Received: 15 August 2022 / Accepted: 28 September 2022 / Published online: 31 October 2022

DOI 10.34689/SH.2022.24.5.026

UDC 616-083.88- 14.882

COMPARISON OF EMERGENCY MEDICAL SERVICES IN DIFFERENT COUNTRIES. LITERATURE REVIEW

Assylzhan M. Messova[1], https://orcid.org/0000-0001-5373-0523
Lyudmila M. Pivina[1], https://orcid.org/0000-0002-8035-4866
Diana G. Ygiyeva[1], https://orcid.org/0000-0001-8391-8842
Galymzhan N. Abilov[2],
Almas A. Dyussupov[1], https://orcid.org/ 0000-0002-2086-8873
Gulnara B. Batenova[1], https://orcid.org/0000-0003-3198-1860
Arman S. Bayanbaev[3],
Ayaulym E. Akhmetova[1], https://orcid.org/ 0000-0002-4593-9404
Askar S. Serikbaev[1], https://orcid.org/ 0000-0002-6077-5065
Gabdygali Z. Ygiyev[4],
[1] NCJSC «Semey Medical University», Semey c., Republic of Kazakhstan;
[2] NCJSC "Social Health Insurance Fund", The Branch in the Abay region, Semey c., Republic of Kazakhstan;
[3] RSE on REM "National Coordinating Center for Emergency Assistance", Astana, Republic of Kazakhstan;
[4] Hospital emergency medical care, Semey c., Republic of Kazakhstan.

Abstract

Introduction. Emergency medical services (EMS) is a well-organized system used to get wounded or ill patients to the hospital. The primary goal of emergency medical services should be to make emergency medical care universally accessible to everyone in need. We give an overview of different system designs, system funding, and training.

The aim of the study is to analyze emergency medical services in different countries.

Material and methods. We searched scientific publications in evidence-based medicine databases (PubMed, UpToDate, TripDatabase, ResearchGate). Search keywords: "Emergency medical technician", "medical first responder", "emergency medical services", "emergency healthcare system", and "paramedic". A total 118 sources were found, and 32 articles were chosen for additional examination.

Results and conclusion. The creation of a single interdepartmental classifier of events, incidents, and emergencies as well as the approval of a single response process for all operational and emergency services are required in order to create a single information space (integrated communication platform) for emergency services that will allow for the prompt and efficient exchange of information. Emergency care must be administered by skilled personnel, including traffic officers, firefighters, and drivers, who are often the first on the scene of an accident. The amount of training hours for those without medical degrees should be raised in light of worldwide experience.

Keywords: emergency healthcare system, paramedic, Emergency medical technician

Резюме

СРАВНИТЕЛЬНЫЙ АНАЛИЗ СЛУЖБЫ ЭКСТРЕННОЙ МЕДИЦИНСКОЙ ПОМОЩИ В ЗАРУБЕЖНЫХ СТРАНАХ И РЕСПУБЛИКЕ КАЗАХСТАН. ОБЗОР ЛИТЕРАТУРЫ

Асылжан М. Месова[1], https://orcid.org/0000-0001-5373-0523
Людмила М. Пивина[1], https://orcid.org/0000-0002-8035-4866
Диана Г. Ыгиева[1], https://orcid.org/0000-0001-8391-8842
Галымжан Н. Абилов[2],
Алмас А. Дюсупов[1], https://orcid.org/ 0000-0002-2086-8873
Гульнара Б. Батенова[1], https://orcid.org/0000-0003-3198-1860
Арман С. Баянбаев[3],
Аяулым Е. Ахметова[1], https://orcid.org/ 0000-0002-4593-9404
Аскар С. Серикбаев[1], https://orcid.org/ 0000-0002-6077-5065
Габдыгали Ж. Ыгиев[4],
[1] НАО «Медицинский университет Семей», г. Семей, Республика Казахстан;

[2] НАО «Фонд социального медицинского страхования», Филиал по области Абай, г. Семей, Республика Казахстан;
[3] РГП на ПХВ «Национальный координационный центр экстренной медицины», г. Астана, Республика Казахстан;
[4] КГП на ПХВ «Больница скорой медицинской помощи г. Семей», Республика Казахстан.

