

ANALYSIS OF ORGANIZATIONAL MODELS OF DISASTER MEDICINE SERVICE OF THE  
MINISTRY OF HEALTH OF THE RUSSIAN FEDERATION AT REGIONAL LEVEL\*

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**Abstract.** The results of study and analysis of organizational and functional changes in the Disaster Medicine Service of the Ministry of Health of Russia at the regional level, organizational models of the Disaster Medicine Service functioning in the subjects of the Russian Federation are presented. The study was conducted at the All-Russian Center for Disaster Medicine "Zashchita" (since 2015) and at the Federal Center for Disaster Medicine of the National Medical and Surgical Center named after N.I. Pirogov of the Ministry of Health of Russia.

*The purpose of the study* is to analyze organizational models of the Disaster Medicine Service functioning at the regional level. *Materials and research methods.* The following methods were used in the study: expert evaluation, statistical, analytical, field observation, etc.

The method of expert evaluation was applied through questionnaire survey of experts – Russian experts in the field of disaster medicine and emergency medical care. The questionnaires were filled in twice – questionnaire №1 – in 2015 and questionnaire №2 – in 2019-2020; a total of 529 people took part. Questionnaires № 1 and № 2 included questions and provisions relating to organizational models of the Disaster Medicine Service functioning at the regional level and to organizational and functional changes in the Disaster Medicine Service of the subjects.

*Results of the study and their analysis.* The results of the research helped to formulate a number of principle statements on further improvement of the Disaster Medicine Service, including development of organizational structure, implementation of its organizational models at the regional level.

**Keywords:** departments of emergency consultative medical care, Disaster Medicine Service of the Ministry of Health of Russia, emergency medical care stations, expert evaluation method, medical treatment organizations, organizational and functional changes, organizational models, regional level, territorial centers for disaster medicine, united regional centers of emergency medical care and disaster medicine

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АНАЛИЗ ОРГАНИЗАЦИОННЫХ МОДЕЛЕЙ ФУНКЦИОНИРОВАНИЯ  
СЛУЖБЫ МЕДИЦИНЫ КАТАСТРОФ МИНИСТЕРСТВА ЗДРАВООХРАНЕНИЯ  
РОССИЙСКОЙ ФЕДЕРАЦИИ НА РЕГИОНАЛЬНОМ УРОВНЕ\*

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**Резюме.** Представлены результаты научного исследования, посвященного изучению и анализу организационно-функциональных изменений, осуществляемых в Службе медицины катастроф Минздрава России (СМК, Служба) регионального уровня, организационных моделей функционирования СМК в субъектах Российской Федерации (субъекты). Исследование проводилось во Всероссийском центре медицины катастроф «Защита» Минздрава России (с 2015 г.) и Федеральном центре медицины катастроф Национального медико-хирургического Центра им. Н.И.Пирогова Минздрава России (завершение исследования).

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*Цель исследования* – проанализировать организационные модели функционирования СМК на региональном уровне. *Материалы и методы исследования.* При выполнении исследования применялись методы: экспертной оценки, статистический, аналитический, натурного наблюдения и др.

Метод экспертной оценки применялся путём анкетирования экспертов – российских специалистов в области медицины катастроф и экстренной медицинской помощи. Анкетирование проводилось дважды – анкетирование №1 – в 2015 г. и анкетирование №2 – в 2019–2020 гг., в них принимали участие в общей сложности 529 чел. В анкеты №1 и №2 вошли актуальные, по мнению автора, вопросы и положения, имеющие отношение к организационным моделям функционирования СМК на региональном уровне и организационно-функциональным изменениям в СМК субъектов.

*Результаты исследования и их анализ.* По результатам исследования сформулирован ряд принципиальных положений по вопросам дальнейшего совершенствования деятельности СМК, в том числе по развитию организационной структуры, внедрению организационных моделей функционирования Службы на региональном уровне.

