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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНИТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman** (**Кириллица**), для текста на грузинском языке следует использовать **AcadNusx.** Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - http://www.spinesurgery.ru/files/publish.pdf и http://www.nlm.nih.gov/bsd/uniform_requirements.html
В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректура авторам не высылается, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or compu-ter-printed on a single side of standard typing paper, with the left margin of **3** centimeters width, and **1.5** spacing between the lines, typeface - **Times New Roman** (**Cyrillic**), print size - **12** (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf
In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

Articles that Fail to Meet the Aforementioned Requirements are not Assigned to be Reviewed.

ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე,დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx.** შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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POST-TRAUMATIC STRESS DISORDER AMONG EMERGENCY RESPONDERS AND VICTIMS OF DISASTERS IN KAZAKHSTAN: PREVALENCE, RISK FACTORS, AND REHABILITATION NEEDS

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Abstract.

Introduction: Natural and man-made emergencies have a significant long-term medical and psychological impact on both victims and emergency response personnel. Post-Traumatic Stress Disorder (PTSD) is one of the most common mental health consequences in these groups. However, comprehensive assessments of rehabilitation needs in Kazakhstan remain limited.

Objective: To assess the need for medical and psychological rehabilitation and to identify the main risk factors for PTSD among emergency response personnel and victims of emergencies.

Materials and Methods: A cross-sectional study was conducted in Kazakhstan between 2021 and 2023 with prospectively planned data collection through structured interviews and surveys, involving 872 participants: 551 emergency service workers and 321 victims. The assessment included structured questionnaires (demographic, professional, and medical data), a Structured Clinical Interview (SCID), and the Mississippi PTSD Scale. Statistical analysis included descriptive statistics, correlation analysis, multivariate logistic regression, and ROC analysis of diagnostic accuracy.

Results: PTSD symptoms were identified in 17.3% of emergency response personnel and 33.1% of victims. Independent risk factors for PTSD included belonging to the victim group (OR = 1.72; 95% CI: 1.3–2.4; $p < 0.001$), age (OR = 1.05 per year; $p = 0.003$), and length of service in emergencies (OR = 1.03 per year; $p = 0.048$). A moderate positive correlation was found between age and severity of PTSD symptoms ($r = 0.42$; $p < 0.001$). The Mississippi PTSD Scale demonstrated high diagnostic accuracy (AUC = 0.82; 95% CI: 0.77–0.87) at an optimal cut-off score of 78.

Conclusion: Both victims and emergency response personnel show a significant need for medical and psychological rehabilitation. Early diagnosis and targeted rehabilitation programs are essential to reduce long-term psychological consequences in high-risk groups. The Mississippi PTSD Scale can be used as an effective screening tool in post-disaster rehabilitation practice.

Key words. Post-traumatic stress disorder, emergency response personnel, victims, medical rehabilitation, psychological rehabilitation.

Introduction.

Natural and man-made emergencies remain among the key factors that exert long-term negative impacts on public health [1,2]. The scale of modern disasters is accompanied not only by physical injuries but also by the development of various forms of psycho-emotional disorders in both directly affected individuals and professional participants in disaster response — emergency rescue service personnel [3,4].

In addition to physical damage, the consequences of psychological trauma — primarily the development of post-traumatic stress disorder (PTSD), anxiety and depressive states, and psychosomatic disorders — form a significant medical and social problem [5]. The duration, persistence, and severity of these disorders determine a high demand for systematic medical and psychological rehabilitation as a mandatory component of subsequent health recovery and restoration of working capacity [6].

In this context, the study of professional emergency rescue service personnel becomes particularly important [7]. Unlike a single traumatic impact, they are repeatedly exposed to psychotraumatic factors while working in disaster zones [8]. These groups are characterized by a combination of physical strain, constant readiness for extreme conditions, high emotional responsibility for the lives of others, and professional burnout [9]. At the same time, in some cases, their own rehabilitation needs are underestimated within the healthcare system [10].

In Kazakhstan, comprehensive assessments of the medical and psychological consequences of emergencies — especially regarding systematic rehabilitation of emergency service personnel — remain understudied. Available data are mainly limited to general estimates of the scope of medical care during emergencies [11], whereas precise epidemiological assessments of PTSD severity, rehabilitation needs structure, and risk factors are insufficiently covered [12,13].

In this regard, the study of medical and psychological rehabilitation needs among both professional disaster response service personnel and affected individuals is of particular relevance.

Accordingly, the aim of this study is to conduct a comprehensive assessment of the health status, psycho-emotional condition, and medical and psychological rehabilitation needs among emergency rescue service personnel and individuals affected by emergencies.

Materials and Methods.

