Topic 2.6 Medical and sanitary support in the aftermath of natural emergencies (natural disasters)

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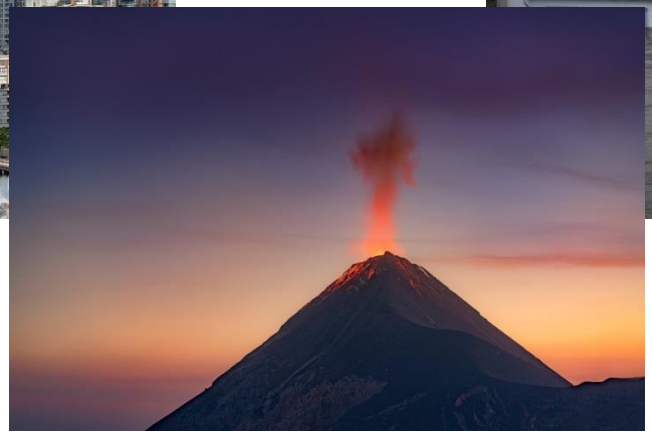
Introduction

Natural disasters (natural disasters) **are catastrophic situations that arise suddenly as a result of the action of natural forces, leading, as a rule, to disruption of the daily way of life of large groups of people, in the vast majority of cases accompanied by loss of life, destruction of material values, destruction of housing stock, objects economy and environmental pollution. The consequences of many major devastating natural disasters are often catastrophic for the inhabitants of the affected regions.**

The territory of Russia is exposed to a wide range of natural phenomena and processes of geological, hydrological and meteorological origin, as well as wildfires. Earthquakes, floods, tornadoes, hurricanes, cyclones, mudflows, landslides and landslides, typhoons, tsunamis, avalanches and forest fires represent the greatest danger of the considered natural disasters.



The following natural disasters are distinguished:

- **geological (tectonic - earthquakes, telluric - volcanic eruptions,**
- **topological - (landslides, mudflows, landslides, snow avalanches, etc.);**
- **meteorological (hurricanes, storms, tornadoes, large hail, heavy rains, snowfalls, frosts, heat, etc.);**
- **hydrological (floods, high waters, traffic jams, ice jams, surges, typhoons, tsunamis, low and high groundwater levels);**
- **natural fires (forest, peat, steppe).**

Question 1. Earthquakes

Earthquake **- tremors, shocks and vibrations of the earth caused by natural processes occurring in the earth's crust.**

Earthquakes are tectonic, volcanic, landslide and in the form of seaquakes. They usually cover large areas. The number of shocks and the time intervals between them can be very different. Every year about 100 thousand tectonic earthquakes occur on the planet, of which people feel about 10 thousand, and about 100 are catastrophic.

In their destructive effect, earthquakes are similar to the action of the shock wave of a nuclear explosion. The area of land from which the waves emanate is called the center, and the point located above it on the surface of the earth is called the epicenter of the earthquake.

Causes of earthquakes

Natural

- **Rock displacement**
- **Movement of lithospheric plates**
- **Caused by landslides and large landslides**
- **Volcanic earthquakes**

Man-made

- **In areas of flooding during the construction of large reservoirs**
- **When extracting oil and gas**
- **When extracting large quantities of rocks from mines, quarries, during the construction of large cities from imported materials**

Earthquake Intensity Estimation

Points («MM»)	Brief characteristic	The reaction of people, the degree of destruction of buildings
1	Imperceptible	Not felt, or very weak sensations. Buildings are not damaged.
2	Barely noticeable	
3	Weak	
4	Tangible	
5	Pretty strong	Felt by most people, but buildings don't collapse.
6	Strong	Felt by everyone. People get scared and run out into the street. Buildings are not damaged.
7	Very strong	Signs of panic. Buildings start to collapse. Small ground landslides.
8	Destructive	Panic. The collapse of balconies, monuments, factory pipes. Trees break.
9	Devastating	General panic. Underground communication lines are destroyed. Buildings are damaged. Many buildings are completely destroyed.
10	Destroying	Almost all buildings (non-seismic) are completely destroyed. Curvature of railway tracks. Bridge collapse.
11	Catastrophic	General destruction of buildings and structures. Mass death of people.
12	Strong disaster	Complete destruction. Landscape change.

5 points	**Felt by most people both inside and outside buildings, sleepers wake up. The fluid in the vessels oscillates and partially splashes. Small objects move or tip over. Dishes may break.**
6 points	**It is felt by all people, many are frightened, some run out. The gait of people becomes unsteady. Light furniture moves. Dishes fall. Animals run out of hiding places. In mountainous areas - isolated cases of landslides and shedding of soil.**
7 points	**The population is frightened, people run out of the premises, sometimes jump out of the windows. It's hard to stand still. Hanging objects swing, furniture breaks. Books and dishes are falling. Small landslides of soil on sandy shores. Damage to concrete irrigation canals.**
8 points	**General fear, signs of panic; all people run out of the premises. Factory pipes, monuments and beams on high supports are falling. Tree branches break off. Furniture shifts and partially tips over.**
9 points	**General panic. Underground pipelines are broken. Furniture topples over and breaks. Mountain collapses. Lots of landslides and landslides.**
10 points	**Numerous damage to household items. Serious damage to dams and moorings. Local curvature of railroad tracks.**
11 points	**Loss of many people, animals and property under the rubble of buildings.**
12 points	**Underground pipelines are falling into disrepair. The railroad tracks are strongly bent. Landscape change. Numerous landslides, collapses, cracks.**

The nature of the buildings: type "A" - houses with walls made of torn stone, raw brick, adobe, etc.; type "B" - brick, stone, concrete and reinforced concrete houses; type “C" - wooden houses.

The degree and nature of the destruction of buildings:

- ***1st degree (light damage)*** **- thin cracks in plaster and in ovens, shedding of whitewash;**
- ***2nd degree (significant damage)*** **- cracks in plaster, falling pieces of plaster, thin cracks in walls and partitions, damage to chimneys, stoves, etc.;**
- ***3rd degree (destruction)*** **- large cracks in the walls, masonry delamination, collapse of individual sections of the walls, falling cornices and parapets, collapses of plaster, falling chimneys of heating furnaces, etc.;**
- ***4th degree (landslides, severe destruction)*** **- collapse of walls, partitions and roofs of the entire building or a significant part of it, large deformations of the walls;**
- ***5th degree (complete destruction)***

The degree and nature of the destruction refers to buildings without anti-seismic reinforcement.

According to the severity of the health consequences of an earthquake, they occupy a leading place among natural disasters. Such an assessment is determined by their significant frequency, catastrophic losses among the population and the difficulties of reducing their scale.

Houses type "A"

Houses type “B"

Houses type “C"

Spitak, Leninakan, Kirovakan

Spitak earthquake occurred on December 7, 1988 at 10:41 Moscow time in the north-west of Armenia.

Powerful tremors destroyed almost the entire northern part of the republic in half a minute, covering an area with a population of about 1 million people. In the epicenter of the earthquake - Spitak - the intensity of shocks reached 10, in Leninakan - 9, in Kirovakan - 8 points.A significant part of the republic was subjected to an earthquake of 6 points, tremors were felt in Yerevan and Tbilisi. The wave caused by the earthquake went around the planet 2 times and was registered by scientific laboratories in Europe, Asia, America and Australia.

At 11 o'clock Moscow time, all fire brigades were raised on alarm. The fire was extinguished at the oil depot and in the area of the textile mill.

12,000 people were mobilized and sent to the five most affected areas. Hundreds of cranes, bulldozers, excavators, and motor vehicles also arrived there.

On the afternoon of December 7, more than 100 vehicles loaded with building materials, 5,000 tents, and medicines left Georgia for Armenia.

