

АКТУАЛЬНЫЕ ПРОБЛЕМЫ МЕДИЦИНСКОЙ ЭВАКУАЦИИ ACTUAL PROBLEMS OF MEDICAL EVACUATION

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ROUTING PROBLEMS IN MEDICAL EVACUATION OF VICTIMS IN EMERGENCY SITUATIONS: RESULTS OF SWOT ANALYSIS OF SOLUTIONS TO SITUATIONAL PROBLEMS IN URBAN. MESSAGE 1

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Abstract. *The purpose of the study is to analyze and evaluate the decisions of specialists of regional Services for disaster medicine (SMK) of the country on the application of routing principles during medical evacuation and to identify ways to improve the quality and effectiveness of medical evacuation measures (LEM) under various conditions of emergency situations with a large number of victims.*

Materials and methods of research. The research is based on 85 solutions to actual problems "100 victims" with different structure of the lesions according to their location and severity, with different proportion of adults and children and different locations of emergency with the use of technology case method (Case study) and SWOT analysis of medical evacuation events in liquidation health impacts of various emergency situations.

The results of the study and their analysis. Medical specialists who took part in solving situational tasks-cases, and experts of the Staff of the All-Russian Service for Disaster Medicine (VSMK) identified a fairly large number of factors that affect the quality of medical evacuation measures in emergencies, which, in relation to SWOT analysis, can be structured into "internal"- strong and weak, and "external" – increasing the possibility of quality medical evacuation measures or increasing the risk of adverse outcomes.

The analysis of the factors identified, in relation to the conduct of medical evacuations in the event of an emergency in the city, suburban area and in a remote area – more than 50 km from the city - revealed the strengths and weaknesses of each option:

- when conducting medical evacuation in the city - the prevalence of strong "internal" sides and the presence of certain risks;
- when conducting medical evacuation in the event of an emergency in a suburban area – similar positions, but with a number of differences that affect the routing;
- when an emergency occurs in a remote area – a large number of weak "internal" factors and "external" risks are compensated by the available opportunities.

In all cases of emergency, a weighted score of factors was carried out.

As a result of the SWOT analysis, the goal was achieved – the directions of improving medical evacuation measures for the development of a strategy for "breakthrough", "development", "defense" and "containment" in each case of an emergency were identified.

Key words: case method, emergencies, medical evacuation, remote area, routing principles, situational tasks, suburban area, SWOT analysis, urban locality, victims

Conflict of interest. The authors declare no conflict of interest

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ПРОБЛЕМЫ МАРШРУТИЗАЦИИ ПРИ МЕДИЦИНСКОЙ ЭВАКУАЦИИ ПОСТРАДАВШИХ В ЧРЕЗВЫЧАЙНЫХ СИТУАЦИЯХ: РЕЗУЛЬТАТЫ SWOT-АНАЛИЗА РЕШЕНИЙ СИТУАЦИОННЫХ ЗАДАЧ В УСЛОВИЯХ ГОРОДСКОГО НАСЕЛЕННОГО ПУНКТА. СООБЩЕНИЕ 1

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Резюме. *Цель исследования – проанализировать и оценить решения специалистов Службы медицины катастроф (СМК) регионов страны по применению принципов маршрутизации при проведении медицинской эвакуации и выявить пути повышения качества и эффективности лечебно-эвакуационных мероприятий (ЛЭМ) при различных условиях возникновения чрезвычайных ситуаций (ЧС) с большим числом пострадавших.*

Материалы и методы исследования. Материалы исследования – 85 вариантов решений актуальной задачи «100 пострадавших» с разной структурой поражений по их локализации и степени тяжести, с разной долей взрослых и детей и разным вариантам места возникновения ЧС с применением технологии кейс-метода (Case study) и SWOT-анализа лечебно-эвакуационных мероприятий, проводимых при ликвидации медико-санитарных последствий различных чрезвычайных ситуаций.

Результаты исследования и их анализ. Медицинские специалисты, принимавшие участие в решении ситуационных задач-кейсов, и эксперты Штаба Всероссийской службы медицины катастроф (ВСМК) выявили достаточно большое количество факторов, влияющих на качество проведения лечебно-эвакуационных мероприятий в ЧС, которые, применительно к SWOT-анализу, можно структурировать на «внутренние» – сильные и слабые и «внешние» – повышающие возможности качественного проведения лечебно-эвакуационных мероприятий или повышающие риски неблагоприятных исходов.

