

## Medical and Sanitary Support in the Aftermath of Emergency Situations of Anthropogenic Nature

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**Key words:** Medical support, sanitary support, disasters, accidents, provision of emergency, emergency medical service and medical assistance

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**Abstract:** The history of the development of terrestrial civilization is associated with natural disasters, accidents and disasters. Emergencies as a result of the impact of various factors and phenomena on man and the environment, lead to injuries and loss of life, cause enormous material and moral damage. The statistics of human and material losses from natural disasters, accidents and disasters reveals their rapid growth around the world and especially in the second half of the 20th century.

## INTRODUCTION

For example, on the territory of the Russian Federation, a high level of threat of technogenic emergencies remains and the tendency of the growth in the number and scale of their consequences which makes it necessary to seek new solutions to the problem of protecting the population and territories from emergencies, to anticipate future threats, risks and dangers, to develop methods for their forecasting and warnings, give serious attention to medical care in the aftermath of emergency situations<sup>[1]</sup>.

**Medical and sanitary support in the aftermath of radiation accidents:** The analysis of the experience of liquidation of the consequences of accidents, disasters and natural disasters shows that irrespective of the origin of emergencies and their scale, the organization and provision of Emergency Medical Care (EMC) to the victims should be carried out first of all by the forces of

medical and preventive institutions closest to the places of dislocation potentially dangerous objects or to areas where catastrophes of natural origin are possible<sup>[2]</sup>.

The primary part of the emergency medical service is the so-called Brigades of Rapid Reaction (BRR) which should be established on the basis of medical and preventive facilities that serve potentially dangerous objects or central city (rayon) medical and preventive institutions in places where natural disasters are possible.

The BRR to provide EMC for radiation accidents includes a radiologist, a hematologist laboratory assistant, a physician-dosimeter, a hygienist-hematologist. Organizational, personnel, financial, material and technical support is provided by the institution on the basis of which the BRR was created.

The main task of the brigades is to provide emergency medical assistance to the affected, their hospitalization in specialized local, regional or central medical institutions. If the strengths and resources of local health authorities are not enough in this case, the BRR of regional and central EMC services are involved<sup>[3]</sup>.

Regional centers are organized in large cities on the basis of emergency and planning consultative services of republican (within Russia), regional and regional hospitals. Their organizational and staff structure depends on the number and nature of radiation-hazardous facilities in the serviced area, taking into account economic, climatic, climatic, geographical, ecological and other peculiarities. The primary link in the EMC service is a BRR of the same composition and structure as in the field. The centers are designed to maintain the permanent readiness of the territorial specialized forces and means of EMC service, especially when the scale of the radiation accident and the number of people affected exceed the capabilities of local EMC services<sup>[4]</sup>.

**Regional centers are responsible for:** In the period of emergency preparedness (before the occurrence of an accident)-forecasting the medical and environmental consequences of possible radiation accidents in the region: interaction with departmental medical services, state supervision bodies, administration of potentially dangerous objects, civil defense formations; establishment of communication and order of notification of emergency situations; accumulation of medical and other property on the basis of the work of the BRR within 72 h; determination of ways of evacuation of the affected and the population in the event of significant amounts of radioactive substances entering the environment; check the readiness of the personnel of the BRR and specialized medical and preventive institutions to evacuate the victims<sup>[5]</sup>.

In case of emergencies-the direction to the scene of the responsible representatives of the regional center and the BRR (if the accident occurred at a facility located in one of the cities in the region, then the outpost is prepared by the BRR); ensuring continuous communication with the facility and submitting reports to higher health authorities; organization and conduct, if necessary, of preventive and anti-epidemic measures.

The Head Institution of the Russian Federation on the organization and provision of EMC in emergency situations involving radiation injuries is the Specialized Scientific and Practical Center for Emergency Medical Care (SSPCEMC) "ZASHITA" which is assigned to it is decided through the regional centers. BRR and an off-site Autonomous Hospital (OAH) on pneumo frame modules. The structure of the center, along with the practical ones, includes scientific units that ensure the development of new and improving existing methods and means of providing emergency medical care in case of radiation accidents, the preparation of normative and methodological documents that determine the procedure for the operation of EMC services, the rationale for the system of medical and hygienic measures to prevent such disasters and emergency preparedness of EMC services.

