Ministry of Health of Ukraine
Ukrainian Medical Stomatological Academy

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disaster medicine
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Head of Department K.V. Shepitko

Methodical instructions
for independent work of students
during preparation for a practical (seminar) lesson
and in class

Academic discipline	**Training of reserve officers**
Module № 1	Premedical help in extreme situations
Topic of the lesson	Internal bleeding, collapse, shock: premedical help
Course	2
Faculty	foreign students training specialty "Medicine", "Stomatology"

Poltava 2020

2. Internal bleeding, collapse, shock: premedical help

1. Relevance: Bleeding from the main vessels is the most dangerous for human life, but bleeding from the cavities of the human body is not safer because they are not visible and they lose a lot of blood (massive bleeding). Bleeding can occur with injuries, as well as from the respiratory tract, stomach, intestines, uterus. Other forms of anemia often occur in everyday life, such as collapse due to temporary functional heart failure, and shock associated mainly with bleeding of the body, significant damage to internal organs or musculoskeletal system, nerve trunks and accompanied by depletion of the nervous system. humoral regulation of the cardiovascular system, which leads to a sharp drop in blood pressure, vasodilation and heart failure. Shock is a life-threatening condition. Properly performed rescue operations at the stage of DMD are the key to further success

2. Specific objectives:

- the cause and signs of internal bleeding, the technique of stopping;
- premedical help for internal bleeding.
- physiology and pathophysiology of systemic circulation;
- physiology and pathophysiology of the microcirculation system;
- the concept of elastic, capacitive vessels and vessels of resistance;
- systemic oxygen transport;
- the concept of central venous and mean systolic pressure, their clinical significance;
- classification of various forms of acute circulatory disorders (fainting, acute heart failure, hypertensive crises)
- clinical signs of various forms of acute circulatory disorders;
- diagnostic criteria for acute circulatory disorders and methods of monitoring the effectiveness of prescribed therapy;
- analyze the place of assistance
- recognize critical internal bleeding
- apply direct pressure to the wound
- apply direct pressure to the abdomen
- apply direct pressure to large vessels
- apply a bandage
- recognize collapse
- recognize shock

Competences and learning outcomes, the formation of which is facilitated by the discipline (relationship with the normative content of training of higher education, formulated in terms of learning outcomes in the Standard).

In accordance with the requirements of the standard, the discipline provides students with the acquisition of competencies:

-integral: The ability to solve typical and complex specialized problems and practical problems in professional activities in the field of health care, or in the

learning process, which involves research and / or innovation and is characterized by complexity and uncertainty of conditions and requirements. The ability of the individual to organize an integrated humanitarian educational space, the formation of a single image of culture or a holistic picture of the world.

-general: The ability to apply knowledge in practical situations. Ability to exercise self-regulation, lead a healthy lifestyle, ability to adapt and act in a new situation. Ability to choose a communication strategy; ability to work in a team; interpersonal skills. Ability to abstract thinking, analysis and synthesis, the ability to learn and be modernly trained. Definiteness and perseverance in terms of tasks and responsibilities.

-special (professional, subject): Ability to carry out medical and evacuation measures. Ability to determine the tactics of emergency medical care. Emergency care skills. Skills to perform medical manipulations.

Basic knowledge, skills, abilities necessary for studying the topic (interdisciplinary integration):

Names of previous disciplines	Acquired skills
1. Human anatomy	Anatomy of the head and neck, anatomy of the chest, abdomen, pelvis and limbs. Anatomy of the vascular system.
2. Normal physiology	Physiological bases of functioning of respiratory organs, vascular system.

