abdominal cavity).
6. Urgently take the victim to a medical institution.

Pressing the arteries to stop bleeding is only applicable for a short time, which is necessary to prepare the application of a tourniquet or twist.

## **Ways of imposing a tourniquet**

Harness or twist should be applied over clothing (or on top of several bandage tours) above the wound and possibly closer to it. The applied tourniquet should be clearly visible, it should not be covered with clothing or a bandage. Tighten the tourniquet only until the bleeding ceases, because excessive tightening increases pain without need and often traumatizes nerve trunks. The tourniquet can not be kept for more than 2 hours. During this time, it is necessary to take the victim to a medical institution. If this can not be done, then after 1.5 hours the tourniquet should be loosened for several minutes while simultaneously pressing the damaged vessel with a finger, and then superimposed a little higher again. In cold weather, the tourniquet should be relaxed every 30 minutes for a short time.

When applying a rubber band, it is taken for the ends, slightly stretched, circled around the limb several times and fixed.

Cloth harness is a braid with a length of 1 m and a width of 3 cm, is equipped with a buckle and a device for twisting. The tourniquet is wound around the limb, the end of it is threaded into the buckle, tightened to the point of failure, and then the twist is twisted until the bleeding stops.

Stopping bleeding with a twist is that the limb is tied up with a kerchief wrapped around the wound in the form of a tourniquet, a thick rope, and then, inserting a stick into the formed ring, rotate it until the bleeding stops.

***Remember!*** In all cases of overlapping, a note should be left indicating the time of application of the bundle.

## **Internal bleeding**

Symptoms: sudden onset of blushing of the face, pallor and coldness of the hands, stop, dizziness, increased heart rate, tinnitus, cold sweat, fainting.

At the first signs of internal bleeding, the diseased patient should be immediately sent to a medical institution!



Internal bleeding in the head, chest, abdomen can be stopped only on the operating table. It is necessary to put the cold and urgently to deliver to a medical institution.

### **Venous bleeding**

Symptoms. Blood is darker than with arterial bleeding; follows from the wound more slowly - not pulsating, but a continuous stream. Help: Raise the limb and apply a pressure bandage.

### **Nose bleed**

Causes: stroke, picking in the nose, fluctuations in atmospheric pressure and humidity, physical overstrain, overeating, stuffiness, overheating, hypertensive crisis.

#### **Actions:**

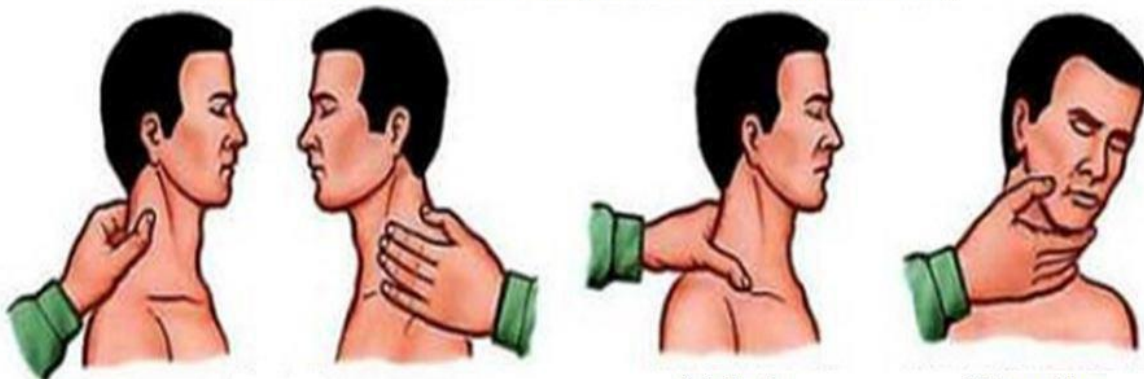
1. Sit down, slightly bending your head forward, and let the blood drain - it's not long. Do not tilt your head, otherwise the blood will enter your stomach, which can cause vomiting;
2. Squeeze for 5 minutes the nose just above the nostrils and breathe with the mouth;
3. Apply cold to the bridge of the nose and the back of the head (wet handkerchief, snow, ice);
4. To stop bleeding, moisten the cotton swab with a solution of 3% hydrogen peroxide and insert into the nose.
5. Slightly lie down. After stopping the bleeding, gently remove the tampon. Avoid sudden movements. Do not blow your nose. Do not eat hot food in the next few hours.

**With a large loss of blood:** lay the injured on the back (head below the trunk); if there are no injuries of the abdominal cavity, you can give a plentiful drink with salt or sugar; Immediately deliver to a medical institution, where it is necessary to organize the infusion of blood or blood substitutes.

**STOP BLEEDING FROM THE ARTERIES**

Artery above the wound site with your finger

The second rescuer at this time prepares funds for stopping bleeding



Somnolent

Subclavian

External jaw



High-altitude

Axillary

Brachial



Femoral

Overlapping pressing bandage on the artery of the forearm

**TWIST  
WITH A  
STICK**



## 7. BURNS

Burn is damage to the body tissue of a person due to external influences. Several factors can be attributed to external influences. For example, a thermal burn is a burn caused by hot liquids or steam, strongly heated objects.

Electric burn - with such a burn, the internal organs are also affected by the electromagnetic field.

Chemical burns are those that have occurred due to the action, for example, of iodine, of some acid solutions - in general, of various corrosive liquids.

If the burn is obtained due to ultraviolet radiation or infrared radiation, then this is a radiation burn.

There is a percentage of the degree of damage to the entire body. For the head, it is nine percent of the whole body. For each hand - also nine percent, chest - eighteen percent, each foot - at eighteen percent and back - also eighteen percent.

This division into percentage of damaged tissues to healthy allows you to quickly assess the patient's condition and correctly give a conclusion whether it is possible to save a person.



Important is the classification of burns in degrees. Such a separation is necessary in order to standardize the volume of therapeutic measures with varying degrees of burn. The classification is based on the possibility of reverse development of changes naturally without the use of surgical interventions.

The main zone that determines the regenerative capacity of the affected skin is the preserved germ and microcirculatory bed. If they are affected, early active surgical procedures are shown in the burn wound, as it can not be healed independently or takes a long time with the formation of a rough scar and a cosmetic defect.

**According to the depth of tissue damage, burns are divided into four degrees.**

**1st degree burn** is characterized by redness and a small swelling of the skin. Usually recovery in these cases occurs on the fourth or fifth day.

**2nd degree burn** - the appearance on the reddened skin of the blisters, which can not form immediately. Burn blisters are filled with a transparent yellowish liquid, when they break, a bright red painful surface of the germ layer of the skin is exposed. Healing, if an infection has joined the wound, occurs within ten to fifteen days without the formation of a scar.

**3rd degree burn** - necrosis of the skin with the formation of a gray or black shard.

**4th degree burn** - necrosis and even charring not only the skin, but also deeper lying tissue - muscles, tendons and even bones. The necrotic tissue is partially melted and torn away for several weeks. Healing occurs very slowly. In the place of deep burns, rough scars are often formed, which, when the face, neck and joints are burned, lead to disfigurement. On the neck and in the joints, as a rule, scarring contractures are formed.

This classification is unified throughout the world and is used for virtually all types of burns, regardless of the cause of their occurrence (thermal, chemical, radiation). Its convenience and practicality are so obvious that even a person unfamiliar with medicine can easily understand it.

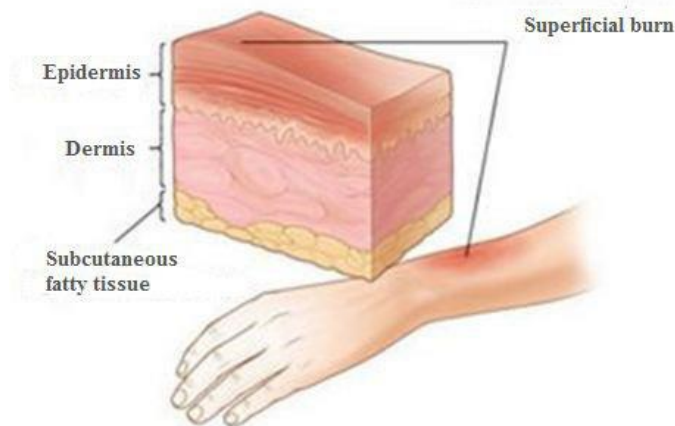
The basis for the development of pathological changes and clinical manifestations of different degrees of burns is the direct destruction of skin elements by high temperatures. The second component is circulatory disorders in neighboring

areas, which play a major role in aggravating the degree and area of damage over time.

A characteristic feature of burn injuries is the increase of these indicators in comparison with the initial ones. It is possible to estimate the true volumes of the burn only the next day after it is received. By this time there is a clear restriction of living and dead tissues, although the zone of microcirculatory disorders remains. For it, and the main medical struggle.

Article on the topic: Providing first aid for burns, both medical and pre-hospital

### **First degree burn**



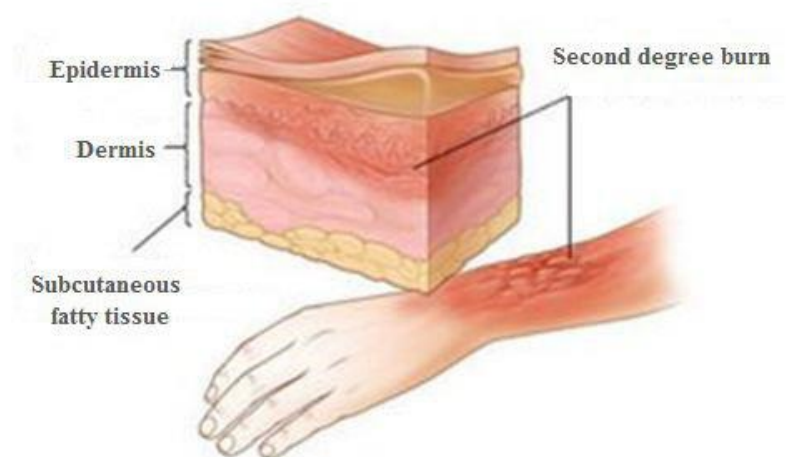
Pathomorphologically, it is represented by damage to the most functionally insignificant upper layer of the skin, the epidermal one. This zone is subject to permanent substitution under normal conditions. In a healthy person, millions of epidermal cells peel off during the day. Usually, sun rays, hot liquids, weak acids and alkalis can cause such a burn. Therefore, such a burn is not accompanied by marked structural rearrangements of the affected skin. Microcirculatory disorders are also minimal, which underlies the formation of clinical manifestations.

Signs of the first degree of skin burn are reduced to redness (hyperemia) of the affected areas, accompanied by moderate pain. Touching them causes increased burning. The edema is expressed moderately or completely absent, which depends on the area of the burn. There are no other manifestations.

First-degree burns are often limited. Common isolated surface lesions are rare and are usually combined with deeper species. The danger of developing a burn disease in case of epidermal damage does not exist, which is reflected in the minimal volume of therapeutic measures.

Healing of the affected surface with burns of 1st degree occurs within a few days. The course of the process is characterized by a gradual drying and wrinkling of the damaged epidermal layer. Then there is its rejection in the form of peeling. A full recovery takes a little more than one week. Rough scars and cosmetic defects, even in the face, do not remain.

### **Second degree burn**



Such burns are characterized by damage to deeper layers of the skin and moderately severe microcirculation disorders in the affected area and adjacent areas. This type of damage occurs most often and is characterized by a relatively favorable course, even with large areas of burns.

The epidermis and surface zones of the dermis, up to the papillary layer, are destroyed. Its significance lies in the fact that most of the capillaries and nerve endings pass here, which forms the clinical manifestations of the 2nd degree burn. These structures remain intact. Temporarily violated only their function with a preserved pain sensitivity.

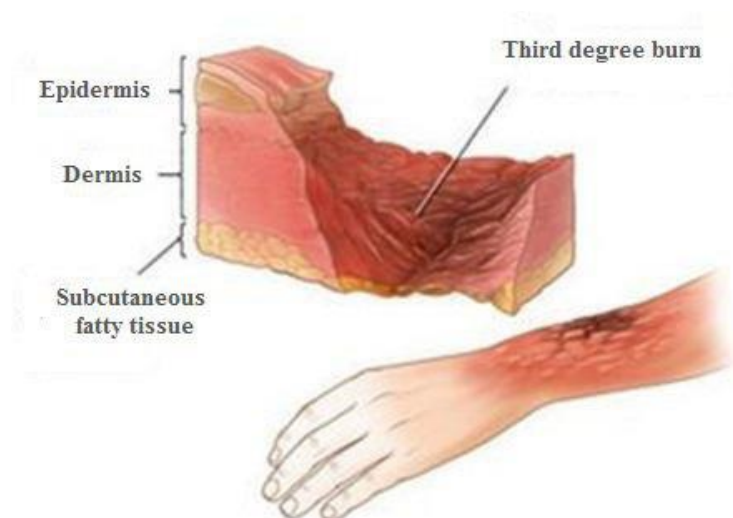
A clinical description of such a burn consists in the formation of bubbles of different sizes and areas filled with a transparent liquid of straw-yellow color. The surrounding skin can be red or unchanged. Their formation is possible due to the fact that the dead epidermis forms a cavity that is filled with plasma (liquid part of the blood) through enlarged, partially altered microvessels. Victims are concerned about burning pain, which persists for several hours after getting a burn. Any touch increases the pain. Fabrics in the affected area and adjacent areas are swollen.

Burns of 2nd degrees heal independently, leaving behind reddened areas, which eventually acquire a natural shade and do not stand out among healthy ones. The process of complete restoration of damaged tissue takes, on average, about two weeks. Small burns do not cause any danger in terms of burn disease.

But if their surface is large enough, there is a threat of infection and dehydration, which requires appropriate measures of specialized medical care. It is limited to infusion therapy and antibiotic prophylaxis. All active surgeries on the burn surface are reduced to piercing or pruning of blisters with fluid evacuation under aseptic conditions.

Sometimes there are controversial issues when determining with a degree of burn and conducting differential diagnosis between burns of 2nd and 3rd degrees. After all, both are bubbles. But the key role here is to maintain the pain sensitivity when touching the burned surface. If it is present, it is a second degree burn.