**Ключевые слова:** лечебные медицинские организации, метод экспертной оценки, объединенные региональные центры скорой медицинской помощи и медицины катастроф, организационно-функциональные изменения, организационные модели, отделения экстренной консультативной медицинской помощи, региональный уровень, Служба медицины катастроф Минздрава России, станции скорой медицинской помощи, территориальные центры медицины катастроф

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**Study relevance.** In the Russian Federation organization and rendering of medical aid to victims in emergency situations are connected with the activities of the All-Russian Disaster Medicine Service and with its most important component – the Disaster Medicine Service of the Ministry of Health of the Russian Federation. The management bodies of the All-Russian Disaster Medicine Service and the Disaster Medicine Service of the Ministry of Health of the Russian Federation must ensure the readiness of healthcare to respond to emergency situations, to provide medical aid, to carry out medical evacuation of victims. A number of scientific works are devoted to the problems of improving the organization and rendering medical aid to the victims in emergencies, to their medical evacuation to medical treatment organizations [1-8]. In recent years the Disaster Medicine Service has been undergoing significant organizational changes, the model of the united regional Center of emergency medical care and disaster medicine is being introduced. In spite of the fact that a number of scientific publications are devoted to the discussion of organizational models of the Disaster Medicine Service functioning at the regional level, from the scientific and methodological point of view these issues seem to be insufficiently elaborated [9-14].

**The purpose of the study** is to analyze organizational models of the Disaster Medicine Service functioning on the regional level.

**Materials and research methods.** When conducting the research the following methods were used: expert evaluation, statistical, analytical, field observation, etc. Scientific works and publications in scientific journals on the problem under study, reports on special exercises conducted by the Service of the regional level, reference and analytical materials on the assessment of the state of readiness of the Disaster Medicine Service of the subjects of the Russian Federation were analyzed.

An essential role in the research was played by the method of expert evaluation. There was a survey of experts – Russian experts in the field of disaster medicine and emergency medical care. The questionnaire survey was conducted twice - questionnaire #1 – in 2015; questionnaire #2 – in 2019-2020. Questionnaires #1 and #2 were developed. They included topical questions and provisions related to the system of organization of medical aid to victims of emergencies and the activities of the Disaster Medicine Service in modern conditions. The questions included in the 2015 questionnaire were initially considered by the expert group of the Scientific Council of the All-Russian Center for Disaster Medicine "Zaschita" of the Ministry of Health of Russia and recognized as relevant and significant for scientific research.

242 specialists in the field of disaster medicine and emergency medical care from 51 subjects took part in the survey in 2015.

When preparing questionnaire No.2 we took into account personal experience and experience of our colleagues from All-Russian Center for Disaster Medicine "Zashchita" and territorial centers of disaster medicine / regional centers of emergency medical care and disaster medicine of the subjects. This experience was related to organization of medical aid rendering to victims of emergency situations and reflected personal opinion about organizational and functional changes in the Disaster Medicine Service of the Ministry of Health of Russia on the regional level. Both the established and accepted in the medical community provisions and a number of new but important questions were presented for the expert discussion. It should be noted that the topics of questions in questionnaire No. 2 are in much the same way as those in questionnaire No. 1. It is made deliberately – with the purpose of formulating and expert evaluation of a number of actual and principal provisions, checked up taking into account the time factor. Determining the significance of all

meaningful questions (from 0 — minimum score to 100 — maximum score) in questionnaire № 2 (2019) was mandatory.

Questionnaire #2 survey was conducted from the end of December 2019 to February 2020. The experts filled out the questionnaire online, the Internet program "Yandex Forms" (forms.yandex.ru) was used in the survey. The questionnaire was sent to specialists in different ways: by e-mail, via messengers (WhatsApp, etc.), by official letters to the organization with a link.

287 experts in the field of organization and provision of emergency medical care and disaster medicine from 57 subjects took part in the survey No. 2. Responding to the questions in the questionnaire, the respondents chose one of the possible answers: "yes", "no", "difficult to answer", "other".

The answers of the experts were analyzed taking into account their distribution into groups by their place of work. The following groups of experts were identified: specialists of territorial centers for disaster medicine; specialists of emergency stations and regional centers for emergency medical care and disaster medicine; specialists of medical treatment organizations of the 1st and 2nd levels; specialists of medical treatment organizations of the 3rd level; specialists of federal medical organizations; specialists of other organizations. In the course of the study, expert opinions were analyzed using cross-tabulations.

The results of both questionnaires were statistically processed and analyzed, including the use of a special software named "Statistika".

A total of 529 experts in the field of disaster medicine and emergency medicine took part in surveys #1 and #2.

