

ROUTING OF MEDICAL EVACUATION IN SYSTEM OF PROVIDING EMERGENCY MEDICAL CARE TO PATIENTS AND VICTIMS IN EMERGENCY SITUATIONS IN STAVROPOL TERRITORY

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Abstract. The results of the implementation of the regional program "Improving road safety in the Stavropol territory" are presented. The organization of activity of 22 trauma centres in the Stavropol territory is considered. Schemes of delivery of victims of road accidents, principles and stages of successful routing in emergency situations are shown. The article analyzes the experience of the regional centre for disaster medicine in training various contingents in practical skills of first aid to victims with shock-inducing trauma.

Key words: areas of responsibility, elimination of health consequences, emergency medical care, emergency situations, first aid, "Golden hour", medical evacuation, modern medical technologies, paved roads, road accidents, routing principles and options, shock-inducing combined trauma, specialized medical care, trauma centers

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МАРШРУТИЗАЦИЯ МЕДИЦИНСКОЙ ЭВАКУАЦИИ В СИСТЕМЕ ОКАЗАНИЯ ЭКСТРЕННОЙ МЕДИЦИНСКОЙ ПОМОЩИ БОЛЬНЫМ И ПОСТРАДАВШИМ В ЧРЕЗВЫЧАЙНЫХ СИТУАЦИЯХ В СТАВРОПОЛЬСКОМ КРАЕ

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Резюме. Представлены результаты внедрения краевой программы «Повышение безопасности дорожного движения в Ставропольском крае». Рассмотрена организация деятельности 22 травмоцентров, функционирующих на территории Ставропольского края. Показаны схемы доставки пострадавших в дорожно-транспортных происшествиях (ДТП), принципы и этапы успешной маршрутизации в чрезвычайных ситуациях (ЧС). Проанализирован опыт работы краевого центра медицины катастроф по обучению различных контингентов практическим навыкам оказания первой помощи пострадавшим с шокогенной травмой.

Ключевые слова: автомобильные дороги с твёрдым покрытием, дорожно-транспортные происшествия, «золотой час», ликвидация медико-санитарных последствий, медицинская эвакуация, первая помощь, принципы и варианты маршрутизации, специализированная медицинская помощь, травмоцентры, чрезвычайные ситуации, шокогенная травма, экстренная медицинская помощь

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Medical evacuation (ME) routing is one of the basic concepts of medical and evacuation support for the population. One of the priorities in the development of Russian health care is to ensure the availability and to improve the quality of medical care both in the framework of daily activities and in the framework of elimination of medical and sanitary consequences of emergencies (ChS). Currently, fast development and intensive introduction of information technologies in various areas of medical science and practice is becoming especially important [1].

Medical evacuation is an integral part of medical and evacuation support of the population, which is inextricably linked with the process of providing medical assistance to those injured in emergencies and with their treatment. Medical evacuation routing is one of the tools that, to a certain extent, contribute to the achievement of key goals - saving lives and maintaining health of patients. Since medical evacuation is a compulsory event, it must be quick, gentle and medically equipped.

In addition to these goals, medical evacuation routing increases the throughput of the ME stages and frees them up for receiving newly arriving patients [2].

Making up a viable ME routing is impossible without correct and timely monitoring of patients - both in the prehospital period and during interhospital medical evacuation. This allows to provide patients with comprehensive medical care in a timely manner [3-5].

A three-level system of medical care is a way of organizing medical care using technologically ranked levels and regimens which are methodologically distributed over successive periods of patient treatment. Their use allows at each stage to ensure the provision of the minimum required volume of medical care and, at the same time, to avoid using of insufficient or excessive medical resources [6].

In the Stavropol Territory, as in other regions, patient routing schemes have been developed in order to improve the provision of different kinds of medical care, to strictly adhere to the standards and procedures of medical care provision, approved at the federal and regional levels. The procedures for the provision of medical care describe: sequential stages of the provision of medical care; requirements for specialized medical institutions; basic principles of patient routing.