To address the issue of attracting additional forces and means, the scale of criteria for the degree of participation of SSPCEMC "ZASHITA" in the provision of emergency medical care in radiation accidents is used, according to which five levels of intervention are identified<sup>[6]</sup>.

**Main criteria:**

- Personnel exposure in doses exceeding 1 g
- Combined injuries, burns and other types of injuries, life-threatening
- Release into the environment of radioactive materials in quantities that require emergency measures for Protection of the population
- The number of victims in need of emergency medical care, >50 people

**Type of accident:**

- Accidents at Nuclear Power Plants (NPP), corresponding to 7-5 levels of the IAEA scale (INES) of radiation accidents at nuclear power plants
- Serious accidents when transporting radioactive materials (nuclear fuel, radioactive waste)
- Accidents at the storage of high-level waste
- Serious accidents on ship NPPs while the ship is in the port

**Nature of participation:**

- Partial or complete deployment of the OAH
- Reinforcement of the OAH in addition to the BRR of the SSPCEMC
- Involvement of the BRR in the basic centers and Medical Health Units (MHU)
- Involvement of a specialized clinic

**Main functions:**

- Assessment of the radiation situation at the emergency facility and adjacent territory
- Diagnosis of damage and medical sorting of victims
- Provision of emergency and specialized medical care
- Organization of evacuation of victims for treatment in a specialized hospital
- Participation in activities to survey the personnel of the facility and the public
- Participation in sanitary and hygienic measures
- Participation in measures to prevent further overexposure of personnel and the public
- Accompanying the victims to a specialized hospital

**Fourth level**

**Main criteria:**

- Personnel exposure in doses exceeding 1 g
- Contamination of premises, equipment surfaces
- The possibility of traumatic and other injuries requiring emergency medical care

- The number of victims requiring specialized and other types of medical assistance does not exceed 50 people

**Type of accident:**

- Accidents at NPPs corresponding to 5-4 levels of the IAEA scale
- Transport accidents
- Accidents at radioactive waste storage facilities
- Accidents at the ship-nuclear power plant
- Accidents at certain technological sites of production and in research laboratories related to the production or use of radioactive materials
- Depressurization and escape from the control of closed radioactive sources containing significant amounts of one or another radioactive element (isotope)

**Type of participation:**

- Partial deployment of the departments of the OAH (mainly the reception and sorting department, the sanitary attendant and the outpatient department)
- Participation of the BRR of the base center
- If necessary, participation of a specialized clinic

**Main functions:**

- The same as at 5 m level of intervention. But with fewer victims
- Provision of emergency and specialized medical care is required mainly for the personnel of the facility
- The health of the population, as a rule is out of danger

**The third level**

**Main criteria:**

- Personnel irradiation in recalculation for irradiation of the whole organism in doses of 0.5-1.0 g and below
- The presence or possibility of high doses of local irradiation
- Internal exposure
- High levels of contamination of the skin
- Radioactive contamination of premises and equipment of the production site, as well as the adjacent production area
- A possible number of victims requiring medical assistance, no more than 15-20 people

**Type of accident:**

- Accidents and events at nuclear power plants corresponding to the 3rd level and below the IAEA scale
- Accidents at certain technological sites of production, industrial and research laboratories associated with the handling and storage of radioactive materials
- Accidents with radioactive sources associated with their depressurization<sup>[7]</sup>

**Nature of participation:**

- Participation of the BRR-regional, base center
- Involvement of specialists from the Center and other organizations
- Limited participation of a specialized hospital, mainly to clarify the diagnosis and conduct detailed studies

**Main functions:**

- An assessment of the nature of the accident and the radiation situation
- Conducting an express dosimetry survey of people exposed to the radiation factor
- Preparation of an opinion on the need for further examination and treatment in a specialized hospital
- Participation in the organization and conduct of sanitary and hygienic measures to prevent further possible overexposure of personnel and elimination of the consequences of the accident

**Second level**

**Main criteria:**

- Irradiation of a limited number of employees (<15 people) in doses of 0.25-0.5 g
- Radioactive contamination of a limited number of premises and equipment of the production site
- Emission (discharge) into the environment of radio-nuclides in quantities slightly exceeding the values of the relevant Draft Allowable Emissions (DAE) and the Draft Maximum Permissible Discharges (DMPD)