Tasks for independent work in preparation for class and in class:

1. Causes and signs of internal bleeding.
2. Premedical help for internal bleeding.
3. The concept of collapse and shock, the causes of their occurrence, recognition and provision of premedical help.
4. Specific cases: bleeding from wounds of the extremities, nose, mouth, ears, amputation of the limb.
5. Blood substitutes and means for their prenatal administration at the stage of premedical help.
6. Maintaining temperature balance

The list of the basic terms, parameters, characteristics which the student should master at preparation for employment:

Term	Definition
1. Bleeding	leakage of blood from damaged blood vessels.
2. Internal bleeding	characterized by leakage of blood from damaged vessels into cavities, organs and surrounding tissues.
3. Internal bleeding is characterized by:	- pale skin; - frequent weak pulse;

	- frequent breathing; - nausea, vomiting, thirst; - tachycardia, low blood pressure; - decrease in the level of hemoglobin, erythrocytes in the blood test; - excretion of blood with feces, urine, food.
4. Wound	it is a violation of the integrity of the skin or mucous membrane with possible damage to adjacent tissues.
5. Chemicals to stop bleeding	chemicals that cause vasospasm (adrenaline) Sol. adrenalini hyfrochloridi 0.1% - 1 ml, (norepinephrine) Sol. nor adrenaline 0.2% - 1 ml. Vascular narrowing is caused by a drug such as ephedrine (Sol. Ephedrine hyfrochloridi 5% - 1ml), but drugs such as naphthysine 10 ml, sanorin, galazoline, isadrine, novodrin, euspiran narrow blood vessels in inflammatory processes and do not cause bleeding. Calcium chloride (Sol. Calcii chloride 10% 10 ml), hemophobin (Sol. Haemophobini - 150 ml), fibrinogen (Sol. Fibrinogeni 250, 500 ml) take part in creating a convolution and stop bleeding. Hemophobin and fibrinogen are released in vials, obtained from donor blood plasma.

Theoretical questions for the lesson:

1. Causes and signs of internal bleeding.
2. Premedical help for internal bleeding.
3. The concept of collapse and shock, the causes of their occurrence, recognition and provision of premedical help.

Practical work (tasks) performed in class:

1. Master the technique of applying a tourniquet SAT (turnstile), Israeli compression bandage, using powdered, granular hemostas;
2. To determine blood loss according to the weight of the victim, shock index according to pulse and blood pressure;
3. Provide assistance in case of fainting, collapse, shock.

Topic content:

Features of the use of chemicals to stop bleeding:

In cases where it is not possible to apply a tourniquet or you need to loosen the tourniquet, it is necessary to seal the wound.

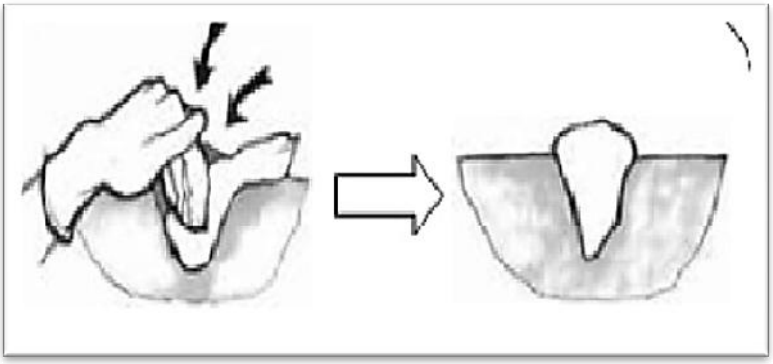
Wound tamponing technique:

Open the wound by cutting the clothes of the wounded.

Open the sterile package and remove the sterile product.

Place the product in the wound and seal it as hard and deep as possible using Celox gauze or QuickClot.

WARNING! Do not tampon the thoracic and abdominal cavities, skull



Apply pressure to the tool for 3-5 minutes. or to stop the bleeding.

Cover the wound with a pad (pads) from a multifunctional dressing package (PPI).

Wrap a bandage (or elastic bandage) around the limb;

if an Israeli bandage, pass the bandage through the brace and pull in the opposite direction.

Continue bandaging in the opposite direction, completely covering the wound site.

Secure the end to the last wrapper of the bandage with a knot, pin or hook.

Check for pulsation, motor and tactile sensitivity distal injury.

NOTE: Pay attention to the places of hidden bleeding - inguinal, inguinal, popliteal areas.

WARNING! See Bleeding Stop Algorithm.

The technique of applying a pressure bandage.

Applying a pressure bandage is the easiest way to stop minor bleeding. An individual dressing package (PPI) or BPP is used for such a bandage.