In the first hours after the disaster, units of the USSR Armed Forces, as well as the Border Troops of the KGB of the USSR, came to the aid of the victims. On the same day, a team of 98 highly qualified doctors and military field surgeons headed by USSR Minister of Health Yevgeny Chazov flew from Moscow to Armenia.

Rescue work and medical assistance to the victims were carried out in winter in a mountainous area (altitude about 1400 m above sea level). For 10-12 days, seismic tremors with a strength of 3.5 to 5 points continued several times a day. Air temperature fluctuations ranged from +5 to -12 ºC. Periodically, precipitation in the form of sleet and rain was observed, accompanied by gusty winds. The mountainous terrain of the Spitak region, a limited number of roads, some of which were destroyed, traffic jams made it impossible to evacuate the victims by road in the first 10 days. Helicopter evacuation was only possible during daylight hours. This required the deployment of heated tents for temporary hospitalization, stocks of linen, and food. An additional supply of medicines was required.

Providing assistance to the population was complicated by the fact that medical facilities were destroyed in the affected cities. For example, in Spitak, the wounded were taken to the Bazum city stadium, where they provided medical assistance. In a few days, 50 thousand tents and 200 field kitchens were deployed in the republic. In total, in addition to volunteers, more than 20 thousand soldiers and officers took part in the rescue work, more than three thousand units of military equipment were used to clear the rubble. Throughout the USSR, the collection of humanitarian aid was actively carried out.

A number of states deployed field hospitals in the disaster zone: Norway - 2 hospitals, France, Germany, Sweden, Finland, Cuba, Afghanistan - one each, in which more than 1.2 thousand victims received medical care.

All the republics of the USSR and foreign countries, a total of 111 countries, including Israel, Belgium, Great Britain, the Federal Republic of Germany, Japan, France, China, and Switzerland took part in the restoration of the destroyed areas.

As a result of the earthquake, at least 25 thousand people died (according to other sources, 45 thousand), 140 thousand became disabled, 514 thousand people were left homeless. In total, the earthquake covered about 40% of the territory of Armenia.

Secondary schools for 210,000 students, kindergartens for 42,000 students, 416 healthcare facilities, 2 theaters, 14 museums, 391 libraries, 42 cinemas, 349 clubs and cultural centers were destroyed or fell into disrepair. 600 kilometers of roads, 10 kilometers of railways were put out of action, 230 industrial enterprises were completely or partially destroyed.

Conclusions and lessons, the experience of carrying out emergency rescue and emergency recovery operations during the elimination of the medical and sanitary consequences of this catastrophic earthquake showed the need for international agreements to provide assistance to the affected population, to develop clear rules for coordinating the actions of medical and rescue teams.

The events gave impetus to the creation in Armenia and other republics of the USSR of a qualified and extensive system for preventing and eliminating the consequences of various emergency situations. In 1989, the State Commission of the Council of Ministers of the USSR for Emergency Situations was formed, in 1991 - the State Committee, and in 1994 - the Russian Emergencies Ministry.

About 20% of the territory of the Russian Federation is subject to seismic impact with an intensity of more than 7 points, and more than 5% is occupied by extremely dangerous 8-9 point zones.

The main active seismic regions are the North Caucasus, the Baikal region, Primorye, Sakhalin, Kamchatka and the Kuril Islands, where more than 100 cities and towns are located, in which more than 20 million Russians live.

Only for the period 1992-1995. more than 120 earthquakes occurred in Russia, including 2 strongest earthquakes with catastrophic consequences (Shikotan on October 4-5, 1994 and Sakhalin on May 27, 1995), as a result of which 2 thousand people died.

Earthquakes usually cause massive sanitary losses. Most of the affected receive various traumatic injuries, often closed and combined.

The possibility of combined injuries resulting from the simultaneous destruction of buildings, the occurrence of fires, damage to chemically hazardous and explosive objects, accidents at other enterprises is not excluded.

The population is left homeless, as most of the buildings are destroyed, and staying in the surviving buildings is dangerous due to repeated tremors.

Medical facilities, water and sewer systems are damaged, and electricity is cut off. Lack of basic sanitary and hygienic conditions leads to the risk of infectious diseases.

The magnitude of sanitary losses during earthquakes depends on the strength and area of a natural disaster, population density in the earthquake area, the degree of destruction of buildings, suddenness and a number of other factors. Limbs are most often damaged in earthquakes. Almost half of those affected had bone damage. Soft tissue bruises and multiple injuries of various localization occupied a large proportion.

An analysis of the causes of injuries during earthquakes shows that in 10% of cases, injuries were received as a result of collapses, collapse of walls and roofs of buildings, in 35% - from falling structures, debris from buildings and in 55% - from the wrong behavior of the affected, unreasonable actions caused by fear and panic.

Now there are no sufficiently complete and evidence-based data on the proportion of light, moderate and severe injuries during earthquakes. With regard to earthquakes that have occurred over the past 50 years on the territory of our country, this is primarily due to the fact that a significant part of the lightly injured, as a rule, did not seek medical help or, when it was provided in the lesion, was not recorded and therefore was not taken into account. Apparently, this also applies to some of the moderately severely affected, who, after the provision of medical care, did not end up in medical institutions.

Distribution of those injured with injuries according to the possible timing of death while under the rubble (results of an expert survey)

Possible time of death from the moment of injury	The share of the affected, in whom death may occur in a given period,% of this group of affected		
	affected, with severe life threatening injuries	affected, with serious injuries, not life-threatening	all affected, with severe injuries
Up to 6 h	60		42
6-12 h	20		14
13-24 h	10		7
1-2 days	7	5	6
2-3 days	3	5	4
Total in the first 3 days	100	10	73
4-6 days		60	18
7-10 days		20	6
After 10 days		10	3

Thus, up to 40% of all seriously injured can die under the rubble during the first 6 hours, 60% - on the first day, and almost all - within 3 days; victims with injuries of moderate and mild severity begin to die from the 4th day and 95% of them die on the 5th-6th day.

In those affected with mild and moderate injuries who find themselves under the rubble, death occurs in most cases as a result of dehydration and hypothermia.

The syndrome of prolonged compression (crash syndrome) during an earthquake can be observed in 3.8% - 23.8-29.0% of cases in those affected with severe and moderate injuries, including approximately 40% with predominant damage to the limbs and in 15% - with combined and multiple injuries (if it is impossible to establish the leading lesion).

As a result of the earthquake, a large number of people developed various mental disorders. In 20% of the inhabitants, these reactions lasted up to 2-3 hours, in 70% - from 2-3 hours to 1-5 days, and in 5% - from 5 days to several months.

In addition, a significant part of the population will need sedatives and other sedatives, as well as medical care for other diseases (heart failure, angina pectoris, myocardial infarction, hypertensive crisis, etc.).

Thus, as a result of earthquakes, people experience not only traumatic injuries, but also a variety of neuropsychiatric disorders and somatic diseases that require emergency medical care.

The medical and tactical situation is further complicated by the fact that medical facilities are out of order and there are losses among medical personnel. Thus, during the earthquake in Tashkent, out of 140 medical institutions, 118 were damaged, while 22 were completely out of order. Of the 51 outpatient clinics in the city, 37 completely or partially stopped working in their buildings. During the earthquake in Armenia, 250 medical institutions were completely destroyed, out of 36 hospitals 24 were completely destroyed and 8 partially; 97 polyclinics were in emergency condition.

Losses of medical personnel in some destroyed cities amounted to about 70%

As a result of an earthquake in a city, containers with emergency hazardous chemicals can be destroyed, and secondary foci of chemical pollution may arise. In such a situation, mass poisoning is very likely, for example, with ammonia, chlorine, nitrogen oxides and other aggressive substances.