**Type of accident:** The same types of accidents that are accepted for the 3rd level of the intervention of the SSPCEMC

**Nature of participation:**

- Possible participation of the RBB and the regional core center
- Involvement of specialists from the Center

**Main functions:**

- Carrying out in a limited amount (or selective) studies to assess the radiation situation and the conditions of exposure
- Implementation of selective measurements on the Human Radiation Spectrometer (HRS) for the assessment of internal contamination and radiation doses
- Participation in the organization and conduct of sanitary and hygienic measures

**First level**

**Main criteria:**

- Single cases of personnel exposure in doses exceeding the DAE

- Pollution of radioactive material production sites
- Detection of radioactive sources or local areas of pollution of the territory

**Type of accident:**

- violation of the rules for the operation of installations or other devices associated with the release of ionizing radiation
- violation of the rules for the operation and storage of open and closed radioactive sources

**Nature of participation:**

- Participation of the specialists of the Center or the Center in the investigation of the accident or incident
- Conducting consultations
- Preparation of expert opinions

**Main functions:**

- Participation in the organization and conduct of an investigation in the event of an accident or incident
- Analysis and evaluation of collected information
- Preparation of conclusions and recommendations

In real conditions, the effect of radiation is usually combined with the effects of toxic and other non-radiative factors (burns, trauma, carbon monoxide poisoning in the event of fire, intake of nitric oxide, fluorine, concentrated acids, alkalis, etc.). Amazed are providing emergency first aid and medical assistance. Then, the activities of qualified medical assistance are carried out in full in an acute period; dynamic medical observation in the long-term; general and specific therapeutic and preventive and improving measures; rational employment on the basis of an expert opinion<sup>[8]</sup>.

Pre-medical and medical assistance is provided for acute poisoning with radio-nuclides and with a single external irradiation in doses exceeding 1 Gr and also with local irradiation (limbs) at a dose of 10 Gr. Provision of emergency first aid is carried out by the forces of the enterprise (institution, laboratory) where the accident occurred, using specialized anti-radiation and general emergency kits and medical assistance by the forces of the BRR at the health center in the central district or city hospital serving this contingent. The victims are hospitalized for at least 1-3 hours for medical examination and specialized treatment in full.

Medical assistance for acute poisoning with radio-nuclides is carried out as soon as possible from the moment of the incident (min, h). It includes checking the effectiveness of measures taken in the provision of pre-medical care with adjustments and replenishment of oversights made in the previous stage. Emergency medical care with external radiation at doses predicting the development of acute radiation sickness or radiation damage to the body segment is provided in a regular

hospital or in a specialized institution, depending on the expected severity and clinical manifestations of the lesion. These are the basic principles of organizing emergency medical care for radiation accidents.

**Health emergency in case of railway accidents:**

Railway transport which carries out huge volumes of passenger and cargo transportation, including dangerous and especially dangerous ones, belongs to the branches of the national economy with an increased risk of emergencies.

**Common causes of accidents in railway transport:**

- Natural physical wear of technical means
- Violation of the rules of operation
- Increase in the number, power and speed of vehicles
- An increase in population density near railway facilities, non-compliance with the rules of personal security

The composition of railways was considered the safest mode of transport. However, a more rigorous analysis shows that according to the safety indicators of the traffic, railway transport takes the third place after road and air. Static data of recent year indicate a significant number of casualties and deaths as a result of the wreckage of passenger trains. Emergency situations when dangerous and especially dangerous goods are transported by rail lead to considerable destruction, contamination of the terrain and the destruction of large masses of people by toxic substances<sup>[9]</sup>.

A more complex task facing the healthcare industry is the creation and development of an operational response system to provide the necessary medical assistance to the victims, especially for large-scale emergencies. Therefore, managers and other participants in eliminating the consequences of the disaster usually have to make non-standard decisions in each specific case. The objective difficulties in the work of the medical service are mainly related to the variety of specific conditions and factors affecting both the scale of the consequences of railway wrecks and accidents and the nature and extent of the medical care provided<sup>[10]</sup>.