However, the bandage should not be applied too tightly. If, after applying the bandage, the limb turns blue, it means that the bandage has compressed the veins, the outflow of blood to the heart is difficult and it stagnates. In this case, the bleeding can only get worse. Paleness of the limb below the site of tight bandage means complete cessation of blood circulation.

To apply a tight bandage, it is necessary to raise the injured limb above the level of the heart, put a cotton swab on the wound site (where there is already PPI) and apply a pressure bandage with bandages or hand tools.

The procedure for applying the individual dressing package:

The package should be opened after the wound (burn) has been prepared for bandaging. In cases where access to the wound is prevented by clothing or footwear, they should be cut (preferably at the seams), and other incisions can be made.

The outer shell is torn along the existing incision.

Remove the hairpin and the dressing is wrapped in a paper wrapper (not recommended for use with PPI in which the hairpin has rusted).

The paper wrapper is removed with a split thread.

The bandage is unfolded so that the hands do not touch the surfaces of the cotton gauze pads that will be adjacent to the wound. Cotton gauze pads are taken by hand only from the side of the stitching with colored threads.

How to use an individual dressing package

Fig. 5. Imposition of an individual dressing package

If a bandage is applied to one wound, the second pad should be placed on top of the first.

If a bandage is applied to two wounds, the movable pad is pushed away from the stationary one so that both wounds can be closed.

The pads are held on the wounds with a bandage.

The end of the bandage is fixed with a pin on the surface of the bandage or tied.

The outer rubberized PPI shell can be used to apply an occlusive dressing for penetrating chest injuries.

Massive acute blood loss causes disruption of the blood supply to the organs, which depends on the volume of blood (fluid) lost and the rate of fluid loss.

Such injuries, which may be accompanied by massive bleeding, include, for example, gunshot wounds; open and closed injuries of the thigh, pelvis with damage to large vessels; multiple and combined injuries; penetrating injuries into the thoracic and abdominal cavities.

To understand these processes, we must mention the physiology of the cardiovascular system. The main function is the delivery of oxygen to tissues and organs (provided sufficient oxygen saturation). Its effectiveness depends on three components: the pumping function of the heart, the condition of the vascular bed and the sufficient volume of blood in the vascular bed.

In violation of any of these components develops a condition that is attributed to the SHOCK STATE.

Insufficient perfusion (blood supply) and insufficient supply of oxygen and other substances necessary for functioning to fabrics are characteristic of any SHOCK.

Shock is characterized by increasing suppression of all vital functions of the body: the central and autonomic nervous systems, blood circulation, respiration, metabolism, liver and kidney function, so prevention and treatment should be started as early as possible.

The cause of fluid loss is:

1. External bleeding. It can be different depending on the damaged vessels: arterial, venous, capillary and mixed.

1. Internal (hidden) bleeding:

- bleeding from fractures of large bones;
- bleeding from chest trauma (hemothorax);
- bleeding from trauma to the abdominal organs;
- bleeding from trauma to the peritoneal organs (in the peritoneal space;
- bleeding in diseases of internal organs (eg gastrointestinal bleeding).

2. Burns.

3. Fluid loss due to diseases of the internal organs (in case of vomiting or diarrhea).

WARNING! Hemorrhagic shock and its symptoms can develop not only with external bleeding, but also with internal bleeding.

The symptoms of hemorrhagic shock depend on the amount of fluid or blood lost. Separate stage IV blood loss (table 4).

And stage. With a loss of up to 15% of the circulating blood volume (BCV), which is up to about 750 ml, and with such a loss of pathological changes will not occur. There may be a slight weakness, a slight feeling of thirst. With:

Color of skin and visible mucous membranes - without changes;

State of consciousness - without changes or slight arousal;

Blood pressure - within normal limits;

Heart rate - may increase slightly, but up to 100 heartbeats per minute;

Capillary filling test - up to 2 seconds;

Urine excretion is normal.

A healthy body compensates for this amount of loss without any complications. There is no threat to life. Provided stable indicators of infusion therapy is not required.

Stage II - stage of compensated blood loss. It develops with a loss of 15-30% BCC, which is approximately 750 to 1500 ml. This amount of blood loss is essential for the body, which is trying to compensate for the lack of volume by reducing (spasming) peripheral blood vessels.