The statistical significance of the indicators was determined according to the methods generally accepted in statistics. The critical level of significance for testing statistical hypotheses ( $p$ ) was taken to be 0,05. Statistically significant differences were recorded at  $p$  less than 0.05. The methodology used in the dissertation work confirms the reliability of the research results.

While analyzing the organizational model of the united regional center of emergency and disaster medicine both positive sides (advantages) of this model and its probable risks (potential negative sides) were evaluated. Thus, SWOT-analysis has been done.

**Results of the research and their analysis.** In our article the results of the analysis of the consequences of functional changes in the Disaster Medicine Service and the organizational models of the Disaster Medicine Service operation on the regional level are presented.

As of January 1, 2021 in the Russian Federation there were: 45 territorial centers of the Disaster Medicine Service as independent medical organizations (legal entities); 14 territorial centers of the Disaster Medicine Service within regional, republican, territorial hospitals; 24 territorial centers of the Disaster Medicine Service united with the Emergency Medical Care Stations.

Among the questions presented for expert discussion, of great importance are the questions of validity of development of different organizational models. To the question "What, in your opinion, will uniting in one medical organization (legal entity) a territorial center of disaster medicine, an ambulance station, a department of emergency consultative medical care lead to?", the experts chose one of the proposed options as the answer: 1. Improvement of coordination and interaction of emergency medical services in the region for rapid response and emergency medical care to the population in different modes of operation. 2. Improving the quality and accessibility of emergency medical care in pre-hospital and hospital periods, also for the population living in remote, sparsely populated and hard-to-reach areas. 3. Increasing the level of preparation of medical workers, including in the provision of emergency medical care in emergencies. 4. Creating conditions for organizing a unified operational dispatching service and a situation center of regional health care, introduction of new information technologies. 5. Creation of conditions for optimization of work of supporting and auxiliary departments and services. 6. All of the above. 7. Deterioration of the situation with emergency medical care in the region. 8. Difficult to answer. The majority (56.6%) of experts positively assessed the prospects of the united institution, choosing as their answer the option "6. All of the above." In addition, another 11.6% of experts expressed a positive opinion, choosing options 1-5. The possible consequences of the unification of the territorial centers for emergency medicine, ambulance stations and air ambulance were assessed negatively by 18.2%. They indicated that this would lead to a worsening of the situation with the provision of emergency medical care in the region. Thirteen and a half percent (32 people) could not express a distinctive opinion. The greatest share of answers with a negative opinion on the unification issue was revealed in the groups of territorial disaster medicine centers (29.0%) and ambulance stations (19.0%). These groups also revealed a relatively high percentage of the answer option "Difficult to answer" — 11.0% and 28.6%, respectively. Statistical analysis showed that significant differences in group responses depended on the place of work of the expert (Pearson's chi-square — 70.701 at  $p = 0.0001$ ).

The questions of unification were emphasized once again in the questionnaire No. 2 in 2019-2020. To the question "Do you agree that the introduction of the organizational model of functioning of the united regional centers for emergency medical care and disaster medicine is expedient in many constituent entities of the Russian Federation. Especially in those regions where the territorial centers of disaster medicine perform mainly organizational and administrative functions and do not have medical forces and means?" the majority (59.9%) of experts answered "yes". A negative answer "no" was given by 17.4; 18.5 found it difficult to answer; "other" was mentioned by 4.2%. The significance of this question — from 0 (minimum score) to 100 (maximum score) — was estimated by the experts as  $78.06 \pm 28.11$ .

As already noted, statistical analysis showed significant differences in experts' answers depending on their place of work. The highest number of positive answers (in %) was found in the following groups: Ambulance stations and regional centers for emergency medical care and disaster medicine — 73.9%; medical treatment organizations of the 3rd level and health care management bodies — 84.0; medical treatment organizations of the 1st and 2nd levels — 70.0%. Significantly fewer people supported the implementation of the model of a unified regional center for emergency medical care and disaster medicine in the following groups. Territorial centers of catastrophic medicine — 49.0%; federal medical organizations — 54.5; other medical organizations — 50.0%. Representatives of the group of

territorial centers for disaster medicine dominated among those who indicated "other" (10 out of 12) and "difficult to answer" (27 out of 53) in their answers. They were also the leaders among all expert groups in terms of the relative share of negative answers — 25.5%. This indicator in other groups was as follows: ambulance stations and regional emergency and disaster medicine centers (7.2%); Level 1 and Level 2 medical treatment organizations (10.0%); Level 3 medical treatment organizations and health care authorities (12.0%); and federal medical organizations (9.1%).