Анализ выявленных факторов, применительно к проведению медицинских эвакуаций при возникновении ЧС в городской черте, пригородной зоне и в отдаленном – более 50 км от города – районе, выявил сильные и слабые стороны каждого варианта:

- при проведении медицинской эвакуации в городской черте – превалирование сильных «внутренних» сторон и наличие при этом определенных рисков;
- при проведении медицинской эвакуации в случае возникновения ЧС в пригородной зоне – аналогичные позиции, но с рядом отличий, влияющих на маршрутизацию;
- при возникновении ЧС в отдаленном районе – большое количество слабых «внутренних» факторов и «внешних» рисков компенсируются имеющимися возможностями.

Во всех случаях ЧС дана взвешенная балльная оценка факторов.

В результате SWOT-анализа достигнута цель – выявлены направления совершенствования лечебно-эвакуационных мероприятий для разработки стратегии «прорыва», «развития», «обороны» и «сдерживания» в каждом варианте ЧС.

Ключевые слова: SWOT-анализ, городской населенный пункт, кейс-метод, медицинская эвакуация, отдаленный район, пригородная зона, принципы маршрутизации, пострадавшие, ситуационные задачи, чрезвычайные ситуации

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The purpose of the study is to analyze and to evaluate the decisions of specialists of the regional Disaster Medicine Service upon the application of routing principles during medical evacuation and to identify ways to improve quality and efficiency of medical evacuation measures under various emergencies with a large number of affected people.

Materials and research methods. Within the research we applied the case study methodology

As part of improving the organization of medical evacuation, the heads of the territorial centers of disaster medicine, the united regional centers of emergency medical care and disaster medicine and other institutions of the Disaster Medicine Service were asked, on the basis of input data, to formulate a problem and to find optimal ways to solve it, using team work.

When compiling the cases, the following input data were used:

- number of victims - 100 people;
- pathology profiles of the victims: neurosurgery, thoracoabdominal trauma, burn trauma, skeletal polytrauma and others - 5–10 options;
- structure of the contingent of victims according to the severity of the condition: severe, moderate, light - 3–7 options;
- proportion of adults and children in the total number of victims - 3–5 options;
- location of emergencies: in the city; suburban area - at

a distance of no more than 50 km from the city; in remote areas - at a distance of 50 km or more from the city.

In addition, when modeling the cases, real infrastructural and natural objects in the regions were indicated. It was proposed to take into account the actual season and weather conditions in relation to the date of the event specified in the case. When solving the problem, the participants had to decide on the possibility of attracting forces and means available in the region, including the deployment of such mobile medical units as emergency response teams, mobile medical teams, field multiprofile hospitals.

The cases were handed over to each manager on electronic media; 7-10 days were allocated for the development of solutions and for their submission for assessment by experts of the Headquarters of the All-Russian Service of Disaster Medicine.

In the search for a solution to the problem specified in the case, each manager took into account the following conditions of his region:

- staffing, material and technical support;
- number and possibilities of using ambulance vehicles and air transport;
- remoteness of medical organizations of the 1st, 2nd, 3rd level, their bed capacity and other characteristics;
- system of emergency information exchange existing in the region;
- existing schemes of interagency cooperation at the re-

gional and interregional levels, etc.

When solving each case, it was required:

1. To evaluate the capabilities of all available medical forces and means to rescue victims within one day: provision of emergency medical care, organization of medical evacuation to the 1st, 2nd, 3rd level medical facilities, further interhospital medical evacuation.

2. To develop a schedule for medical evacuation to medical facilities of the 1st - 3rd level.

3. To calculate the data on the dynamics of the inflow of victims in each medical facility - in a form of an hourly table with a cumulative total.

4. To calculate the dynamics of medical care, taking into account the hourly load in each medical center of the 1st - 3rd level, as well as the data on the number of specialist doctors, on the number of operating tables, on the number of intensive care units, etc.

5. To calculate the required volume of interhospital medical evacuation.

6. To calculate the proportion of evacuees for each routing option.

The proposed solutions for each of the cases were evaluated by the experts of the All-Russian Service of Disaster Medicine Headquarters.

A total of 85 solutions were presented and analyzed, of which 16 solutions were related to an emergency within a city; 41 - within a suburban area; 28 solutions - to an emergency that occurred at a distance of 50 km or more from a city.