Ethical issues:

The study was approved by the Local Ethics Committee of the "S.D. Asfendiyarov Kazakh National University" (Protocol No. 4, May 4, 2016). All participants provided written informed consent to participate in the study.

Study design:

A cross-sectional study was conducted using sociological, clinical-psychological, and statistical analysis methods aimed at assessing the need for medical and psychological rehabilitation among emergency response personnel and individuals affected by natural and man-made disasters.

Setting:

The study was conducted between 2021 and 2023 in the Republic of Kazakhstan, based on emergency response service organizations in the city of Almaty, as well as among individuals affected by various emergency situations.

Study participants:

The study included 872 respondents, of whom 551 were emergency response personnel (firefighters, rescuers, mountain rescuers, divers, medical staff, and psychologists) and 321 were individuals affected by emergency situations (various natural and man-made disasters).

- **Inclusion criteria:** participation in disaster response (for personnel), documented evidence of exposure to an emergency situation (for victims), age over 18 years, and provision of written informed consent.
- **Exclusion criteria:** refusal to participate in the study, presence of acute mental disorders preventing adequate survey participation, absence of confirmed involvement in an emergency.

Survey:

A specially developed structured questionnaire was used, consisting of the following sections: demographic data (age, sex, work experience, professional affiliation); assessment of physical health status (presence of injuries, chronic diseases, acute conditions after the emergency); subjective assessment of the need for medical and psychological rehabilitation; frequency of medical examinations.

The survey was conducted in person with strict confidentiality.

Psychological testing:

To diagnose the severity of post-traumatic stress disorder, the following tools were used: a structured clinical interview (SCID) based on a modified PTSD assessment scale (according to ICD and DSM criteria); and the Mississippi PTSD Scale designed for quantitative assessment of symptom severity. Additionally, the number and type of experienced emergency situations and participants' social status were taken into account.

The Mississippi PTSD Scale was selected for its well-established use in assessing PTSD symptom severity among populations with high exposure to trauma, including emergency responders. While not originally validated in the Kazakh population, the scale was translated into Russian/Kazakh using forward and backward translation by bilingual clinical psychologists. To assess internal consistency, Cronbach's alpha coefficient was calculated. Values greater than 0.6 were deemed acceptable, while values below 0.5 were regarded as indicating inadequate reliability in this study. Preliminary pilot testing showed good internal consistency (Cronbach's α =0.695). The threshold of 78 points was chosen based on ROC analysis in this sample, yielding the best balance between sensitivity (81.5%) and specificity (74.3%).

Statistical analysis:

Statistical data analysis was performed using SPSS 26.0 software. The following methods were applied: descriptive statistics (mean, standard deviation, median, interquartile range); Pearson's chi-squared test (χ^2) for analysis of frequency differences; Pearson's correlation coefficient (r) to assess the relationship between age and PTSD symptom severity; univariate and multivariate logistic regression analysis (with OR and 95% CI calculation); ROC analysis to assess the diagnostic effectiveness of the Mississippi Scale. A p-value of < 0.05 was considered statistically significant.

Results.

General characteristics of study participants:

The study included 872 respondents, of whom 551 (63.2%) were emergency response personnel and 321 (36.8%) were individuals affected by emergencies.

The average age of emergency response personnel was 35.2 ± 5.8 years (median: 35 years; interquartile range: 31–39 years), while the average age of the affected individuals was higher — 42.5 ± 7.2 years (median: 42 years; interquartile range: 37–48 years). The average length of service in emergency response among the personnel was 8.5 ± 3.2 years.

In terms of professional affiliation among emergency response personnel, firefighters predominated (48.2%), followed by mountain rescuers (12.5%), medical personnel and psychologists (9.8%), divers (6.7%), and other specialists (22.8%).

Frequency and structure of health disorders:

The types of health disorders following participation in disaster response among emergency service personnel are presented in Table 1. The most common disorders among the respondents were psychoemotional and psychosomatic disorders, accounting for 40.4% (n=201) of all recorded cases. This type of disorder contributed the most to the overall χ^2 value (χ^2 = 103.2), indicating its significant prevalence and importance. The next most frequent were exacerbations of chronic diseases — 17.3% (n=86); however, their contribution to the χ^2 was the lowest (χ^2 = 1.9), suggesting a less pronounced statistical difference for this category. Acute somatic and infectious diseases were identified in 15.1% (n=75) of personnel and demonstrated a moderate contribution to group differences (χ^2 = 6.1). It is particularly noteworthy that injuries and wounds accounted for a very small proportion — only 1.4% (n=7); however, despite the low number, this category made a high contribution to the χ^2 (χ^2 = 86.1), indicating a statistically significant deviation from

Table 1. *Types of health disorders after participation in emergency response among rescue service personnel.*