Table 1

Classification of hypovolemic shock

Signs	**Degrees of hypovolemic shock**			
	I	**II**	**III**	**IV**

	(light)	(medium severity)	(heavy)	(terminal state)
Blood loss (ml)	to 750	750-1500	1500-2000	> 2000
Blood loss (% of total blood volume)	to15%	15-30%	30-40 %	> 40%
Pulse rate	<100	>100	>120	>140
Blood pressure	Normal 100-120	Normal 90-100	Reduced 60-80	Reduced Lower 60
Pulse pressure (mm Hg)	Normal or elevated	Reduced	Reduced	Reduced
Respiration rate (per minute)	14-20	20-30	30-40	>35
State of consciousness	Slightly excited or slightly inhibited	Somewhat excited or inhibited	Excited, consciousness is darkened Does not respond to painful stimuli	Consciousness is darkened, absent
Integuments	Pale	Pale, Cyanosis of the lips, nose and fingertips. Covered with sticky sweat	Earthy gray, Covered with cold sticky sweat, pronounced cyanosis of the lips, nose and fingertips	Earthy gray, Covered with cold sticky sweat, pronounced cyanosis of the lips, nose and fingertips
Capillary filling time	2 sec	>2 sec	>2 sec	>2 sec

WARNING!!! An increase in heart rate may be the only sign of internal bleeding.

Capillary filling test - capillary blood flow recovery time more than 2 sec.

Urinary excretion - normal or slightly reduced. Normal urine output of more than 0.5 ml per minute is normal. (approximately 30 ml per hour).

This condition requires monitoring of the victim's condition. It is considered a potentially offset shock shock.

Skin and visible mucous membranes - there is pallor of both skin and visible mucous membranes. The limbs become cold to the touch.

State of consciousness - there is depression of consciousness, confusion, but the victim is available to contact, can perform simple voice commands (for example, show where it hurts, where the injury).

Blood pressure - with this amount of BCC loss, pressure reduction is already possible, but still insignificant.

WARNING! Systolic blood pressure is not always correlated with fluid loss. Low blood pressure is often a late sign of shock.

Heart rate - there is a compensatory increase in heart rate, with values above 100 but less than 120 beats per minute (in the absence of other factors affecting heart rate, such as pain or exercise).

Stage III - develops with the loss of 30-40% of BCC, or from 1500 to 2000 milliliters of blood. This amount of loss poses a threat to the body, quickly depletes the body's compensatory capabilities, leads to the development of decompensated hemorrhagic shock.

Symptoms that indicate this amount of loss are:

The color of the skin and visible mucous membranes - a pronounced pallor of the skin, with the development of microcirculation disorders, the skin in places becomes gray, marble or earthy hue. The skin is cold to the touch.

State of consciousness - severe depression of consciousness, possible episodes of loss of consciousness, especially when in an upright position.

Blood pressure - a drop in blood pressure begins, a decrease in systolic blood pressure of less than 90 mm Hg is critical, which threatens the effective blood supply to internal organs. The kidneys, intestinal mucosa and lungs are particularly sensitive to reduced blood supply.

WARNING!!! At decrease in systolic arterial pressure less than 90 mm of mercury the pulsation on a radial artery therefore absence of pulse on a radial artery is a sign of a critical condition and demands the beginning of liquid resuscitation disappears.

Heart rate - increases in the range of 120-140 beats per minute.

Capillary filling test - capillary blood flow recovery time more than 2 sec.

Urinary excretion - a decrease in urine output per unit time, until cessation.

This amount of blood loss is critical and threatens the life of the victim due to the significant risk of developing uncompensated potentially reversible hemorrhagic shock. Requires immediate action to stabilize the condition.

Stage IV. It develops at a loss of more than 40% of BCC. It is considered an extremely serious condition with the irreversible development of hemorrhagic shock.

At this stage:

The color of the skin and visible mucous membranes - a pronounced pallor of the skin, with the development of microcirculation disorders, the skin becomes gray, marble or earthy hue. The skin is cold to the touch.