Research results and their analysis. The analysis of case solutions by specialists-experts of the All-Russian Disaster Medicine Service Headquarters revealed a number of factors that formed the basis for making a SWOT *-analysis of medical and evacuation measures during the elimination of medical and sanitary consequences of various emergencies [1].

The main factors are: remoteness of the medical facility from the place of emergency and duration of medical evacuation (Tables 1, 2). In almost every federal district, regardless of population density and other factors, there is a proportional distance between medical facilities of various

levels and a place of emergency - in cities as well as in suburban areas, and at places situated within a distance of more than 50 km from a city.

As the analysis has shown, in districts with a high population density, a developed network of highways and relatively short distances to medical facilities, it is possible, when using ambulance vehicles, to deliver the victims immediately to medical facilities of the 3rd and 2nd levels (the 1st and 3rd routing options) with minimal time costs [2]. Thus, in the Central Federal District, the rate of hospitalization of victims from the scene of an emergency in the 3rd level medical treatment facility is on average of 22.2%; in medical organisations of level 2 - 42.4; in the Northwestern Federal District - 23.7 and 53.2%, respectively.

In federal districts with a low population density and with large distances between settlements, medical evacuation of victims from the scene of an emergency has to be carried out in 2 or more stages - even with the use of medical helicopters. So, for example, in the Siberian Federal District one-stage medical evacuation was carried out in 51.5% of cases (1st and 3rd routing options) provided that an air transport was used, in other cases there was an intermediate stage of evacuation; in 0.2% of cases - 2 intermediate stages (4th routing option) [2]. In the Volga Federal District 47.0% of medical evacuations were one-stage, and the share of medical evacuations with two intermediate stages was 2.4%.

As the analysis of solutions to cases shows, the use of air transport reduces the time for medical evacuation in the event of an emergency in a city and in suburban area and is a prerequisite for conducting medical evacuation in an emergency that takes place at a distance of 50 km or more from the city. So, in the Central Federal District, when solving cases, only 6 out of 18 constituent entities of the Russian Federation (hereinafter referred to as the constituent entities) used ambulance helicopters, although only two constituent entities were asked to solve the cases on the elimination of health consequences of emergencies in the city, where the use of helicopters is not always justified. In other cases, the use of helicopters would make it possible to speed up medical evacuation, especially since in a number of regions the distance to medical facilities of the 2nd and 3rd levels was 100-175 km. In the Far Eastern Federal District, only 44.4% of victims - regardless of the location of an emergency - were delivered to medical organisations by ambulance, the rest

* SWOT from English: Strengths, Weaknesses, Opportunities, Threats

Таблица 1/ Table No 1

Удаленность места ЧС от ЛМО 1-го, 2-го, 3-го уровня, среднее значение, км
Distance of the emergency site from the medical organization (LMO) of the 1st, 2nd, 3rd level, average value, km

Федеральный округ Federal District	В городе/In the city			В пригородной зоне/In the suburbs			>50 км от города/Outside the city >50 km		
	1-й уровень 1st level	2-й уровень 2nd level	3-й уровень 3rd level	1-й уровень 1st level	2-й уровень 2nd level	3-й уровень 3rd level	1-й уровень 1st level	2-й уровень 2nd level	3-й уровень 3rd level
Центральный/Central	59	96	110	79	43	68	76	173	175
Северо-Западный/Nord-West	35	35	57	70	330	330	172	140	470
Южный/South	33	41	47	41	39	49	80	96	330
Северокавказский*/North-Caucasian*	5	125	124	40	46	224	-	-	-
Приволжский/Volga	5	5	20	110	150	170	67	98	170
Уральский/Ural'sky	63	120	380	27	48	136	120	120	386
Сибирский/Siberian	5	100	107	46	15	170	314	191	198
Дальневосточный/Far Eastern	18	32	44	60	75	400	42	1100	1100
Среднее значение/Average	27,8	65,7	111,1	59,1	93,2	193,4	124,4	274,0	404,1

* Специалисты СКФО не принимали участия в решении кейсов, по условиям которых ЧС произошла на расстоянии >50 км от города
* Specialists of the NCFD did not participate in solving cases in which an emergency occurred outside the city at a distance of >50 km

were delivered by air, using which all subsequent re-evacuations were carried out.