### **Third degree burn**



Characterizing this type of burn, it should be noted that it is divided into two subspecies. Necessity in this has arisen in connection with the fact that the deep layers of the dermis have certain features that are also significant in determining therapeutic tactics. In general, the third degree burn characterizes the complete defeat of the entire thickness of the skin, to the subcutaneous tissue.

Consequently, its complete independent restoration becomes impossible. Microcirculatory disorders in the adjacent areas are so pronounced that they can often turn into burns of the 2nd degree with the passage of time.

In terms of the risk of developing a burn disease, this degree of damage is at a very important place. This is due to the fact that burns of this kind are often extensive, spreading over a large extent. Large amounts of dead tissue and wound surfaces formed in their place. These features lead to the fact that all degradation products are actively absorbed into the blood, causing severe intoxication.

Accordingly, the possibility of infection of such burns with the development of the septic state remains high. Restoration of the skin can take several months and in most cases requires surgical interventions. Such damage leaves behind a rough scars, which can cause cosmetic defects.

Clinical manifestations determine the division of the third degree burn into two subspecies:

1. 3a degree - lesion of the dermis, including the papillary layer. Only the deepest parts of it remain intact, in which the appendages of the skin are laid (hair follicles and sebaceous glands). This fact also determines the possibility of self-healing of small burns due to granulation and marginal epithelization from the surrounding healthy areas;

2. 3b degree - damage to all skin elements, including subordinate formations. This makes its independent recovery impossible, since the underlying subcutaneous fatty tissue does not possess this ability.

Burns of 1st and 2nd, as well as 3a degrees, are referred to as superficial, due to their ability to self-healing. Determining the degree of burn is not so difficult, if you know what you need to pay attention to.



The criteria characterizing a third degree burn can be identified as follows:

1. With burns 3a, different-sized blisters are formed, filled with bloody fluid against the background of reddened surrounding tissues;
2. Wound defects with abundant serous-hemorrhagic (mucocutaneous) discharge, the touch to which does not cause pain;
3. Burns of 3b degree are characterized by the formation of thick-walled bloody blisters or dense scabs from dead skin;
4. Severe edema and hyperemia of the surrounding skin;
5. General manifestations in the form of intoxication and dehydration (tachycardia, frequent breathing, falling blood pressure, fever).

It is very important with such burns to hospitalize the victims in a specialized hospital, where early surgical treatment and appropriate medication correction will be performed, which will prevent the development of burn disease. It is very difficult to withdraw patients from the latter condition. Therefore, for a given degree of burns, modern combustiologists recommend conducting early surgical treatment with single-stage or stage burns of burn wounds.

### **Fourth degree burn**



This type of burns is the heaviest, regardless of the area of the lesion. If it spreads within the same segment, it can cause the death of the patient or loss of the limb. As the world practice shows, burns of the 4th degree of a local nature are mostly received by a flame or a hot object, being in a state of alcoholic or narcotic intoxication. Such burns are possible with chemical compounds of acidic or alkaline

nature. The electric injury of the extremities often has the form of burns of the hand and forearm of the 4th degree, manifested by complete charring of the fingers.

Morphologically, this type of damage refers to deep. Destroyed can be all layers of skin and underlying tissue: subcutaneous fat base, muscles, ligaments and tendons, bone formations, vessels and nerves. Perhaps circular distribution of these changes around the affected limb, which leads to the formation of a dense crust of necrotic tissue and causes compression of the stored elements and the violation of adequate blood supply.

In terms of clinical manifestations, these burns can not be confused with anything. On the site of the destroyed tissues a dense thick-walled scab of black or brown is defined. The general condition of patients is disrupted until the shock and cerebral coma. If the burn area is large, then there is very little time to save life. Circular damages are especially dangerous. The dense scab that forms the frame, with a progressive increase in the edema of the tissues becomes a barrier to their stretching, which leads to their compression and loss of chances of salvation. The most important is compression of the chest, which leads to disruption of vital functions and rapid death of victims in the event of failure to provide specialized care.

In terms of the development of burn disease, then with burns of the 4th degree, its manifestations can be traced already from the first hours after their receipt. If such burns are limited to small areas, the predictions for a complete cure are favorable. This process can take several months.

With extensive burns, if the survivor survives, the recovery lasts for months or even years, as it requires numerous plastic surgeries to replace the formed defects.

The most important thing about which you need to remember - it is not necessary first of all to seek an answer to the question of the degree of burn received. It is necessary to quickly and efficiently organize the provision of emergency measures and the transportation of the patient to a medical facility, on which often depends not only the amount of damage, but also human life. All the rest must be entrusted to specialists in this matter, who know the intricacies of a complex problem.

## How to help the victim?



### In domestic conditions

The first thing to do is to cool the skin. To do this, it is enough to lower the burned body area in cool water for 10-15 minutes. During this time, the pain will go away, and redness will decrease. Just do not use ice! You just need cool water.

After this, it is necessary to treat the skin with a special agent:

- Panthenol (or any remedy that contains panthenol)
- Ointment Bepanten
- Ointment dermozin
- Solcoseryl gel
- Sulfargin

These drugs can significantly reduce the burning force, accelerate the regeneration of the skin and quickly heal the burn itself. If these funds are not at home, then the burned body area can be smeared with raw egg albumen, aloe juice. Or you can make a compress from raw potatoes or pumpkins. It is not necessary to apply such a popular method, as oil and fatty cream. This method really removes the primary pain, but in the aftermath it only gets worse.

Home remedies are recommended to be used as an interim measure, and treatment should be carried out with special ointments, listed above.

## **8. ACUTE RESPIRATORY FAILURE. CONICOTOMY**

Under acute respiratory failure is now understood as a syndrome in which the maximum stress of all the body's compensatory systems is unable to ensure its adequate oxygen saturation and the removal of carbon dioxide. Pathogenetically, the development of acute respiratory failure is due to hypoxia as a result of violations of alveolar ventilation, diffusion of gases through the alveolar membranes and utilization of oxygen in tissues.

Acute respiratory failure is divided into primary and secondary. Primary is associated with impaired mechanisms of oxygen delivery from the environment to the alveoli of the lungs. Most often, it occurs with unchained pain syndrome, impaired airway patency, lung tissue damage and respiratory center, endo- and exogenous poisoning with impaired neuromuscular impulse. Secondary respiratory failure is caused by a violation of oxygen transport from the alveoli to the tissues of the body. The causes of its occurrence may be violations of central hemodynamics, microcirculation, cardiogenic pulmonary edema, pulmonary embolism, and the like.

Acute respiratory failure is also subdivided into ventricular and parenchymal. Ventilation refers to respiratory failure, developed as a result of the defeat of the respiratory center of any etiology, impaired transmission of impulses in the neuromuscular device, damage to the chest, lungs, etc. The parenchymal form can be caused by the development of obstruction, restriction, constriction of the respiratory tract, impaired diffusion of gases and blood flow in the lungs.

### **Etiological classification of acute respiratory failure**

In clinical practice, the following classification of acute respiratory failure is adopted, depending on the etiological factors. Allocate:

**1. Acute respiratory insufficiency of the central genesis.** Acute respiratory insufficiency of the central genesis occurs with some poisoning, brain damage (craniocerebral trauma, stroke), increased intracranial pressure, and the like.

Intoxication with hypnotics, sedatives and some other drugs leads to the depression of the respiratory center and the violation of the innervation of the respiratory muscles. Patients develop hypoventilation, hypoxia, respiratory metabolic acidosis. The clinical picture in this case and intensive therapy is determined by the type of poison.

Damage to brain structures in the area of the respiratory center, as a result of craniocerebral trauma, stroke, brain tumor or increased intracranial pressure, development of cerebral edema of any other aetiology results in impaired ventilation of the lungs due to development of the lower barbaric syndrome. There is a decrease and difficulty in breathing, a disorder of his rhythm. Paralysis of the respiratory center and respiratory arrest often develop. Increased intracranial pressure leads to a decrease in pO<sub>2</sub> in arterial and venous blood with the development of hypoxia and metabolic acidosis. The organism compensates this condition due to hyperventilation, which leads to the development of compensatory respiratory alkalosis with PaCO<sub>2</sub> less than 35 mm Hg. Art. But hypocapnia leads to a violation of cerebral blood flow and an increase in the activity of anaerobic glycolysis. As a result, acidic products of decomposition accumulate in tissues, which reflexively intensifies hyperventilation and leads to the development of a vicious circle.

The clinical picture and specifics of intensive care are determined by the specific causes of the development of the pathological condition. The main principles of treatment of acute respiratory insufficiency of the central genesis is the restoration of airway patency, normalization of disorders of alveolar ventilation and hemodynamics, elimination of the causes of oppression of the respiratory center. The principle is based on the replacement of a damaged function (artificial ventilation, etc.), correction of respiratory center disorders, control of swelling and swelling of the brain, use of antidotes and antagonists of substances that caused poisoning.

**2. Acute respiratory failure associated with airway obstruction.** Acute respiratory failure associated with airway obstruction can develop with laryngo-, bronchiolo-, bronchospasm of various etiologies, foreign bodies of the respiratory tract and other pathological conditions.

### **3. Acute respiratory failure due to impaired neuromuscular transmission.**

Acute respiratory failure due to impairment of neuromuscular conduction can develop in tetanus, myasthenia, myopathies, spinobulbar poliomyelitis, residual curare, metabolic disorders accompanying certain pathological conditions, etc. The clinical picture mainly depends on the etiology of the lesion and the severity of respiratory disorders.

At the prehospital stage, the treatment of respiratory failure in cases of neuromuscular conduction disorders should begin with the supply of increased oxygen and auxiliary ventilation of the lungs, and if ineffective, intubation of the trachea and artificial ventilation are indicated.

**4. Acute respiratory failure in cases of diffusion of gases through the alveolar-capillary membrane.** Diffusion of gases through the alveolar-capillary membrane can be disrupted for pneumonia, chronic lung diseases with respiratory failure (pneumosclerosis, pulmonary emphysema), pulmonary edema, and the like.

**5. Acute respiratory failure associated with damage and diseases of the respiratory system.** The causes of acute respiratory failure in traumatic injuries of the chest may be intrapleural bleeding, partial or complete exclusion of lungs from gas exchange due to accumulation of air and blood in the pleural cavity, obstruction of the trachea and bronchi by blood, flotation and displacement of the mediastinum. The development of respiratory failure can also be caused by a violation of the mechanics of breathing due to damage to the skeletal function of the chest and the development of severe pain syndrome.

At the prehospital stage, the most common cause of the disorder of respiratory function in case of a chest injury is pneumo- or pneumohemothorax and multiple fractures of the ribs.

Fractures of the ribs, the presence of subcutaneous emphysema, lack of breathing on the side of the injury or asymmetric respiratory movements of the chest give reason to suspect pneumothorax. It should be borne in mind that pneumothorax can develop and on the half of the chest, opposite trauma. Multiple fractures of the ribs lead to flotation of the walls of the chest and mediastinum.

## **6. Acute respiratory failure of mixed type.**

As a rule, acute respiratory failure rarely develops in isolation, without capturing other vital body systems. In the practice of an ambulance physician, there are often pathological conditions such as pulmonary embolism, hanging, drowning, in which respiratory failure is accompanied by severe cardiovascular, nervous and other body systems. These conditions conditionally refer to acute respiratory failure of mixed genesis.

### **FOREIGN BODIES**

Predict in advance which subject turns out to be “not in that throat” is impossible. Tragedy can be played out in the dining room or on the street, in a car or plane. The variety of foreign bodies falling into the larynx and trachea can only be amazed. Most often, such misfortunes happen to children.

#### **Types of foreign bodies**

Depending on the form, all foreign bodies can be divided into three groups:

1. Wide and flat objects are referred to coin-like bodies. This is the coins themselves, and buttons similar to them, as well as any flat rounded plates.

2. Another group combines objects with a globular shape or a pea-shape - dragees and crustaceans, all kinds of pellets and balls, as well as unprocessed pieces of potatoes, sausages, cucumbers, or apples.

3. The last group, which should be paid special attention, includes foreign bodies that resemble a rocker in shape. Most often these are pieces of shish kebab, connected by a thin, but very strong fascial film.

This classification is of fundamental importance for determining the tactics of first aid.

#### **Methods of providing emergency care**

##### **Extraction of spherical objects**

If the child is choked with a pea, a piece of apple or any other spherical object, the most sensible thing is to turn the baby head down as quickly as possible and tap it with his palm on the back at the level of the shoulder blades several times. The so-called “Pinocchio effect” will work. If after 2-3 shocks between the blades the

foreign body did not fall to the floor, then immediately proceed to other ways of extracting it.

If the height and weight of the child must not be lifted by the legs at the full length of the body, it will be enough to bend the upper half of the trunk through the back of the chair, the bench or through your own thigh so that the head is as low as possible of the pelvic torso. In these actions there is nothing complicated, and, as practice shows, they are quite effective.

### **Extraction of coins**

When coin-like foreign bodies hit, especially when the foreign body has advanced below the glottis, wait for success from the previous one method is not necessary: **the effect of the piggy bank will work.**

In this situation, it is necessary to resort to methods aimed at concussion of the chest as soon as possible. It is necessary to force a foreign body to change its position.

Most often, the foreign body is in the right bronchus. This will enable a person to breathe at least one lung, and, therefore, survive.

There are several ways of shaking the chest.

1. The most common of these is tapping with the palm of the back. The greatest effect occurs when short, frequent strokes on the interscapular area. Blows on the back can be applied only with the palm open and in no case by the fist and not by the edge of the palm.

2. Another, more effective method, was called “the way American policemen”. By itself it is quite simple and has two options.

The first option is: carried out as follows: it is necessary to stand behind the suppressed, take him by the shoulders and, pulling away from himself to the outstretched hands, sharply forcefully strike against his own chest. The blow can be repeated several times.

The second option is: to stand behind the patient and grab him with your hands so that your hands, folded in the lock, are below his xiphoid process, and then sharply



push hard under the diaphragm and hit back against your chest. This will allow not only to strongly shake, but also due to a sharp displacement of the diaphragm to squeeze out the remainder of the air from the lungs, i.e. significantly increase the displacement of the foreign body.