**The main ones are:**

- A significant contingent of casualties (often fatalities) among railway personnel and passengers on trains on passenger platforms and in railway station buildings and on the population of adjacent areas
- Peculiarities of the structure of railway traumatism in terms of localization, nature and severity
- The need to work in conditions of shortage of own forces and funds for the provision of medical assistance in a timely and proper manner

The need to provide emergency medical care in adverse local geographical and landscape conditions (hard-to-reach terrain on stretches, far from populated areas and medical facilities) and at any time of the day and year, as well as in the event of possible chemical and radioactive contamination of the terrain and objects as a result of emergency situations with chemical and radioactive dangerous goods.

Features of the medical and tactical situation in railway accidents should be taken into account when planning adequate measures in the event of emergencies. Their effectiveness is significantly improved in the course of the prognostic assessment of the health consequences of the typical variants of the emergency situation, taking into account the actual possibilities of using their own medical forces and means and relating these opportunities to their needs in order to deal with the consequences of different in the scale and nature of the ES and establishments of the service of medicine of catastrophes.

**Organization of emergency response:** At the stage of primary information about emergency situations (by means of train, distillation, inter-station, service dispatch and other types of communication), if it contains information about a collision or descent of a passenger rolling stock, an immediate departure to the scene of mobile medical forces and means generated at the base linear, nodal and departmental hospitals. It is they who are responsible for the transfer of timely medical information to higher authorities about the presence and number of victims, the nature and severity of the lesions.

On the basis of the information received and the assessment of the situation, the bodies of management of the medical forces and facilities take prompt decisions on providing the victims with the necessary medical care. Almost simultaneously and in the order of subordination, three levels of management of the course of liquidation of the medical and sanitary consequences of emergencies are involved, depending on the scale of the accident: separate (separate, nodal or Linear Production Management (LPM), road (medical and sanitary service of the road) and central (Department of Health Ministry of Railways). At all levels there is a clear system of operative watch, ensuring the receipt and transfer of medical information to higher authorities and from them-appropriate orders for the entire period of emergency response (including duplication on weekends and holidays).

Among the priority measures include the formation and preparation for work in emergency situations of medical forces and facilities, especially Visiting Medical Brigades (VMB) and Emergency Hospitals which are completed on the basis of health facilities of railways. Their priority is to provide timely and adequate medical assistance to the victims. To this end, all available resources of sectoral health are used, including railway rolling stock.

In the structure of railway injuries, multiple mechanical injuries of different localization prevail, closed cranio-cerebral, combined trauma, burns, poisoning by combustion products and other toxic substances. Depending on the type of crash and the effect of the main damaging factor, the same type of damage prevails in the structure of sanitary losses<sup>[11]</sup>.

**Typical mechanical damage:** Collision of passenger rolling stock mainly closed cranio-cerebral trauma (up-50%), traumas of upper and lower extremities (up-30%), superficial blunt and ripped-bruised wounds of soft tissues of different localization (up to 20%). Specific weight of multiple and combined injuries (>60%), as well as injuries with the syndrome of prolonged squeezing with the impossibility of rapid release of the locomotives and wagons affected from deformed structures.

Mainly superficial soft tissue damage (up to 60%) and cranio-cerebral trauma (up to 30%). With the ignition of rolling stock, this can lead to a sharp increase in the number of victims with thermal (up to 40%) and combined (up to 60%) lesions.

## CONSEQUENCES OF EXPLOSIONS

Mainly scalped, cut and torn-bruised wounds of soft tissues, closed cranio-cerebral trauma and injured eyes. In most cases, up to 20% of the total number of people affected need emergency medical care.

The provision of medical assistance to victims during crashes and accidents at the first, most difficult stage of liquidation of consequences has its own peculiarities. To the place of the accident according to the established regulations and as soon as possible, a sanitary train with a medical team, necessary equipment and equipment should be part of the recovery train. In addition, depending on the severity of medical consequences, departure to the scene of responsible workers, chief and leading specialists of the medical department is regulated. Railway departments, departments and departments of public health of railways, road and departmental hospitals, as well as medical brigades of the relevant profiles (surgical, resuscitation, etc.).