At the same time, in addition to the distance from an emergency site to medical facilities, the duration of medical evacuation by various modes of transport and the ability of subjects to use ambulance helicopters during emergencies in a city, in suburban area and outside the city (> 50 km), medical specialists who took part in solving cases, as well as the experts of the All-Russian Disaster Medicine Service Headquarters, who analyzed these decisions, pointed to a large number of other factors that negatively or positively affect the quality of medical evacuation in emergency situations.

These factors are grouped into "internal" ones related directly to the organization of emergency medical care and medical evacuation, which can be characterised as strengths (S) and weaknesses (W), and "external", some of which - O - will increase the opportunities for high-quality medical evacuation and some - T factors - will increase the threats of unfavorable outcomes of medical evacuation.

SWOT analysis in relation to the options for medical support of the population and its evacuation in emergencies with a large number of victims within a city, suburban area and at a significant (> 50 km) distance from a city is an analy-

sis of strengths and weaknesses of the organization of emergency medical care and medical evacuation for each variant of the location of an emergency, as well as of opportunities and threats posed by the surrounding natural and social environment.

A part of purpose of the SWOT analysis of medical evacuation in three emergency scenarios is to develop a strategy:

- of "breakthrough" in improving the quality of medical evacuation in each emergency situation, using strong "internal" factors and "external" opportunities (S + O);

- of "development" of medical evacuation efficiency using "external" opportunities to minimize the effect of weak "internal" factors (W + O);

- of "defense", using strong "internal" factors or advantages to minimize "external" threats (S + T);

- of "containment", getting rid of weak "internal" factors and minimising "external" threats (W + T).

Examples of "internal" factors of medical evacuation organization, which, depending on the location of an emergency, can represent strengths (S) or weaknesses (W)

Examples of "external" factors that create opportunities (O) to increase the level of efficiency and quality of medical

Примеры «внутренних» факторов организации ЛЭМ, которые, в зависимости от места ЧС, могут быть сильными (S) или слабыми (W) сторонами

Сильные стороны – S /Strengths – S	Слабые стороны – W /Weaknesses – W
Достаточная численность медицинского персонала Sufficient number of medical personnel	Нехватка медицинского персонала Lack of medical staff
Врачебные бригады /Medical teams	Фельдшерские бригады /Paramedic teams
Доступность телемедицинских технологий Availability of telemedicine technologies	Недоступность телемедицинских технологий Unavailability of telemedicine technologies
Наличие системы трассовых пунктов Availability of a system of highway points	Отсутствие системы трассовых пунктов Lack of a system of highway points
Высокая мотивация медицинского и немедицинского (водители) персонала к работе High work motivation of medical and non-medical (drivers) personnel	Низкая мотивация медицинского и немедицинского (водители) персонала к работе Low work motivation of medical and non-medical (drivers) personnel
Достаточное количество санитарного автотранспорта Sufficient number of sanitary vehicles	Недостаточное количество санитарного автотранспорта Insufficient number of sanitary vehicles
Наличие санитарных вертолетов Availability of ambulance helicopters	Отсутствие санитарных вертолетов Lack of ambulance helicopters
Наличие мобильных медицинских формирований – ММО, БЭР, ПМГ* Availability of flexible medical units – ММО, REM, PMG*	Отсутствие мобильных медицинских формирований – ММО, БЭР, ПМГ Lack of flexible medical units – ММО, REM, PMG
Своевременность информационного обмена Timeliness of information exchange	Несвоевременность информационного обмена Absence of timeliness of information exchange
Наличие ЕДДС** догоспитального и госпитального периодов The presence of EDDS of the prehospital and hospital periods	Отсутствие ЕДДС догоспитального и госпитального периодов Absence of EDDS of pre-hospital and hospital periods
Хорошая материально-техническая база Good material and technical base	Слабая материально-техническая база Weak material and technical base

* ММО – мобильный медицинский отряд, БЭР – бригада экстренного реагирования, ПМГ – полевой многопрофильный госпиталь

ММО – mobile medical detachment, REM – emergency response team, PMG – field multidisciplinary hospital

** ЕДДС – Единая дежурно-диспетчерская служба / EDDS – Unified Duty Dispatch Service

evacuation in an emergency when organizing medical and evacuation support:

1. Development of Internet coverage, improvement of cellular coverage, 3G, 4G, in the future - 5G.

2. Provision of transport, including non-medical, means of the Glonass system.

3. Availability of new medical technologies (equipment) to reduce the number of medical personnel.

4. Regular, including interdepartmental, exercises, trainings of medical personnel, etc.

5. Development of regulations for interagency coopera-

tion at regional and interregional levels.

