

OCCUPATIONAL RISK FACTORS AND CONSEQUENCES OF MENTAL DISADAPTATION IN MEDICAL SPECIALISTS AND RESCUERS IN EMERGENCY SITUATIONS: CURRENT STATE OF THE PROBLEM

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Abstract. *The purpose of the study* is to analyze modern domestic and foreign publications, devoted to the study of factors of professional risk and consequences of mental disadaptation in rescuers and medical workers in emergency situations.

Materials and research methods. The publications' analysis was performed using the PubMed database, electronic scientific library eLIBRARY.RU, open access statistical reporting data, as well as official websites of relevant scientific journals.

Combinations of specific terms related to emergency services, post-traumatic stress disorder, mental maladaptation and professional risk factors of extreme professions, including medical ones, were used.

Results of the study and their analysis. While performing their service duties, rescuers and medical workers, acting in conditions of emergency with numerous human and material losses, being exposed to the threat to their own life, health or psycho-emotional condition, face a variety of critical incidents. As the number of lived traumatic situations and events increases, individuals involved in rescue operations are at higher risk of developing the pathology known as post-traumatic stress disorder. Throughout the relevant scientific literature, there is a consensus that health care workers in emergencies are at increased risk for high-level stress, anxiety, depression, burnout, addiction, and PTSD, which can have long-term psychological consequences. The specialists developed and implemented new methods and approaches to support medical specialists participating in the liquidation of medical and sanitary consequences of emergencies; substantiated the need for normative legal regulation of psychophysiological examination of personnel during periodic medical examinations, which will allow to maintain "health of the healthy".

Key words: COVID-19 pandemic, emergencies, first aid, medical specialists, mental maladaptation, post-traumatic stress disorder, professional risk, rescue workers, victims

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ФАКТОРЫ ПРОФЕССИОНАЛЬНОГО РИСКА И ПОСЛЕДСТВИЯ ПСИХИЧЕСКОЙ ДЕЗАДАПТАЦИИ У МЕДИЦИНСКИХ СПЕЦИАЛИСТОВ И СПАСАТЕЛЕЙ В ЧРЕЗВЫЧАЙНЫХ СИТУАЦИЯХ: СОВРЕМЕННОЕ СОСТОЯНИЕ ПРОБЛЕМЫ

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Резюме. *Цель исследования* – проанализировать современные отечественные и зарубежные публикации, посвященные изучению факторов профессионального риска и последствий психической дезадаптации у спасателей и медицинских работников в чрезвычайных ситуациях (ЧС).

Материалы и методы исследования. Выполнен анализ публикаций результатов исследований по заявленной тематике с использованием: базы данных Pubmed, научной электронной библиотеки eLIBRARY.RU, данных статистической отчетности, находящихся в открытом доступе, а также официальных сайтов научных журналов по изучаемой тематике.

Использованы комбинации терминов, относящихся к аварийно-спасательным службам, посттравматическому стрессовому расстройству (ПТСР), психической дезадаптации и факторам профессионального риска служебной деятельности специалистов экстремальных профессий, в том числе медицинских работников.

Результаты исследования и их анализ. В процессе выполнения служебных обязанностей у спасателей и медицинских работников, действующих в условиях ЧС, на фоне многочисленных человеческих жертв, материальных потерь, реальной угрозы для своей жизни, здоровья или психоэмоционального состояния, а также для жизни, здоровья и благополучия окружающих, неизбежно возникают разнообразные критические инциденты. С увеличением количества пережитых травмирующих ситуаций и событий, лица, задействованные в спасательных операциях, подвержены более высокому риску формирования патологии, известной как посттравматическое стрессовое расстройство. Во всей соответствующей научной литературе существует консенсус в отношении того, что медицинские работники в условиях ЧС подвергаются повышенному риску возникновения стресса высокого уровня, тревоги, депрессии, выгорания, зависимости и посттравматического стрессового расстройства, которые могут иметь долгосрочные психологические последствия. Специалистами разработаны и внедрены новые методы и подходы к поддержке медицинских специалистов, принимающих участие в ликвидации медико-санитарных

последствий ЧС; обоснована необходимость нормативного правового регулирования психофизиологического обследования персонала при прохождении периодических медицинских осмотров, что позволит сохранить «здоровье здоровых».

Ключевые слова: медицинские специалисты, пандемия COVID-19, первая помощь, пострадавшие, посттравматическое стрессовое расстройство, профессиональный риск, психическая дезадаптация, спасатели, чрезвычайные ситуации

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Introduction

The modern stage in the development of society is characterized by the rapid development of science and the emergence of new high technologies. A large concentration of industrial production, complication of the technological chain using a significant number of explosive, fire, radiation and chemical hazardous substances, deterioration of industrial equipment, failure to observe elementary safety measures lead to an increase in the number of accidents and man-made disasters. In addition, various natural disasters cause significant damage.

