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## ANALYSIS OF THE STAFFING AND STRUCTURE OF THE AMBULANCE SERVICE IN THE REPUBLIC OF KAZAKHSTAN

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### Abstract

**Objectives.** The ambulance service is a crucial component of any healthcare system, providing life-saving care to those in need. The problem of staffing the ambulance service today is of the most acute importance. The state of the ambulance service is now seen as a factor of national security. To study the organization of emergency medical care, a comprehensive characterization of the quality of the personnel potential of an institution and the conditions for its development is of great importance.

**The aim** of this study is to analyze the staffing of emergency medical care in Kazakhstan.

**Materials and methods.** An analysis of the personnel of the ambulance service of the Republic of Kazakhstan for 2018-2021 was carried out.

**Results.** An increase in the number of paramedic teams and decrease in the number of doctor's teams was shown. The percentage of categorization for doctors increased to 68.7%, for nurses to 46.2% in 2021. The coefficient of part-time work in all years remained equal to 1.1. The percentage of staffing for 2018-2021 decreased in all categories in 2021.

**Conclusion.** The Republic of Kazakhstan's ambulance service is still developing in terms of both staffing and organizational structure. Despite a large growth in recent years in the number of ambulance stations, there is still a lack of trained medical people to staff them. One of the measures taken by the government to solve this issue is the expansion of training programs and simulation centers.

**Keywords:** structure, ambulance service, Kazakhstan, staffing, emergency medicine.

### Резюме

## АНАЛИЗ ШТАТОВ И СТРУКТУРЫ СЛУЖБЫ СКОРОЙ МЕДИЦИНСКОЙ ПОМОЩИ В РЕСПУБЛИКЕ КАЗАХСТАН

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**Введение.** Службы неотложной помощи являются важным компонентом любой системы здравоохранения, оказывая жизненно важную помощь тем, кто в ней нуждается. Вопрос кадрового обеспечения службы скорой медицинской помощи является наиболее актуальным на сегодняшний день. Качественное оказание неотложной помощи в настоящее время считается важнейшим фактором национальной безопасности. Для изучения организации скорой медицинской помощи большое значение имеет комплексная характеристика качества кадрового потенциала и условий его развития.

**Целью** данного исследования является анализ кадрового состава скорой медицинской помощи в Казахстане.

**Материалы и методы.** Проведен анализ кадрового состава службы скорой медицинской помощи Республики Казахстан за 2018-2021 годы.

**Результаты** показали увеличение количества фельдшерских бригад и уменьшение количества врачебных бригад. В 2021 году процент категоризации для врачей увеличился до 68,7%, для медсестер до 46,2%. Коэффициент совместительства был равен 1,1 во все годы. Процент укомплектованности кадрами в 2018-2021 годы снизился в 2021 году по всем категориям.

**Заключение.** Численность и структура службы скорой медицинской помощи в Республике Казахстан пока находятся на начальной стадии развития. Хотя количество станций скорой помощи значительно увеличилось за последние годы, по-прежнему ощущается нехватка квалифицированного медицинского персонала для их обеспечения. Правительство усиливает ряд мер, направленных на решение этой проблемы, включая организацию симуляционных центров и программ подготовки кадров.

**Ключевые слова:** структура, скорая помощь, Казахстан, штаты, неотложная медицина.

Түйіндеме

## ҚАЗАҚСТАН РЕСПУБЛИКАСЫНДАҒЫ ЖЕДЕЛ ЖӘРДЕМ ҚЫЗМЕТІНІҢ ШТАТТЫҚ ҚҰРАМЫ МЕН ҚҰРЫЛЫМЫН ТАЛДАУ

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**Кіріспе.** Жедел жәрдем қызметі кез-келген денсаулық сақтау жүйесінің маңызды құрамдас бөлігі болып табылады, ол мұқтаж адамдардың өмірін сақтап қалады. Жедел жәрдем қызметін кадрлармен қамтамасыз ету мәселесі бүгінгі таңда ең өзекті болып отыр. Жедел жәрдем қызметінің жағдайы қазіргі уақытта ұлттық қауіпсіздік факторы ретінде қарастырылуда. Жедел медициналық көмекті ұйымдастыруды зерттеу үшін мекеменің кадрлық әлеуетінің сапасын және оны дамыту жағдайларын жан-жақты сипаттаудың үлкен маңызы бар.