Введение Служба неотложной медицинской помощи (EMS) — это хорошо организованная система, используемая для транспортировки раненых или больных пациентов в больницу. Основная цель служб неотложной медицинской помощи должна состоять в том, чтобы сделать неотложную медицинскую помощь доступной для всех, кто в ней нуждается. Мы предоставляем обзор различных систем, системного финансирования и обучения.

Цель исследования - проанализировать службы экстренной медицинской помощи в разных странах.

Материал и методы. Мы провели поиск научных публикаций в базах данных доказательной медицины (PubMed, UpToDate, TripDatabase, ResearchGate). Ключевые слова для поиска: «медицинский техник», «парамедик», «скорая медицинская помощь», «неотложная медицинская помощь», «фельдшер». Всего было найдено 118 релевантных источников, и 32 статьи были отобраны для дальнейшего изучения.

Результаты и вывод. В целях создания единого информационного пространства (единой коммуникационной платформы) экстренных служб необходимо создать единую межведомственную классификацию происшествий, происшествий и чрезвычайных ситуаций, а также утвердить единый процесс реагирования для всех аварийно-спасательных служб. Для обеспечения быстрого и эффективного обмена информацией. Неотложная медицинская помощь должна оказываться квалифицированным персоналом, включая спасателей, пожарных и водителей. Объем учебных часов для лиц без медицинского образования следует увеличить с учетом мирового опыта.

Ключевые слова: *система неотложной медицинской помощи, парамедик, медицинский техник.*

Түйіндеме

ШЕТ ЕЛДЕРДЕГІ ЖӘНЕ ҚАЗАҚСТАН РЕСПУБЛИКАСЫНДАҒЫ ШҰҒЫЛ КӨМЕК ҚЫЗМЕТІН САЛЫСТЫРМАЛЫ ТАЛДАУ. ӘДЕБИЕТТЕРГЕ ШОЛУ

Асылжан М. Месова[1], https://orcid.org/0000-0001-5373-0523
Людмила М. Пивина[1], https://orcid.org/0000-0002-8035-4866
Диана Г. Ыгиева[1], https://orcid.org/0000-0001-8391-8842
Галымжан Н. Абилов[2],
Алмас А. Дюсупов[1], https://orcid.org/ 0000-0002-2086-8873
Гульнара Б. Батенова[1], https://orcid.org/0000-0003-3198-1860
Арман С. Баянбаев[3],
Аяулым Е. Ахметова[1], https://orcid.org/ 0000-0002-4593-9404
Аскар С. Серикбаев[1], https://orcid.org/ 0000-0002-6077-5065
Габдыгали Ж. Ыгиев[4],

[1] «Семей медицина университеті» КеАҚ, Семей қ., Қазақстан Республикасы;
[2] «Әлеуметтік медициналық сақтандыру қоры» КеАҚ, Абай облысы бойынша филиалы, Семей қ., Қазақстан Республикасы;
[3] «Шұғыл медицина жөніндегі ұлттық үйлестіру орталығы» ШЖҚ РМК, Астана, Қазақстан Республикасы;
[4] «Семей қаласының жедел жәрдем ауруханасы» ШЖҚ КМК, Қазақстан Республикасы.

Кіріспе Жедел медициналық қызмет (ЖМҚ) – жараланған немесе науқас науқастарды ауруханаға жеткізу үшін қолданылатын ұйымдастырылған жүйе. Жедел медициналық қызметтің (ЖМҚ) негізгі мақсаты шұғыл медициналық көмекті мұқтаждардың барлығына қолжетімді ету болуы керек. Біз әртүрлі жүйе дизайнына, жүйені қаржыландыруға және оқыту бағдарламаларына шолу жасаймыз.