State of consciousness - suppression of consciousness to the point of loss.

Blood pressure - not determined, no pulse in the radial artery.

Heart rate - more than 140 beats per minute.

Capillary filling test - up to 2 seconds.

Urine excretion - no.

It is considered an extremely critical condition that requires immediate action.

Note: the method of checking the filling time of capillaries is given in the Topic

Diagnosis of the stage of hemorrhagic shock. The health instructor may not have access to specific shock diagnostic devices. However, there is a list of required skills to roughly determine the amount of fluid lost and the stage of hemorrhagic shock. These skills include the ability to:

detect bleeding at the initial examination;

assess the condition of the skin;

assess the state of consciousness (so-called mental status);
determine the pulse in the carotid and radial arteries;
estimate heart rate per unit time;
conduct and evaluate a capillary test;
to measure blood pressure by the method of Korotkov.

These skills will help (indirectly) to diagnose shock and start anti-shock therapy in time.

To check the pulse on the carotid artery, you need to check the pulsation on the nearest side of the victim's neck (Fig. 61). This is done by placing the tips of your two or three fingers (index, middle and ring fingers) on the side of your neck. To determine the pulse in the femoral artery, press the tips of your two or three fingers in the middle of the groin. To check the pulse on the radial artery, place your two or three fingers at the site of attachment of the victim's thumb.

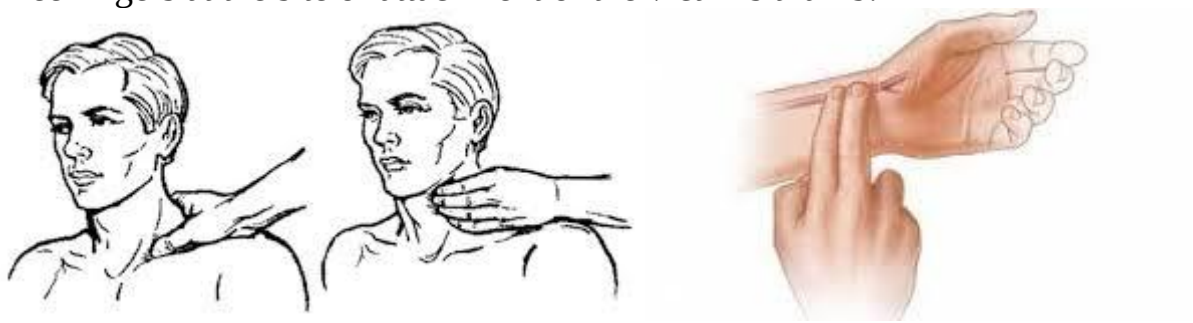


Fig. 61. Methods of checking the pulse on the carotid and radial arteries

NOTE: Do not use your thumb to check the victim's heart rate, as you may confuse your own heart rate with the wounded person's heart rate.

REMEMBER!

If the pulse is on the radial and carotid arteries, the pressure is more than 80-90 mm Hg.

If the pulse is on the carotid artery, and the radial is absent, the pressure is less than 80-90 mm Hg.

If there is no pulse in the radial and carotid arteries, the pressure is below 60 mm Hg.

Basic principles of care and treatment.

1. Immediate cessation of external or internal bleeding (imposition of a tourniquet on the extremities, tamponade, application of a pressure bandage or administration of tranexamic acid preparations for internal bleeding);
2. Giving the victim a horizontal position that facilitates the delivery of blood to the brain;
3. Providing anti-shock posture (raise the lower extremities above the head (Fig. 62), provided that the deterioration of the victim is associated with the development of any, including hemorrhagic, type of shock;