### **Scheme of first aid when foreign body enters the larynx or trachea**

1. The infant (child under 5 years old) is turned upside down and raised by the feet.
2. Adult bend over the back of an armchair, bench or own thigh.
3. To strike several times with the palm between the shoulder blades.
4. In case of failure and with the saved consciousness - use one of the variants of the way "American policemen".
5. In case of unconsciousness, turn the person who has choked on his side and hit the back with his open palm several times.
6. This recommendation has the right to perform only physicians. If the previous methods proved ineffective and in case of kebab removal - to make an emergency conicotomy.
7. Even after a successful extraction of a foreign body, it is necessary to consult a doctor.

### ***Remember! It is unacceptable!***

1. Take out the foreign body (fingers or tweezers).
2. Inflict punches on the spine.
3. At once to open hands at carrying out of a way of "the American policemen" (blow in this area can provoke sudden cardiac arrest).

Conicotomy (anatomical conus [elasticus] elastic cone + Greek toma incision, dissection, synonym for koniotomy) median dissection of the larynx between the cricoid and thyroid cartilages within the periostematous ligament.




In emergency cases, a conicotomy must be performed, which the doctor should be able to do under any conditions, with any tools (sometimes they can be a kitchen knife and a spout from a porcelain teapot).






It is used in adults and children older than 8 years. In children under 8 years, puncture conicotomy is performed.

Conicotomy (dissection of the conical ligament) is a safer method compared to a tracheotomy, since:






- at this point, the trachea is closest to the skin;
- there are no large vessels and nerves;
- manipulation is relatively easy to perform.

### **First aid for violation of airway patency**

	<p>Sign of blockage of the respiratory tract.</p>
	<p>To determine the degree of blockage, you should ask the victim “Have you choked?”</p>
	<p>If the victim does not respond, it is necessary to stand on the side and slightly behind the victim ...</p>

	<p>... holding the chest of the patient with one hand, the other tilt it forward so that in case of displacement of the foreign body it fell into the victim's mouth, and did not fall lower into the respiratory tract ...</p>
	<p>... and apply 5 sharp strokes between the blades with the base of the palm, checking after each stroke whether the obstruction could be eliminated.</p>
	<p>If after 5 strokes the obstruction is not eliminated, 5 attempts should be made to press the abdomen.</p>
	<p>To do this, it is necessary to stand behind the victim, grab him from behind with both hands at the level of the upper half of the abdomen ...</p>
	<p>.. tilt the victim forward, squeeze the hand into a fist, place it in the middle between the navel and the xiphoid process of the sternum ...</p>
	<p>... grasp the fist with the other hand and sharply press on the victim's stomach in the direction inward and upward. If necessary, this method is repeated up to 5 times.</p>

## First aid in the violation of the patency of the respiratory tract in pregnant and obese people

	<p>Sign of obstruction of the respiratory tract</p>
	<p>To determine the degree of blockage, you should ask the victim "Have you choked?"</p>
	<p>If the victim does not respond, it is necessary to stand on the side and slightly behind the victim ...</p>
	<p>... holding the chest of the patient with one hand, the other tilt it forward so that in case of displacement of the foreign body it fell into the victim's mouth, and did not fall lower into the respiratory tract ...</p>
	<p>... and apply 5 sharp strokes between the blades with the base of the palm, checking after each stroke whether the obstruction could be eliminated.</p>



If after 5 strokes the obstruction is not eliminated, it is necessary to make 5 attempts of pressing on the lower part of the thorax.



To do this, it is necessary to stand behind the victim, grab him from behind with both hands at the level of the specified level and make sharp jerks

## **9. ALLERGIC REACTIONS. ANAPHYLACTIC SHOCK**

This shock is terrible primarily because of its suddenness and high probability of death. The threat of an absurd death from a mosquito bite or a spoon of strawberry jam hanging over each of us. Millions of people completely painlessly take analgin or eat lemons, but only someone can develop a shock even after one tablet or a small slice of lemon. The insidiousness of the allergy lies in the fact that one can never know in advance what new substance the body will respond with such a reaction. This circumstance is one of the main causes of high mortality in allergic shock.

### **External manifestations of an allergic shock:**

1. Numbness and itching, burning sensation and compression of the skin and mucous membranes;
2. Edema of the eyelids, lips and soft tissues of the entire face and neck - Quincke's edema;
3. Isolated swelling of the limb (most often two fingers or the entire hand or foot);
4. Sometimes the swelling of the brain - a sudden loss of consciousness, convulsions, vomiting;
5. Lowering blood pressure;
6. Sometimes swelling of the lungs - bubbling breath;
7. Rashes of the type of urticaria;
8. Broncho-laryngospasm.

### **Variants of allergic shock**

The picture of an allergic shock develops depending on which organs and tissues were most affected. So, in case of edema of the face and mucous membranes of the oral cavity, especially of the lips and tongue, accompanied by multiple rashes like hives with characteristic burning and itching, they speak of Quincke's edema.

Sometimes the tongue grows to such an extent that it does not fit in the mouth and causes a significant difficulty in swallowing and speaking.

As a rule, at the same time the soft palate, pharynx and tonsils swell. Sometimes there are cases of isolated edema of the tonsils, which leads to an erroneous diagnosis of catarrhal angina.

This condition develops lightning fast. The patient will suddenly feel difficulty breathing with a peculiar wheezing bronchospasm, there will be hoarse voice or even aphonia (lack of voice). Within a few minutes the face turns blue, the patient loses consciousness and has a breath of breath. In this case, it must not be saved without an urgent conicotomy. This variant of the development of anaphylactic shock was called asthmatic or asphyxic.

**Asfiardial (“heart”)** variant of shock is characterized by a sudden drop in the level of arterial pressure and cardiac activity. Loss of consciousness is accompanied by a pink foam and bubbling breath - a clinic of pulmonary edema.

**In the cerebral (“brain”)** variant, excitement, fear, severe headache, vomiting, convulsions and rapid loss of consciousness come to the fore. This clinical picture is typical for the development of cerebral edema.

**Abdominal (“abdominal”)** variant of shock is accompanied by the symptomatology of “acute abdomen”. Unbearable pains, a pronounced strain of abdominal muscles often lead to an incorrect diagnosis of perforation of the ulcer or intestinal obstruction.

If you consider that all of the above options for shock are not always accompanied by skin rashes and swelling of the tissues, then these errors are not surprising. The only thing that always makes you think about the likelihood of an allergy is the development of shock in all its manifestations after taking a medicine or food, biting an insect or rubbing an ointment. Moreover, the time interval from the last contact with the allergen to the first symptoms of an allergic reaction can be from 3 to 5 seconds to several hours.

### **Emergency care for an allergic reaction without loss of consciousness**

1. Apply a tourniquet above the insect bite, subcutaneous or intramuscular injection.
2. To drip 5-6 drops of adrenolin-containing drops (galazoline, sanorin) in the nose or in the wound from a bite or injection.
3. Give 1-2 tablets of diazolin, dimedrol or suprastin.
4. Take 1-2 tablets of calcium gluconate.
5. Put cold in the place of bite or medication.
6. Carry out careful monitoring of the patient before the arrival of the doctor.

#### ***It is unacceptable!***

1. Rub the earth in the place of bite of insects, snakes or burns of poisonous plants.
2. To give without the appointment of a doctor any medications other than those listed.
3. Rinse or warm the area of the bite or allergic reaction.

### **Emergency care for anaphylactic shock with loss of consciousness**

1. Rotate the patient to the side. This clinical picture is typical for the development of cerebral edema.
2. Release the oral cavity from mucus and foreign bodies.
3. Apply the tourniquet above the injection or bite site.
4. To drip 5-6 drops of galazoline or sanorin in the nose or in the wound from a bite or injection.
5. Apply cold to the head and to the site of the bite or injection.
6. Carefully monitor the patient before the doctor arrives.

***It is unacceptable!*** With a loss of consciousness, leave the patient lying on his back. Use a heating pad or warming compresses.

The first aid scheme considered is quite effective. Already in 10-15 minutes from the beginning of therapy the rash will considerably turn pale, the swelling will disappear, the patient will literally get a new look before the eyes, the blood pressure



level will return to the norm. And yet, in each case of an acute anaphylactic reaction, urgent hospitalization is necessary, since one can never be sure that anaphylactic shock will not happen again.

## 10. HYPERTENSIVE CRISIS

**Hypertensive crisis** - a sudden increase in blood pressure, resulting in a sharp deterioration of the person's well-being. Predicting the development of the crisis is very difficult. For each specific patient, the hypertensive crisis is characterized by an elevated blood pressure level that is different from the regular one. Even if the measured pressure is normal for most people, this person may be too high for this person.

### What is dangerous hypertensive crisis?

The hypertensive crisis is dangerous because it causes serious complications - vital organs are affected: the liver, kidneys, heart and brain. In addition, hypertensive crisis can lead to impaired vision. Therefore, when symptoms of a crisis appear, it is important to provide timely and high-quality care. It is to eliminate symptoms and prevent complications. Drugs that can quickly restore normal blood pressure, should be selected by a qualified specialist. Overdosing of medicines or too strong an action can cause additional problems with blood supply. In this case, tissues and organs will be deprived of the necessary amount of oxygen.

The doctor selects the drug, taking into account the age of the patient and the characteristics of his body. When helping with hypertensive crisis, it is important to accurately calculate the rate of lowering blood pressure and the optimal level that should be achieved as a result.

### Risk factors



The causes of this condition in humans are:

- stress or emotional stress;
- change in weather conditions: sharp cooling, warming, winds;
- alcohol poisoning;
- drinking a lot of salt;
- Cancellation of therapy in those who have long been taking antihypertensive medications.

However, the most common cause is neural overstrain. Among the main manifestations of hypertensive crisis - a sense of fear and anxiety, from which you need to get rid of in the first place, so that the pressure came back to normal.

### **Types of hypertensive crisis**

The crisis can be of two types, depending on the degree of severity:

- The first type of hypertensive crisis is easier and faster. The attack can last only a few hours. At this time, the patient is nervous, suffers from headache, dizziness, experiencing unpleasant sensations in the heart. You can shiver in the body. Of the external signs, the redness of the skin of the face and neck is the brightest. In the biochemical analysis of blood during the hypertensive crisis of the first type, an increased number of leukocytes is detected, and in the urine - a protein. The pressure rises, the pulse becomes faster. This type of hypertensive crisis is often called uncomplicated. This means that during the exacerbation of the disease, the target organs (brain, heart, kidneys) do not suffer. To cope with the crisis, you need to help the patient during the day. Most often, there is enough medication and bed rest. With an uncomplicated hypertensive crisis, there is no need for hospitalization.

- Hypertensive crisis of the second type lasts several days. Symptoms in this case are the same, however, they are more pronounced. The patient experiences dizziness, heart pain, nausea, vomiting, visual impairment. Among the main complications in this case - heart attack, stroke, pulmonary edema. The blood test shows an increase in the rate of erythrocyte sedimentation and an increased number of leukocytes. This kind of crisis is known as complicated. In most cases, the patient

has to be hospitalized, since there is a threat of damage to target organs. Assistance must be provided immediately, otherwise serious complications must not be avoided until death.

The complicated hypertensive crisis is usually repeated in the form of periodic attacks. Patients suffering from chronic arterial hypertension are at risk. To avoid crises, it is necessary to track the course of the disease. Among patients with hypertension, high mortality due to hypertensive crises was noted.

### **Epidemiology**

In most cases, the call of a brigade of emergency medical care is due to the hypertensive crisis. Depending on the region, patients receive treatment of varying quality, and the degree of complications varies. The most favorable situation has developed in Western Europe. There, the number of cases of hypertensive crisis decreased due to the high level of development of medicine. Also it is connected with qualitative diagnostics, allowing in time to reveal the presence of the disease and prevent its aggravation.

Russia is considerably behind in this indicator. Only a quarter of patients receive timely treatment, so cases of hypertensive crisis are much more common. They are more common among women. Men suffer from a hypertensive crisis less often. The frequency of exacerbations of the disease is largely due to the imperfect system of medical institutions in Russia and the lack of coordinated work of ambulance teams, polyclinics and inpatient departments.

### **Symptoms of hypertensive crisis**



### **Symptoms of a hypertensive crisis are:**

• A sharp increase in blood pressure. It is generally accepted that with a hypertensive crisis, the systolic pressure exceeds 150 mm Hg. Art. However, the upper limit of the value of blood pressure largely depends on the individual characteristics of the body, so you should consider what level of pressure is normal for each individual patient. For some, even the "upper" pressure of 130 mm Hg. Art. can become critical;

- Headache, which is located in the occiput, and dizziness;
- Nausea, resulting in vomiting - this symptom is more characteristic of a complicated hypertensive crisis;
- Problems with eyesight - some patients complain of the appearance of dots in front of the eyes, partial blindness is possible;
- Nystagmus is an involuntary swing of the eyeball. Depending on the direction of movement, the nystagmus can be vertical, horizontal, rotational or pendulum;
- Increased body temperature;
- Redness of the skin in the face and neck;
- Trembling all over the body;
- Feeling of fear and panic are common symptoms of hypertensive crisis, as it is often caused by emotional stress or stress.

First of all, the normal psychological state of the patient should be restored, which for recovery needs to cope with fear and panic, which causes the following symptoms:

- increased heart rate and rhythm disturbance, shortness of breath;
- sweating;
- impaired coordination of movements, unsteadiness of gait.

In accordance with the classification and depending on the symptoms and causes, several types of hypertensive crisis are distinguished:

- The first type is associated with a neurovegetative syndrome. The cause of the crisis in this case is psychological stress, severe stress. The main symptoms: dizziness, nausea, vomiting, headache. All manifestations of this type of hypertensive crisis take place after several hours. Hospitalization of the patient is not required, since there is no threat of his life;

- The second type of hypertensive crisis - water-salt. The renin-angiotensin-aldosterone system in the human body maintains the constancy of the internal environment. When in her work failures occur, there is a water-salt hypertonic crisis. Patients at the same time experience nausea, headaches, lose orientation in space, their vision is impaired, including nystagmus. The aggravation of the disease in this form lasts several days, and then passes;

- The most severe type of crisis is acute hypertensive encephalopathy. In this case, hospitalization of the patient is required, because due to a significant increase in blood pressure, cerebral circulation is disturbed and serious complications develop, for example, convulsions, confusion, heart attack or stroke.