6. Development of distance learning system - availability of education.

7. Development of quality and safety management system for medical activities in the field.

8. Proximity of medical organisations.

9. Consolidation of Territorial Disaster Medicine Centers with ambulance stations and creation of Regional Centers of Emergency and Disaster Medicine, allowing to combine organizational, human, material and technical resources to conduct more efficient medical evacuation.

**Продолжительность медицинской эвакуации с места ЧС
до ЛМО 1-го, 2-го, 3-го уровня, среднее значение, ч**
Duration of medical evacuation from the emergency site to the medical organization (LMO)
of the 1st, 2nd, 3rd level, average values, hour

Федеральный округ Indicator	Медицинская эвакуация/Medical evacuation					
	санитарным автотранспортом by ambulance vehicles			воздушным транспортом* by air transport*		
	1-й уровень 1st level	2-й уровень 2nd level	3-й уровень 3rd level	1-й уровень 1st level	2-й уровень 2nd level	3-й уровень 3rd level
Центральный/Central	59	96	110	79	43	68
Северо-Западный/Nord-West	35	35	57	70	330	330
Южный/South	33	41	47	41	39	49
Северокавказский/North-Caucasian						
Приволжский/Volga	5	125	124	40	46	224
Уральский/Uralsky	5	5	20	110	150	170
Сибирский/Siberian	63	120	380	27	48	136
Дальневосточный/Far Eastern	5	100	107	46	15	170
Среднее значение/Average	27,8	65,7	111,1	59,1	93,2	193,4

* Санитарные вертолеты/Ambulance helicopters

Вариант №1/Variant No.1

Схема проведения SWOT-анализа ЛЭМ для ЧС, произошедшей в черте города
Scheme of SWOT analysis of medical and evacuation measures (LEM) for an emergency that occurred within the city limits

Сильные стороны – S/ Strengths – S	Слабые стороны – W /Weaknesses – W
Достаточная численность медицинского персонала – S1 Sufficient number of medical personnel – S1	Нехватка медицинского персонала – W3 Lack of medical staff – W3
Врачебные бригады – S2 Medical teams – S2	Отсутствие санитарных вертолетов – W7 Lack of ambulance helicopters – W7
Высокая мотивация медицинского и немедицинского (водители) персонала к работе – S5 High work motivation of medical and non-medical (drivers) personnel – S5	–
Достаточное количество санитарного автотранспорта – S6 Sufficient number of sanitary vehicles – S6	–
Своевременность информационного обмена – S9 Timeliness of information exchange – S9	–
Наличие ЕДДС догоспитального и госпитального периодов – S10 The presence of EDDS of the prehospital and hospital periods – S10	
Хорошая материально-техническая база – S11 Good material and technical base – S11	–
Возможности – O/ Opportunities	Риски – T /Threats – T
Обеспечение транспортных, в том числе немедицинских, средств системой Глонасс – O2 Provision of transport facilities, including non-medical, with the Glonass system – O2	Пробки/заторы на дорогах – T1 Traffic jams/congestion on the roads – T1
Проведение регулярных, в том числе межведомственных, учений, тренингов медицинского персонала и пр.– O4 Conducting regular exercises, training of medical personnel etc including on interdepartmental level – O4	Перегрузка ближайших больниц – T4 Capacity overload of nearby hospitals – T4
Разработка регламентов межведомственного взаимодействия на региональном и межрегиональном уровнях – O5 Development of regulations for interagency cooperation at the regional and interregional levels – O5	Ошибки при проведении эвакуационной медицинской сортировки – T5 Mistakes during aviatransport medical triage – T5
Развитие системы дистанционного обучения – доступность образования – O6 Development of the distance learning system-accessibility of education – O6	Неблагоприятные погодные условия и время суток – T6 Adverse weather conditions and time of day – T6
Развитие системы менеджмента качества и безопасности медицинской деятельности при выездных формах работы – O7 Development of the quality and safety management system for medical activities in field-work environment – O7	Сложности определения точного числа пострадавших и их местонахождения – завалы и пр.; трудность лечебно-эвакуационной характеристики пострадавших – профиль патологии, тяжесть состояния – T7 Difficulties in determining the exact number of victims and their location – blockages, etc.; difficulty in medical and evacuation characteristics of victims-pathology profile, severity of the condition – T7
Близость расположения ЛМО – O8 Proximity of LMO – O8	Межведомственные разногласия при организации ЛЭМ – T11 Interdepartmental differences in the organization of LEM – T11
–	Повышенное внимание к работе медицинских бригад при ликвидации последствий ЧС со стороны журналистов, прохожих и других свидетелей – T12 Increased attention to the work of medical teams in emergency response from journalists, passers-by and other witnesses – T12