A specific peculiarity of professional activity of specialists of rescue services and medical workers, who provide liquidation of medical and sanitary consequences of emergency situations (ES), is the work under special conditions. It takes place under the influence of a significant number of such stressogenic factors as presence of an explicit or latent threat to life and health, formation of physical and mental overload, suddenness of events, information overload in conditions of lack of time, etc.

Peculiarities of the status of rescuers are determined by their assigned duties within the framework of the work to eliminate emergency situations and the related threat to their life and health¹.

Such activity requires specialists to have a formed set of motives, reliable functioning of their psychophysiological functions, ability to self-regulate mental states, readiness to apply knowledge, skills and abilities.

From the above, **the relevance of this study** follows. It included an analysis of modern domestic and foreign sources on the study of factors of professional risk and consequences of mental disadaptation in medical specialists and rescuers in emergency situations.

Materials and methods of research. Publications of domestic and foreign authors were analyzed, their systematization according to the stated topic using the developed search protocol performed. The PubMed database; the Russian information-analytical portal in science, technology, medicine and education – scientific electronic library eLIBRARY.RU; open-access statistical reporting data, as well as official websites of scientific journals on the studied subject were included in the search protocol.

Combinations of terms related to emergency services/rescue workers, post-traumatic stress disorder (PTSD), mental maladaptation and professional risk factors of extreme professions were used.

Main limitations: publication language was either Russian or English; date of publication was not earlier than 2000.

Recommendations of Preferred Reporting Items for Systematic Reviews and Meta-Analyses – PRISMA – were used as a basis for identification of possible studies.

Research results and their analysis. The activities of a number of professions are associated with the provision of medical emergency care to victims in emergency situations of man-made, natural and other nature and belong to the category of extreme activities. In the process of performing their official duties rescuers and medical specialists acting in conditions of emergency, on the background of numerous human losses, material losses, real threat to their life, health or psycho-emotional state, as well as to life, health and well-being of surrounding people have a variety of critical incidents [1, 2].

A comparative analysis of official statistics data shows a steady increase in the number of threats of various emergencies in the Russian Federation^{2,3}.

Thus, in 2020, compared to 2019, the number of ES increased by 24.44%, and the material damage from ES increased by 94.38%. At the same time, the number of people injured and killed in emergencies decreased by 64.83% and 38.72% respectively.

The number of man-made emergencies in 2020 was 167 (202 in 2019, a 17,7% decrease); natural emergencies – 104 (49 in 2019, a 2,1 times increase); bio-social emergencies – 60 (5 in 2019, a 12 times increase).

Thus, in 2020 the largest share of emergencies consisted of man-made emergencies – 50,5%; followed by natural emergencies – 31,4%; the share of biological and social emergencies was 18,1%.

In 2020, a pandemic of a new coronavirus infection COVID-19 became a biosocial emergency. This required the development of new organizational measures not only for the system of Rospotrebnadzor and the Ministry of Health of Russia, but also for specialists of other extreme professions.

¹ http://www.consultant.ru/document/cons_doc_LAW_388873/#dst100011 (accessed 26.01.2021)

² <https://www.mchs.gov.ru/dokumenty/4602> (accessed 27.01.2022)

³ <https://www.mchs.gov.ru/dokumenty/5304> (accessed 27.01.2022)

Previously, the main concern was such consequences of extreme situations as deaths, physical illnesses, injuries and disabilities. And now there is a growing concern about their consequences for the psychosocial and psychoemotional health of society [3].

As for the term "mental trauma", it is based on the theory of posttraumatic personality disorder and the provisions of crisis psychology that emerged at the end of the 20th century. Life situations and events that a person perceives as a clear threat to his/her existence, which can disrupt his/her habitual life activity, become a traumatic event for him/her. And it lies at the basis of experiences of a special kind, exposing him/her to stress [4].

As the number of traumatic situations and events experienced increases, those involved in rescue operations are at higher risk of developing a pathology known as post-traumatic stress disorder [5, 6].

Specialists of different professions are involved in the elimination of the consequences of emergencies, each of them has certain tasks. These professionals have a different level of preparation for overcoming traumatic events and stress, and, consequently, the risk factors of PTSD development have different significance for them. According to a number of authors, the prevalence of PTSD among representatives of various professional groups (firefighters, police officers, medical workers, etc.) varies from 0 to 46 [7-9].

A significant number of domestic and foreign publications are devoted to the stressogenic impact of the COVID-19 pandemic on emergency medical workers. Thus, the query "The psychological impact of COVID-19" in the PubMed search engine alone yielded 4861 sources. At the same time, there is an "explosive growth" in their number: in 2020 — 1622; in 2021 — 3403. The query for "The psychological impact of COVID-19 the mental health of healthcare professionals" yielded 487 sources (187 for 2020; 320 for 2021) [10-13].

Since the entry gates of COVID-19 are the epithelium of the upper respiratory tract, stomach and intestinal epithelial cells, the infection is transmitted by the airborne, air-dust, contact and fecal-oral routes. Large respiratory particles play a major role here, so personal protective equipment (PPE) has become an important component of the system to protect nursing staff and other patients from cross-contamination.