Зерттеудің мақсаты әртүрлі елдердегі шұғыл медициналық қызметтерді талдау болып табылады.

Материал және әдістер Біз ғылыми жарияланымдарды дәлелді медицина деректер қорынан іздедік (PubMed, UpToDate, TripDatabase, ResearchGate). Іздеу кілт сөздері: «жедел медициналық техник», «медициналық алғашқы көмек көрсетуші», «жедел медициналық қызметтер», «жедел медициналық көмек көрсету жүйесі», «фельдшер». Барлығы 118 сәйкес дереккөз табылып, қосымша сараптамаға 32 мақала таңдалды.

Нәтижелер және қорытынды Төтенше жағдайлар қызметтері үшін бірыңғай ақпараттық кеңістікті (біріктірілген байланыс платформасын) құру үшін оқиғалардың, оқыс оқиғалардың және төтенше жағдайлардың бірыңғай ведомствоаралық жіктеуішін құру, сондай-ақ барлық жедел және төтенше жағдайлар қызметтері үшін бірыңғай әрекет ету процесін бекіту қажет. Бұл шаралар ақпаратпен жедел және тиімді алмасуға мүмкіндік береді. Төтенше медициналық көмекті білікті қызметкерлер, соның ішінде жол-көлік оқиғасы болған жерде бірінші болып

келетін жол сақшылары, өрт сөндірушілер және жүргізушілер жүргізуі керек. Медициналық дәрежесі жоқ адамдар үшін оқу сағаттарының көлемі әлемдік тәжірибені ескере отырып, ұлғайтылуы керек.

Түйінді сөздер: *жедел медициналық көмек жүйесі, парамедик, медициналық техник.*

Bibliographic citation:

Messova A.M., Pivina L.M., Ygiyeva D.G., Abilov G.N., Dyussupov A.A., Batenova G.B., Bayanbaev A.S., Akhmetova A.E., Serikbaev A.S., Ygiyev G.Z. Comparison of emergency medical services in different countries. Literature review // *Nauka i Zdravookhranenie* [Science & Healthcare]. 2022, (Vol.24) 5, pp. 212-219. *doi 10.34689/SH.2022.24.5.026*

Месова А.М., Пивина Л.М., Ыгиева Д.Г., Абилов Г.Н., Дюсупов А.А., Батенова Г.Б., Баянбаев А.С., Ахметова А.Е., Серикбаев А.С., Ыгиев Г.Ж. Сравнительный анализ службы экстренной медицинской помощи в зарубежных странах и Республике Казахстан. Обзор литературы // Наука и Здравоохранение. 2022. 5 (Т.24). С. 212-219. *doi 10.34689/SH.2022.24.5.026*

Месова А.М., Пивина Л.М., Ыгиева Д.Г., Абилов Г.Н., Дюсупов А.А., Батенова Г.Б., Баянбаев А.С., Ахметова А.Е., Серикбаев А.С., Ыгиев Г.Ж. Шет елдердегі және қазақстан республикасындағы шұғыл көмек қызметін салыстырмалы талдау. Әдебиеттерге шолу // Ғылым және Денсаулық сақтау. 2022. 5 (Т.24). Б. 212-219. *doi 10.34689/SH.2022.24.5.026*

Introduction

Two methods have historically been used to practice emergency medicine in the highly developed world. The first is the well-known Anglo-American system, which includes trained emergency departments and a pre-hospital emergency medical service that uses paramedics. The second is the so-called Franco-German system, which has a well-developed pre-hospital emergency physician service but just a basic organization of hospital-based emergency care [4,7,18]. Currently, hospital-based emergency medicine is developing quickly on a global scale [26]. Access to more advanced technology, higher-quality education, and well-organized healthcare systems will improve survival rates. Understanding the components that enable emergency medical service (EMS) systems to achieve the best survival results is essential for understanding the structure and scope of EMS systems.