### **Consequences of hypertensive crisis**



The lack of timely medical care for hypertensive crisis can lead to severe consequences - kidney, vessel, heart and brain lesions, pulmonary edema, myocardial infarction, angina pectoris. Often develop disorders of the central nervous system, such as stroke of the brain or coma.

## **Dizziness**

After a hypertensive crisis, many patients experience difficulties in orientation in space and sensation of the position of their body in it, feel very dizzy. It is necessary to consult a doctor to determine the exact cause of this phenomenon.

Probably, to a giddiness has resulted or brought not a hypertensive crisis, and other disease. During an attack that usually catches unawares, you do not need to panic, sit down and do not close your eyes, and try to focus on something.

If the headache ...

Headaches are the most common symptom in hypertensive crisis and one of its possible consequences. The attack passes, but unpleasant sensations in the field of a nape remain. In this case, the use of medications is required, which can be prescribed only by the attending physician.

Many drugs that are used for hypertensive crisis, are potent, so the dosage should be calculated accurately. During the rehabilitation period after an attack, it is recommended to observe bed rest, which will help to ease the consequences in the form of a headache. However, it is not worth it, it is necessary to contact a specialist who will recommend an anesthetic drug.

### **Algorithm of actions for hypertensive crisis**

Before starting treatment for hypertensive crisis and using potent drugs, you should help the patient cope with the fear and anxiety that inevitably arise in such cases.

Eliminate the psychological discomfort allows tincture valerian, corvalolus, motherwort. The patient's breathing should be even. Several deep breaths and exhalations will help restore it. It is also important to provide fresh air to the room and put the patient on the bed or sit on a chair.

Reduce the pressure before the arrival of an ambulance can be with the help of a medication prescribed by the attending physician. If the patient experiences severe pain in the chest area, nitroglycerin is used. Every quarter of an hour, the pressure should be measured. If within a couple of hours there is no improvement, you need to call a doctor.

To provide qualified assistance, the doctor must obtain the fullest possible information about the nature of the patient's illness and find out the following:

- how long ago hypertension has developed;
- what pressure for the patient is considered to be elevated and which is lowered;
- how long the attack lasts;
- whether the patient takes any medication regularly;
- what medications have been used since the onset of this hypertensive crisis;
- Does the patient suffer from chronic diseases, for example, diabetes mellitus.

The more a doctor knows about the characteristics of the patient's body, the faster he will be able to provide the necessary assistance. In addition, the specialist should determine the type of hypertensive crisis, depending on which treatment will be prescribed.

The first type - hyperkinetic hypertensive crisis - is associated with an increase in the intensity of the heart, against which there is an increase in systolic blood pressure, at the same time, these processes have no effect on diastolic pressure. The patient is sweating profusely, tachycardia. After several hours the hypertensive crisis passes.

The second type - of crisis is hypokinetic. It manifests itself in a change in both diastolic and systolic blood pressure. The hypertensive crisis occurs within a few days, the patient experiences general weakness, noticeably reddening of the skin, spots appear on it. Often the target organs are affected. To select drugs to help the patient, an ambulance doctor must determine the type of hypertensive crisis in accordance with this classification. Medications are administered intravenously or taken orally depending on whether the hypertensive crisis is complicated or not complicated.

Cupping uncomplicated hypertonic crisis involves a gradual decrease in blood pressure. In the case of a hyperkinetic crisis, it is sufficient to use one drug, with hypokinetic therapy should be complex.



**Table 2: Drugs for intravenous administration with a complicated hypertensive crisis**

Name of the preparation	Method of injection, dose	Beginning of action	Duration of action	Note
<b>Medications, relaxing blood vessels</b>				
Sodium nitroprusside	Intravenously, drip 0,25-10 mcg/kg/min (50-100 ml in 250-500 ml 5% glucose)	At once	1-3 min	It is suitable for slow pressure reduction in hypertensive crisis of the type. Enter only with the help of a special dispenser with continuous monitoring of blood pressure.
Nitroglycerine	Intravenously, drip 50-200 mkg/min	2-5 min	5-10 min	Nitroglycerin is especially effective in acute heart failure, myocardium
Nicardipine	Intravenously, drip 5-15 mg/h	5-10 min	From 15 min to 12 hours, with prolonged injection	Effective in most hypertensive crises. Not suitable for patients with heart failure. Patients with ischemic disease are – be careful
Verapamil	Intravenously 5-10 mg, can continue intravenous drip, 3-25 mg/h	1-5 min	30-60 min	Not suitable for patients with heart failure and for them who takes blockers
Hydralazine	Intravenously, bolus (jet) 10-20 mg for 20 ml isotonic solution, or Intravenously, drip 0,5 mg/min or intramuscularly 10-50mg	10-20 min	2-6 h	It is contraindicated in eclampsia. You can repeat the injection in 2-6 hours
Enalaprilate	Intravenously 1,25-5 ml	15-30 min	6-12 h	Effective in acute insufficient left ventricle of the heart
Nimodipine	Intravenously, drip 15 mg/kg per hour , further 30 mg/kg per hour	10-20 min	2-4 h	With subarachnoid hemorrhages
Phenoldopam	Intravenously, drip, 0,1-0,3 mkg/ kg/min	1-5 min	30 min	Effective in most hypertensive crises
<b>Adrenoreceptor blockers</b>				
Labetalol	Intravenously, bolus (jet) 20-80 mg with speed 2 mg/min or Intravenously 50-300 mlg	5-10 min	4-8 h	Effective in most hypertensive crises. Not suitable for patients with heart failure.
Propranolol	Intravenously, drip 2-5mg with speed 0,1 mg/min	10-20 min	2-4 h	Mainly with exfoliating aortic aneurysm and coronary syndrome
Esmolol	Intravenously, drip 250-500 mkg/kg/min within 1 min, then 50-100mkg/kg within 4 min	1-2 min	10-20 min	It is the drug of choice for exfoliating aortic aneurysm and postoperative hypertonic crisis
Trimetaphane camsylate	Intravenously, drip 1-4 mg\min (1ml 0,05-0,1% solution of glucose or isotonic solution of sodium chloride	At once	1-3 min	At crises with pulmonary edema or brain exfoliating aortic aneurysm

Clonidine	Intravenously 0,5-1,0 ml or intramuscularly 0,5-2,0 ml 0,01% solution	5-15 min	2-6 h	It is undesirable in cerebral stroke
Azamethonium bromide	Intravenously 0,2-0,75 ml (dose gradually raise until the effect is achieved) or intramuscularly 0,3-1 ml 5% solution	5-15 min	2-4 h	Contraindicated in elderly patients. Causes orthostatic hypotension
Phentolamine	Intravenously or intramuscularly, 5-15 mg (1-3 ml 0,5 % solution)	1-2 min	3-10 min	Predominantly with pheochromocytoma withdrawal syndrome clonidine
<b>Other drugs</b>				
Furosemide	Intravenously, bolus (jet) 40-200 mg	5-30 min	6-8 h	Predominantly with hypertensive crisis with acute cardiac and renal insufficiency
Magnesium sulfate	Intravenously, bolus (jet) 5-20 ml 25 % solution	30-40 min	3-4 h	With convulsions of eclampsia of pregnant women

### **Medications for the treatment of uncomplicated hypertensive crisis**

For the treatment of uncomplicated hypertensive crisis, mainly used drugs taken orally: clonidine, nifedipine or captopril.

#### **Clophene (clonidine)**

The main advantage of this drug is that it can be used to treat patients with tachycardia. A number of drugs used to stop the hypertensive crisis, can increase cardiac output. Clopheline does not have this property. Most quickly, it allows you to reduce the pressure with intramuscular injection. Oral reception ensures the desired effect in an hour. If the pressure does not decrease after the first application, the procedure is repeated again after 60 minutes.

Reception clonidine contraindicated in complex work and the need for constant concentration of attention. This is due to the strong sedative effect that the drug has on the body. The soothing effect of clonidine can be excessive, which makes it difficult to adequately assess the patient's condition. Therefore, if the cause of the hypertensive crisis is a mental disorder, it is necessary to use another remedy. The intake of the drug should also not be combined with the use of alcoholic beverages.

## **Nifedipine**

This drug quickly relaxes blood vessels and facilitates blood flow. Nifedipine is available in tablets, which are first chewed, and then swallowed. The maximum period of time, allowing to achieve the desired effect - half an hour. Usually the pressure decreases even faster. Save the achieved result is possible within a few hours.

According to American scientists, regular use of nifedipine can lead to a negative result and contribute to the development of ischemia. This is due to the too high rate of lowering blood pressure under the action of the drug. Since some patients after receiving nifedipine feel severe headaches, the use of this remedy for hypertensive crisis is possible only for those who have already been treated to them and did not face side effects.

## **Captopril**

It is an inexpensive, but effective drug that allows you to quickly lower blood pressure during a hypertensive crisis. Among its main advantages is safety for elderly patients. In addition, after its administration, there is no deterioration of cerebral blood flow. Captopril is recommended not only in emergency cases with hypertensive crisis, but also for the normalization of blood pressure.

Complicated hypertensive crisis requires the use of drugs that are administered intravenously. This allows you to quickly reduce the pressure to the desired level.

## **Drugs for emergency treatment - an overview**

### **Sodium nitroprusside**

This drug quickly reduces blood pressure, moreover, its action can be controlled. To achieve the desired effect can be a few minutes after the injection of sodium nitroprusside. At the time of taking the drug, you should constantly monitor blood pressure.

The use of sodium nitroprusside causes vasodilation and a decrease in heart rate. All this provokes a redistribution of blood flow, and in coronary heart disease -

worsening of the coronary blood flow. The drug remains in the blood for a long time, so when taking it in large doses, toxic poisoning is possible. It manifests itself in the form of nausea and weakness.

## **Nitroglycerine**



Nitroglycerin is often used in the form of tablets, but its injections are more effective. It has a rapid effect on the body, which also quickly stops. Adjust the rate of lowering blood pressure can, gradually increasing the dosage.

Nitroglycerin in many respects resembles sodium nitroprusside, but it has a significant advantage, as it does not increase blood flow in certain areas of the heart muscle in patients with coronary heart disease.

## **Diazoxide**

Today, this drug is rarely used in comparison with other drugs from the same group. This is due to the various side effects that it causes. Reducing pressure with diazoxide is accompanied by reddening of the skin, dizziness and severe headaches.

To minimize side effects, the drug should be administered by combining it with other medicines, or by resorting to a drip method. In most cases, injections are administered in small doses at short intervals.

## **Hydralazine**

Intravenous or intramuscular injection of hydralazine helps to relax arteries and lower blood pressure. This causes tachycardia. Also in most cases, the use of this drug causes a headache, as intracranial pressure increases.

Hydralazine is not suitable for patients with ischemic heart disease and aortic aneurysm. But this is an effective remedy for hypertensive crisis for pregnant women suffering from eclampsia, as it is absolutely safe for the health of both mother and child.

### **Trimetaphan camsylate**

Injections of this drug are administered intramuscularly. Its effect is of a short-term nature, and the rate of BP reduction can be easily controlled. Trimetaphane camsilate reduces the power of the heart, so it is suitable for patients with aortic aneurysm. Today, it is more often replaced by more modern drugs, but it is still used in some cases.

After several months of regular admission, trimetifan camsilate is addictive, which contributes to reducing the effect it exerts on the body. In this case, the drug has to be replaced, since it no longer allows you to lower blood pressure to the desired level.

### **Azamethonium bromide**

Acute left ventricular failure requires a special approach when managing the hypertensive crisis. In this case, azame- tonium bromide comes to the rescue. It is administered intravenously and lasts for a long time - the effect lasts up to 7 hours.

Most often, doctors try to use other drugs, since it is difficult to accurately pick up the necessary dose of azame- tonium bromide. In case of an overdose, the pressure may drop to a critical value.

### **Fentolamine**

If a significant amount of catecholamines becomes the cause of the hypertensive crisis, it is advisable to use phentolamine. Lowering the pressure with phentolamine can be up to a quarter of an hour. Among the side effects of the drug dizziness, tachycardia, headaches.

## **Labetalol**

Labetalol is an effective drug that has virtually no contraindications. It is not recommended to resort to his help only in cases where the patient has an acute left ventricular failure of the heart. The drug begins several minutes after intravenous injection. The effect can last up to 6 hours.

## **Esmolol**

This drug is non-toxic due to rapid destruction in the blood. However, for the same reason, its effect stops after half an hour after the injection. Therefore, the use of esmolol is advisable only for patients with aortic aneurysm.

## **Enalaprilat**



Reducing blood pressure with enalaprilata is not accompanied by a reduction in blood supply to the brain, so the drug is suitable for patients suffering from heart failure. Its effect is enhanced when combined with some antihypertensive drugs.

## **Nicaradipine and other calcium antagonists**

Among the calcium antagonists the most popular are nicardipine, nimodipine and verapamil. Nicardipine is well tolerated, but in some cases sweating, headaches and nausea are possible. It is not recommended for use in severe heart failure.

Nimodipine from all other calcium antagonists is different in that it has a strong effect on the blood supply to the brain. Verapamil can be used both in emergency

situations to lower blood pressure, and for the prevention of arrhythmias and angina pectoris.

### **Fenoldopam**

The effect of phenoldopam resembles the effect of sodium nitroprusside. However, there is a much lower risk of side effects. This drug is recommended to be prescribed to patients suffering from kidney failure, as phenoldopam increases the excretion of fluid from the body.

### **Diuretics for the management of hypertensive crises**

Drugs from the group of diuretics are used in cases when a patient has a fluid retention during the hypertensive crisis. If the volume of circulating blood does not correspond to the norm, then the use of such medicines is contraindicated. They are capable of causing severe vomiting or impaired urination.