As a result, health care workers have become potentially most at risk of being infected with coronavirus because they come into contact with the virus in aerosol form during the course of their duties [14].

In the context of the pandemic, one of the main issues discussed in the medical community has been the effectiveness of PPE to protect medical personnel from infection. It is worth noting that their proper use, while not eliminating the risk of virus transmission, significantly reduces it [15].

Researchers cite rapid spread of COVID-19; severity of its symptoms; lack of scientific knowledge about the virus and increased mortality rate among medical colleagues as the main reasons for caution and uncertainty among medical professionals. Additional risk factors include: feelings of inadequate support; fears for one's own health; fear of transmission to family members or others; lack of quick access to testing; isolation; feelings of insecurity and social stigma; excessive workload. Throughout the relevant literature, there is consensus that health care workers

are at increased risk for stress, high levels of anxiety, depression, burnout, addiction, and post-traumatic stress disorder. All of these can have long-term psychological consequences [16].

In the COVID-19 pandemic, significant psychological discomfort is experienced not only by rescue workers, but also by their families.

Thus, in the study carried out by the group of authors, the following were revealed: problems with sleep — in 55% of respondents; appearance of symptoms of stress of mild and moderate severity — in 49; clinically significant symptoms of depression — 12,2; suicidal thoughts — in 8,3% of respondents. Researchers attribute these disorders in family members of rescuers to anxiety for their life and health. And also with disturbance of a habitual course of daily life, reduction of the amount of time spent with the family and children [17].

A number of works devoted to psychophysiological, neurophysiological and subclinical manifestations of cardiovascular diseases can be singled out as a separate independent direction.

The estimation of cortisol level in saliva and its correlation with stress index is given. In this paper, stress was assessed by the Spielberger-Hanin test, designed to determine situational and personality anxiety. A linear regression was used to determine associations between stress indexes and various cortisol parameters, adjusted for age, gender, race/ethnicity, increased waist volume and smoking status. A significant positive relationship was found between stress indices (general stress, physical hazard stress, and lack of support in the past month) and daily cortisol levels [18].

Undoubtedly, professional activity in the conditions of rescue work and emergency medical care entails stress. It is associated with the need to solve a large number of tasks in the shortest possible time. Prolonged exposure to the factor can accelerate the development of processes of body maladaptation to the environment with the subsequent formation of various psychosomatic conditions. This will be characterized by nonspecific changes in the hormonal status in the form of a functional decrease in the production of thyroid hormones, as well as increased levels of cortisol. Changes in the brain neurotransmitter systems result in a sharp inhibition of almost all nonspecific cellular and humoral immune protection factors [19, 20].

In recent decades, intensive work has been done to develop strategies, techniques and algorithms for early pre-diagnosis and timely measures to prevent mental disadaptation in rescue service professionals [21].

In Great Britain a set of measures on support as well as recommendations on communication and reduction of social tension; on self-help strategies (for example, rest, work breaks, sleep, shift work, fatigue, healthy lifestyle) and management of emotions (for example, moral trauma, overcoming difficulties, guilt, grief, fear, anxiety, depression, prevention of emotional burnout and psychological trauma) were developed. All of them are aimed at mitigating the impact of the COVID-19 pandemic on the mental health of medical professionals [22]. It is necessary to use all modern experience in providing psychological and other support to professionals providing medical care in the conditions of the COVID-19 pandemic [23].

It stands to reason that special importance is attached to the preparation of medical students for terrorism, natural

disasters and emergencies. The authors note that often the educational needs of students differ from the needs of practical medicine. A list of basic competencies that medical students should possess in order to provide qualified medical, including psychological, assistance in an emergency situation has been proposed [24].

At the same time, it is proposed to expand the practical part of the classes fostering skills of rendering assistance. Since, according to specialists' estimates, in a number of medical institutions the level of emergency preparedness is quite low and, according to the average calculated indicators, is 45.6%. And the readiness for emergency response and emergency measures is 33.3% [25-27].

Specialists have developed and implemented new methods and approaches to support medical specialists taking part in the liquidation of medical and sanitary consequences of emergencies. The normative legal regulation of psychophysiological examination of personnel during periodic medical examinations has been substantiated, which will allow to keep the "health of the healthy" [28].

The use of a comprehensive program of psychological correction "Shield" makes it possible to improve the functional state of the nervous and cardiovascular system. It increases general work capacity as well as the subjective assessment of the psychological and somatic state of the specialists, which in turn allows to maintain the professional longevity of the specialists [29].

Thus, the given study showed that despite an abundance of scientific literature, the prevalence and level of PTSD in medical professionals and rescue workers is currently understudied. While professionals in professional groups such as police and firefighters prepare for the risk of developing PTSD and learn possible self-regulation techniques to improve mental health during their training, medical professionals often lack such training modules.

The need to develop preventive measures, which should be aimed at helping professionals who are at risk, remains urgent. Also, there is the need to develop more adaptive coping strategies — relaxation training — to manage compulsive symptoms of hypervigilance and re-experiencing.

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