Medical evacuation routing in the Stavropol Territory

The Stavropol Territory is a constituent entity/subject of the Russian Federation (hereinafter referred to as a subject) within the North Caucasian Federal District. The administrative center of the region is Stavropol.

The Stavropol Territory is located in the central part of the Ciscaucasia, on the northern slope of the Greater Caucasus. Its territory stretches from north to south for 285 km, from west to east – for 370 km.

The Stavropol Territory borders on the Krasnodar Territory, Rostov Region, Kalmykia, Dagestan, Chechen Republic, North Ossetia - Alania, the Karachay-Cherkess and Kabardino-Balkarian Republics.

The population of the region is more than 2.8 million people. The population density is 42.37 people / km². The share of urban residents in the total population is 58.4%.

On the territory there are 10 cities of regional subordi-

nation and 26 administrative-territorial centers – districts, in each of them there is a medical organization (LMO) of the 1st or 2nd level – a city or district hospital.

The main road of the region is M-29 "Kavkaz". It passes through Nevinnomyssk, Mineralnye Vody and Pyatigorsk, has approach roads to Stavropol and reaches Elista and Astrakhan, Cherkessk and Kislovodsk, through Georgievsk, Zelenokumsk and Budennovsk to Neftekumsk and goes to Dagestan and Kalmykia.

For the provision of emergency, as well as specialized, including high-tech, medical care to patients and injured in emergencies in the region there are 126 LMOs: 20 LMO of the 3rd level, 44 LMO of the 2nd, 62 LMO of the 1st level.

Road trauma ranks third in the structure of mortality among the population of the Russian Federation. For several years in the whole country, including the Stavropol Territory, a set of interdepartmental measures has been carried out to improve road safety, which has a positive effect on the dynamics of these indicators over the past 4 years – see Table.

In the Stavropol Territory in 2009, the regional program "Improving road safety in the Stavropol Territory" was approved. A special place in this program is occupied by measures to improve the organization of medical assistance to injured in road accidents (DTP) and to create a three-level system of trauma centers.

In total, 22 trauma centers have been created on the territory of the Stavropol Territory as part of the LMO located near federal and regional highways.

In accordance with the order of the Ministry of Health of Russia dated November 15, 2012 No. 927n, which determined the procedure for providing medical care to injured with trauma accompanied by shock, a three-level system of providing specialized medical care to injured in road accidents has been created in the region [7].

In 2010, 8 trauma centers were created and equipped:

- Traumatic center of the I level – City Clinical Hospital of Emergency Medicine – GKB SMP, Stavropol;
- Trauma centers of the II level – City Hospital – GB, Nevinnomyssk; Central City Hospital, Pyatigorsk;
- Trauma centers of the III level – Andropovskaya, Kirovskaya, Kochubeevskaya, Mineralovodskaya, Predgornaya central regional hospitals – CRH.

In 2014, 12 trauma centers were created and equipped:

- Trauma center of the I level – Regional center of specialized types of medical care, Budyonnovsk;

Таблица/Table

Смертность в ДТП в 2013–2019 гг., на 100 тыс. населения

Death rate in road accidents in 2013–2019,
per 100 thousand population

Год Year	Ставропольский край Stavropol territory	Российская Федерация в целом Russian Federation as a whole
2013	18,6	18,8
2014	19,9	18,0
2015	17,0	15,7
2016	16,6	13,7
2017	16,2	13,1
2018	15,2	12,5
2019	14,1	11,6

- Trauma center of the II level – Petrovskaya Central Regional Hospital, Svetlograd;

- Level III trauma centers – Krasnogvardeyskaya, Novoaleksandrovskaya, Izobilnenskaya, Apanasenkovskaya, Blagodarnenskaya, Kurskaya, Neftekumskaya, Sovetskaya, Levokumskaya, Arzgirskaya CRH.

In 2020, two level II trauma centers were created and equipped – Kislovodskaya GB and Essentuki GCH.

The Government of the Stavropol Territory, by its Order of July 10, 2013 No. 237-rn, approved the areas of responsibility of health care institutions located near public roads with hard surface of federal, regional and intermunicipal significance [8].

