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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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RESULTS OF MEDICAL CARE FOR PERSONS WITH POLYTRAUMA IN ALMATY AND CORRECTION OF THE ORGANIZATIONAL APPROACH

Abylay Baimakhanov[1], Ainash Oshibayeva[2], Temirkhan Kozhakhmetov[2], Nazarbek Omarov[3]*, Dinara Akhmetzhanova[3], Berikuly Duman[3].

[1]JSC "Asfendiyarov National Medical University", Almaty, Republic of Kazakhstan.

[2]Al Farabi Kazakh National University, Almaty, Republic of Kazakhstan.

[3]Non – Commercial Joint-Stock Company "Semey Medical University", Republic of Kazakhstan.

Abstract.

Organizational aspects of patient management play an important role in ensuring adequate diagnosis, treatment, and rehabilitation. They are especially important in severe acute conditions in therapeutic, surgical practice, and traumatology. Polytrauma occupies a special place among traumatic injuries, is allocated to a special category at the level of all stages of medical care for patients with traumatic injuries.

The purpose of the study was to evaluate the effectiveness of providing care to patients with polytrauma in a metropolis (Almaty), including when using a modified management program at the prehospital and hospital stages. Research base: Emergency medical care organizations in Almaty, clinics providing hospital medical care to patients with injuries in Almaty. The general characteristics of polytrauma in the conditions of the Kazakh metropolis - Almaty - allows us to note its relatively moderate prevalence, combined with high mortality, which causes a significant part of the negative outcomes of traumatic injuries in general.

According to some data, the mortality rate for multiple injuries in a metropolitan area ranges from 18% to 32%, depending on the severity of the condition, the timeliness of assistance, and the coordination of actions between the stages of prehospital and hospital treatment.

Key words. Polytrauma, emergency care, mortality, specialized care.

Introduction.

Traumatic injuries are one of the most important causes of mortality and disability, including in the modern world [1,2]. In the Republic of Kazakhstan, this cause is on the 4th place in the overall mortality structure and on the 2nd place in the mortality rate of persons under 48 [3].

The ambiguous trends of changes in the structure of human activity and the structure of the population also do not allow us to make unambiguous conclusions about the dynamics of injury severity. On the one hand, the exclusion of most of the able-bodied population from participation in physical and mechanized labor reduces the risk of severe occupational injuries; on the other hand, the sharp increase in the volume of passenger transportation by land transport increases this risk [4].

The degree of risk in trauma is a complex function of the localization, other characteristics of a particular injury, the general condition of the body, the injured person, and other factors (including those related to the efficiency and quality of medical care) [5]. The presence of polytrauma in this case is a factor that is among the decisive ones. Simultaneous damage of supporting-motor apparatus (SMA) and somatic organs, CNS, widespread damage of SMA segments is usually associated with the impact of great force or minimal resistance of the organism to damage (in particular, due to senile involution) [6].

As a result, polytrauma acts as a systemic problem, the solution of which, firstly, cannot be complete in existing conditions, because quite often injuries are immediately incompatible with life, and secondly, the organizational and technical capabilities of the medical care system cannot provide the full scope of necessary measures to preserve life and prevent other severe consequences in the early period [7]. Provision of emergency and urgent care and subsequent stages of medical care in all cases remains a compromise between the ideal and the existing organizational and technical capabilities [8-10].

The aim of the study was to assess the effectiveness of care for patients with polytrauma in a metropolitan area (Almaty), including the use of a modified management program at the pre-hospital and hospital stages. Thus, the study aims to answer the key question: can the implementation of structured polytrauma management programs significantly reduce mortality rates and improve outcomes in a resource-limited metropolitan setting.

Materials and Methods.

The study design is a longitudinal organizational and clinical study.

Study base: Emergency medical care organizations of Almaty, clinics providing hospital medical care to patients with injuries in Almaty.

Terms of the study: January 2016-May 2020.

Organizational scheme of the study. The work was carried out in three stages. At the first stage, the results of medical care to persons with polytrauma in the conditions of Almaty for the period 2016-2019 were analyzed. Negative outcomes and their circumstances and main causes were identified. At the second stage (2020-2021), a thorough analysis of the actions of emergency medical services, hospitals providing care to patients with injuries and their interaction was performed. The most common mistakes and organizational shortcomings that are the potential causes of complications and adverse outcomes in polytrauma were identified and ways to eliminate them were outlined. At the third stage (2021), organizational measures aimed at improving the care of patients with polytrauma were implemented and their effectiveness was evaluated.

Scope of the study: At the stage of archival study, the case histories and other medical documents of 25738 persons with injuries who were treated in Almaty were analyzed, including 2840 persons with diagnosed polytrauma.