During underwater and coastal earthquakes, as a result of shifts up and down sections of the seabed, sea waves arise - tsunamis. The speed of their propagation is from 30 to 100 km/h, the height in the area of origin is up to 5 m, and near the coast - from 10 to 50 m or more. Tsunamis produce devastating destruction on land.

During the liquidation of the consequences of the earthquake, the following works must be performed without fail:

- **extraction of people from under the rubble, dilapidated and fire-engulfed buildings;**
- **localization and elimination of accidents on communal energy and technological lines, the consequences of which threaten people's lives;**
- **collapse or strengthening of structures of buildings that are in an emergency condition and threaten to collapse;**
- **organization of water supply and nutrition of the population in the earthquake zone;**
- **providing medical care to the injured.**

It is important to know how many people you need to find in each area, quarter, house.

In earthquake areas, the prevention of mass mental reactions and panic is of great importance.

Question 2. Fundamentals of the organization of medical and sanitary support in the aftermath of earthquakes

When eliminating the medical and sanitary consequences of most devastating earthquakes in our country, a system of staged treatment is used with the evacuation of the affected according to their destination to specialized (profiled) medical institutions that can provide the victims with comprehensive medical care and treatment. At the same time, the organization of medical care has significant differences not only during certain earthquakes, but even in different parts of the source of the same earthquake. This was clearly manifested in the liquidation of the consequences of the most studied earthquakes in organizational and medical terms.

First aid to those affected in the earthquake source is provided in the order of self- and mutual assistance, as well as by the personnel of rescue teams. As mentioned, sanitary losses during earthquakes are formed almost simultaneously, in connection with this, the maximum amount of work to provide first aid to the affected occurs immediately after the earthquake.

In the initial period (within a few hours), first aid to the affected and their evacuation from the outbreak is spontaneous; during this period it is called in the order of self- and mutual assistance; in earthquakes with an intensity of 7 points or more, the proportion of all those affected who received first aid from residents of a settlement affected by an earthquake is small.

Depending on the conditions, the capabilities of full-time and non-staff units to perform search and rescue operations, different rates of increasing first aid work are possible.

It should be borne in mind that before it becomes possible to receive first aid in an organized manner, a more or less significant part of the affected on their own or with the help of other people (on surviving or arrived vehicles) is evacuated outside the outbreak. Therefore, in the course of organized first aid among those remaining in the outbreak, the proportion of those affected with severe and moderate injuries increases.

During the most severe earthquakes in terms of medical and sanitary consequences, the capabilities of medical institutions existing in the earthquake zone or near it may turn out to be insufficient.

A large territory captured by the earthquake, the "binding" of the main part of medical institutions to settlements located in earthquake-prone areas quite far from each other, the absence or shortage of specialized beds of one profile or another in medical institutions, which forces the evacuation of a significant part of the victims over a fairly long distance from the source of the earthquake - all this, in turn, requires the implementation of a complex of medical measures before evacuation that reduce the risk of an unfavorable outcome or a significant deterioration in the condition of those affected during transportation.

Treatment and evacuation activities are organized and carried out by the forces and means of the facility, local and territorial levels of the VSMK, the territory and facilities of which were in the earthquake zone.

To provide primary medical and sanitary medical and primary specialized medical care to those affected by the earthquake, all medical facilities located in the administrative territory where the earthquake occurred, regardless of their departmental affiliation, are used.

The experience of providing primary medical and sanitary pre-hospital, primary medical and sanitary medical and primary specialized medical care during earthquakes showed that there was practically no case when the formation or institution involved in the elimination of the medical and sanitary consequences of an earthquake carried out only regulated activities of one type of medical help.

Thus, medical and nursing teams and ambulance teams, as a rule, provided primary health care and performed some activities of primary health care; medical posts in most cases had a surgeon and, along with the first medical aid, carried out some urgent measures of primary specialized medical care; medical institutions that received victims from the outbreak, as a rule, carried out some activities of specialized high-tech medical care. Obviously, this provision must be taken into account when determining the composition and equipment of units and institutions of the disaster medicine service.

Earthquakes 5-6 points

When planning and implementing LEM during the elimination of the medical and sanitary consequences of earthquakes with an intensity of 5 or 6 points, the following provisions should be taken into account:

- **most of the inhabitants of this settlement will not be affected by the earthquake and will be able to take part in rescue operations;**
- **88-100% of buildings will not receive serious destruction and damage;**
- **most healthcare facilities will remain operational;**
- **victims in need of medical care will seek it soon after the earthquake;**
- **with an earthquake of 5 points, a few victims will not need medical, primary specialized care and hospitalization;**
- **during an earthquake with an intensity of 6 points, approximately 1.5% of the inhabitants of the settlement can seek medical help.**

When eliminating the consequences of earthquakes with an intensity of 5 points, it seems possible to maintain the organization of the LEO that exists under normal conditions, then with a 6-point earthquake, it may be necessary to organize and perform a number of additional LEMs at the expense of the forces and means of the QMS of the territorial level.

Thus, if during the elimination of the medical and sanitary consequences of earthquakes with an intensity of 5 points, in most cases it is possible to maintain the organization of medical and preventive support that exists under normal conditions, then with a 6-point earthquake, it may be necessary to organize and implement a number of additional medical and evacuation measures. at the expense of the forces and means of the disaster medicine service at the territorial level, namely:

- **providing some of the victims with first aid at the site of injury and their evacuation to the nearest medical facilities;**
- **providing the injured (in accordance with the situation) with primary medical and sanitary medical and specialized medical care;**
- **deploying additional hospital beds of the appropriate profile in existing inpatient medical institutions or organizing the evacuation of the affected, in need of one form or another of specialized high-tech medical care, outside the given settlement (earthquake zone);**
- **organization of management of the evacuation of the affected from the places of injury and from the nearest outpatient clinics to inpatient medical institutions.**

Earthquake 7-8 points

During an earthquake of 7-8 points, the fundamental provisions of the organization of the LEO, characteristic of an earthquake of 6 points, retain their validity, however, there are also significant features.

Every 7th-10th inhabitant receives various injuries, up to fatal ones, during an earthquake of 7 points, and every 3-4th inhabitant of 8 points. Under these conditions, it is not possible to involve residents who were not injured in the earthquake to provide first aid.

Compared to a magnitude 6 earthquake, 4-7 times more people can seek medical help in a magnitude 7 earthquake, and 9-10 times more people affected in a magnitude 8 earthquake.

With an earthquake of 7 points, about 3% of all those affected will need complex anti-shock therapy, with an earthquake of 8 points - 5%. The need for hospital beds is sharply increasing: with an earthquake of 7 points, it will be 2.5%, and with an 8-point - 4.5% (of the total population).

All those affected by an earthquake of 7 points and most of those with an 8-point will be outside the rubble. In the first case, sanitary losses can amount to about 13% of the population, and in the second - 23%, and therefore there is a need for the simultaneous provision of medical care to a large number of those affected.

To solve this problem, it will be necessary to quickly attract significant forces and means of the territorial, regional, and sometimes federal levels to the implementation of the LEM.

The situation will make it possible to deploy medical units that arrived in the earthquake zone directly in the earthquake source - in buildings and structures that received the 1st and 2nd degrees of destruction.

Earthquake 9, 10, 11, 12 points

Compared with the consequences of 8-point earthquakes, the sanitary losses of the population during an earthquake of 9-10 points increase by 15%, and with 11 and 12 points (in cities of different types) it increases by 15-22 and 35-50%, respectively. The conditions for medical and evacuation support for the consequences of such earthquakes will be much more difficult.