It is advisable to attract highly qualified specialists (usually surgeons) who have extensive experience in organizational work in emergency situations. Usually, the affected are divided into four categories which differ in priority in the provision of medical care and evacuation to medical institutions:

- Being in a terminal state and in need of relief of suffering (about 10%)
- In serious condition and in need of urgent measures (about 20%)

- Being in a state of moderate severity whose help can be delayed (about 30%)
- Easily attacked, requiring mainly ambulatory care (about 40%)

Take into account that among the affected can be a large number of children, especially during the holiday period (up to 45%). In all cases, the mortality rate among them is much higher than that of adults. In hospitals, young children, as a rule, do not arrive, they die at the scene. Children who have been injured, burned, poisoned, etc., are subject to immediate hospitalization because they need urgent surgery, detoxification and at the same time sparing treatment which can be ensured with the involvement of highly qualified pediatric specialists<sup>[12]</sup>.

Along with the nature and severity of medical consequences, a serious problem in the conditions of crashes and accidents is the mental health of people. Often it is characterized by attacks of panic fear, inadequate emotional reactions and depressive states. And with the time that has passed, since, the disaster, the number of victims with mental disorders can dramatically increase.

In most cases, these disorders led to a complication of the course of the main pathological process in the affected. Therefore, if necessary, medical specialists should include specialists of the appropriate profile to provide emergency psychiatric care to any persons in the presence of acute psychiatric disorders and psychotic reactions. In the future such assistance should be provided for both in the treatment-prophylactic and outpatient clinics of the railways.

The level of road accidents and the number of injuries among the population remains significant. Transport accidents and disasters are the cause of the largest number of casualties in peacetime which take >200,000 lives a year and about 1 million people are injured. The main causes of traffic accidents:

- Violations by drivers of vehicles of traffic rules
- Drinking alcoholic drinks at the wheel
- Technical malfunction of vehicles
- Violation of traffic rules and personal carelessness of pedestrians

To ensure the provision of medical assistance to victims during an accident in the required volume, the establishment of medical institutions is being carried out beyond the sections of highways of the republican and regional significance. To consolidate, medical institutions are identified in which there are appropriate doctors-specialists (traumatologists or surgeons trained in traumatology, anesthesiology, resuscitation, radiology, taking into account the characteristics of childhood), anesthesia and resuscitation department as well as an

opportunity for a full examination and treatment of victims. Medical assistance to affected children in the absence of children's surgical (traumatological) departments is provided in the appropriate departments for adults.

Hospitals in which assistance can be provided to victims in an accident in the required volume should be located no >25-50 km from each other in the direction of the roads. They are indicated by the traffic signs "hospital", the direction indicator and the distance to the hospital (in km). Hospitals allocated to provide assistance to victims should be appropriately trained with this purpose: doctors of the indicated hospital and first of all, doctors-surgeons and traumatologists should undergo additional training on resuscitation, treatment of burns, assistance to patients with damage to the bones of the skull and spine including damage to the brain and spinal cord. The hospital should be equipped with additional equipment for resuscitation, as well as providing surgical, traumatological and neuro-traumatological care; The hospital should be provided with round-the-clock duty: X-ray laboratory technicians, clinical laboratory assistants, doctors (or nurses); Anesthetists<sup>[13]</sup>.

In hospitals dedicated to providing medical assistance to victims of road accidents, special attention should be paid to the readiness of the reception offices for round-the-clock reception of victims. In these hospitals, ambulances intended for traveling to traffic accidents must be equipped with the necessary medical equipment for resuscitation.

The fastening of hospitals beyond the road sections must be carried out in such a way that the maximum transport arm of the injured is no>25 km.

In addition to assigned hospitals, other signs are also placed on the roads which are designated by medical and preventive institutions, the sign first aid station.

The system of organization of emergency medical care for victims of road accidents provides for a set of measures that are implemented consistently:

- Medical care at the scene;
- Medical care on the way to the medical institution
- Medical care in a medical institution
- Medical assistance at the scene includes

Rendering self-help and mutual assistance to persons who happened to be on the scene (drivers of motor vehicles and other vehicles, traffic police, employees of road enterprises). Rendering medical assistance to injured medical personnel, ambulance brigades, paramedic-obstetric feldshers, doctors of rural district hospitals and outpatient clinics (as part of the permanent readiness teams of hospital formers). Medical workers in the first stage of the accident in road accidents are the following: Careful removal and removal from the car or cuvette of

the victim, putting out of burning clothing, etc., transferring it to a safe place of collection of the injured, protection from unfavorable weather conditions (cold, heat, etc.). The application of a sterile bandage to the wound, the immobilization of fractures or special tires<sup>[14]</sup>.