At the second stage, the analysis of the actions of medical workers and the outcomes of the management of patients with polytrauma was performed using the materials of 355 injured persons.

The third stage included data from 133 cases. Fatal outcomes, assignment of disability group, or recovery during follow-up were considered as "endpoints" at all stages.

Study methods: at the first stage, we used a method of archival analysis involving a systematic study of archival materials (official medical documents of the ER and hospital stage). At the second stage, methods of questionnaire survey of employees of medical organizations and patients were additionally used. The third stage was performed with the personal participation of the researcher and medical workers instructed and consulted by him. The results of standard (defined by the current clinical protocol) methods of examination of patients with traumatic injuries, including physical, laboratory, instrumental and consultations of specialists with a high level of competence were used in the work.

The significance of deviations from protocols and errors in the diagnostic process and management at the stages of care delivery was assessed in the absence of a conclusion about the presence of fatal injury.

In the analysis of incapacity for work, individuals who received disability group 1, 2, and, temporarily 3 were taken into account if long-term rehabilitation was necessary.

Before proceeding to the third stage, a complex of measures aimed to improving the diagnosis and treatment of polytrauma was performed, including the introduction of a specialized organizational algorithm and training of the emergency care personnel and hospital physicians involved in the care of the injured.

Statistical methods. Frequency rates were compared using Pearson's $\chi 2$ criterion, with Yates' correction if necessary.

Factor analysis was performed with principal component separation and the varimax rotation method. Both binary and continuous variables were used as variables in the factor analysis.

To refute the null hypothesis about the absence of significant differences, the boundary criterion $p<0,05$ was taken.

Results.

The results of the first stage in terms of the ratio of the total number of traumatic injuries and polytrauma, as well as their outcomes in an epidemiological analysis are presented in Table 1.

The sharp and significant excess of mortality and disability in polytrauma is noteworthy. The differences with diagnosed trauma of isolated localization in terms of mortality are 5.36 times (χ=145, $p<0.001$), disability - 3.1 times (χ=58.8, $p<0.001$). These differences mainly reflect the peculiarities of polytrauma as an injury usually associated with exposure to great force, resulting in a sharp increase in the number of cases where the degree of organ structure and function impairment is incompatible with life. The results of factor analysis are presented in Table 2.

The factors identified in the epidemiologic study phase associated with impaired casualty management had a medium level of significance with respect to both mortality and disability. Factors such as older age, presence of comorbidities, and severity of injury related to transport etiology contributed more.

However, these data were corrected to some extent in the second phase of the study, with a more thorough analysis of patient management. Table 3 presents the comparative rates of adverse outcomes reported in the second phase of the study with the structure of potential factors.

The revealed irregularities and errors made by medical personnel in the management of patients with polytrauma in the factor analysis come second after the elderly age in terms of mortality in the evaluation of the emergency stage and also second in terms of disability in the evaluation of the hospital stage. The data of the corresponding analysis for individual deficiencies are presented in Table 4.

Overall, 0.83 errors and/or deficiencies were identified per patient at the emergency stage, and 0.20 at the hospital stage. We should point out, first of all, the lack of detection of polytrauma and/or underestimation of the severity of the injured person's

Table 1. *Frequency of polytrauma in the structure of traumatic injuries at the first stage of the study and its outcomes.*

Indicator	**Total number of injured**		**Isolated trauma**		**Polytrauma**	
	Abs. number	**%**	**Abs. number**	**%**	**Abs. number**	**%**
Total number	25738	100	22898	89,0	2840	11,0
Mortality	1590	6,2	955	4,2	635	22,4
Including at prehospital stage	895	3,5	606	2,6	289	10,2
Physical disability	1395	5,4	1008	4,4	387	13,6

Table 2. *Risk factors for mortality and disability in polytrauma patients at the first stage of the study.*

Factor	**Mortality**		**Disablement**	
	Contribution	**Significance**	**Contribution**	**Significance**
Age over 60	36,5	<0,001	29,6	<0,001
Two or more chronic diseases	16,2	0,006	18,4	0,005
Traffic accident injury	14,8	0,008	12,9	0,011
Male	10.3	0,014	6,2	0,170
Violations in the management of patients at pre-hospital stage	8,3	0,037	7,7	0,049
Violations in the management of patients at hospital stage	6,5	0,142	11,5	0,015
Note - the table shows factors with a contribution of more than 5%				