In particular, only a small part of the affected will be able to receive first aid in the form of self-help and mutual assistance. The total loss of population during earthquakes of 9-12 points can reach 55-81% of the population; among those affected, 65-80% may have severe and moderate injuries. These data convincingly prove that the first aid to the main part of the affected will be provided only by the personnel of the emergency rescue teams or the population who arrived from other settlements outside the earthquake zone.

With the most probable for Russia earthquakes with an intensity of 9-10 points, 50-70% of those affected will immediately require medical care.

Based on the experience of eliminating the consequences of earthquakes, a system for providing the affected with primary medical and sanitary medical and specialized medical care with the involvement of the forces and means necessary for this is created within 1-2 days.

It is obvious that in case of an earthquake with an intensity of up to 9 points or more, medical institutions located in the earthquake zone will be destroyed or become inoperable. - sanitary medical and specialized medical care for the injured and their hospital treatment in medical institutions located at a considerable distance from the earthquake zone, attracting air transport to evacuate the injured.

When evacuating victims both from the source of the earthquake and between EMEs, the following provisions should be taken into account:

- **landing sites for helicopters should be equipped near all medical posts and medical institutions intended for victims;**
- **at the helicopter pad, if it is located at a distance from the medical institution, and a medical center (evacuation receiver) must be deployed at the airfield;**
- **when evacuating victims by road transport, medical distribution points should be organized along the evacuation routes;**
- **organization of escort of evacuated victims.**

To ensure a clear medical evacuation of the affected, it is necessary:

- **before loading the injured into vehicles in the earthquake focus, monitor their condition and perform the necessary emergency medical care;**
- **on the evacuation routes from the source to the first EME, create regulatory (distribution) points that should ensure the provision of medical care to those in need (as a rule, in the amount of first or primary pre-hospital care) and determine the direction of movement of vehicles with the affected;**
- **in the places of waiting for the evacuation of groups of the affected (airfields, landing sites, marinas, collection points during evacuation by columns of motor transport), deploy evacuation receivers, which should, as a rule, provide primary medical care to those in need;**
- **to ensure the evacuation of the injured to hospital-type medical institutions located at a considerable distance from the source of the earthquake, it is necessary to organize a clear dispatch service and medical support.**

Question 3. floods

Flooding is a temporary significant flooding of an area with water as a result of a rise in its level in a river, lake or sea, as well as the formation of temporary streams.

Depending on the causes of occurrence, the following types of floods are distinguished:

- **floods - a rapid, but relatively short-term rise in the water level in the river, caused by heavy rains or intense melting of snow cover, glaciers, jams and ice dams in its basin (dams - the accumulation of loose spongy sludge and finely broken ice in the riverbed; jams occur in the spring when rivers open and the destruction of the ice cover, are characterized by the accumulation of ice in the riverbed, which makes it difficult to flow);**
- **flooding that occurs under the influence of surge wind on the sea coasts and in the mouths of rivers flowing into the sea;**
- **tsunami - a flood caused by underwater earthquakes, eruptions of underwater or island volcanoes and other tectonic processes.**

In terms of frequency of occurrence, area of distribution, total average annual damage, floods rank first in Russia among dangerous hydrological phenomena and processes. In terms of the number of human casualties and damage per unit area of damage, they rank second after earthquakes.

The largest floods in terms of catastrophic consequences over the past 100 years were river floods in China (Henan Province, 1887), when the number of victims exceeded 900 thousand people, and the flood of the Yangtze River (1911), as a result of which about 100 thousand people died.

Significant snow and rain floods are observed on the major rivers of Russia almost every year. This happens especially often in areas where mutual backwaters of rivers are possible with non-simultaneous onset of floods. So, the rivers of Western Siberia (Ob, Irtysh, etc.), dammed by later floods, temporarily acquire a reverse flow and overflow strongly. Ice jams form in their channels. Catastrophic floods in the basins of the rivers of the Far East (Amur, Zeya, Bureya, etc.) recur approximately once every 7 years. During a flood, water that overflows the channel and floods the coastal area at high speed, together with entrained debris, poses a danger to people and buildings.

According to the Ministry of Emergency Situations of Russia, in our country there is a threat of floods for almost 746 cities and several thousand settlements.

Flooding is a major potential hazard. On the territory of Russia, about 960 cities, more than 500 urban-type settlements and thousands of small settlements are periodically flooded. Flooding of territories causes deformation and destruction of soils of building foundations and underground utilities, increased seismicity of territories, flooding of basements of buildings, deterioration of sanitary and environmental conditions in cities and towns.

Quite often, floods occur from the wind surge of water, according to the consequences they are compared with the largest flood floods and tsunamis. Wind surges of water often occur on large lakes and reservoirs, as well as at the mouths of large rivers flowing into the sea.

The magnitude of the surge water level is influenced by: the speed, direction and length of the wind acceleration, the average depth, the area of the reservoir, its configuration, etc. In cases where high water levels are formed as a result of the wind surge, the adjacent territory may be flooded.

The threat of flooding can be created by the possible destruction of dams, hydroelectric facilities, protective dams and other hydraulic (hydrodynamically dangerous) objects as a result of accidents, natural disasters and terrorist acts.

Hydrodynamically dangerous objects include structures or natural formations that create a difference in water levels before (upstream) and after (downstream) the water table. These include artificial and natural dams, waterworks, dams. A feature of flooding during accidents at such facilities is the appearance of a breakthrough - the main damaging factor of the accident, formed in the downstream as a result of a rapid fall of water from the upstream during the breakthrough of a hydroelectric complex or other hydrodynamically dangerous object.

The volume of water and the speed of its fall from the upstream (height, width, and speed) depends on the size (magnitude) of the damage during the breakthrough of the hydraulic structure.

The propagation speed and height of the breakthrough wave are significantly affected by the nature of the terrain over which it moves. So, on the plains, the speed of its movement does not exceed 25 km / h, and on rough terrain (in the mountains) it can reach 100 km / h (forests, hills, ravines, etc. reduce the speed and height of the breakthrough wave).

In addition to the damaging factors characteristic of other floods (drowning, mechanical injuries, hypothermia), in case of accidents at hydrodynamically dangerous objects, people are affected by factors caused by the kinetic energy of the breakthrough wave. Mechanical damage of varying severity may be the result of:

- **direct dynamic impact on the affected wave breakthrough;**
- **the traumatic effect of fragments of buildings, structures, destroyed by a breakthrough wave;**
- **the damaging effect of various objects involved in the movement of a breakthrough wave.**

The magnitude and structure of losses among the population during floods can vary depending on the density of the population living in the flood zone, the timeliness of the warning, the distance of the settlement from the place where the flood began, the time of day, the speed and height of the breakthrough wave, the temperature of the water and the ambient air, and other factors. . In case of accidents at such facilities, the total losses of the population located in the zone of action of the breakthrough wave can be 90% at night, and 60% during the day, while among the total losses, irretrievable losses can be: at night - 75%, during the day - 40%, and sanitary - 25 and 60% respectively.