**Зерттеудің мақсаты** – Қазақстандағы жедел медициналық көмектің кадрлық құрамын талдау.

**Материалдар мен әдістер.** Қазақстан Республикасы жедел жәрдем қызметінің 2018-2021 жылдарға арналған жеке құрамына талдау жүргізілді.

**Нәтижелер:** Фельдшерлік бригадалар санының көбеюі және дәрігерлік бригадалар санының азаюы анықталды. 2021 жылы категориясы бар дәрігерлердің пайызы 68,7%-ға, медбикелер үшін 46,2%-ға дейін өсті. Толық емес жұмыс уақыты коэффициенті барлық жылдары 1,1-ге тең болды. 2018-2021 жылдарға арналған кадрлармен қамтамасыз ету пайызы 2021 жылы барлық санаттар бойынша төмендеді.

Қорытынды Қазақстан Республикасында жедел жәрдем қызметінің штаттық саны мен құрылымы әлі де дамудың бастапқы сатысында. Соңғы жылдары жедел жәрдем станцияларының саны айтарлықтай өскенімен, оларды қамтамасыз ететін білікті медициналық кадрлар әлі де жетіспейді. Үкімет осы мәселені шешуге бағытталған бірқатар шараларды, соның ішінде симуляциялық орталықтар мен кадрларды даярлау бағдарламаларын көбейтуде.

**Түйінді сөздер:** құрылымы, жедел жәрдем, Қазақстан, штаттар, шұғыл медицина.

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**Introduction**

At present, the problem of rational use of human resources of the organization is of particular relevance. The most problematic in the personnel sphere are the issues of proper planning of human resources, their staffing, coverage of disproportions in the distribution of qualified personnel. The number of errors in the provision of ambulance depends on the staffing of the ambulance teams and the level of their training [3,4].

Kazakhstan is a country that ranks ninth in the world in terms of territory, so there is a high need for personnel using a scientific and sound system of material incentives, as well as benefits that, first of all, require attracting young professionals where they will be most in demand.

The ambulance service is an essential component of any healthcare system, providing emergency medical care to those in need. In Kazakhstan, the ambulance service is managed by the Ministry of Health, and the primary responsibility for providing pre-hospital care falls on the ambulance crews [8].

The aim of this study is to analyze the staffing and structure of the ambulance service in the Republic of Kazakhstan and compare it with other countries..

**Materials and methods:** An analysis of the personnel of the ambulance service of the Republic of Kazakhstan for 2018-2021 was carried out. Study design: descriptive,

population-based study of the work of ambulance in the Republic of Kazakhstan. All data provided by the ambulance stations of 16 regions of the Republic Kazakhstan.

Statistical analysis of the data was carried out using SPSS version 20.0 (IBM Ireland Product Distribution Limited, Ireland).

**Results****The structure of the ambulance service in the Republic of Kazakhstan**

The Emergency medical care in Kazakhstan is provided by paramedics and specialized (doctor) brigades. Depending on the category of call urgency, the composition of the paramedic team includes: 1) one paramedic; paramedic (or) driver 2) two paramedics and driver. The specialized (medical) team includes: doctor, paramedic, paramedic (or) driver [7].

As shown in Table 1, the number of ambulance stations and substations increased from 213 to 285, from 86 to 130 in 2018-2021. The population served also increased from 18,311,803 to 19,448,251 people. The GPS navigation coverage rate reached 100% in 2021. The number of ambulance brigades also increased from 1,355 to 1,484. There is an increase in paramedic teams from 962 to 1,193 and a decrease in the number of physician teams from 392 to 290, to 290 brigades in 2021.

Table 1.