Type of Disorder	Number (n)	Percentage (%)	χ^2 Contribution
Psychoemotional and psychosomatic disorders	201	40.4	High ($\chi^2 = 103.2$)
Exacerbation of chronic diseases	86	17.3	Low ($\chi^2 = 1.9$)
Acute somatic and infectious diseases	75	15.1	Moderate ($\chi^2 = 6.1$)
Injuries and wounds	7	1.4	High ($\chi^2 = 86.1$)
Other	129	25.9	Moderate ($\chi^2 = 8.7$)
Total	**498**	**100**	($\chi^2 = 305.3$)

Table 2. *Assessment of PTSD severity using SCID and Mississippi scale for PTSD.*

Group	Number of Participants (n)	SCID (M ± SD)	Mississippi Scale (M ± SD)	Proportion with Severe PTSD (%)	p-value (SCID / Mississippi)
Responders	551	23.75 ± 4.10	74.64 ± 5.80	17.3%	< 0.001 / < 0.001
Victims	321	34.51 ± 5.20	81.97 ± 6.15	33.1%	

Table 3. *Risk Factors for PTSD.*

Variable	OR	95% CI	SE	Wald	p-value
Victims vs. Responders	1,72	1,3–2,4	0,16	15,24	<0,001
Age (per year increase)	1,05	1,02–1,09	0,017	8,97	0,003
Experience in emergency response (per year)	1,03	1,00–1,07	0,018	3,90	0,048

Table 4. *Results of ROC analysis of the diagnostic performance of the Mississippi PTSD scale.*

Indicator	AUC	95% CI	Cut-off	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
Mississippi PTSD Scale	0.82	0.77–0.87	78	81.5	74.3	80.0	76.1

expected values. The "other" category covered 25.9% (n=129) of disorders and was characterized by a moderate contribution to the overall χ^2 value ($\chi^2 = 8.7$). The total Pearson's chi-squared value was $\chi^2 = 305.3$ ($p < 0.0001$).

Assessment of PTSD severity and the need for medical and psychological rehabilitation:

The results of PTSD severity assessment using SCID and the Mississippi PTSD Scale are presented in Table 2. The assessment of post-traumatic stress disorder (PTSD) severity, conducted using the Structured Clinical Interview for SCID and the Mississippi PTSD Scale, revealed statistically significant differences between the groups of rescuers and victims ($p < 0.001$ for both scales). Among the victims, the mean SCID score was 34.51 ± 5.20, and the Mississippi scale score was 81.97 ± 6.15; whereas among rescuers, the scores were 23.75 ± 4.10 and 74.64 ± 5.80, respectively. The proportion of individuals with pronounced signs of PTSD among the victims reached 33.1%, while among rescuers it was 17.3%.

Subjective need for psychological rehabilitation among emergency response personnel was identified in 303 individuals (55.0%); at the same time, 150 individuals (27.2%) reported no such need, and 17.8% found it difficult to answer ($\chi^2 = 121.4$; $p < 0.0001$).

Comparative analysis of PTSD risk between groups:

The comparison of the risk of developing post-traumatic stress disorder (PTSD) among victims versus emergency responders showed that the likelihood of developing PTSD was significantly higher among victims compared to emergency responders (OR = 1.56; 95% CI: 1.2–3.1; $p < 0.001$).

Risk Factors for PTSD (Multivariate Logistic Regression) are presented in Table 3. Multivariate logistic regression analysis identified three independent factors associated with an increased risk of developing post-traumatic stress disorder (PTSD). It was found that individuals directly affected by emergencies had a significantly higher risk of PTSD compared to rescue service personnel (OR = 1.72; 95% CI: 1.3–2.4; $p < 0.001$).

A significant association was also found between age and PTSD risk: with each additional year of life, the likelihood of developing the disorder increased (OR = 1.05; 95% CI: 1.02–1.09; $p = 0.003$).

Finally, a longer duration of participation in emergency response was also identified as a predictor of PTSD (OR = 1.03; 95% CI: 1.00–1.07; $p = 0.048$).

Relationship Between Age and PTSD Severity:

A moderate positive correlation was found between participants' age and PTSD severity as measured by the Mississippi Scale ($r = 0.42$; 95% CI: 0.32–0.51; SE = 0.05; $p < 0.001$), indicating that PTSD symptom severity increases with age.

Diagnostic accuracy of the scales (ROC analysis):

The results of the ROC analysis of the diagnostic performance of the Mississippi PTSD Scale are presented in Table 4. The Mississippi PTSD Scale demonstrated high diagnostic accuracy in identifying patients with pronounced PTSD symptoms. According to the ROC analysis, the area under the curve (AUC) was 0.82 (95% CI: 0.77–0.87), indicating good discriminative ability of the scale. The optimal cut-off point was 78 points, at which the sensitivity was 81.5% and specificity was 74.3%. The positive predictive value (PPV) was 80.0%, and the negative predictive value (NPV) was 76.1%.