Characteristics of losses by flood zones (in % of the population)

flood zone	Losses					
	are common		irrevocable		sanitary	
	afternoon	at night	afternoon	at night	afternoon	at night
I. Zone of catastrophic flooding: current speed - 30 km/h; length of the zone - 6-12 km; wave passage time - 30 min	60,0	90,0	44,0	75,0	60,0	25,0
II. Fast current zone: current speed - 15-20 km/h; the length of the zone is 15-25 km; wave passage time -50-60 min	13,0	25,0	11,0	20,0	90,0	80,0
III. Middle current zone: current speed - 10-15 km/h; the length of the zone is 30-50 km; wave passage time - 2-3 hours	5,0	15,0	77,0	15,0	93,0	85,0
IV. Weak current zone (spill): current speed - 5-10 km/h; length of the zone - 36-70 km	2,0	10,0	55,0	10,0	95,0	90,0
Average loss	20,0	35,0	15,0	30,0	85,0	70,0

Floods, depending on the scale and total damage caused, are divided into 4 groups:

•***1st - low floods*** **(observed on flat rivers with a frequency of 1 time in 5-10 years), characterized by a relatively small area of flooding, minor material damage and, as a rule, do not pose a threat to human life and health;**

•***2nd - high floods*** **(observed once every 20-25 years), are accompanied by flooding of significant sections of river valleys, causing significant material damage and, as a rule, are accompanied by a threat to human life and health, which necessitates partial evacuation of the population;**

•***3rd - outstanding floods*** **(observed once every 50-100 years), lead to the flooding of entire river basins with flooding of settlements. Such floods are accompanied by the threat of mass losses among the local population, and, as a result, require the evacuation of a significant part of it;**

•***4th - catastrophic floods*** **(occur no more than 1 time in 100-200 years), cause flooding of vast areas, completely paralyzing economic and production activities, cause significant material damage and, as a rule, are accompanied by large losses among the local population.**

Depending on the extent of the flooding of a particular territory, the speed of water movement, the height of the flood wave and the distance of the settlement from the hydraulic structure or a dangerous natural phenomenon (typhoon, tsunami, strong sea waves, the prevalence of floods, etc.), it is customary to distinguish four zones of catastrophic flooding:

- ***the first*** **- adjoins directly to the hydraulic structure or the beginning of a mudflow or other natural phenomenon. It extends for a distance of 6-12 km with a wave height of up to several meters. The wave is characterized by a turbulent flow of water with a current speed of 30 km/h or more; wave passage time - 30 min;**
- ***the second*** **is the fast current zone (15-20 km/h). The length of this zone can be up to 15-25 km; the wave passage time is 50-60 minutes;**
- ***the third*** **- the zone of the middle current with a speed of 10-15 km / h and a length of up to 30-50 km; wave passage time 2-3 hours;**
- ***the fourth*** **- a zone of weak flow (spill). The current speed can reach 6-10 km/h. The length of this zone will depend on the terrain and may be 35-70 km from the hydraulic structure or the beginning of a natural phenomenon.**

Such a conditional division into zones allows rescuers and medical workers to better navigate the current situation in the disaster area, which, in turn, improves both the quality and efficiency of rescue operations and the use of forces and means of the disaster medicine service to provide medical assistance to the affected population in during the liquidation of the health consequences of the flood.

Question 4. Storms, hurricanes, cyclones, tornadoes

Scale for assessing the strength of a storm, hurricane, cyclone, tornado

Points for Beaufort	Definition wind force	Wind speed	The action of the wind on land
0	Calm	0.0 – 0.2 m/s	Smoke rises vertically.
1	Quiet	0.3 – 1.5 m/s	The direction of the wind can be seen from the smoke.
2	Easy	1.6-3.3 m/s	The direction of the wind is determined by the weather vane. The wind is felt in the face. The leaves rustle.
3	Weak	3.4-5.4 m/s	The leaves are constantly swaying. The flags are being developed.
4	Moderate	5.5-7.9 m/s	The wind raises dust moving thin branches of trees.
5	Fresh	8.0-10.7 m/s	Thin tree trunks sway.
6	Strong	10.8 -13.8 m/s	Thick boughs sway. Buzzing telegraph wires.
7	Strong	13.9-17.1 m/s	Tree trunks sway. Against the wind is hard to go.
8	Very strong	17.2 -20.7 m/s	The wind breaks the branches of the trees.
9	Storm	20.8-24.4 m/s	Minor damage to houses. The wind rips off the tiles.
10	Heavy storm	24.5-28.4 m/s	Significant damage to buildings. Trees are uprooted.
11	Violent storm	28.5-32.6 m/s	Large destruction over a large area
12	Hurricane	More 32.6 m/s	Total destruction

Шкала Бофорта

Сила ветра определяется по **12-балльной** шкале, которую предложил британский адмирал Френсис Бофорт в 1806 г

Сила ветра

ШТИЛЬ 0 баллов (<1 м/с)	СЛАБЫЙ 3 балла (4–5 м/с)	СИЛЬНЫЙ 6 баллов (11–12 м/с)	ШТОРМ 9 баллов (19–22 м/с)	УРАГАН 12 баллов (>29 м/с)
				

Extremely dangerous natural disasters: storms (storms), hurricanes (typhoons), tornadoes (tornadoes), cyclones, which are extremely fast and strong air movement, causing destruction of buildings, death of people and animals.

By wind speed they distinguish: weak wind - up to 5 m / s, strong - up to 10 m / s, very strong - 15-18 m / s, storm - 18-29 m / s, hurricane (typhoon) - over 29 m/s, sometimes reaching up to 120-210 m/s.

A *storm* is a very strong and prolonged wind that causes great destruction on land and rough seas (storm). Depending on the time B of the year and the involvement of various particles in the air flow, dusty, dustless, snowy and squall storms are distinguished.

***Dust (sand) storms* are accompanied by the transfer of large amounts of soil and sand particles. They arise in deserts, semi-desert and plowed steppes and are capable of carrying millions of tons of dust over hundreds of kilometers and filling up territories with an area of several thousand kilometers**

***Dust-free storms* are characterized by the absence of dust entrainment in the air flow and a relatively smaller scale of destruction and damage.**

***Snow storms* occur in winter and move huge masses of snow through the air. Their duration is from several hours to several days. They have a relatively narrow bandwidth. More often in Siberia.**

***Squall storms* are characterized by an almost sudden onset, a quick end, a short duration of action, and great destructive power.**

A *hurricane* is a whirlwind with a huge speed of movement of air masses and low atmospheric air pressure in the central part. The speed of air movement can exceed 120 m/s in an area with a diameter of 500-1000 km and a height of up to 10-12 km. Hurricanes occur in zones of contact between warm and cold air masses at the most pronounced temperature contrasts and are accompanied by heavy cloudiness, heavy rains, thunderstorms and hail.

A *cyclone* is a giant atmospheric vortex in which pressure decreases towards the center, air currents circulate around the center counterclockwise (in the Northern Hemisphere) or clockwise in the Southern Hemisphere.

During a cyclone, cloudy weather prevails. Tropical cyclones with storm and hurricane winds and air movement force of 9 and 12 on the Beaufort scale, respectively, pose the greatest danger. The wind speed with a strong upward movement sometimes reaches 70 m/s, and its individual gusts - 100 m/s, dense continuous cloudiness develops with heavy rainfall (up to 1000 mm per day or more) and thunderstorms.

In Southeast Asia, tropical cyclones are called typhoons, and in the Caribbean they are called hurricanes. During thunderstorms, atmospheric vortices are often born, propagating down to the very surface of the earth. Their diameter can be tens of meters above the sea and hundreds of meters above land. Such a whirlwind is called a tornado (a blood clot in Western Europe, a tornado in the USA).

A *tornado* is the most destructive atmospheric phenomenon. It is a huge vortex with a vertically directed axis of rotation, resembling a funnel in shape with a "trunk" stretched upwards. The air in the tornado rotates at a speed of several tens of meters per second, rising simultaneously in a spiral to a height of up to 800-1500 m. The tornado travels 40-60 km, moving along with the cloud, accompanied by a thunderstorm, downpour, hail, capable of causing great destruction.

Tornadoes are formed in an unstable state of the atmosphere, when the air in its lower layers is very warm, and in the upper layers it is cold, while a powerful vertical movement of air masses occurs. A low atmospheric pressure is formed inside the vortex flow, so the tornado draws in itself, like a giant vacuum cleaner, dust, water and all objects encountered in the path of its movement, lifting them high up and carrying them over long distances.