Table 3. *Risk factors for adverse outcomes in stage 2 analysis.*

Factor	Mortality		Disablement	
	Contribution	**Significance**	**Contribution**	**Significance**
Age over 60	32,2	<0,001	20,8	0,006
Violations in the management of patients at pre-hospital stage	19,4	0,007	11,5	0,023
Two or more chronic diseases	14,8	0,015	16,0	0,013
Violations in the management of patients at hospital stage	12,9	0,020	17,5	0,011
Traffic accident injury	10,0	0,037	6,1	0,073
Note - the table shows factors with a contribution of more than 5%				

Table 4. *Frequency of errors and deficiencies in the management of polytrauma patients in the pre-hospital and hospital stages.*

Deficiency characteristics	Pre-hospital stage (n=355)		Hospital stage (n=319)	
	Abs.	**%**	**Abs.**	**%**
Failure to detect the presence of polytrauma*	79	22,3	11	3,4
Inadequate correction of vital defects#	56	15,8	17	5,3
Underestimation of the severity of the condition	74	20,8	22	0,0
Long transportation	38	10,7	-	-
Unreasonable delays in medical assistance	15	4,2	37	11,6
Inadequate transport immobilization	30	8,5	-	-
Notes: * - during the initial examination at both stages # - at hospital stage – within the first 24 hours				

condition (which were clearly associated with each other) at the emergency care stage and the prevalence of unreasonable delays in medical care - at the hospital stage.

The use of a set of methods for the prevention and correction of violations and errors in the management of patients with polytrauma made it possible to achieve certain results revealed at the 3rd stage of the study.

A comparative analysis of the frequency of violations and errors in medical care identified at stages 2 and 3 of the study is presented in Figure 1.

In contrast to the second stage, the cumulative frequency of detected defects was 47.8%, and they occurred in 32.7% of patients. The differences with the second stage group were significant ($\chi2=52.83$, $p<0.001$).

Figure 2 shows the frequency of negative outcomes depending on the stage of the study.

Overall mortality had a moderate and non-significant decrease in stage 3 compared with stages 1 and 2. However, this reduction was mainly obtained at pre-hospital stage, for which the most significant organizational measures were implemented. The difference in favor of the stage 3 group was 31.7% ($\chi2=1.451$, $p=0.229$).

More significant differences were obtained with respect to the disability of patients after injury. They reached 45.5% compared to the stage 2 group ($\chi2=3.898$, $p=0.050$).

Discussion.

The general characteristic of polytrauma in the conditions of the Kazakhstan megalopolis, Almaty, allows noting its relatively moderate prevalence combined with a high lethality, which accounts for a significant proportion of the negative outcomes of traumatic injuries in general.

However, at the level of emergency medical care and partly in hospital care, this aspect is not taken into account sufficiently, and the management of patients with polytrauma in most cases has no features in relation to isolated injuries. As a result, frequent errors and violations of patient management protocols, especially at the emergency care level, are among the factors of negative outcome. Such phenomena have been found in more than half of cases of multitrauma patient management, and factor analysis has identified up to a quarter of the contribution to the development of negative outcomes, which can be considered as very important [11-13].

Conducting factor analysis in an epidemiological study based on archived data is associated with a high risk of systematic and non-systematic errors [14]. However, the data obtained in our study on the degree of significance of differences, taking into account the only possible in practice tendencies to underestimate the frequency of deviations from the protocol, reliably indicate the role of maladministration of patients with polytrauma in increasing mortality and disability.

Correcting organizational approaches to medical care for polytrauma patients contributed to decrease in the incidence of errors and management irregularities, which was found to be significant. However, significant differences between the groups studied in terms of the frequency of negative outcomes were not recorded because the contribution of the severity of injury and irreversible impairment of vital functions to the outcomes in polytrauma is very high [15].

Compared to current international literature, which often reports the contribution of prehospital mismanagement to trauma-related mortality in the range of 10–15% [16-17], our study demonstrates a substantially higher figure—19.4% for