10. Development of the project for the use of medical helicopters in the regions.

11. Railway and water transport usage for medical evacuation.

12. Development of the ideology of a three-tier health care system, etc.

Examples of "external" factors that increase threats (T) to the organization of medical evacuation:

1. Traffic jams.

2. Off-road.

3. Water obstacles - island territories, etc.

4. Overloading of nearby hospitals.

Таблица 3/Table No 3

Значимость факторов и их оценка, баллы
Significance of factors and their assessment, points

Показатель Indicator	Значимость Significance	Оценка Evaluation	Взвешенная оценка Weighted estimation of	Уд. вес фактора- Specific weight of the factor
Сильные стороны – S /Strengths – S				
Достаточная численность медицинского персонала – S1 Sufficient number of medical personnel – S1	5	3	15	10,18
Врачебные бригады – S2/Medical teams – S2	3	2	6	0,07
Высокая мотивация медицинского и немедицинского (водители) персонала к работе – S5 /High work motivation of medical and non-medical (drivers) personnel	5	2	10	0,12
Достаточное количество санитарного автотранспорта – S6 Sufficient number of sanitary vehicles – S6	4	4	16	0,19
Своевременность информационного обмена – S9 Timeliness of information exchange – S9	3	4	12	0,14
Наличие ЕДДС догоспитального и госпитального периодов – S10 The presence of EDDS of the prehospital and hospital periods – S10	5	3	15	0,17
Хорошая материально-техническая база – S11 Good material and technical base – S11	4	3	12	0,13
Всего/Total	–	–	86	1,0
Слабые стороны – W /Weaknesses – W				
Недоступность телемедицинских технологий – W3 Unavailability of telemedicine technologies – W3	3	3	9	0,81
Отсутствие санитарных вертолетов – W7/Lack of ambulance helicopters – W7	1	2	2	0,19
Всего/Total	–	–	11	1,0
Возможности – O /Opportunities – O				
Обеспечение транспортных, в том числе немедицинских, средств системой Глонасс – O2 Provision of transport facilities, including non-medical, with the Glonass system – O2	3	3	9	0,16
Проведение регулярных, в том числе межведомственных, учений, тренингов медицинского персонала и пр. – O4 Conducting regular exercises, training of medical personnel etc including on interdepartmental level – O4	5	1	5	0,08
Разработка регламентов межведомственного взаимодействия на региональном и межрегиональном уровнях – O5 Development of regulations for interagency cooperation at the regional and interregional levels – O5	5	2	10	0,17
Развитие системы дистанционного обучения – доступность образования – O6 Development of the distance learning system-accessibility of education – O6	4	2	8	0,14
Развитие системы менеджмента качества и безопасности медицинской деятельности при выездных формах работы – O7 Development of the quality and safety management system for medical activities in field-work environment – O7	5	1	6	0,10
Близость расположения ЛМО – O8/Proximity of LMO – O8	4	5	20	0,34
Всего/Total	–	–	58	1,0
Риски – T /Threats – T				
Пробки/заторы на дорогах – T1 /Traffic jams/congestion on the roads – T1	5	5	25	0,24
Перегрузка ближайших больниц – T4/Capacity overload of nearby hospitals – T4	4	3	12	0,12
Ошибки при проведении эвакуационной медицинской сортировки – T5 Mistakes during aviatransport medical triage – T5	5	3	15	0,15
Неблагоприятные погодные условия, время суток – T6 Adverse weather conditions and time of day – T6	2	2	4	0,03
Сложности при определении: точного числа пострадавших и их местонахождения – завалы и пр.; лечебно-эвакуационной характеристики пострадавших – профиль патологии, тяжесть состояния – T7 Difficulties in determining the exact number of victims and their location – blockages, etc.; difficulty in medical and evacuation characteristics of victims-pathology profile, severity of the condition – T7	5	3	15	0,15
Межведомственные разногласия при организации ЛЭМ – T11 Interdepartmental differences in the organization of LEM – T11	3	4	12	0,12
Повышенное внимание к работе медицинских бригад по ликвидации медико-санитарных последствий ЧС со стороны журналистов, прохожих и других свидетелей – T12 Increased attention to the work of medical teams in emergency response from journalists, passers-by and other witnesses – T12	4	5	20	0,19
Всего/Total	–	–	103	1,0