Tornado in Ivanovo in 1984

On June 10, 1984, in the city of Ivanovo, losses were counted after a terrible natural disaster that hit the city the day before.

The hurricane that passed in Ivanovo in June 1984 was called the "Soviet tornado". It claimed 100 human lives in two minutes, 804 residents were injured, many were missing. So far, 33 years later, no other details of the natural disaster and exact data on the dead have been provided.

It was a good Saturday, weddings were roaring in the "city of brides", many residents of Ivanovo went out into nature, summer residents were digging in the beds. Having received "independence" from their wives, the three peasants "figured out for three", bought a bottle of Moskovskaya, Druzhba processed cheese and went to the river bank, where a treasured faceted glass was waiting for them on a birch knot. Suddenly, the weather began to deteriorate, a strong wind blew, a black cloud suddenly “extinguished” the sun. There was a strong roar in the air. The peasants hurried, two drank their ration, and the third, twitching his Adam's apple, remained with his head thrown back. Staring up at the sky, he poured vodka down his collar: “Guys, look, cows are flying! Got drunk! It's time to tie!". And immediately hail hit their backs, first the size of a pea, then the size of a chicken egg. Their wives did not recognize them at home, completely sober, smeared from head to toe with mud, with sand in their ears.

It became known that a herd was grazing almost near that place, and many owners did not find their cows. And only a few days later, dead animals were found hundreds of meters away on the other side of the river, and not only cows, but also cars and traffic lights were flying in the city and its environs. A huge black funnel, with numerous sleeves, sucked in water from ponds, garages. The tornado was so strong that it tore off a fifty-ton tank from the water tower and threw it 200 meters.

At the Tekstilnaya cargo station, a crane (with a lifting capacity of 42 tons and a weight of 350 tons) was tied into a knot by a tornado, lifting it a few meters from the ground, and seventy-ton containers were found within a radius of more than a kilometer.

Experts later calculated that the maximum wind speed in the Ivanovo region was about 100 meters per second.

In two minutes, the tornado zigzagged over a hundred kilometers through the neighborhood.

Many cars were turned into lumps of metal. Power lines and poles were strewn on the ground. In the forest, trees were felled or broken at a height of up to three meters. Two days later, a horse was found on one of the trees, which was removed only with the help of a crane.

Eyewitnesses told many strange stories: one of the summer residents, waking up from the blow, found that instead of linoleum he was lying on bare boards. At another summer resident, a tornado blew off the roof, destroyed the house, but there was a chiffonier, for some reason clogged with slate. Another gardener was thrown 15 meters out of the house, next to him in a ditch lay broken native Zhiguli, and two peonies grew in a flower bed: red and white. There was no trace of the red, and the tornado did not touch a single petal on the white. The table with the tools disappeared without a trace, but the box with the nails remained. Another mistress, hearing a rumble, climbed into the cellar. Having climbed out into the open world, she saw that the house had no roof and no furniture, two walls had fallen. But in the corner there was a refrigerator, which she never had in her childhood. But her neighbor's passport flew out of his pocket, which was later sent to him from Kostroma.

All the wounded noted one strange circumstance that the pain from the wounds received during the tornado was not strong, and the wounds healed quickly and without complications, but small objects - branches, straws, caused severe damage, penetrating into the human body to a depth of up to 5 centimeters.

In the Ivanovo region, 680 residential buildings, 200 industrial and agricultural facilities, 20 schools, kindergartens, forests were affected, 416 families were left homeless, 500 dacha buildings were destroyed. The entire Soviet Union helped to eliminate the consequences of the tornado.

Question 5. Mudflows, snow avalanches

Mudflow **is a temporary mud and mud-stone stream with a high content (up to 75%) of rocks that suddenly forms in the channels of mountain rivers, resulting from intense and prolonged heavy rains, rapid melting of glaciers or seasonal snow cover and other phenomena.**

Mudflows move in separate waves at a speed of up to 10 m/s or more, carrying huge volumes of earth, pebbles and large stones (up to 3-4 m in diameter and weighing up to 100-200 tons). A steep leading front of a mudflow wave with a height of 5 to 15 m forms the "head" of the mudflow (the maximum height of the shaft of the water-mud flow can reach 25 m), the length of the mudflow channels is from several tens of meters to several tens of kilometers. According to the origin of the main component of the mudflow, they distinguish: rains and showers - 81.9%; melting of snow and glaciers -11.3%; breakthrough of ice reservoirs - 3%; breakthrough of natural dams - 3.8%. Mudflows have great destructive power. In the transit and stopping zone, mudflow is capable of causing great destruction or blocking structures with mudflows, the thickness of which can reach several meters.

The territory of Russia is distinguished by a variety of conditions and forms of manifestation of mudflow activity. All mudflow-prone mountainous areas are divided into two zones - warm and cold. The warm zone includes temperate and subtropical climatic zones, within which mudflows are formed in the form of water-stone and mud-stone flows.

The cold zone covers mudflow-prone regions of the Subarctic and Arctic. Here, in conditions of heat deficiency and permafrost, snow-snow mudflows are predominantly common.

Mudflows are especially active in the North Caucasus. Due to the negative role of the anthropogenic factor (destruction of vegetation, quarrying, etc.), mudflows began to develop on the Black Sea coast of the North Caucasus. In terms of action, mudflows are close to landslides, snow avalanches, most often representing rocks or snow masses moving at high speed down the slope.

Landslide - sliding displacement of rock masses down the slope under the influence of gravity; occurs, as a rule, as a result of slope erosion, waterlogging, seismic shocks and other factors.

Snow avalanches occur as a result of the accumulation of snow on mountain peaks during heavy snowfalls, heavy snowstorms with a sharp drop in air temperature. Avalanches can also come down during the formation of deep frost, when a loose layer (quicksnow) appears in the thickness of the snow. Most avalanches descend along certain trays - narrow hollows on steep mountain slopes. Along these hollows, 200-300, and sometimes up to 500 thousand tons of snow can fall off at the same time.

In addition to flume avalanches, there are basic and jumping avalanches. The main avalanches slide off the slopes of the mountains in uncertain places, as a rule, they are small and do not pose a particular danger. Jumping avalanches are flume avalanches that meet "springboards" on their way and "jump" over them with great force, acquiring an increasing speed of movement, the force of destruction increases.

Quite often avalanches arise suddenly and begin their initial movement silently. When avalanches move in narrow mountain gorges, an air wave growing in strength moves ahead of them, bringing even greater destruction in comparison with the falling mass of snow. Repeated avalanches leave deep traces in the mountain landscape. Often avalanches fall into riverbeds and block them, forming dams for a long time.

Avalanche danger is caused by sudden changes in the weather, heavy snowfalls, heavy snowstorms, and rains. To prevent avalanche danger, there is a special mountain-avalanche service.

Catastrophic snow avalanches in the world occur on average at least once every two years, and in some mountainous areas - at least once every 10-12 years.

sel

Landslide

snow avalanche

Karmadon Gorge. How the film crew of Sergei Bodrov died

The largest glacial tragedy in the history of modern Russia, which resulted in the death and disappearance of 128 people. Among them are Sergei Bodrov Jr. and four dozen members of his film crew. In North Ossetia, Bodrov filmed the film "The Messenger".

On September 20, 2002, at 20:08:30, a block of the Hanging Miley Glacier broke off from a height of 4350 meters from the spur of Mount Dzhimaraikhokh and fell on the rear part of the Kolka Glacier. This moved him down, created an ice collapse and a mudflow. Later it was established that the total volume of the ice-stone mass that had set in motion reached 130 million cubic meters.