Thus, despite the fact that the majority of experts perceive positively the trend toward unification, there is a significant number of specialists in the field of disaster medicine and emergency medical care who express doubts or negative opinions about the validity and expediency of these organizational measures. Analysis of expert evaluations given in 2019-2020 showed that the greatest reticence and caution regarding the processes of unification of emergency medical organizations is shown by employees of disaster medicine centers. In their explanations for the "other" response option, experts in the field of disaster medicine and emergency medicine indicated the following. They believed that this reorganization and the disappearance of territorial centers of catastrophe medicine as independent organizations can lead to a weakening of the role of the service of disaster medicine, "dilution" and relegation to the background of the functions of disaster medicine in the united centers, to the reduction of efficiency in making managerial decisions in emergency situations.

The following positive results (advantages) can be achieved if the unification process is properly organized:

- concentration and management of the main medical forces and means in the region in the prehospital period and carrying out medical evacuation in various modes of operation;
- creation of optimal conditions: for implementation of modern organizational and information technologies, development of a unified operative-dispatching service, unified information space; for implementation of a monitoring system for emergency medical assistance and medical evacuation; for better coordination of emergency medicine services, ambulance services, emergency consultative medical assistance department (sanitary aviation);
- formation of conditions for improving the level of training of medical workers, including on the issues of emergency medical aid in emergency situations;
- optimization of the activities of supporting departments and services;
- optimal organization of procurement activities in a united institution, etc. [9].

In practice there are clear positive results of the functioning of the joint institution in the Chuvash Republic, where the process of unification took place step-by-step, starting in 2013, as well as in the Tula Region and the Republic of Crimea.

Considering the positive aspects (advantages) of the organizational model of the unified regional center for emergency medical care and disaster medicine, it is necessary to mention certain risks (probable "weaknesses") of the unified institution model, which can be divided into 3 main groups:

1. Risks and difficulties resulting from the necessity to perform a significant amount of organizational and technical work.

2. Risks of a decrease in the efficiency of managerial decision-making as a result of a significant consolidation of the organization.

3. Risks of domination of some directions of activities to the detriment of other main directions. Some respected and honored specialists in disaster medicine express concerns, that in some regions the "disaster medicine" voice in the work of united centers can significantly weaken because of the domination of everyday work on rendering emergency medical aid [9].

The experts supported the expediency of preserving and further developing the organizational model of territorial disaster medicine centers to a greater extent than in the two above-mentioned questions. To the question "Do you agree with the fact that in a number of subjects of the Russian Federation it is expedient to preserve territorial centers of disaster medicine, including those performing the functions of interregional centers of disaster medicine?" the great majority (78.4%) of experts answered "yes". 10.5 found it difficult to answer; 7.6 expressed a negative opinion (answer "no"); 3.5% chose "other". According to the experts' assessment, the significance of question #25 was  $83.84 \pm 24.88$ . Statistical processing of the results of the questionnaire showed significant differences in the answers in the groups depending on the place of work (Pearson's chi-square - 32.578 at  $p=0.005$ ). In all groups the majority of experts gave a positive answer, the most supporters of preserving the model of territorial centers of disaster medicine were in the groups of territorial centers of disaster medicine (83,4%) and medical treatment organizations of the 1st and 2nd levels (85,0%). Slightly less were in the groups of emergency stations and regional centers for emergency and disaster medicine (75.4%) and treatment medical organizations of the 3rd level and health care authorities (76.0%); the least were in the group of federal medical organizations (54.5%). The share of negative answers was greater (10.1%) in the group of emergency medical care workers and in the group of employees of leading regional medical treatment institutions of the 3rd level and health care management bodies of the subjects (12.0%). It is noteworthy that a certain part of experts who disagreed on the question of the advisability of maintaining the model of territorial disaster medicine centers in some regions, as well as who indicated "other" in their answers, were employees of disaster medicine centers — 10 of 22 and 6 of 10 people, respectively. The option "Difficult to answer" (in %) was more frequently encountered in the group uniting representatives of federal medical centers, including departmental, military medical institutions and scientific organizations — 36.4%. In this group, the same percentage of the "Difficult to answer" response option was also found in the previous question regarding the implementation of the unified center model. This situation can be explained by the focus of the employees of these organizations on solving problems at the federal level, and to a lesser extent by involvement in problems at the regional level.