Discussion.

The data obtained in the course of the study confirm the high prevalence of psychoemotional and psychosomatic disorders both among emergency response personnel and among victims exposed to emergency situations. Exposure to traumatic life events can affect the prevalence of PTSD among workers and overall quality of life [14]. In our study, particular attention should be given to the high proportion of individuals with pronounced PTSD symptoms, which underscores the importance of a systematic approach to medical and psychological rehabilitation in both groups.

Among emergency response personnel, PTSD was diagnosed in 17.3% of cases, which is comparable to data from several international studies where the prevalence of PTSD in professional rescuers ranges from 10% to 20%, depending on years of service, occupational profile, and exposure intensity. For example, systematic review and meta-regression analysis of the worldwide current prevalence and correlates of PTSD in rescue workers based on 40 samples with 20,424 rescuers showed that worldwide pooled current prevalence was 10% [6]. Among victims, the proportion of PTSD was 33.1%, confirming the general trend of higher vulnerability among those directly affected by traumatic events compared to professional groups, as previously reported [15-17]. This difference is confirmed both by the mean scores on the SCID and Mississippi scales ($p < 0.001$), and by the odds ratio (OR = 1.56; 95% CI: 1.2–3.1). The results of multivariate analysis demonstrated the independent contribution of age and professional experience to increased PTSD risk. Similar patterns have been noted in studies of Western cohorts, where age is considered a factor of cumulative traumatic experience and age-related decline in adaptive capacity [18-20]. The moderate positive correlation between age and severity of PTSD symptoms identified in our study ($r = 0.42$; $p < 0.001$) also supports these findings.

The high diagnostic accuracy of the Mississippi PTSD Scale (AUC = 0.82) confirms the validity of its application in the comprehensive assessment of the psychoemotional state of individuals exposed to emergencies. The tool has several cut-off scores recommended by various studies [21]. The identified optimal diagnostic cut-off score of 78 points demonstrates good sensitivity (81.5%) and specificity (74.3%) of the scale, which may be practically useful for selecting patients for further in-depth psychiatric evaluation and rehabilitation programs.

It is also important to highlight the high demand for psychological rehabilitation identified among emergency response personnel (55%). Despite the relatively lower prevalence of PTSD compared to the group of victims, professional rescuers often underestimate the severity of their own symptoms, which necessitates the implementation of regular screening programs and preventive psychocorrectional interventions [22]. Given the limited number of high-quality randomized controlled trials, future research should focus on conducting multi-arm studies to validate and compare the effectiveness of different interventions, thereby identifying the most optimal approach for improving psychological outcomes in disaster-affected populations and emergency responders [23,24].

Conclusion.

Emergencies have a significant impact on both the physical and psycho-emotional state of emergency response personnel and affected individuals. The prevalence of pronounced symptoms of post-traumatic stress disorder was 17.3% among emergency responders and 33.1% among victims, confirming the need for active diagnosis and early detection of PTSD in both risk groups. The main factors associated with an increased risk of developing PTSD are belonging to the group of victims, older age, and longer experience in responding to emergencies. The Mississippi PTSD Scale demonstrated high diagnostic effectiveness (AUC = 0.82), confirming its applicability for screening purposes in the practice of comprehensive assessment of individuals affected by emergencies. The obtained results confirm the need for a systematic organization of medical and psychological rehabilitation not only among victims but also among professional rescue service personnel, taking into account their occupational risks and chronic accumulation of stress factors.

Strengths and limitations.

This study has several strengths, but also some limitations. The strengths include a comprehensive design involving two key risk groups; the use of validated scales for PTSD assessment; and the implementation of multivariate analysis considering several predictors. On the other hand, the limitations of the study include its implementation within a single region of Kazakhstan, which restricts the generalizability of the findings; the lack of extensive investigation into the long-term consequences of PTSD over time; and the absence of longitudinal monitoring of the participants' condition. Despite the fact the study employed prospectively organized data collection, its cross-sectional design precludes causal inference. The obtained data confirm the need to enhance the focus on medical and psychological rehabilitation within the structure of emergency response services for both affected populations and professional emergency response personnel. Although sex and chronic disease status are acknowledged as potential confounders in PTSD research, our study focused primarily on exposure-related predictors, namely group affiliation, age, and emergency service experience. These variables were selected based on their direct relevance to trauma exposure mechanisms. The inclusion of sex and health status, while potentially informative, was outside the scope of our main hypothesis and did not substantially alter the primary associations in exploratory models. Nonetheless, their role warrants further investigation in future longitudinal studies.

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Conflicts of interest statement.

The authors declare no conflict of interest.

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