A shaft of rock fragments and ice 250 meters high moved at a speed of 200 km / h, destroying everything in its path. The ice-stone stream demolished power lines, roads, residential buildings and recreation centers. The length of the path of the glacial mudflow was over 30 kilometers, and in the lower part of the gorge the height of the ice wall exceeded 120 meters.

All this took a few minutes, during which the Kolka glacier redrawn the landscape of the gorge, and at the same time hundreds of human destinies.

On the morning of September 21, the removal of rubble began. On December 10, the termination of the work of the Ministry of Emergency Situations was announced. During the search and rescue operations, the bodies of 19 dead were found. Sergei Bodrov was not among them.

In parallel with the rescuers, volunteers and relatives of the missing were conducting their search operation. In the Karmadon Gorge, they set up a tent camp and worked daily. Even when it was officially announced that there was no point in further searches, they continued to dismantle the rubble.

People had the last hope that someone managed to hide in the car tunnel. It took 500 days and 127 tons of explosives to discover it.

For a year and a half of the search operation, a team of volunteers found many bones and body fragments along the entire length of the glacier. Businessman Konstantin Dzherapov spent all his money and 500 days of his life searching. He was the first to go down into the tunnel, after which he told his relatives that there was no more hope.

When the last hope collapsed, people raised money for the monument and installed memorial plaques on the tunnel. Two years after the tragedy, on September 18, the volunteers turned and took out the camp. Now they annually return to the Karmadon Gorge on September 20 to honor the memory of the victims of the terrible incident.

Karmadon Gorge after the tragedy

Kolka Glacier before the tragedy

Question 6. Forest and peat fires

Forest fires **occur annually in the spring-summer and autumn periods in the forests of Russia over vast areas and often take on the character of a natural disaster.**

Thus, in the actively protected area of the forest fund, from 10 to 30 thousand forest fires are recorded annually, covering an area from 0.2 to 2.5 million hectares.

Forest fires, along with the destruction of the forest wealth of Russia, by the time the fight against them begins to spread over a large area, often spreading to residential and industrial funds of adjacent territories. In this case, there is a serious threat of destruction by fire of settlements and objects of the national economy located near forests, strong smoke and gas contamination of territories remote at considerable distances from the forest.

The most difficult fire situation is typical for the regions of Eastern Siberia and Transbaikalia.

In some areas, underground (peat) fires occur, the shares of which, in number and area, are 1% and 0.2%, respectively. During prolonged (more than 2-3 weeks) dry and hot weather, spontaneous combustion of peat in caravans, piles and peat fields is not ruled out. The largest and most fire hazardous areas of peat mining are located in the Moscow, Vladimir, Ivanovo, Ryazan, Tver, Yaroslavl and Nizhny Novgorod regions.

The severity of damage inflicted on a person from the action of high temperatures in a fire depends on the temperature, time of exposure, spread of the lesion, and a number of other factors (being in an atmosphere of high ambient temperature, direct exposure to a flame, etc.). The main consequences of human exposure to high temperatures are as follows.

At high ambient temperatures, overheating of the human body occurs in mild, moderate and severe degrees.

With a mild degree, general weakness, malaise, thirst, tinnitus, dry mouth, dizziness develop, nausea and vomiting are possible.

With moderate severity, the symptoms listed above are accompanied by an increase in body temperature (up to 39-40 ° C), lethargy or short-term loss of consciousness, moisture in the skin and a decrease in muscle tone.

With a severe degree of overheating, heat stroke occurs, which is a consequence of the manifestation of decompensation in the body's thermoregulation system, consciousness is absent (thermal coma), body temperature reaches 40-42 ° C, skin and visible mucous membranes are dry, pupils are dilated, reaction to light is sluggish or absent , pulse 140-160 beats per minute or more, breathing is often frequent, shallow, intermittent; the mentioned manifestations, as a rule, are preceded by various kinds of mental disorders in the form of hallucinations, delusions of persecution, psychomotor agitation, etc.

With direct exposure to the flame on the skin, thermal burns occur, the severity of local and general manifestations of which depends on the depth of tissue damage and the area of the affected body surface.

Question 7. Fundamentals of the organization of medical and sanitary support in the aftermath of natural disasters

The provision of medical assistance to the population affected by natural disasters during the liquidation of the medical and sanitary consequences of emergencies is organized and financially provided by the state.

Directly in the focus of a natural disaster, first and primary medical care is organized for the affected, and specialized medical care is provided in medical institutions located outside the focus.

First aid is provided at the site of the lesion in the order of self-help and mutual assistance by the victims themselves, arriving rescue teams. When providing first aid to the injured, it must be remembered that often the affected are in an unconscious state.

Regardless of the cause of the loss of consciousness, first aid providers should act approximately as follows:

- **stop the action of the damaging factor;**
- **give the affected person a horizontal position, if possible without moving him until immobilization;**
- **make sure that breathing, the pulse on the carotid arteries is maintained. If there are signs of clinical death, then resuscitation should be started immediately (artificial lung ventilation, closed heart massage, etc.);**
- **in the presence of convulsions, it is necessary to put a gasket between the teeth;**
- **in the presence of an injury, bleeding should be stopped and immobilization should be ensured;**
- **protect the victim from overheating or hypothermia;**
- **if, despite the measures taken, the affected person is unconscious, then you should carefully examine him, establish damage, and perform the necessary medical procedures;**
- **before the evacuation of the injured on the vehicle, it is necessary to ensure the patency of the respiratory tract and transport immobilization.**

Depending on the situation, the forces and means of the regional and federal levels, including field multidisciplinary hospitals (detachments), may be involved.

The evacuation of the lightly injured can be organized on foot (in the absence of transport), and the injured, who are in serious and moderate condition, are evacuated using the available ambulance or general purpose transport.

Responsibility for the evacuation of the injured from the outbreak is borne by the leaders of the combined rescue teams, heads of economic facilities or representatives of the local administration of the district who are in charge of rescue operations.

The hospital (detachment) deployed in case of mass casualties in the disaster area organizes the reception and medical sorting of incoming victims, the provision of primary medical and sanitary medical care (if it has not been provided earlier) and primary specialized medical care, temporary hospitalization of the affected and isolation of infectious patients and persons with mental disorders, preparation of the affected for evacuation to inpatient medical institutions to continue treatment in them until the outcome of the lesion (disease).

The situation in areas of natural disasters, as noted above, can be complicated by a sharp deterioration in the sanitary and epidemiological situation and the associated danger of the emergence and spread of infectious, mainly gastrointestinal, diseases. Therefore, along with the provision of medical care in the disaster area, sanitary-hygienic and anti-epidemic measures organized and carried out by the sanitary-epidemiological service are of great importance during the period of liquidation of medical and sanitary consequences.

The most common type of flood damage is drowning. Conventionally, drowning is aspiration (“true”), asphyxic and syncopal (reflex) drowning.

With true drowning, water enters the respiratory tract and lungs, which, as a rule, leads to respiratory distress and respiratory hypoxia. Respiratory and vascular disorders in this case are exacerbated by spasm of the vessels of the pulmonary circulation, the appearance of metabolic and respiratory acidosis. The skin and mucous membranes of "drowners", as a rule, have a bluish color (the so-called "blue drowneds").

Resuscitation measures include cleansing the oral cavity of foreign objects (algae, mud, etc.), removing water from the lungs, performing artificial lung ventilation, chest compressions, and other measures.

With asphyxic drowning, a small amount of water enters the upper respiratory tract, which causes reflex respiratory arrest and laryngospasm. Holding the breath is accompanied by periods of false breaths, which are ineffective due to laryngospasm. The initial period of asphyxic drowning is practically absent, and the agonal period differs little from that in "true" drowning. The cyanosis of the skin and mucous membranes is weakly expressed.