Fig. 62. Antishock pose

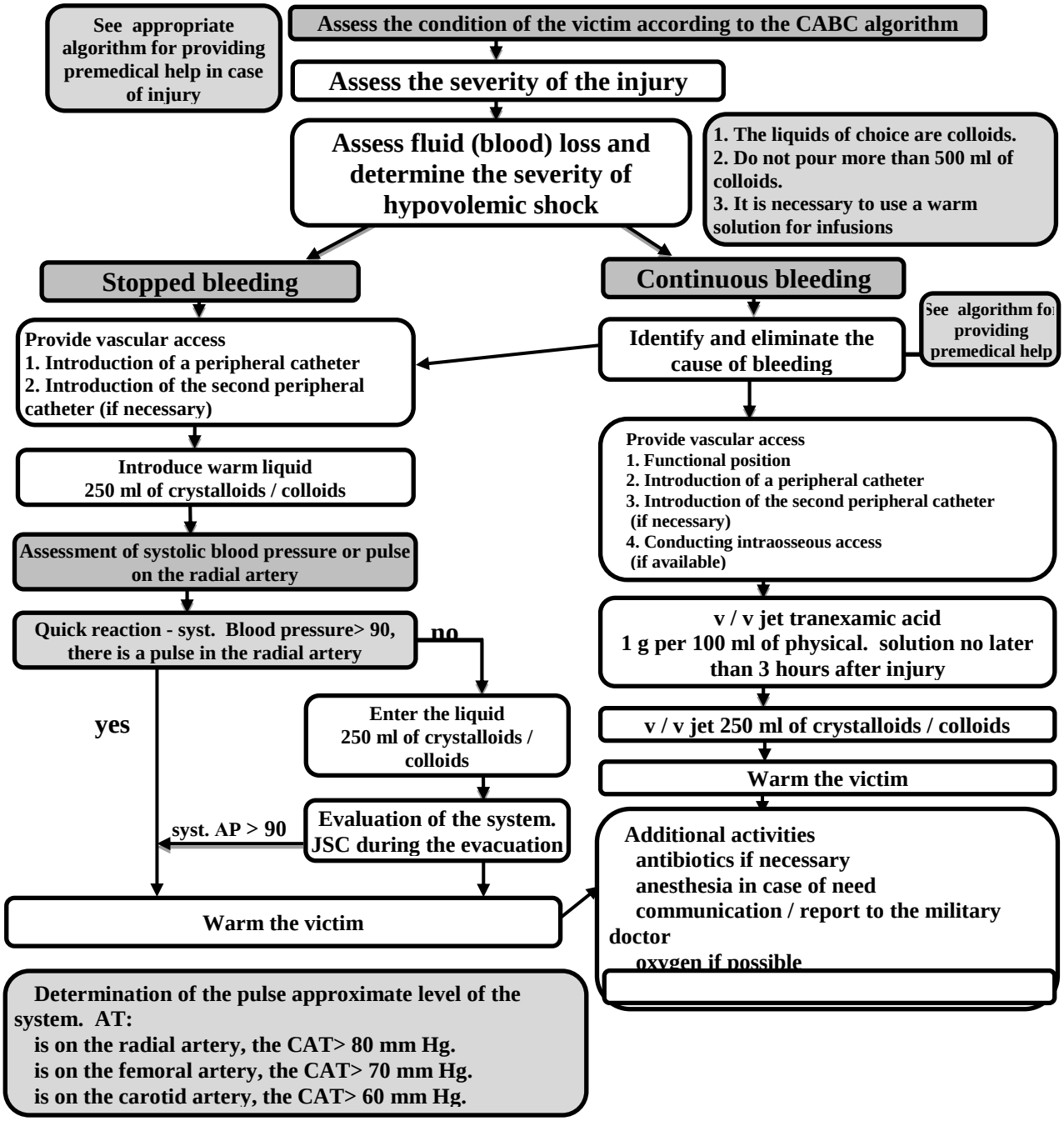
4. Protect the victim from hypothermia (need to warm up);

5. If the victim is conscious and can swallow on his own - perform oral rehydration;

6. Perform peripheral venous access with an intravenous catheter at least 18G, if possible, place a second venous catheter in the second hand of the second venous catheter.

In general, the algorithm for providing premedical help for signs of hypovolemic shock is given below.

ALGORITHM FOR PROVIDING DOMEDIC CARE FOR SYMPTOMS OF HYPOVOLEMIC SHOCK (shelter sector, evacuation sector)



WARNING!!! With low blood pressure, as a defense mechanism, the peripheral veins (upper and lower extremities) collapse and the blood circulation is centralized to supply blood to vital organs. Therefore, intravenous access as early as possible and timely recovery of BCC will help to avoid severe complications of shock. Without quality venous access, it is very difficult or impossible to carry out adequate anti-shock actions. Such a complication of injury as shock in an hour can be irreversible, and immediately initiated anti-shock measures reduce mortality by 25-30%.