We share the opinion of the majority of experts and consider it reasonable and expedient to keep the model of territorial centers for disaster medicine in a number of regions.

We believe that in the conditions of our country other organizational models of functioning of the Disaster Medicine Service, ambulance and sanitary aviation, including mixed ones, are also possible. A number of provisions

on possible variants of organizing the activity of emergency medical services at the level of the region are formulated and presented for discussion to the experts in questionnaire №2.

To the question "Do you agree that solving medical evacuation issues, taking into account the principles of optimal routing at medical district level, necessitates the creation/increase of evacuation forces and means at this level? And this can be accomplished within the framework of the following organizational models: creation and functioning of regional centers of emergency medical care and disaster medicine at the level of medical districts of subdivisions; creation and functioning of stations of emergency medical care with a similar area of responsibility as the multidisciplinary medical center of the 2nd level (within the medical district with sub-stations of emergency medical care in districts, working in a single information space and under functional "supervision" of regional centers). In any of these variants a clear organizational-functional integration and single information space of the emergency medical aid, Disaster Medicine Service, sanitary aviation and medical organizations are obligatory?". The majority (77.0%) of specialists answered "yes" and supported these provisions. Negative answers were given by 4.6%, 15.3% found it difficult to answer, and 3.1% indicated "otherwise". Significance of this question was estimated by experts as  $80.47 \pm 24.45$ . The highest rate of positive answers was noted in the groups of medical treatment organizations of the 1st and 2nd levels (85.0%); emergency medical aid stations and regional centers of emergency medical aid and disaster medicine (84.1%); medical treatment organizations of the 3rd level and health authorities (84.0%). This indicator is somewhat lower in the groups of disaster medicine centers (72.4%) and federal medical organizations (68.2%). This question caused the greatest "difficulties in answering" for representatives of disaster medicine centers (23 people) and emergency medical services (9 people). In relative terms (as a percentage of the total number of answers in a particular group), it was in the group of federal medical organizations (27.3%). The differences between the groups are not statistically significant (Pearson's chi-square - 12.509 at  $p=0.640$ ). We share the opinion of the majority of experts and consider reasonable the variant of the organizational

model of functioning of emergency medical care, disaster medicine and sanitary aviation in a number of regions, taking into account the peculiarities of formation of medical districts.

The structure of the regional centers of emergency medical aid and disaster medicine must correspond to the tasks assigned to this institution, contribute to its functioning and development of its activities.

### Conclusion

The analysis of the activity of the territorial centers of disaster medicine in the subjects of the Russian Federation testifies that if the work is properly organized, positive results can be achieved with different organizational models: the territorial center of disaster medicine (independent medical organization) — Sverdlovsk region, Chechen Republic, Khanty-Mansi Autonomous Area, Khabarovsk territory etc.; territorial center of disaster medicine (as a part of leading regional hospitals) — Rostov region, Republic of Tatarstan

The results of expert evaluation of provisions on organizational models of emergency medical care functioning at the regional level confirm the necessity of weighted, thoughtful approach to the choice of organizational model of emergency medical care in the region. This model should take into account territorial peculiarities of healthcare and exclude administrative "pushing and imposing" of one of the models.

It is fundamentally important that in any organizational model the tasks and powers of the territorial center of disaster medicine as a body of everyday management of the Disaster Medicine Service on the regional level and its functionality in the field of "disaster medicine" must be fully solved.

Taking into account the experts' opinions, the following organizational models of the Disaster Medicine Service seem to be the most promising: the model of the territorial center for disaster medicine with the emergency consultative medical aid department (sanitary aviation) in it and the model of the united regional center of the emergency and disaster medicine or the regional center for disaster medicine and emergency medical aid.

In any variant a clear functional integration and creation of a single information space are mandatory.

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