Emergency medical evacuation routing principles

Medical evacuation of injured in road accidents in the Stavropol Territory is carried out only to the medical organizations which are nearest to the accident site (in accordance with the areas of responsibility of these LMO) and which have trauma centers of I and II levels in their structure.

Medical evacuation is carried out to one or another trauma center, depending on:

- place of an accident;
- nature of injuries;
- severity of the patient's condition;
- distances to the nearest LMO.

The medical evacuation is carried out to the nearest to the accident site medical organization, in the structure of which there are trauma center of the III level, if there are injuries that require urgent surgical intervention.

From the level II trauma center to the level I trauma center, medical evacuation of the following groups of injured in road accident is carried out:

- patients with injuries accompanied by development of grade III shock;
- with acute massive blood loss;
- with severe traumatic brain injury (ChMT) – regardless of shock degree;
- with craniofacial trauma requiring delayed surgeries;
- in need of subsequent osteosynthesis of two or more segments of the upper or lower limb;
- with complicated spinal fractures;
- patients who develop purulent complications.

Medical evacuation of all adult victims with concomitant, multiple and isolated injuries accompanied by shock is carried out from level III trauma centers to level I trauma centers.

From level III trauma centers to level II trauma centers, medical evacuation of adult patients with isolated trauma, not accompanied by shock, and with a stable hemodynamic state, if a surgery and further treatment in the conditions of the trauma department of the level II trauma center is required, can be carried out.

All pediatric patients with concomitant, multiple and isolated injuries accompanied by shock are transferred from LMO to level I trauma centers, where medical care for pediatric patients can be provided, for further treatment.

The following solution of the situational task by specialists of the territorial center of disaster medicine (TCMK) of the Stavropol Territory can serve as an example of correctly planned routing in an emergency. The name of the situational task is "Sotnya(One hundred). Elimination of health conse-

quences of an emergency". The task's conditions: due to heavy rainfall in the mountains, near the village of Zelenogorsk, in the west of Kislovodsk, a mudflow descended, raising the river level by more than 4 m. Structures of the architectural complex "Castle of Treachery and Love" were damaged, the road near the river was littered with stones, 2 buses with tourists were demolished. Hotel guests and bus passengers have injuries of varying severity. In total, 100 people were injured, including 70 adults and 30 children. 40 people were seriously injured, including 12 children; 30 people have injuries of moderate severity, including 9 children; of mild severity – 30 injured, including 9 children.

The ambulance brigades (SMP) provided emergency medical assistance and evacuated the injured: a total of 67 units were involved.

Considering that in the region of the Caucasian Mineral Waters there are a large number of LMOs on a relatively small area and they are situated at a small distance from each other, medical evacuation from the emergency zone was carried out mainly to LMOs of Kislovodsk, Pyatigorsk and Essentuki, including children's hospitals in Kislovodsk and Pyatigorsk.

It should be noted that in Yessentuki and Pyatigorsk there are medical facilities of the 3rd level, which makes possible to provide patients with specialized, including high-tech, medical care.

When solving the problems of the evacuation of injured to the 1st - 3rd level medical facilities, the specialists of the Stavropol TCMK took into account the real situation in the emergency area: they used the most of the capabilities of the 2nd and 3rd level medical facilities, taking into account their proximity to the emergency site, an extensive network of asphalt roads and staffing with qualified medical personnel. 3 routing options were used.

In the territorial center of disaster medicine in the Stavropol Territory, much attention is paid to the preparation and training of various contingents in the practical skills of providing first aid to patients with shock injury. Rescuers, firefighters, traffic police, police, vehicle drivers, employees of secondary schools, etc. are trained. On the basis of the educational and methodological center "School of Disaster Medicine" of TCMK: in 2015 - 762 people, 2016 - 1602, 2017 - 1610, 2018 - 1846, in 2019 - 3981 people were trained.