### **Magnesium sulfate**

Magnesium sulphate is known for its antispasmodic, anticonvulsant and dehydrating action. Its intramuscular or intravenous injection causes depression of the vasomotor center, as a result of which the pressure decreases.

## 11. ACUTE HEART FAILURES: CAUSES, SYMPTOMS



- What are the types of acute heart failure?
- Why does acute heart failure develop?

Symptoms of acute heart failure

- Diagnosis of acute heart failure
- Treatment of acute heart failure
- Prevention of the development of acute heart failure

Acute congestive heart failure is a pathological emergency that occurs due to a sharp violation of myocardial contractile activity. Heart failure is characterized by disorders in the large, and in a small circle of blood circulation, as well as intracardiac pathology. The disease can develop both against the background of already existing cardiovascular pathologies, and suddenly, for no apparent reason.

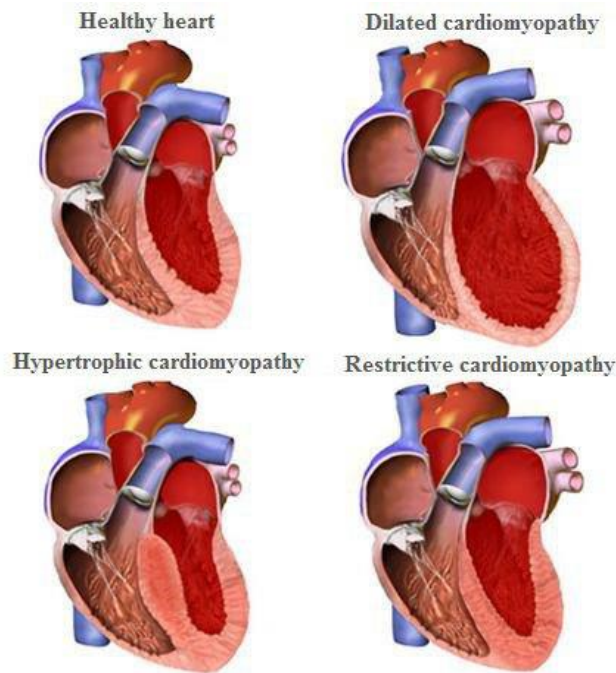
### **What are the types of acute heart failure?**

Depending on which part of the heart the pathological changes begin, the right ventricular and left ventricular deficiencies are isolated. Medical classification is based on the type of hemodynamics, that is, on the possibility of blood circulating through the vessels. So, cardiologists stand out the following types of heart failure:



**A stagnant type - which, in turn, can be:**

- Right ventricular - is characterized by stagnation in the whole body, which manifests itself in the form of generalized edema;
- Left ventricular - entails stagnation in the pulmonary circulation. It is manifested by the development of extremely dangerous and life-threatening conditions - asthma of cardiac origin or pulmonary edema.



Hypokinetic type or in another way - cardiogenic shock - which, in turn, can manifest itself as:

- Arrhythmic shock - occurs due to violations of the heart rhythm;
- Reflex (pain shock);
- True cardiogenic shock - occurs with extensive myocardial damage after a heart attack complicated by hypertension or diabetes.

Separately, a condition is distinguished in which there is a sharp deterioration in the indices for chronic heart failure. It also requires urgent medical attention.

Why does acute heart failure develop?

The whole set of factors can be divided into three groups:

1. Defeat the heart muscle directly;
2. Violations in the work of the cardiovascular system;
3. Other pathologies not associated with CVS

The defeat of the heart muscle ranks first among the factors provoking insufficiency. Most often cardiologists talk about the following points:

- Myocardial infarction, which provokes mass death of myocardial cells, due to impaired blood circulation in the heart muscle. The greater the degree of damage, the more pronounced the symptoms of OSH. Myocardial infarction is in the lead among the causes that cause acute heart failure and is characterized by a high probability of death.

- Myocarditis.

- Operations performed on the heart, and the use of life support systems through artificial circulation.

Diseases of the cardiovascular system, which can cause acute heart failure, a lot:

- Deterioration of the condition in chronic heart failure.

- Pathological changes in the heart valve system and violation of the integrity of its chambers.

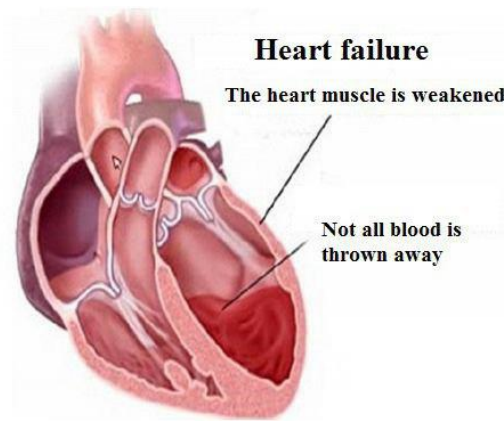
- Arrhythmias, which can be associated with both acceleration of the heart rhythm and with its decline.

- Pathology of the respiratory system, in which the adequate circulation of blood in the small circle is disturbed. These include conditions such as pulmonary embolism, pneumonia and bronchitis.

- Hypertensive crisis - this is an emergency, caused by a sharp increase in blood pressure to individually high figures.

- Significant thickening of the heart walls.

- Cardiac tamponade, which causes pathological accumulation of fluid in nearby tissues. This squeezes the cavity of the heart and interferes with its normal functioning.



Not always AHF develops as a result of violations in the cardiovascular system. Sometimes this can be facilitated by other factors, up to an accident:

- Various infections for which the myocardium is one of the target organs.
- Stroke in the brain tissue, the consequences of which are always unpredictable.
- Extensive brain trauma or surgical interventions on the brain.
- Poisoning with drugs or alcohol, including chronic ones.

### **Symptoms of acute heart failure**

It must be remembered that acute heart failure is a critical condition, the likelihood of a lethal outcome in the development of which is very high. At the slightest suspicion of its development, you should immediately call an ambulance, requesting a team of cardiac recovery.

Symptoms of right ventricular failure:

- Shortness of breath without physical exertion, which goes into choking due to bronchospasm;
- Pain behind the sternum;
- Cyanosis of the skin or skin coloration of a yellowish hue;
- Cold sticky sweat;
- Swelling of the jugular veins located on the neck;
- Liver enlargement in size and appearance of painful sensations in the right hypochondrium;
- Hypotension, a thread-like pulse associated with rapid heartbeat;
- Edema in the lower limbs;

- Accumulation of fluid in the abdominal cavity.

So, it is obvious that right ventricular AHF is characterized by the prevalence of general symptoms.

Symptoms of left ventricular failure:

- Appearance of shortness of breath, quickly passing into suffocation;
- Increased heart rate and arrhythmia;
- Severe weakness and pale skin;
- A productive cough with foam, in which there may be traces of blood so that it acquires a pink tinge;
- Characteristic rales in the lungs.

For left ventricular failure is characterized mainly by pulmonary symptoms. The patient tends to adopt a sitting position, lowering his legs to the floor.

### **Diagnosis of acute heart failure**

It is necessary to understand that from the whole list of diagnostic methods the doctor chooses those that are appropriate in this situation. With the rapid development of symptoms and an increase in the likelihood of a lethal outcome, one has to focus only on the clinical picture.

In general, when diagnosing heart failure, cardiologists resort to the following methods:

- Anamnesis, including family history. The doctor will be interested in the transferred and chronic diseases of the cardiovascular and respiratory systems, as well as accidents or injuries. It is necessary to tell the cardiologist what preparations the patient takes or took, as well as the particular way of life. If the family had cases of sudden death from AHF or a heart attack, then this should definitely inform the physicians.

- General examination of the patient, during which the pressure, pulse, and listening to heart and lungs are measured.

- Electrocardiogram is a classic method of detecting signs of cardiac arrhythmia.



- A general blood test is also included in the list of mandatory diagnostic methods. The cardiologist will be interested in such parameters as the level of leukocytes (increases) and ESR (increased), which allow us to assert that the body has a focus of inflammation.

- General urine analysis - helps to identify not only possible cardiac pathologies, but also other diseases that can develop due to AHF. The most important diagnostic parameters are the level of protein in the urine, as well as white and red blood cells (leukocytes and red blood cells).

- Biochemical blood test - allows you to get more accurate information about the patient's health status. Important indicators of this survey are the level of total cholesterol, as well as the level of high and low density fractions. An important diagnostic sign is also the level of glucose in the blood.

- Echocardiography.

- Determination of the level of AlAT and AcAt - highly specific biomarkers, indicating an inflammatory process in the heart muscle.

- Chest X-ray, which allows you to assess the size of the heart.

- Coronary angiography is a method that allows you to visually assess the adequacy of oxygen supply to the heart. It is the introduction of contrast material into the coronary vessels and their subsequent visualization.

- MRI - the newest method of research, which allows you to get a picture of layered sections of the heart.

## **Treatment of acute heart failure**

AHF is life threatening for the patient, therefore, qualified assistance should be provided immediately. The team of cardioreanimatologists conducts the following activities:

- Restore the normal rhythm of the heart, in case of its violation.
- Restore normal blood flow to damaged vessels if there was a myocardial infarction. To do this, intravenously administered special substances that dissolve thrombi.
- Emergency surgical intervention to restore the integrity of the heart muscle, if the cause of an acute violation of hemodynamics was its rupture.
- Withdrawal of an asthmatic attack, which was the cause of congestive right ventricular failure.
- Elimination of thromboembolism of the pulmonary artery (in case of right ventricular failure).
- Oxygen therapy.



- Sedation of the patient and anesthesia, for which most often resort to narcotic analgesics.
- Simulation of contractile activity of the myocardium with cardiac glycosides and cardiotonics.

- Reduction of the volume of circulating blood by forcing diuresis and limiting the water regime (reducing the volume of circulating fluid).

- Improvement of vascular circulation.

It must be remembered that, if there is a slightest suspicion of the development of AHF, an ambulance must be called immediately. Delay in this matter is fraught with death of the patient, especially if it is a question of a lightning-fast type of development. In this case, doctors have no more than half an hour to conduct all resuscitation activities.

### **Prevention of acute heart failure**

To date, there is no specific prevention of AHF. All the activities recommended by cardiologists fit into the concept of a “healthy lifestyle” and are reduced to the following recommendations:

- Regular preventive examinations with a therapist, cardiologist and other specialized specialists depending on the presence of chronic diseases.

- Complete quitting and restricting the consumption of alcoholic beverages. In case the patient is diagnosed with chronic heart disease or other organs and systems, it is better to completely eliminate alcohol.

- Control over body weight and its gradual decrease in case of obesity.

- Moderate physical activity is shown, the intensity of which is selected depending on the patient's state of health.

- Elimination of stress and other psycho-emotional overload. Careful observation of the working and rest hours.

- Adherence to the principles of healthy eating, that is, the exclusion from the diet of fast carbohydrates and saturated fats, especially animal origin.

- Daily self-monitoring of blood pressure.

## 12. FAINTING, COLLAPSE

**Fainting** - is a short-term loss of consciousness.

All the set of causes and provoking factors of fainting and collapse development can be combined into the following groups:

**The first**, representing the greatest danger, is latent bleeding: ectopic pregnancy or ovarian hemorrhage, perforation of duodenal ulcer or closed abdominal injury with internal organs damage.

**The second** group consists of acute poisoning with various toxic substances or intoxication in diseases such as influenza or pneumonia.

**The third** - a number of provoking factors, such as work in a stuffy room (hypoxic collapse) or high ambient temperature (heat stroke).

**The fourth** group includes such “purely physical” factors, such as rapid change of body position (with a sharp rise) or a long standing - orthostatic collapse.

**The fifth** group of reasons for syncope is emotional turmoil and “disturbing situations”.

**The sixth** - gross violations of the heart rate, accompanied by a short-term cardiac arrest.

**Symptoms of a fainting:** a sudden short-term loss of consciousness (no more than 3-4 minutes), blanching of the skin and a sharp decrease in blood pressure.

**Forerunners of fainting:** for a few minutes, or even a few seconds before the fall, there is light dizziness, nausea, ringing in the ears, iridescent arches, flies flashing or darkening in the eyes, a sharp weakness.

Usually fainting lasts no more than 1-5 minutes. Longer loss of consciousness leads to suspected development of a coma, which could be caused by cerebral hemorrhage, poisoning with various substances or alcohol, diabetes mellitus.

Sudden hypotension, when the blood pressure drops below 80 mm Hg. it is customary to call collapse, from the Latin colapso - I fall. This term can be understood in two ways: both as a fall of a person, and as a fall in his blood pressure. Even in



those cases when a sharp decrease in blood pressure was not accompanied by loss of consciousness, they still talk about collapse, but short-term loss of consciousness without a prolonged drop in the level of blood pressure is called only fainting. Although many authors believe that fainting and collapse is an outward manifestation of the same processes.

### **Development of fainting and collapse with latent blood loss**

To explain why there is a loss of consciousness during fainting, consider a scheme of its development with latent bleeding, when blood is poured into some closed space of the body, for example, in case of rupture of the arterial vessel of the ovary. The patient loses a large amount of blood and does not feel pain, and the blood in the meantime accumulates in the spaces of the small pelvis. The smaller its volume remains in the bloodstream, the so-called circulating blood volume (VBC), the less it returns to the heart. This will result in a decrease in the volume of ejected blood at each heartbeat - stroke volume of the heart (SVH) and will lead to a drop in the level of blood pressure (BP).

### **Schema of fainting and collapse**

(with latent bleeding):

**BLOODING → (VBC ↓) (SVH ↓) (blood pressure ↓)**

When a person is in a standing position with latent bleeding, the brain does not receive the blood he needs because of a sharp decrease in blood pressure and SVH. There is a sharp bleeding - ischemia. Acute ischemia of the brain is the main cause of unconsciousness during fainting.

In the prone position the patient will become much better. But after 2-3 minutes she will have severe pain in the abdomen and in the lumbar region, because in the horizontal position the hematoma, spreading along the body, will start to irritate more and more pain receptors. The pain will become so intolerable that the patient can not lie down and will have to sit down. But as soon as she sits down, she immediately

turns pale and faints. Appears a kind of symptom “Vanka – vstanka”. Within a few hours, the consequences of hemorrhage will be irreversible.