When providing medical care, first of all, water should be removed from the lungs; during artificial ventilation of the lungs, the spasm of the larynx is overcome with the help of a fixed intensive exhalation (preferably the use of oropharyngeal tubes-air ducts).

With syncopal drowning, a reflex cardiac arrest is observed due to psycho-emotional shock, contact with cold water of the skin and upper respiratory tract. In this case, clinical death occurs immediately. In drowned people, pallor of the skin, absence of a pulse on the carotid arteries, and wide pupils are noted. Water does not enter the lungs, and therefore there is no need to waste time trying to remove it; artificial ventilation of the lungs and indirect heart massage should be urgently started. Those rescued in the initial period of drowning retain consciousness, but must be under the control of others, since they may have mental disorders and inadequate reactions to the environment. This is due to the fact that the development of the so-called "secondary" drowning syndrome is possible, when, against the background of relative well-being, a hysterical cough suddenly reappears with copious sputum containing streaks of blood, breathing and heart rate increase, hypoxia increases, cyanosis of the skin occurs. Such affected in some cases may require resuscitation.

Medical assistance to the population affected by a catastrophic flood is organized both in the flooded area and in the adjacent territory. It includes carrying out measures to remove the victims from the water, their delivery to a special floating facility or to the shore, a complex of anti-shock and resuscitation measures (artificial lung ventilation, closed heart massage, etc.).

The provision of first aid to the injured in the flood zone after examining them from the water according to urgent indications is carried out directly on the "rescue facilities", and only after that they are delivered to the shore. Temporary collection points for the affected and temporary medical stations are organized on the shore, deployed on communications adjacent to the flood zone or in nearby settlements.

The main content of the work of temporary medical centers in these conditions will be the removal of the affected from a life-threatening state, the implementation of the simplest resuscitation measures. It is obvious that the staff of the temporary health posts should be trained in resuscitation and intensive care.

Persons who do not need medical assistance are sent from a temporary collection point to sorting and evacuation points, deployed, as a rule, together with mobile food points, clothing supplies and a water supply unit. Here, the affected population is warmed, changed into dry clothes, fed and prepared for evacuation to resettlement sites or, if necessary, to medical institutions closest to the flooded area;

Among the people affected by the flood, the vast majority will be affected by a therapeutic profile, since the most common consequence of people staying in water (especially in the cold season) is the development of pneumonia. When carrying out evacuation and medical evacuation measures in areas of flooding caused by the formation and destruction of congestion, it should be borne in mind that due to the high heat capacity and thermal conductivity of water, the time a person stays in cold water is extremely limited.

Human survival in cold water at an air temperature of 2-3°C is 10-15 minutes, at -2°C - no more than 5-8 minutes. This forces the organization of rescue and medical evacuation work on the water to focus on helicopters and high-speed floating facilities. Up to several hours, people can hold out in the flood zone, settling on non-flooded elevated areas of the terrain, roofs of houses and other buildings, on trees.

When people fall under avalanches, it should be remembered that a person, being covered with avalanche snow, can only survive for a few hours, and the chance of survival is higher, the thinner the layer of snow above him. Among people who were in an avalanche for no more than 1 hour, up to 50% can survive, after 3 hours the probability of staying alive does not exceed 10%. Therefore, work to rescue people caught in an avalanche should begin even before the arrival of the rescue team.

Upon detection of a fallen asleep, first of all, they free the head, clear the mouth, nose, and ears of snow; then, carefully (taking into account the possibility of fractures), they remove it from under the snow, transfer it to a place protected from the wind, wrap it in dry clothes, give it a hot drink, and in the absence of signs of life, start artificial ventilation and other resuscitation measures.

A similar picture emerges during rescue operations in the area affected by the mudflow. The duration of the period of rescue of people buried by a mudflow in transport or under the rubble of buildings usually does not exceed several tens of minutes; cut off by a strong snowstorm or avalanches on a mountain road - a few hours. Therefore, it is important to timely arrive at the scene of the disaster rescue teams provided with search equipment and first aid.

When eliminating the medical and sanitary consequences of fires in the course of medical and evacuation measures, the main attention of medical workers is drawn to the termination of the thermal factor.

Primary attention is paid to those affected with impaired consciousness, respiratory and cardiovascular disorders. For this purpose, analgesics, cardiac and respiratory analeptics are administered to the affected, conducts: I inhalation of an anti-smoke mixture or ficillin.

With a delay in evacuation from the lesion, in addition to general warming of the affected, measures are taken to prevent hypovolemia, drinking plenty of salted water or (better) a salt-alkaline mixture is shown. When determining the order of evacuation, priority should be given to children in serious condition.

First of all, those affected with respiratory failure due to burns of the upper respiratory tract and concomitant damage to blood vessels with external arterial (a tourniquet) or ongoing internal bleeding are evacuated from the focus. Then the injured are evacuated in serious condition with extensive burns. Severely injured are taken out of the fire on an adapted or ambulance transport in a prone position on a stretcher, victims with minor burns leave the fire on their own or are evacuated by transport in a sitting position.

The organization and implementation of medical care for those affected with a mechanical injury is based on the general principles of staged treatment with evacuation as directed, taking into account the specific general and medical situation.

In general, health care in natural emergencies, as in other types of emergencies, is one of the most labor-intensive types of health care activities. The successful solution of this problem largely depends on the readiness of the All-Russian Service for Disaster Medicine, taking into account the features of emergencies and forecasting the development of the situation in the course of eliminating medical and sanitary consequences.

Here you can not be guided by any one typical variant of the conditions.

Along with the ambiguity of the initial situation, in the course of medical and sanitary support, unexpected complications may arise that can have a significant impact on the outcome of the situation (violation of the integrity of roads, the emergence of secondary lesions, the death of medical personnel, etc.). All this creates additional difficulties for the service of disaster medicine, to overcome which it must be prepared.

Questions for self-control of knowledge acquisition

1. Define "natural disasters", "earthquake"
2. Types of earthquakes
3. General characteristics of the consequences of earthquakes by intensity
4. Characteristics of buildings for seismic resistance
5. The degree and nature of the destruction of buildings
6. Peculiarities of occurrence of centers of mass sanitary losses during earthquakes
7. Distribution of those injured with injuries according to the possible timing of death while under the rubble
8. Features of the conditions of medical and evacuation support during an earthquake
9. Peculiarities of providing primary medical and sanitary pre-medical, primary medical and sanitary medical and primary specialized medical care in case of earthquakes to the affected
10. Peculiarities of elimination of medical and sanitary consequences of earthquakes with an intensity of 5 or 6 points
11. Peculiarities of liquidation of medical and sanitary consequences of earthquakes with an intensity of 7 or 8 points

12. Peculiarities of elimination of medical and sanitary consequences of earthquakes with an intensity of 5 or 6 points
13. Features of liquidation of medical and sanitary consequences of earthquakes with an intensity of 9-12 points
14. Organization of evacuation of victims from the source of the earthquake.
15. List the types of floods and give a brief description of them
16. List dangerous hydraulic structures
17. Mechanical damage in victims of floods. Their medical features
18. Possible flood zones. Their classification according to sanitary losses
19. Classification of floods depending on the scale and damage
20. Four areas of catastrophic flooding and their health characteristics
21. Define the following natural emergencies: “storm”, “dust (sand) storms”, “hurricane”, “cyclone”, “tornado”
mudflow, landslide, snow avalanche
22. Fires, forest fires, peat fires. Their characteristics
23. Heatstroke
24. The procedure for providing first aid to those affected as a result of natural emergencies