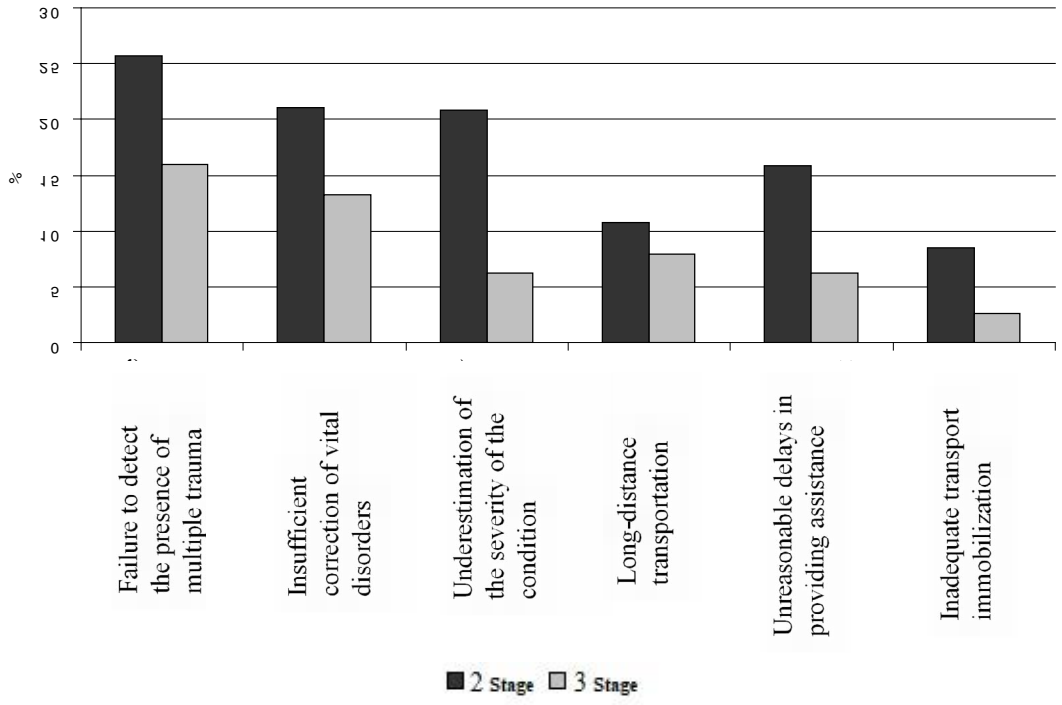

Figure 1. *Frequency of errors and deficiencies in the management of patients with polytrauma depending on the stage of the study.*

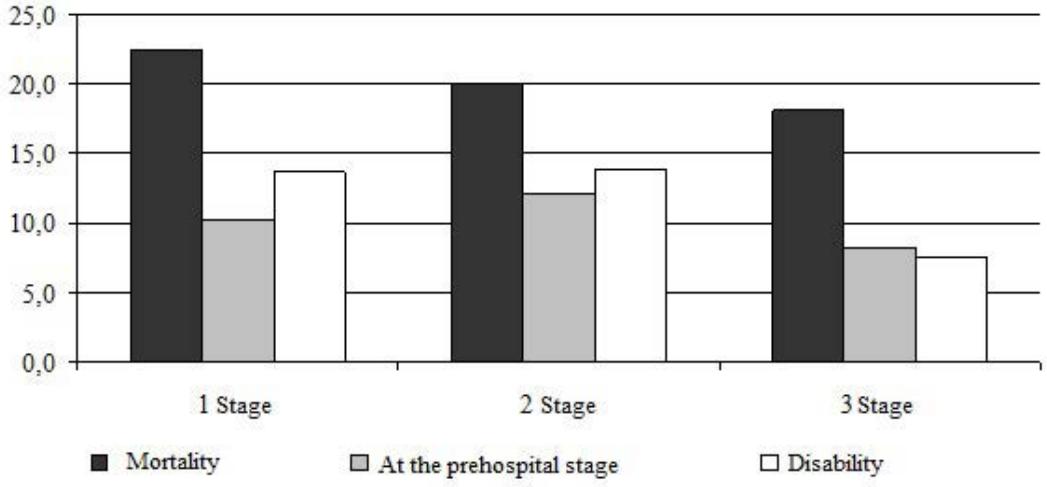

Figure 2. *Comparative characteristics of negative outcomes of polytrauma at the study stages.*

mortality and 11.5% for disability. This reflects not only the gravity of systemic organizational limitations at the prehospital stage in Almaty, but also underscores the potential for significant improvements in patient outcomes through relatively targeted interventions. The identification of this specific contribution rate represents a novel finding in our context and supports the importance of addressing prehospital care as a primary point of failure in polytrauma management.

Nevertheless, the degree of reduction in the frequency of negative results was significant in numerical terms - 31.7-45.5%, which, with an expanded implementation of the approach, would ensure the preservation of life and ability to work for a significant number of individuals.

Despite the strengths of the study, some limitations should be noted such as the lack of randomization and the possibility of unmeasured factors making it difficult to establish causality and the possibility that the results may be confounded by hidden variables.

Conclusion.

Polytrauma remains one of the leading causes of mortality and disability, which is confirmed by a more than fivefold excess of these indicators compared to isolated injuries ($p<0.001$). The analysis showed that a significant part of adverse outcomes is associated with diagnostic and organizational errors, especially at the pre-hospital stage.

The introduction of a modified care program, including staff training and algorithmization of actions, made it possible to significantly reduce the frequency of errors and the level of disability. This confirms the need for a systematic approach and improvement of all stages of medical care for polytrauma.

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