5. Errors during evacuation medical triage.
6. Unfavorable weather conditions and time of day.
7. Difficulty of determining the exact number of victims and their location - rubble, etc. - treatment and evacuation characteristics of the victims - profile of pathology, severity of condition.
8. Low interest of authorities in the development of the Disaster Medicine Service of the subjects.
9. Insufficient development of regulatory legal framework for the creation of mobile units in the regions.
10. Weak regulatory framework for hospitalization of patients at interregional level - proximity of an emergency to hospitals of a neighboring subject, etc.
11. Interdepartmental disagreements in the organization of medical evacuation.
12. Increased attention to the work of medical teams in the elimination of medical and sanitary consequences of emergencies from the part of journalists, passers-by and other witnesses.

On the basis of the above factors, we have constructed schemes for conducting a medical evacuation SWOT analysis. There are three options of the location of an emergency, while the number and composition of the selected factors depend on their relevance in relation to each option.

Based on the analysis of the cases solutions, experts of the Headquarters of the All-Russian Disaster Medicine Service noticed a significant prevalence of the strong "internal" factors of medical evacuation in the event of an emergency in the city. Weaknesses are:

- lack of ambulance helicopters - this factor is of minimal importance, since in this case we are not talking about their absence, but about the impossibility of using helicopters in the city - lack of places for helicopter landing, due to a developed network of overhead communications, etc.;
- inaccessibility of telemedicine technologies is a factor rather associated with an inexpediency of their use in most cases.

At the same time, there is a significant number of risks associated with the provision of medical evacuation in specific conditions of the urban environment.

To develop strategies to improve the efficiency and quality of medical evacuation, we carried out a weighted point assessment of the factors:

Based on the assessment of the specific weight of each factor affecting the conduct of medical evacuation in the event of an emergency in a city, the following directions for improvement can be identified:

1. The strategy of "breakthrough" (S + O) in improving the quality of medical evacuation will be facilitated by the presence of: sufficient number of medical personnel; sufficient

number of medical vehicles; sufficient material and technical equipment of field crews; provision of communication facilities; information exchange system, which, if there is a good cellular coverage in the city, will allow timely online exchange of data on the progress of medical evacuation in the prehospital and hospital periods. The presence of a stable Internet coverage creates conditions for medical personnel, including its management staff, to undergo distance learning and acquire necessary competencies. The proximity of medical organisations of different, including 2nd and 3rd levels, equipment of ambulances with the Glonass system will ensure the routing of patients in accordance with the severity of their condition and the profile of the pathology, avoiding multi-stage. The development of a quality management system for offsite forms of work, including in emergencies, will make it possible to apply a process approach to minimize the risks of large losses among victims and to rationally use the available forces and means.

2. The strategy of "development" (W + O) of the efficiency and quality of medical evacuation can be built by leveling the weak "internal" factors- insufficient use of ambulance helicopters and telemedicine in the elimination of medical and sanitary consequences of emergencies in a city - by using available opportunities: developed network of roads, sufficient number of medical personnel of mobile teams, proximity of medical treatment facilities, short delivery times for victims to the hospital and others, which minimize the need for the use of medical aviation and telemedicine in the event of an emergency in an urban environment.

3. The "defense" strategy, i.e. the use of strong "internal" factors to minimize "external" threats (S + T), will be based on the development of regulations for interagency cooperation, allowing to prevent traffic jams on the roads near the emergency site, to build relationships with rescue services to speed up the removal of rubble; availability of information exchange system will ensure correct routing of patients and will allow to avoid overloading of the nearest medical facilities. A sufficient number of mobile teams and quick delivery of victims to medical facilities will minimize the impact of weather conditions on victims, etc.

4. The "containment" strategy will consist in identifying and reducing the impact of weaknesses and in minimizing risks through a retrospective analysis of earlier emergencies, by solving situational problems, training medical and management personnel through face-to-face and distance trainings, developing schemes for interagency interaction, conducting joint exercises, etc.

The results of the medical evacuation SWOT analysis in the event of an emergency in a suburban area and a remote area (> 50 km from the city) will be discussed in Communication 2.

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