**The symptom “Vanka – vstanka”, frequent repeated faints and pallor of the skin can suspected of hidden blood loss.** At the slightest suspicion of internal bleeding, urgent hospitalization is needed in the surgical hospital.

### **A feature of fainting and collapse with loss of fluid**

When a disease of cholera and dysentery with diarrhea and vomiting, a large amount of fluid is lost. Intensive sweating leads to excessive sweating during overheating and high fever. As a result, the liquid part of the blood is lost from the bloodstream - plasma. This leads to a decrease in VBC, a decrease in SHV and BP.

### **Scheme of development of collapse and fainting**

(with loss of fluid):

**Loss of fluid → (VBC ↓) (SHV ↓) (BP ↓)**

That is why with pronounced dehydration, frequent repeated fainting and prolonged collapse are inevitable. The condition of patients is further aggravated by the fact that with frequent vomiting, diarrhea and profuse perspiration, a large number of electrolytes are lost. Excessive loss of potassium and sodium ions ruinously affects the contractile ability of the myocardium, as, indeed, the entire body as a whole.

With fainting caused by dehydration, immediate replacement of the lost fluid and electrolytes in a hospital environment is required.

### **Features of the development of collapse and fainting with emotional stress and toxicity**

At first glance, it is difficult to explain why a person faints during severe emotional shocks or illnesses such as influenza and pneumonia. Dangerous blood loss does not occur - hence, there is no reason for a sharp decline in blood pressure and cerebral ischemia.

To answer this question, let us recall that the volume of the vascular system of our body, including its capillary network, many times exceeds the volume of blood circulating in it.

All our blood is not enough to fill at least a third of the available blood vessels. And yet we do not feel its deficit. The secret of this paradox is extremely simple and lies in the supra-rational distribution of blood. It turns out that the blood supply in the first place will be only those organs and muscles that are in a state of active work. It is their capillaries that will be full-blooded. The remaining organs, which are at rest, are kept “on a starvation ration”: they are practically withdrawn from the circulation and receive the minimum amount of blood to maintain their vital functions.

Different groups of muscles or organs periodically are in a state of rest, then they do some work. And with the same periodicity, blood is redistributed between “resting” and “working”. Our body perfectly manages 4-6 liters of blood. Such a universal blood distribution is achieved by regulating the tone of precapillaries.

**Mechanisms of regulation of the tone of precapillaries** are located at the entrance to the capillary, they play the role of a compression cuff, the reduction of which can completely stop the access of blood. As soon as a certain amount of under-oxidized products, primarily lactic acid, accumulates in the tissues of nonworking organs, and its level exceeds a certain limit, the tone of precapillaries immediately decreases. In the precapillary network of the body, a batch of fresh blood rich in oxygen will be delivered. On a condition of a tone of capillaries which has received the name **peripheral resistance (PS)**, **affects a number of factors**, which can increase the tone of precapillaries, that is, peripheral resistance, and, conversely, lower it.

With the allocation of a large amount of adrenaline and catecholamines, the tone of precapillaries of organs such as the kidneys and liver, intestines and skin is significantly increased, and their capillary network is almost entirely removed from

blood circulation. At the same time, the brain, heart and lungs receive much more blood. In the central blood vessels the level of arterial pressure is significantly increased. This phenomenon is called centralization of blood circulation.

A completely different picture is formed with a sharp decrease in PS. When the whole body's capillary system is simultaneously filled, most of the blood from the central blood stream is redistributed into the capillary network of the intestine, skin, spleen, and muscles. Especially a lot of blood will accumulate in the muscles of the lower extremities (if the person is still standing). It will be removed from the circulation and will literally be stored (deposited). In places of deposition (spleen, liver, intestine) can be stored up to several liters of blood. At the same time, the VBC will significantly decrease, and the brain and other vital centers will be on the verge of catastrophe.

As a result, the familiar situation, with the only difference is that the VBC deficit was not caused by blood loss and dehydration, but by a sharp decrease in the PS.

Factors that significantly reduce vascular tone include the state of the autonomic nervous system, the subordinate cortex, and the activity of the subcortical centers of regulation of vascular tone. It is their negative effect on the tone of precapillaries in fright or severe pain that often leads to fainting.

The presence of different kinds of toxins in acute toxins and many infectious diseases is particularly affected by the condition of the precapillary tone. If emotional or painful faints are quick enough, then intoxication, the threat of development of collapse and fainting persists all the time while toxins are acting. With prolonged hypotension (more than 20-30 minutes) in the bloodless organs, gross violations of microcirculation and the development of foci of necrosis - necrosis of the tissues begin.

## **Scheme of emergency care in case of sudden loss of consciousness**

(while maintaining pulsation on the carotid artery):

1. Make sure there is pulsation in the carotid artery.
2. Raise your legs, unbutton the collar of your shirt, loosen your tie and waist belt.
3. Bring to the nose cotton wool with ammonia, or press on the painful point under the nose and massage it.
4. If within 3-4 minutes the consciousness does not appear, it is necessary to turn the patient to the abdomen, take care of the patency of his respiratory tract and put a cold on his head.
5. If you faint in a stuffy room - take the patient out into the fresh air or open the windows.
6. With a thermal or sunny impact, transfer to a cool place or shadow, put a towel on your head and chest.
7. In all cases of dehydration: diarrhea, repeated vomiting, pouring perspiration - abundant salty or sweet drink.
8. After a hungry fainting, give tea sweet tea.
9. If there is pain in the abdomen, in the lumbar region or with repeated fainting, put a cold on the stomach (possibly internal bleeding).
10. Even if the loss of consciousness lasted no more than 1-2 minutes, and after 5-10 minutes after first aid the skin became pink, the blood pressure returned to normal and the person himself does not make any complaints - he should still consult a doctor or better call him to the sick.

### ***Remember! It is unacceptable!***

1. Initiate an indirect massage of the heart in the presence of a pulse on the carotid artery.
2. Apply cotton wool soaked with ammonia to the nose or bury it in the nose (this can result in disfiguring burns of the nose and lips).

3. Apply a warm water bottle to the abdomen and lower back with abdominal pain or with repeated fainting.
4. Feed in cases of hungry fainting.



## 13. CONCLUSION

1.1. The first pre-medical care is a complex of measures aimed at restoring or preserving the life and health of the victim. It should be provided by someone who is close to the victim (mutual assistance), or the victim himself (self-help) before the arrival of a medical professional.

1.2. Responsibility for the organization of training for the provision of first aid in a health organization is assigned to the head and / or responsible officials.

1.3. In order for the first pre-hospital care to be effective, the health organization should:

- first-aid kits with a set of necessary medicines and medical aids for the provision of first-aid;
- posters depicting the methods of providing first aid to the victims in case of accidents and carrying out artificial respiration and external cardiac massage.

1.4. The assisting person must know the main signs of disturbance of the vital functions of the human body, as well as be able to release the victim from the action of dangerous and harmful factors, assess the condition of the victim, determine the sequence of first-aid measures used, and, if necessary, use improvised means to assist and transport the victim.

1.5. The sequence of actions when providing first aid to the victim:

- elimination of the impact on the body of the injured dangerous and harmful factors (its release from the action of electric current, the extinguishing of burning clothing, extraction from water, etc.);
- assessment of the condition of the victim;
- determination of the nature of the trauma that creates the greatest threat to the life of the victim, and the sequence of actions to save him;
- Carrying out the necessary measures to rescue the victim in the order of urgency (restoring airway patency, performing artificial respiration, external

cardiac massage, stopping bleeding, immobilizing the fracture site, applying bandages, etc.);

- maintaining the basic life functions of the victim before the arrival of medical personnel;

- call an ambulance or doctor or take measures to transport the victim to the nearest medical organization.

1.6. In the event that it is not possible to call medical personnel to the scene of the incident, it is necessary to ensure transportation of the victim to the nearest medical organization. Transport of the affected person is possible only with stable breathing and pulse.

1.7. In the event that the condition of the victim does not allow him to be transported, it is necessary to maintain his basic life functions before the arrival of the medical worker.



# TEST AND SITUATIONAL TASKS

## Terminal condition

1. Duration of the period of clinical death:

- a) 4-5 minutes
- b) 1-2 minutes
- c) 6 -12 minutes
- d) 12-15 minutes
- e) 16-17 minutes

2. For clinical death are not typical:

- a) narrowing of the pupils
- b) absence of palpitations
- c) cyanosis or pallor of the skin
- d) lack of consciousness
- e) lack of breathing

3. When performing resuscitation measures by one reanimator, the following ratio should be observed:

- a) 30 chest compression 2 breaths
- b) 18 chest compression 3 breaths
- c) 20 chest compressions 5 breaths
- d) 5 chest compressions 1 inhalation
- e) 4 chest compressions 1 inhalation

4. For biological death is not typical:

- a) the pupils' reaction to light
- b) the appearance of cadaveric spots
- c) cooling of the body
- d) rigor mortis
- e) corneal opacity

5. With cardiopulmonary resuscitation, first of all it is necessary to carry out:
- a) airway patency
  - b) protection of the brain from swelling
  - c) chest compressions and artificial ventilation of the lungs (AVL)
  - d) access to vein
  - e) drug infusion
6. For indirect heart massage, the right (lower) hand is placed on:
- a) the lower third of the sternum is perpendicular to its axis
  - b) the upper third of the sternum is perpendicular to its axis
  - c) the middle third of the sternum is parallel to its axis
  - d) the lower third of the sternum is parallel to its axis
  - e) the upper third of the sternum is parallel to its axis
7. The irreversible stage of the organism's dying is:
- a) biological death
  - b) the agony
  - c) clinical death
  - d) trauma
  - e) shock
8. The main symptom of heart failure is not:
- a) increase of arterial pressure
  - b) lack of pulse
  - c) dilated pupils
  - d) diffuse cyanosis
  - e) loss of consciousness
9. For clinical death is not typical:
- a) threadlike pulse on carotid arteries
  - b) absence of reflexes
  - c) dilated pupils
  - d) absence of cardiac activity
  - e) lack of breathing

10. For a pre-conditional state is not typical:
- a) threadlike pulse on carotid arteries
  - b) skin and mucous membranes of normal color
  - c) breathing surface
  - d) frequent breathing
  - e) blood pressure less than 70 mm Hg. Comply
11. With cardiopulmonary resuscitation, first of all it is necessary to ensure:
- a) patency of the respiratory tract
  - b) protection of the brain from swelling
  - c) chest compressions and AVL
  - d) access to vein
  - e) drug infusion
12. When performing indirect heart massage, the right (lower) hand is superimposed on:
- a) the middle third of the sternum is parallel to its axis
  - b) the upper third of the sternum is perpendicular to its axis
  - c) the lower third of the sternum is perpendicular to its axis
  - d) the lower third of the sternum is parallel to its axis
  - e) the upper third of the sternum is parallel to its axis
13. The main measures for inferring from clinical death
- a) give a sniff of ammonia
  - b) carrying out artificial ventilation
  - c) holding a closed heart massage
  - d) simultaneous holding of closed cardiac and ventilatory massage
  - e) the injection of adrenaline into the heart
14. When performing an indirect massage of the heart, the compression on the sternum of an adult is performed
- a) with the whole hand
  - b) the proximal part of the palm
  - c) with three fingers

- d) with one finger
  - e) with two fingers
15. A sign of the effectiveness of resuscitation:
- a) absence of chest excursions
  - b) pupils are wide, the appearance of a pulse wave on the carotid artery
  - c) absence of pulse wave on carotid artery
  - d) the appearance of a pulse wave on the carotid artery, the narrowing of the pupils
  - e) surface breathing, pupils wide
16. Correct styling of a patient with cardiopulmonary resuscitation
- a) raise the foot end
  - b) raise the head end
  - c) on a firm, level surface
  - d) lower the head end
  - e) lower the foot end
17. If cardiac activity is not restored, resuscitation can be stopped through
- a) 30 min
  - b) 6 min
  - c) 2 hours
  - d) 20 min
  - e) 60 min
18. In the clinic, the patient suddenly worsened. Myocardial infarction was diagnosed. In what position is the patient transported?
- a) in the supine position
  - b) sitting with a head slightly inclined forward
  - c) lying on the stomach
  - d) the passive position
  - e) standing
19. In a patient with extensive myocardial infarction against a background of general deterioration of the state, confusion, pallor of the skin, a temperature of the body of

34.8 , a BHD of 8 per minute, a pulse of 40 per minute, a whisker, a BP of 60/30 mm Hg . What is the condition of the patient?

- a) terminal pause
- b) agonal period
- c) termination of the vital activity of the body
- d) clinical death
- e) preagonal period

### **Situational tasks**

#### ***Task number 1***

In the hospital reception room, the victim was delivered to a road accident with complete loss of consciousness. Actions of the nurse

#### ***Task number 2***

In the intensive care unit of the hospital, the doctor stated that the patient died. Nurse actions after 2 hours

#### ***Task number 3***

The nurse was witness to an accident. I suffered a man. When examined, there is no breath. Tactics of the health worker

### **Wounds, desmurgy**

1. The most favorable conditions for healing are in the wound:

- a) crushed
- b) cut
- c) chopped
- d) bruised
- e) a gunshot

2. Penetrating into the abdominal cavity is called a wound, if there is damage:

- a) parietal peritoneum
- b) visceral peritoneum
- c) skin

- d) subcutaneous tissue
  - e) abdominal muscles
3. The wound penetrating into the cranial cavity is considered, if there is damage:
- a) bones of the skull
  - b) cranial aponeurosis
  - c) the dura mater
  - d) the pia mater
  - e) brain tissue
4. Blood of scarlet color, beats a fountain at ...
- a) arterial bleeding
  - b) venous bleeding
  - c) capillary bleeding
  - d) parenchymal hemorrhage
  - e) abdominal bleeding
5. Slightly bleeding wound surface with ...
- a) capillary bleeding
  - b) arterial bleeding
  - c) parenchymal hemorrhage
  - d) venous bleeding
  - e) abdominal bleeding
6. Kind of bandage with sprain in the ankle:
- a) a spiral
  - b) eight
  - c) spicate
  - d) turtle
  - e) triple
7. The cruciform bandage is used for damage:
- a) the shoulder joint
  - b) knee joint
  - c) wrist joint

- d) III branched hand
  - e) clavicle
8. For the tensile and fracture, these damages are typical:
- a) muscle damage
  - b) damage to fibrous structures
  - c) damage to the joints
  - d) ligament damage
  - e) skin damage
9. Dezo Bandage is used for fracture:
- a) bones of the forearm
  - b) sternum
  - c) clavicles
  - d) ribs
  - e) clavicle
10. Victims with polytrauma should:
- a) isolation
  - b) single
  - c) combined
  - d) multiple
  - e) single

### ***Task number 1***

As an ambulance doctor, you arrived at the child for 6 years, who received a burn of the right hand with a flame. When examined in the affected area - pronounced skin hyperemia, the necrotic scab of a gray-brown color is defined on the rear of the hand, in the area of the back surface of the fingers - scraps of epithelium, whole bubbles with hemorrhagic detachable.