**The structure of the ambulance service in the Republic of Kazakhstan.**

	2018	2019	2020	2021
Number of independent ambulance stations	19	18	18	18
Number of ambulance stations	213	210	241	285
Number of ambulance substations	86	113	121	130
Number of population served	18,311,803	18,868,520	19,146,512	19,448,251
% equipped with GPS navigation	84.9	100.0	95.0	100.0
Number of EM brigades available per day, total (absolute)	1,355	1,351	1,470	1,484
Paramedical EM brigades	962	1,025	1,163	1,193
Doctor's EM brigades	392	326	307	290
Average daily load (hours)	15,8	15,5	13,3	13,7

According to Table 2, when analyzing the staffing in 2021, there is an increase in paramedics (from 9,507 to 11,812) and a decrease in the number of doctors (1,849 to 1,424) and people without medical education. An increase in the number of paramedic teams and an decrease in the

number of doctor's teams associated with the reform of the emergency care system in Kazakhstan [7]. In general, there is an increase in the number of medical workers from 19,003 people in 2018 to 21,553 people in 2021.

Table 2.

**Staffing with doctors and paramedical workers for the period 2018-2021 in the Republic of Kazakhstan.**

	2018	2019	2020	2021
Staff, total (rates):	22,617.2	25,072.8	24,951.5	26,411.0
Doctors	2,421.0	2,121.5	2,037.0	2,074.3
Paramedics (nursing staff)	10,998.3	12,810.0	13,394.0	14,732.3
Junior medical staff (without medical education)	2,114.5	1,307.8	854.0	806.5
Others	7,083.5	8,833.5	8,666.5	8,798.0
Occupied, total:	21,001.9	23,603.8	23,759.5	23,546.6
Doctors	2,144.6	1,816.0	1,743.8	1,656.5
Paramedics (nursing staff)	10,256.8	12,102.5	12,872.8	12,934.0
Junior medical staff (without medical education)	1,959.3	1,199.3	833.8	729.0
Others	6,641.3	8,486.0	8,309.3	8,227.1
Individuals, total:	19,003	20,680	21,357	21,551
Doctors	1,849	1,506	1,527	1,424
Paramedics (nursing staff)	9,507	10,655	11,585	11,812
Junior medical staff (without medical education)	1,698	985	695	613
Others	5,949	7,534	7,550	7,702

Figure 1 reveals a decrease in the percentage of staffing for 2018-2021, according to which there is a

decrease in all categories in 2021, which is most likely associated with the covid-19 pandemic.

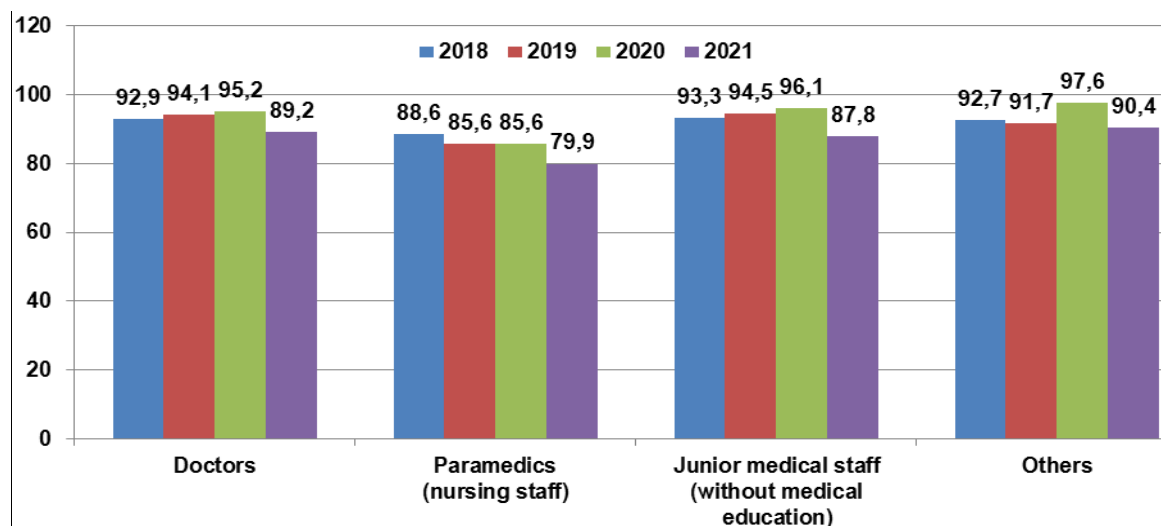


Figure 1. Ambulance staffing dynamics 2018-2021 (%).