Functioning of 22 trauma centers in the region, implementation of the concept of a three-level system of medical care, coverage of all public roads of federal, regional and inter-municipal significance passing through the territory of the region with a hard surface – all this creates conditions for timely – within the "golden hour" – provision of specialized medical care using modern medical technologies to injured in road accidents.

In 2020, Stavropol Territory is included in the regional project "Development of the primary health care system", within which measures will be taken to ensure the timely provision of emergency medical care using air ambulance. The measures include the construction and commissioning of helipads, conclusion of contracts, related to the purchase of aviation services, etc. At present, the construction of a helipad is being completed on the basis of the city clinical hospital SMP No.4 in Stavropol.

СПИСОК ЛИТЕРАТУРЫ

1. Баранова Н.Н., Бобий Б.В., Гончаров С.Ф., Назаренко Г.И., Одинцов Н.И. Информационно-телекоммуникационные технологии в деятельности Службы медицины катастроф Минздрава России // Медицина катастроф. 2019. №1. С. 5–11.
2. Избранные вопросы медицины катастроф практического здравоохранения: Учебное пособие. Краснодар, КубГМУ, 2011 г. 256 с.
3. Баранова Н.Н., Бобий Б.В., Гончаров С.Ф., Кипор Г.В., Фисун А.Я. Медицинская эвакуация в системе ликвидации медико-санитарных последствий кризисных ситуаций // Медицина катастроф. 2018. №1. С. 5–14.
4. Баранова Н.Н. Медицинская эвакуация пострадавших: состояние, проблемы. Сообщение 1 // Медицина катастроф. 2018. №1. С. 37–40.
5. Баранова Н.Н. Медицинская эвакуация пострадавших: состояние, проблемы. Сообщение 2 // Медицина катастроф. 2019. №1. С. 42–46.
6. Баранова Н.Н. Медицинская эвакуация пострадавших: состояние, проблемы. Сообщение 3 // Медицина катастроф. 2019. №2. С. 38–44.
7. Об утверждении Порядка оказания медицинской помощи пострадавшим с сочетанными, множественными и изолированными травмами, сопровождающимися шоком: приказ Минздрава России от 15 ноября 2012 г. №927н.
8. Распоряжение Правительства Ставропольского края от 10 июля 2013 г. №237-рп.

REFERENCES

1. Baranova N. N., Bobiy B. V., Goncharov S. F., Nazarenko G. I., Odintsovo N. I. Information and Telecommunication Technologies in the Activities of the Disaster Medicine Service of the Ministry of Health of Russia. *Meditsina Katastrof* = Disaster medicine. 2019; 1: 5-11 (In Russ.).
2. *Izbrannyye Voprosy Meditsiny Katastrof Prakticheskogo Zdravookhraneniya* = Selected Issues of Disaster Medicine and Practical Health Care: Textbook. Krasnodar, Kuban State Medical University Publ., 2011, 256 p. (In Russ.).
3. Baranova N.N., Bobiy B.V., Goncharov S.F., Kipor G.V., Fisun A.Ya. Medical Evacuation within System of Liquidation of Medical and Sanitary Consequences of Crisis Situations. *Meditsina Katastrof* = Disaster medicine. 2018; 1: 5-14 (In Russ.).
4. Baranova N.N. Medical Evacuation of Victims: their State, Problems. Report 1. *Meditsina Katastrof* = Disaster medicine. 2018; 4: 37-40 (In Russ.).
5. Baranova N.N. Medical Evacuation of Victims: Their State, Problems. Report 2. *Meditsina Katastrof* = Disaster medicine. 2019; 1: 42-46 (In Russ.).
6. Baranova N.N. Medical Evacuation of Victims: State, Problems. Report 3. *Meditsina Katastrof* = Disaster medicine. 2019; 2: 38-44 (In Russ.).
7. *On Approval of the Procedure for Providing Medical Assistance to Victims with Combined, Multiple and Isolated Injuries Accompanied by Shock*, Order of the Ministry of Health of the Russian Federation dated November 15, 2012, No. 927n (In Russ.).
8. *Order of the Government of the Stavropol Territory* dated July 10, 2013, No. 237-rp (In Russ.).

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