1. What kind of bandage do you use for first aid?
2. What is its purpose?
3. What kind of dressings does it apply to the technique of execution?

4. In what position should the victim be when applying the bandage?
5. Where is it necessary to transport the victim?

### ***Task number 2***

A teenager turned 13, who fell from a gymnastic projectile, after which he felt a sharp pain in his right ankle. The examination shows a moderate swelling of the joint area, limiting the volume of active and passive movements due to pain, tenderness in palpation. On the roentgenogram, there were no abnormalities in the integrity and dislocation of articular surfaces.

1. What bandage should I use to treat a patient?
2. What is its purpose?
3. What material is needed to apply the dressing?
4. What position should the patient's limb be in the dressing application?
5. On what other anatomical areas is it possible to superimpose this bandage?

### ***Task number 3***

The department accepted a patient of 12 years with erysipelas of the right lower leg. When viewed in the region of the right shin, pronounced edema is noted, intense hyperemia with a clear “geographical” contour, local hyperthermia. Baneocin powder is applied to the area of hyperemia and edema in the dressing room.

1. With what bandage can you fix the drug on the shins?
2. Where is the first fixing tour of this bandage superimposed?
3. In what position should the limb be in bandaging?
4. List the rules of the technique of bandaging.
5. For what purpose can bandages of the bandage be performed while performing the bandage on the shin?

### ***Task number 4***

The patient with., 10 years old, was operated on for acute purulent prepatellar bursitis to the left. Evacuated to 20 ml of purulent exudate, the synovial bag was drained by



rubber graduates. An aseptic dressing is applied. At your disposal there is only a gauze bandage.

1. How can you fix an aseptic bandage? What varieties of this bandage are known to you?
4. What rules of bandage technique are used when applying bandages?
5. When will the patient be shown a dressing?
6. What are the stages of the dressing?

### ***Task number 5***

The patient with, 41 years old, performed a phlebectomy operation with a bandage of bankrupt perforator veins on the lower leg in occasion of varicose disease of the right lower limb. In the postoperative period, the imposition of a compression bandage with an elastic bandage is shown.

1. How can bandage material on the hip and shin wounds be fixed with a gauze bandage?
2. Where will the first fixing tour of this bandage be applied?
3. In what other cases in clinical practice does it become necessary to use this dressing?
4. Are there other ways of fixing bandages in this patient?
5. What are the advantages of bandage bandages?

### ***Task number 6***

The injured person has superficial cut wounds on the back surface of the first and second fingers of the right hand. The victim is able to work, his professional activity is not related to the need to perform accurate movements with a brush (watchman), the patient continues to work.

1. What bandage should I put on the first finger?
2. What function does the first finger allow to keep this bandage?
3. What bandage should I put on the second finger?
4. What is the purpose of dressings?

5. On what other anatomical areas is it possible to superimpose these bandages?

***Task number 7***

The patient was turned over to the surgeon, aged 24, to whom four days ago a primary surgical treatment of the wound of the palmar surface of the left hand was performed at the emergency department. Damages of tendons, neurovascular bundles of the hand are not revealed. The operation was completed by the imposition of cutaneous sutures. The next day the patient independently performed dressings at home. Seeking help has caused the intensification and bursting character of pain in the wound area, swelling of the hand, an increase in body temperature to 38.3 °c. When viewed in the area of the left hand, a bandage bandage is identified, impregnated with a purulent exudate from the palmar surface.

1. Formulate the indications for the patient's dressing.
2. What diagnostic measures do you perform on the dressing?
3. What therapeutic measures will you take?
4. How do you finish the operation?
5. What kind of bandage can I use to fix the dressing on the wound?

***Task number 8***

In the case of patient V., 75 years old, operated on the obliterating atherosclerosis of the vessels of the lower extremities, the gangrene of the right foot (the right lower limb is performed at the level of the middle thirds of the thigh), on the fifth day of the postoperative period the bandage is dry. Through the through drainage from the soft tissues there is no discharge (drainage does not function).

1. Are there indications for bandaging?
2. List the stages of dressing.
3. What are the features of the second stage of dressing for this patient?
4. With which bandage is it possible to secure the dressing material in the area of the hip stump?
5. What are the requirements for the finished bandage?

### ***Task number 9***

In the clinic, a patient, aged 28, applied to the surgeon, with a clinical picture of an uncomplicated furuncle of the anterior surface of the right shoulder. At the examination local hyperemia is determined, palpated dense painful infiltration up to 1 cm in diameter without signs of softening. The furuncle is diagnosed in the infiltration stage.

1. What kind of medical dressing can I appoint a patient?
2. What active ingredient is used when applying a bandage?
3. What layers does it consist of?
4. How to fix a bandage in the area of the right shoulder?
5. What are the criteria for the effectiveness of the dressing in this patient?

### ***Task number 10***

Patient N., 27 years old, the operation of opening a subcutaneous abscess of the nail phalanx of the second finger of the left hand was performed on an outpatient basis. The operation is completed by draining the purulent focus and applying an aseptic dressing.

1. What kind of bandage should be performed to secure the dressing on the wound?
2. Where should I start the first fixing tour of the bandage?
3. List the rules regarding the position of the bandage and the patient when applying bandages.
4. On which surface of the brush should the transitions between the bandages of the bandage be placed on the wrist and on the finger?
5. On what day should the first bandage be prescribed?

### **Injury tests**

1. Non-manufacturing injury refers to:
  - a) received on the way from work
  - b) received at the workplace after hours
  - c) obtained during physical training

- d) received during working hours at the workplace
2. To open injuries include:
- a) barotrauma
  - b) congenital fracture
  - c) dislocations
  - d) subcutaneous emphysema
  - e) excoriation
3. The greatest danger from the point of view of the possibility of infection with the rabies virus is the wound ...
- a) cut
  - b) firearms
  - c) bitten
  - d) chopped
  - e) chipped
4. Prophylaxis of tetanus in a severely contaminated wound consists of ...
- a) administration of a significant dose of PSS
  - b) administration of tetanus toxoid (AC)
  - c) administration of antibiotics
  - d) the introduction of crystalloids
  - e) administration of antihistamines
5. The early signs of tetanus are ...
- a) trismus of the chewing musculature
  - b) opisthotonus
  - c) irritability
  - d) tonic convulsions
  - e) clonic convulsions
6. The victim with breast damage is transported ...
- a) lying on the back
  - b) lying on a healthy side
  - c) in a semi-sitting position

- d) lying on the abdomen
  - e) lying on the back with the raised head end of the stretcher
7. The victim with damage in the abdomen is transported ...
- a) lying on the back
  - b) lying on the back with the raised leg end of the stretcher
  - c) lying on the stomach
  - d) in a semi-sitting position and bent in the hip and knee joints with feet
  - e) lying on the back with the raised head end of the stretcher
8. First aid for penetrant wounds. Abdomen begins with ...
- a) administration of promedol for analgesia
  - b) the application of an aseptic circular bandage
  - c) the direction of the dropped internals during the event
  - d) evacuation on stretchers
  - e) conducting primary surgical treatment of wounds
9. A reliable sign of a penetrating wound of the abdominal cavity is an...
- a) bleeding from a wound
  - b) loss of a large omentum from the wound
  - c) location of the wound in the epigastric region
  - d) tension of the anterior abdominal wall
  - e) a flaky abdomen
10. The Algovera shock index is ...
- a) the ratio of the pulse rate to the systolic blood pressure value
  - b) the ratio of systolic blood pressure to diastolic pressure
  - c) ratio of heart rate to diastolic pressure
  - d) the ratio of systolic pressure to heart rate
  - e) the ratio of the heart rate to the frequency of respiration

## Situational tasks

### *Task number 1*

As a result of a car accident, a man suffered a wound in the scalp. On examination: in the parietal region to the left a wound 3\* 5 cm in size, abundant bleeding.

List the amount of the first pre-medical care. What bandage and how appropriate to impose on the victim?

Make a diagnosis.

Correct actions paramedic:

### *Task number 2*

1. The first aid is called to the patient with complaints of weakness, dizziness, pain in the right upper quadrant, vomiting, diarrhea. He got sick suddenly after a physical strain 5 hours ago, found that 5 months ago he received a board blow in the stomach, after which he was palpable in the right hypochondrium with a rounded formation. Objectively: pallor, frequent threadlike pulse, BP/60/20 mmHg, abdomen moderately strained, painful in the right hypochondrium, mesogastric and right ileal regions.

Make a diagnosis.

Correct actions paramedic:

## Bleeding

1. The blood of scarlet color, beats a fountain at ...

- a) capillary bleeding
- b) venous bleeding
- c) arterial bleeding
- d) parenchymal hemorrhage
- e) abdominal bleeding

2. Slightly bleeding wound surface with ...

- a) venous bleeding
- b) arterial bleeding
- c) parenchymal hemorrhage

- d) capillary bleeding
  - e) abdominal bleeding
3. The characteristic signs of venous bleeding are ...
- a) a slow flow of blood (drops)
  - b) the flow of blood by a pulsating jet of scarlet color
  - c) the flow of blood with a constant jet of dark cherry color
  - d) bleeding of the entire wound surface
  - e) the flow of blood with a pulsating jet of dark cherry color
4. The danger of air embolism arises in the case of ...
- a) gastric bleeding
  - b) bleeding from the large veins of the neck
  - c) bleeding from the femoral artery
  - d) bleeding from the brachial artery
  - e) bleeding from the parenchymal organs
5. Characteristic signs of parenchymal hemorrhage are ...
- a) the flow of blood by a pulsating jet
  - b) the flow of blood with a constant stream
  - c) the flow of blood drops
  - d) bleeding of the entire surface of the wound
  - e) bleeding only the edges of the wound
6. Gas embolism can develop ...
- a) when the femoral vein is injured
  - b) when wound capillaries
  - c) when a shoulder vein is injured
  - d) when a subclavian vein is injured
  - e) when the major veins of the neck are injured
7. Characteristic signs of internal bleeding is ...
- a) bradycardia
  - b) increase in body temperature
  - c) pallor of the skin

- d) skin hyperemia
  - e) increase of arterial pressure
8. The causes of early secondary bleeding can be ...
- a) a thrombus rupture
  - b) wounding the vessel
  - c) decrease in body temperature
  - d) suppuration of the wound
  - e) increase in body temperature
9. Bleeding that occurs 5 days after the injury is called ...
- a) primary
  - b) secondary early
  - c) secondary late
  - d) hidden
  - e) primary late
10. The causes of late secondary bleeding can be ...
- a) wounding of vessels
  - b) purulent spreading of thrombus
  - c) increased blood pressure
  - d) slippage of the ligature
  - e) increase in body temperature

### **Burns**

1. Bubbles can form with burns ....
- a) I-II degrees
  - b) II-III degrees
  - c) IIIA-IIIB degree
  - d) II-IIIA-IIIB degree
  - e) III-IV degree
2. The severity of the state with burn injuries are affected by everything except ....
- a) burn area



- b) depth of burn
  - c) localization of the burn
  - d) age of the victim
  - e) the victim's sex
3. Signs indicative of deep burns are ....
- a) the presence of bubbles with a clear liquid
  - b) the presence of bubbles with yellow contents
  - c) the presence of blisters with dark hemorrhagic contents
  - d) redness of the skin in the affected area
  - e) detachment of the epidermis to form bubbles with a clear liquid
4. Burn shock develops with burns of II-IV degree with an area exceeding ....
- a) 5% of the body surface
  - b) 10% of the body surface
  - c) 20% of the body surface
  - d) 30% of the body surface
  - e) 50% of the body surface.
5. I phase of burn disease is ....
- a) burn shock
  - b) phase of convalescence
  - c) toxemia phase
  - d) septicotoxemia phase
  - e) remission phase.
6. When calculating the prognostic index (PI) for the “rule of the hundreds,” ....
- a) total burn area and age of the affected person
  - b) condition of consciousness and depth of injury
  - c) area of surface burns and depth of burn
  - d) age of the victim and state of consciousness
  - e) condition of consciousness and sex of the victim.
7. The prognostic index (PI) for the injured male of 50 years with total burns of both upper extremities is ...

- a) PI to 60 - the forecast favorable
  - b) PI = 61-80 - the forecast is relatively favorable
  - c) PI = 81 - 100 - the forecast is doubtful
  - d) PI = 101 or more - unfavorable prognosis
  - e) fatal outcome.
8. When evacuating victims with extensive burns, it is most expedient to use ....
- a) rubber inflatable mattress
  - b) standard stretcher
  - c) immobilized vacuum stretcher
  - d) a pneumatic tire
  - e) dieterichs tire
9. Admissible action in the provision of first aid to burned is considered ....
- a) clip the clothes with scissors around the affected area
  - b) remove the charred shirt from the victim
  - c) lubricate the burn surface with alcohol
  - d) calcify and remove bubbles from the adorned surface
  - e) lubricate the burn surface with petroleum jelly or other ointment.
10. Inadmissible action in the provision of first aid to a victim of a burn is considered ....
- a) clean the burnt surface of the remains of charred clothes
  - b) clip the clothes with scissors around the affected area
  - c) give the victim a salt-alkaline drink
  - d) superimposing a contour bandage on the burn wound surface
  - e) transportation of the victim to a medical institution.