The coefficient of part-time work in all years remained equal to 1.1, for doctors 1.2, for nurses 1.1 (Figure 2). In Russia, the coefficient of part-time work is significantly higher for doctors - 1.71 and for nurses - 1.71[4].

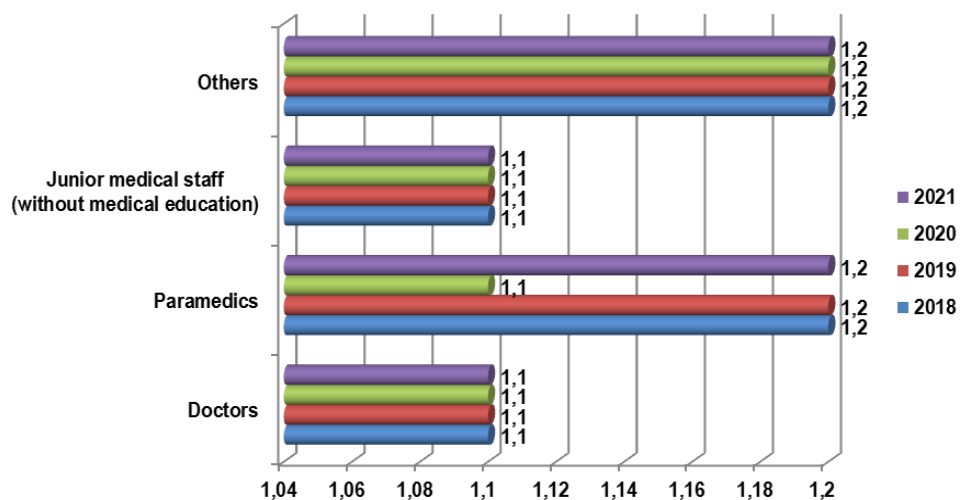


Figure 2. Part-time coefficient in Kazakhstan during 2018-2021.

The state and future development of health care largely depend on the preparation, professional medical staff and supply of them to the health care system as main health resource. The level of qualified specialists depends on competence of the personnel. This indicator can be a relative rating by professional category. Table 3 shows the categories of doctors and nurses. The percentage of categorization of doctors and paramedical personnel has a positive trend. The percentage of categorization for doctors

increased to 68.7%, for nurses to 46.2% in 2021. It should be noted that this indicator must be increased for the quality of emergency care (table 3). On the other hand, the category of medical workers depends on from the number of years worked. The difficult working conditions of medical workers, the state of health sometimes forces workers to change jobs. The low percentage of categorization seems to be associated with high staff turnover.

Table 3.

**Categorization of doctors and nursing staff.**

	2018	2019	2020	2021
<b>% categorization of doctors</b>	52.8	53.9	65.0	68.7
Number of doctors with a category (absolute)	977.1	812	993	978
From which the number of doctors with the highest category (absolute)	439	411	499	499
Number of doctors with the first category (absolute)	333	275	330	314
Number of doctors with the second category (absolute number)	205	126	164	165
<b>% categorization of nursing staff (NS):</b>	41.9	33.3	46.1	45.2
The number of NS with a category (absolute)	3,979	3,543	5,340	5,337
From which the number of NS with the highest category (absolute)	1,946	1,805	2,636	2,538
The number of NS with the first category (absolute)	1,092	1,001	1,594	1,560
The number of NS with the second category (absolute)	941	737	1,110	1,239

## Discussion Structure

In the Republic of Kazakhstan, the ambulance service is structured as a centralized system under the Ministry of Healthcare, with emergency medical services (EMS) provided by the Republican Center of Ambulance (RCA) [6,10]. The ambulance service in Kazakhstan is organized hierarchically, with the RCA at the top overseeing the operations of regional ambulance stations. The RCA is responsible for the management, planning, and coordination of ambulance services across the country. The regional ambulance stations provide EMS to the population of their respective regions.

The structure of the ambulance service in Kazakhstan is similar to that of many other countries, with a three-tier system comprising ambulance stations, ambulance teams, and dispatch centers. However, there are some differences in the structure of the ambulance service between Kazakhstan and other countries. For example, in some countries, such as the United Kingdom and the United States, the ambulance service is organized on a regional or national basis, with a single organization responsible for providing ambulance services across the entire country [3].