Carrying out actions to eliminate the causes that threaten the life of the victim (stopping external bleeding with a pressure bandage and with significant bleeding-overlapping the tourniquet) with tongue twisting-extracting the tip of the tongue from the oral cavity and fixing it with a pin and bandage to the clothes in such a position to prevent its withering. In case of cardiac arrest, perform indirect heart massage while performing artificial mouth-to-mouth breathing to maintain cardiac activity, restore breathing and relieve pain syndrome, make injections of appropriate medications. In case of combined injuries (trauma and burn), carry out the necessary measures to protect the affected parts of the body (from burns) by applying anti-burn dressings or sterile dressings, with special burns applied to the burns site with special anti-burn ointments.

The volume of medical assistance provided to the victim in the path to the medical institution is determined by the condition of the victim and is aimed primarily at maintaining cardiac and respiratory functions, carrying out anti-shock measures. If the victim is transported by ambulance with the presence of a doctor or a paramedic, then the whole complex of measures for restoring or maintaining vital functions of the body (blood transfusion -in case of acute blood loss and a sharp decrease in blood pressure, giving oxygen and if necessary means for anesthesia (nitrous oxide, fluorothan), the use of artificial respiration with a portable device in necessary cases, the use of heart defibrillation and friend x events).

The scope and nature of medical care in a medical institution is in accordance with the type of injury, the condition of the victim and the capacity of the medical institution to which the victim was taken. In the event that it is not possible to provide the victim with the necessary medical care in the required amount, either a specialized team of permanent readiness of the appropriate profile should be called in or if the victim's condition allows, send it to a specialized medical institution: a multi-profile hospital, a specialized center with severe burns. When referring patients to another medical institution, the main requirement is to remove them from the shock state, replenish blood loss and carefully immobilize bone fractures. The amount of assistance to the victim in a specialized institution (center) is dependent on the condition of the victim. At all stages of medical care for victims, medical records should be closely followed, indicating the nature and extent of the medical care provided to the victim at this stage and the activities carried out at the previous stage.

Elimination of the health consequences of the use of Hazardous Chemicals (HCh) by terrorists is a set of special measures implemented to maximize the loss of people and stop the source of the emergency.

Regardless of the differences in the health consequences of terrorist acts, in any of them, the forces of the territorial (local) level of public health (catastrophe medicine) will be primarily involved and only if they are inadequate or impossible to carry out the full range of health-care measures will forces be recruited regional or territorial level.

Among the mobile formations involved in the liquidation of the health consequences of terrorist acts, in addition to the emergency ambulance brigades providing first aid to the affected, specialized sanitary-toxicological and toxic-therapeutic teams should be sent.

If the fast-acting HCh are affected, it is optimal to deploy mobile units on the basis of the collection point of the affected or medical units to provide qualified and urgent specialized medical care. Affected are divided into groups: those in need of urgent medical (or qualified) care with subsequent treatment at this or the next stage; persons, the first medical (or qualified) assistance to whom can be postponed and rendered at the next stage; subject to the provision of first medical assistance to medical supervision.

The first group includes the affected who are in a serious, life-threatening state (acute respiratory and cardiovascular insufficiency, coma, convulsive syndrome, psychomotor agitation), persons with damage to the organ of vision. After rendering urgent care such affected persons are subject, depending on the situation, to treatment at this stage or evacuation by ambulance transport, first of all to the next stage. The second group includes those affected, whose condition does not require urgent measures and whose medical care is provided secondarily or at a later stage. Evacuation is carried out by any transport. The third group includes mild to moderate intoxications which can be eliminated as a result of the provision of the first medical (or qualified medical) care, as well as persons who, by the time of arrival at this stage, the main signs of defeat have already been stopped. Affected by this group need outpatient treatment and supervision<sup>[15]</sup>.

Medical assistance to those affected on site should be provided in the most complete way otherwise the effectiveness of treatment in the subsequent stages will be significantly reduced. Medical characteristics of explosions.