### **Situational tasks**

#### ***Task number 1***

As a result of the fire in the living quarters, the man received a burn of the head, front surface of the trunk and upper limbs. The patient is extremely excited, his face has

opened bubbles, a dense dark crust on the front surface of the chest, in the area of the stomach, bubbles burst.

***Tasks***

1. Determine the patient's emergency.
2. Develop an algorithm for providing first aid.

***Task number 2***

As a result of the fire, the clothes on the child ignited. The flame was extinguished. On examination: the condition is heavy, inhibited, indifferent, the pulse is frequent, the blood pressure is lowered, the breathing is superficial. On the skin of the face are bubbles with transparent contents, opened bubbles, areas of charred skin.

***Tasks***

1. Determine the patient's emergency.
2. Develop an algorithm for providing first aid.

***Task number 3***

During the extraction of the prosthesis, the technique was hit by boiling water. Complains of severe pain, hyperemia of the skin of the hand.

***Tasks***

1. Identify the emergency situation.
2. Make an algorithm for emergency care.

**ONE**

1. Find a reliable description of the breath of Biot.
  - a) uniform and rhythmic breathing movements interrupted by pauses for up to 30 seconds or more
  - b) smooth increase of respiratory movements followed by attenuation
  - c) noisy breathing without pauses
  - d) frequent shallow breathing
  - e) convulsive respiratory movements followed by apnea lasting up to 1 minute

2. The breathing of Kussmaul is most often observed when:
  - a) severe craniocerebral trauma
  - b) hemorrhagic stroke
  - c) ketoacidotic coma
  - d) poisoning with barbiturates
  - e) hypoglycemic coma
3. The clinical signs of hypoxemia are:
  - a) cyanosis
  - b) tachycardia
  - c) a frequent pulse
  - d) behavioral disorder
  - e) all of the above
4. Where most often foreign bodies get stuck:
  - a) the threshold of the larynx
  - b) false vocal cords
  - c) pear-shaped pockets
  - d) true vocal cords
  - e) laryngeal ventricles
5. The main complaint of the patient with bronchial asthma is ....
  - a) attack of asthma
  - b) chest pain
  - c) cough with purulent phlegm
  - d) hemoptysis
  - e) Foamy sputum
6. The expiratory nature of dyspnea is noted when:
  - a) bronchial asthma
  - b) lung abscess
  - c) croupous pneumonia
  - d) pulmonary edema
  - e) cardiac asthma

7. The cause of fulminant stenosis of the larynx can be:
- a) allergic edema of the larynx
  - b) chronic cicatricial stenosis of the larynx
  - c) foreign body of the larynx
  - d) laryngeal tumor
  - e) chemical burn
8. For decompensated stenosis of the larynx is characteristic:
- a) reduced breathing
  - b) severe anxiety of the patient, expressed by a feeling of fear
  - c) rapid breathing to 25-30 per min
  - d) marked cyanosis of the skin
  - e) inclusion in the act of breathing all the auxiliary muscles
9. When determining the degree of stenosis of the larynx, the presence of:
- a) respiratory failure
  - b) in light, wet rales
  - c) systolic murmur when listening to the heart
  - d) noisy breathing
  - e) heart failure
10. When performing a conicotomy for the purpose of emergency recovery of airway patency,
- a) transverse dissection of the tissues between the cricoid and thyroid cartilages
  - b) longitudinal dissection of the cricoid cartilage
  - c) transverse dissection of the cricoid cartilage
  - d) longitudinal dissection of the 1st and 2nd tracheal rings
  - e) longitudinal dissection of tissues between the cricoid cartilage and the 1st ring of the trachea

## Situational challenges

### ***Task number 1***

In the school cafeteria, a sixth-grade student had a convulsive cough and a shortness of breath during a hasty meal and a conversation. She is concerned about pain in the larynx. The patient is confused, speaks with difficulty, is afraid. The face is cyanotic. The slowness of the voice. Periodically, seizures of convulsive cough and noisy breathing with difficulty of inspiration are repeated.

### ***Tasks***

1. Determine the patient's emergency.
2. Develop an algorithm for providing first aid.

### ***Task number 2***

In the hall of the polyclinic, a 42-year-old patient suddenly developed an attack of suffocation. The patient sits, leaning with his hands on the edge of the chair, the chest in the state of maximum inhalation, the face cyanotic, expressing fear, the frequency of respiratory movements of 38 per minute. Dyspnea of an expiratory nature, at a distance dry wheezing wheezes are audible.

### ***Tasks***

1. Identify and justify the emergency that has developed in the patient.
2. Make an algorithm for emergency care and justify each step.

### ***Task number 3***

At the child of 3 years with frequent febrile convulsions once again on a background of a hyperthermia generalized convulsions with loss of consciousness have developed. Measures have been taken to maintain oxygenation and ventilation. In the age-related dose of IM, analgin with dimedrol was administered, twice daily IV diazepam was administered at an interval of 5 minutes, but convulsions were only managed after the administration of phenobarbital.

### ***Tasks***

What complication could the child develop against such intensive therapy?

## Allergic reactions

1. All of the above is related to Quincke's edema, with the exception of
  - a) pallor in the area of edema, itching
  - b) is localized anywhere in the body
  - c) dense consistency of swelling at the rear of the foot, palms
  - d) can lead to acute respiratory failure
  - e) puffiness of the face
2. The main drug in emergency treatment of anaphylactic shock is:
  - a) euphyllin
  - b) prednisolone
  - c) mezaton
  - d) diphenhydramine
  - e) epinephrine
3. Quincke's edema can be localized in the area except for
  - a) larynx
  - b) persons
  - c) plantar surface of the foot, palmar surface of hands
  - d) the mucosa of the gastrointestinal tract
  - e) in the genital area
4. To stop the swelling of Quincke apply
  - a) antihistamines
  - b) plasma
  - c) bronchodilators
  - d) muscle relaxants
  - e) oxygen therapy
5. Acute angioedema, facial, lip, and tongue edema is an indication for prescribing drugs, except for
  - a) suprastin
  - b) lasix
  - c) prednisolone

- d) magnesium sulfate
  - e) dimedrol
6. The drugs of choice for hives are:
- a) lasix
  - b) penicillin 100 mg / kg
  - c) diphenhydramine 1% -1 ml
  - d) gluconate Ca 10% -10 ml
  - e) prednisolone 1 mg / kg
7. After the introduction of the vaccination against influenza, the patient's condition worsened: blood pressure dropped to 50/30 mm Hg. v., there was asthma, coughing, palpitations. What is the preliminary diagnosis of the below listed MOST likely?
- a) anaphylactic shock
  - b) air embolism
  - c) thromboembolism
  - d) asphyxia
  - e) arrhythmia
8. After the administration of penicillin solution, the patient's condition worsened: dizziness developed, malaise. On -no: blood pressure-60/30 mmHg.pulse-40ud.v minute of weak filling and tension. Which of the following preliminary diagnoses is MOST possible?
- a) shock
  - b) coma
  - c) crisis
  - d) collapse
  - e) fainting
9. Localization of edema of loose subcutaneous tissue with the syndrome Quincke.
- a) eyelids
  - b) lips
  - c) ears
  - d) genitals



e) all of the above

10. List the variants of clinical manifestations of anaphylactic shock.

a) cardiovascular

b) asphyxic

c) dermal

d) cerebral

e) abdominal

### **Hypertensive crisis**

1. Which way of administration is preferred in uncomplicated hypertonic crisis?

a) oral

b) subcutaneous

c) intravenous

d) inhalation

e) intramuscular

2. Which way of administration is preferable for a complicated hypertensive crisis?

a) oral

b) subcutaneous

c) intravenous

d) inhalation

e) intramuscular

3. The most frequent condition at which hypertensive crises develop is:

a) renovascular hypertension

b) essential hypertension

c) diabetic nephropathy

d) diseases of the nervous system

e) pheochromocytoma

4. Choose a calcium antagonist for relief of hypertensive crisis

a) Amlodipine

b) Felodipine

- c) Nifedipine
- d) Foridone
- e) Cinnarizine

5. When the hypertensive crisis caused by pheochromocytoma is reduced, the purpose is indicated:

- a) Hydralazin
- b) Enalaprilata
- c) Klonidina
- d) Esmolol
- e) Labetolol

6. When determining the diagnosis of a hypertensive crisis:

- a) the absolute figures of blood pressure are decisive
- b) a combination of increased blood pressure and symptoms (headache, dizziness)
- d) sufficiently small increase in blood pressure and nosebleeds
- d) dizziness in the elderly patient
- e) development of syncope with elevated blood pressure

6. Exogenous reasons for the development of the hypertensive crisis include everything except:

- a) overconsumption of table salt
- b) sudden abolition of antihypertensive drugs
- c) alcohol abuse
- d) resuscitative measures during and after operations
- e) violations of urodynamics with prostate adenoma

7. The endogenous causes of the development of hypertensive crisis include everything except:

- a) exacerbation of IHD (acute coronary insufficiency, cardiac asthma)
- b) cerebral ischemia
- c) hormonal contraceptive use
- d) sleep apnea syndrome

e) sickle cell crisis

8. The vascular mechanism of development of a hypertensive crisis is caused first of all:

a) by fluid retention

b) part of the heart rate

c) with a cardiac ejection

d) increase TPVR

e) endothelial dysfunction

### **AHF**

1 Signs of the effectiveness of resuscitation are:

a) narrowing of the pupils

b) dilated pupils

c) the appearance of a positive symptom of a “cat's eye”

d) lowering of body temperature

e) lack of blood pressure

2 Cardiopulmonary resuscitation should be carried out ....

a) at clinical death +

b) in any case, the death of a patient in a hospital

c) only with sudden death of young patients

d) in cases of death from a serious illness outside the hospital

e) only with sudden death of healthy people

3. An obligatory condition for performing an external chest compressions are:

a) the position of the hands on 2 transverse fingers higher from the articulation of the xiphoid process with the sternum +

b) the presence of a soft base under the chest

c) the presence of two resuscitators

d) the presence of a roller under the blades

e) the position of the hands on the left side of the chest

4. For an attack of angina characterized by:

- a) retrosternal pain lasting 15-20 minutes
- b) chest pain 3-5 minutes long and the effect of taking nitroglycerin
- c) retrosternal pain lasting 30 to 35 minutes
- d) Irradiation of pain in the right shoulder, scapula, upper limb
- e) no effect of nitroglycerin

5 Manifestations of acute cardiac insufficiency by left ventricular type are:

- a) dyspnea, cyanosis, tachycardia +
- b) cyanosis, bradycardia
- c) tachycardia, fever
- d) swelling of the lower extremities
- e) edema on the face and neck

6 A typical sign of myocardial infarction is:

- a) chest pain lasting more than 20-30 minutes +
- b) increase of arterial pressure
- c) lowering blood pressure
- d) headache, nausea, vomiting
- e) recurrent syncope

7 Lung edema develops at ...

- a) acute left ventricular heart failure +
- b) collapse
- c) acute vascular insufficiency
- d) acute right ventricular heart failure
- e) acute respiratory failure

8. For an attack of angina characterized by:

- a) retrosternal pain lasting 3-5 minutes and the effect of taking nitroglycerin
- b) retrosternal pain lasting 15 to 20 minutes, there is no effect of taking nitroglycerin
- c) retrosternal pain lasting 30-35 minutes, there is no effect of taking nitroglycerin

- d) Irradiation of pain in the right shoulder, scapula, upper limb
  - e) prolonged pain, no effect of taking nitroglycerin
9. A typical sign of myocardial infarction is:
- a) recurring syncope
  - b) increase of arterial pressure
  - c) lowering blood pressure
  - d) headache, nausea, vomiting
  - e) chest pain longer than 20 to 30 minutes
10. To stop the pain attack with myocardial infarction apply ...
- a) cordiamine, caffeine;
  - b) baralgin, no-shpa;
  - c) aspirin, paracetamol;
  - d) seduxen, diazepam;
  - e) promedol, morphine;

### **Fainting, collapse**

1. The patient was diagnosed with: short-term loss of consciousness, pale skin, coldness of the limbs, pulse of weak filling and tension, arterial pressure - 100/60 mm. gt; Art.

Which of the following preliminary diagnoses is MOST possible?

- a) a syncope
  - b) collapse
  - c) crisis
  - d) coma
  - e) shock
2. In the form of blood the patient lost consciousness. Which of the following is MOST useful for the patient?
- a) to give position with an elevated headboard
  - b) give the patient a horizontal position
  - c) ensure fresh air

- d) give nitroglycerin a tongue
  - e) give a smell of cotton wool with ammonia
3. The patient has epileptic seizures. What medical measure of the following is MOST appropriate to apply?
- a) reassure the patient
  - b) to put the patient to sleep
  - c) warm the patient
  - d) put a gauze swab between the teeth
  - e) put the patient in the position of the head below the legs
4. What should be done in case of stopping breathing and circulation:
- a) quickly and dramatically cool the victim
  - b) release the head end of the stretcher
  - c) to strike a precordial blow
  - d) conduct CPR
5. On the Glasgow scale, opening the eyes to speech:
- a) 3 points
  - b) 2 points
  - c) 6 points
  - d) 4 points
  - e) 7 points
6. For coma are characteristic ...
- a) the absence of reflexes to external stimuli
  - b) retardation
  - c) lymphadenopathy
  - d) high blood pressure
  - e) all responses are correct
7. With hyperglycemic coma skin:
- a) dry
  - b) wet
  - c) edematic

- d) icterous
- e) hyperemic

8. First aid at the prehospital stage with hyperglycemic coma:

- a) insulin therapy
- b) administration of 10 ml of 40% glucose
- c) administration of euphyllinum
- d) addition of magnesia
- e) administration of furosemide

9. With hypoglycemic coma skin:

- a) wet
- b) dry
- c) edematic
- d) icterous
- e) hyperemic

10. First aid for eclampsic coma:

- a) Magnesium sulfate
- b) glucose
- c) epinephrine
- d) norepinephrine
- e) dopamine

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