Materials for self-control:

1. In what case it is possible to do without imposing of a plait?
    1. With a small blood loss.
    2. Open fracture with bleeding.
    3. Crushed limbs.
    4. Traumatic amputation.
    5. In case of blood loss, which threatens the life of the victim.
2. What does not apply to the disorder of consciousness?
    1. Shock.
    2. Stupor.
    3. Sopor.
    4. Coma.
    5. Fainting.
3. Pre-medical care for nosebleeds consists of the following measures, except:
    1. Giving the victim a supine position.
    2. Cold on the outer nose.
    3. Pressing the wing of the nose to the nasal septum.
    4. Introduction into the anterior parts of the nose cotton swab soaked in a solution of hydrogen peroxide.
    5. Giving the victim a semi-sitting position.
4. External bleeding does not include:
    1. Bleeding in the joint.
    2. Bleeding from the nose.
    3. Bleeding from the stomach.
    4. Bleeding from the urinary organs.
    5. Bleeding from the anus.
5. What is the primary symptom for the diagnosis of circulatory arrest?
    1. Lack of pulse in the carotid arteries.
    2. No pulse in the arteries of the upper extremities.
    3. No heartbeat.
    4. Lack of breathing.
    5. Lack of reaction to light - dilation of the pupils.
6. The patient due to a fracture of the mandible has abundant arterial bleeding from the facial and temporal region. Your actions:
    1. Finger compression of the common carotid artery.

2. Applying a pressure bandage.
3. Wound treatment with hydrogen peroxide.
4. Ask the victim until an ambulance arrives.
5. Call a doctor.

7. The victim on the street suddenly started bleeding from varicose veins in the lower leg. Your actions:
1. Applying a pressure bandage.
2. Applying a tourniquet on the thigh.
3. Bending the leg at the knee.
4. Interrogate the victim until the ambulance arrives.
5. Call a doctor.

8. The main signs of venous bleeding are:
1. Relatively slow nature of bleeding.
2. Blood oozing through the wound.
3. Pulsating nature of bleeding.
4. Bright red color of the spilled blood.
5. There are no signs of venous bleeding.

9. The main signs of arterial bleeding are:
1. Pulsating nature of bleeding.
2. Dark color of blood spilled.
3. Blood color is not important.
4. Relatively slow nature of bleeding.
5. Blood oozing through the wound.

10. The victim is under a car, consciousness is clear. There is an open fracture of the forearm, a pulsating stream of red blood flows from the wound. Your priority:
1. Stop the bleeding.
2. Remove the victim with the help of those present from under the car.
3. Observe the victim while waiting for the ambulance.
4. Ask the victim until an ambulance arrives.
5. Call a doctor.

Literature

Basic references

1. Medicine of emergency situations: textbook for students of higher medical educational establishment of IV level of accreditation/ V.V. Chaplyk, P.V. Oliynyk, S.T. Omelchuk, V. V. Humenyuk. - Vinnytsia: Nova Khuna, 2012. – 343 p.

Additional references:

1. Accident and emergency medicine: study guide/ O. M. Pronina, V. V. Shevchenko, S. I. Danylchenko; Ministry of Public Health of Ukraine, Central Methodical Office, UMSA. – Poltava: ASMI, 2015. – 145 p.
2. Hospital surgery /Edited by L. Kovalchuk, V. Saenko, G. Knyshov et al. – Ternopil: Ukrmedkniga, 2004. – 472 p.
3. Bullok B. Pathophysiology and Alterations I Function. – Illinois Boston-London: Second EditionGlenviev, 1988. – 521 p.

4. The Washington Manual of Sugery/ Third Edition/ Gerard M. Doherty, M. D., 2002. – 777 p.
5. Short Practice of Surgery/ 24th Edition/ R. C. G. Russel., 2004. – 1552 p.
Guidelines prepared by
PhD in medical sciences A. Levkov