The main criteria that determine the magnitude of sanitary losses: the type of explosive device, the power of the explosion, the place of the explosion and the time of day. Depending on the number and location of the damage can be isolated, multiple and combined. The severity of damage: light, moderate, heavy and extremely heavy.

In contact with the explosive device, explosive destruction of the outer parts of the body or destruction (separation) of limb segments occurs. The wound process has a number of characteristics:

- Acute massive hemorrhage and shock
- Contusions of the lungs and heart
- Combined character of wounds
- Traumatic endotoxemia
- Combined nature of the impact of damaging factors

These factors can interact with each other, exacerbate each other with the formation of a vicious pathological circle (the phenomenon of mutual burdening) which significantly increases the overall severity of lesions. Each of the local injuries in isolation, may not represent an immediate threat to life but with the combination they often cause a fatal outcome. At the pre-hospital stage, the manifestation of the leading damage is manifested only in a part of the affected, determining for them a medical-evacuation purpose. However, in 10-15% of sanitary losses at an early stage, it is not possible to unambiguously determine the leading damage. Proceeding from this, it is necessary to approach the strategy of treatment of those affected at the stages of medical evacuation.

Explosive damage is accompanied by blood loss of varying severity (external and internal bleeding). The most severe blood loss was observed in the affected with penetrating wounds of the chest, abdomen, thoraco-abdominal injuries with detachments of limb segments, damage to the main vessels and multiple fractures of pelvic bones.

Extensive trauma in combination with blood loss is usually accompanied by traumatic shock of varying severity. The combination of open and closed internal injuries with injuries of soft tissues and bones markedly aggravates the severity of the condition of the victim. It is possible to combine this type of trauma with penetrating damage to the visual organ, maxillofacial area and Otorhinolaryngology organs, as well as external genital organs. Explosive lesions are accompanied by various mental disorders in the form of reactive states-neurotic reactions or reactive psychoses. The latter can be short-lived or protracted. Organization and features of emergency medical care Pre-hospital stage.

First medical aid. Carrying out urgent measures aimed at saving lives and stabilizing the condition of the affected, allows you to transfer the subsequent evacuation to the hospital stage.

The promptness of rendering medical care to victims with explosive trauma plays a decisive role in improving the results of treatment. In most cases, at the time of the

explosion, there is no one near the victim. Rescue services need to follow all precautions. Many victims die on the site of the explosion. And even if they are found on time, qualified medical care for the affected is a difficult and time-consuming task, especially in remote areas. As a rule, residents of rural areas live away from medical centers and do not have cars. Sometimes it takes a few hours to reach the nearest hospital. Many victims die on the way to the hospital from blood loss and traumatic shock. The optimal organizational option for providing emergency medical care at the first stage is compliance with the rule of the "golden hour".

**Hospital stage:** Qualified assistance. Recognition of all damage. A rational combination of complex anti-shock and active diagnostic measures using instrumental, beam and sound methods (if possible directly on the operating table). The order of interventions is determined taking into account the prevailing pathology by the degree of danger to life and the prognostic period of traumatic disease.

Specialized assistance. The greatest effectiveness of reducing lethality and disability with the participation in the treatment process of several clinical specialties. Achieving the best results in terms of subsequent rehabilitation. Given the nature of lesions, the main aspects of surgical care are highlighted.

A systematic assessment of the condition of the affected and active early diagnosis of lesions. It is carried out immediately upon admission to the stage of qualified care at the same time as intensive therapy. The main task is to identify the leading link of pathogenesis and leading damage. The rational intensive therapy directed at the leading link in the pathogenesis of injury and trauma.

Adequate timing, sequence and sequence of the surgical intervention. Without preoperative preparation, first of all urgent measures are taken, the abandonment of which leads to a lethal outcome (elimination of acute respiratory failure and stopping bleeding). Specialized medical care is provided in hospitals, the specialization profile of which corresponds to the localization of injuries<sup>[16]</sup>.

## CONCLUSION

In the organization of medical and sanitary support of liquidation of consequences of emergency situations of anthropogenic nature, an important place is occupied by the organization of a clear interaction of forces and assets participating in liquidation; the importance of the timing of first aid and the proximity of the location of medical facilities; preliminary planning and comprehensive training of medical personnel and support services. The



safety of man and his environment is the most important characteristic of the quality of life and the state of the country's economy.

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