In Kazakhstan, the ambulance service is organized on a local basis, with each region responsible for providing ambulance services in its area. This can lead to variations in the quality and availability of ambulance services between different regions. To address this issue, the government has introduced a number of measures aimed at improving the coordination and management of ambulance services across the country.

At present, the ambulance service has been modernized in the Republic of Kazakhstan medical care, including the improvement of emergency medical care in accordance with the best international practices. Launched in July 2017 modernization implies the introduction of a two-level system for providing emergency medical care, the use of a differentiated approach to the provision of emergency

medical care and the introduction of a unified call management information system in the regions, which made it possible to speed up and optimize the processes of receiving and call processing. Ambulance calls have been optimized and grouped by category of urgency. All ambulances in the country brought to the unified republican standard [7].

In order to improve the quality of emergency medical care, a new training system has been introduced service specialists skills in providing emergency medical care in accordance with international standards. On an ongoing basis, practical skills are being developed specialists of regional and city ambulance stations to provide emergency medical care on the basis of simulation rooms of regional and city ambulance stations medical care, as well as during participation in the annual Republican competitions ambulance.

## Comparison with other countries

Compared to other countries, the ambulance service in Kazakhstan is still in the early stages of development. For example, in the United Kingdom, the ambulance service is provided by the National Health Service (NHS), which is one of the largest employers in the world, with over 1.5 million employees. The NHS ambulance service employs over 20,000 staff, including paramedics, emergency medical technicians, and ambulance care assistants [9].

In the United States, the ambulance service is provided by a mix of public and private organizations. There are over 21,000 ambulance services in the US, ranging from large public organizations to small private companies. The total number of ambulance personnel in the US is estimated to be around 260,000, including paramedics, emergency medical technicians, and ambulance drivers [4].

The staffing of the ambulance service in Russia is governed by the Ministry of Health, which sets minimum staffing requirements for ambulance stations. Each ambulance station should have at least one physician, one nurse, and one driver. However, as in Kazakhstan, staffing

levels can vary depending on the availability of qualified personnel [11,7].

Ambulance stations in Russia are equipped with basic medical supplies and equipment, including stretchers, oxygen tanks, and first aid kits. Advanced medical equipment, such as defibrillators, is also available on ambulances, which are staffed by a physician and a nurse.

The staffing and structure of the ambulance service in Kazakhstan are similar to those in Russia. Both countries have a hierarchical system with centralized management and regional ambulance stations responsible for providing EMS. The minimum staffing requirements and equipment available at ambulance stations are also similar in both countries. However, the availability of qualified personnel can be a challenge in both countries, which can impact staffing levels and the quality of care provided.

Emergency medical care for citizens of the Republic of Kazakhstan at the prehospital stage is provided by doctors (21%) and paramedic (79%) of ambulance stations medical care. From knowledge and the skills of medical specialists depend on health, and often the life of the patient. In order for these knowledge and skills were of high quality and time demands, an efficient education system is needed. Since 2017 in the Republic of Kazakhstan active training of ambulance specialists started medical care to international standards providing emergency medical care [1].

The process of training ambulance specialists to international standards contributes to a decrease in performance prehospital mortality, an increase successful resuscitation and increase. According to the results of the first half 2021 in the Republic of Kazakhstan from those subject to train 12,104 medical workers trained: 10,026 BLS (82.8%), 9,982 ACLS (82.5%), 9,631 for PALS (79.6%) and 9,552 for PhTLS (78.9%) [2].

The number of ambulance stations in Kazakhstan has increased significantly over the past decade, with the total number of stations and substations now exceeding 400. However, there is a shortage of qualified medical personnel, including doctors, paramedics, and nurses, to staff these stations. The shortage of medical personnel is a common problem in many countries, and Kazakhstan is no exception. To address this issue, the government has increased the number of simulation centers and training programs, with the aim of producing more qualified medical personnel.

### Conclusion

Compared to other countries, the ambulance service in Kazakhstan is still relatively small, and there is a need for further development and expansion. However, the government's commitment to improving the coordination and management of ambulance services across the country is a positive step towards improving the quality and availability of emergency medical care for the people of Kazakhstan.

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