The aim of our study is to analyze emergency medical services in different countries.

Search strategy

We searched scientific publications in evidence-based medicine databases (PubMed, UpToDate, TripDatabase, ResearchGate). The search was also carried out using specialized search engines (GoogleScholar) and electronic scientific libraries (CyberLeninka). Inclusion criteria: studies performed on humans, published in English, Russian, as well as full versions of articles with abstracts published between 2000 and 2021. Exclusion Criteria: Book chapters, dissertations, conference papers, and all studies that did not report the findings of the EMS, that are not published, or that do not have an abstract and full text. Search keywords: "Emergency medical technician", "medical first responder", "emergency medical services", "emergency healthcare system", "paramedic". In total, 118 relevant sources were found, from which 32 publications were selected for further analysis.

Discussion

Two models of emergency medical care have conditionally developed: the Anglo-American, based on "grab and run" and the Franco-German, which agreed on "providing assistance on "the providing assistance at the scene of an accident." No model is better than the other, and the state must decide what suits them best according to their resources, tasks and resources. However, the final decision must be judged on outcomes that reflect the impact on the health and lives of patients [4,7,10,24,25].

Another way to categorize emergency medical care systems is by the level of service and volume of care provided. They are usually classified as the basic life support (BLS) level and the advanced life support (ALS) level [8,9,15].

Basic Life Support (BLS) is closely related to the "grab and run" philosophy, providing non-invasive basic interventions and rapid transport to a medical facility. Interventions are usually basic and include non-invasive cardiopulmonary resuscitation (CPR), splinting, total immobilization, and access to oxygen. On the other hand, Advanced Life Support (ALS) is more suited to a "help on the spot and stabilize" approach. It includes all BLS procedures with the addition of invasive procedures such as endotracheal intubation, chest decompression, administration of controlled and strong drugs, etc.

A typical "Advanced Life Support System" system functions as a single-type fleet of ambulances that manage emergency care. All vehicles are equipped with qualified ALS personnel. While the multi-layered response system, which uses both BLS and ALS, sends ALS specialists only for the most severe cases, and uses BLS services for non-urgent and scheduled transfers of stable patients. A tiered system has the advantage of resources for acute care of critically ill patients [10,16].

Modern EMS systems have different functions and methods, but they are all similar in one way or another to the main models of EMS systems [15]. The goal of the international EMS system is a consideration model that is prioritized and compromised by cultural, environmental and financial factors for each individual population. Advocating for a single system that fits all is a suspicious approach to a diverse and rapidly changing world [1,2,5,6,9].

Organizing an ambulance service

The management of the impact of emergency medical care mainly takes place at the site of detection or discovery. In Croatia and Lithuania, the service is managed at a convenient level, in Estonia, the Czech Republic, Germany [3,25]. In Turkey, management was also carried out both at the capture and at a convenient level. In Ireland, ambulance

services are managed at capture level, with the exception of the city of Dublin where ambulance services are provided by the Dublin Fire Brigad Type of ownership [3].

Type of ownership

In most countries, both state and private ambulance services are served. In some countries, the ambulance organization fully supports public administration (Croatia, Czech Republic, Latvia, United Kingdom). In Ireland, outside of domestic and outbound, customs and voluntary ambulance services [3]. There are quite a few random ambulance services in Lithuania and Norway. In Kazakhstan, there is mainly a state emergency medical service, which is subordinate to the Ministry of Health. There are separate private ambulances.

Type of organization for the provision of emergency medical care

Most ambulance services in different countries are independent organizations. Ambulances in Belgium and Germany and in Dublin (Ireland) are part of the fire department, also, in Belgium, the ambulance service can be part of hospitals, as in Estonia and Norway. In Lithuania, some ambulance services may be part of primary health care centres [3]. Private ambulance services in Ireland are independent organizations. In the Kazakhstan ambulance service is an independent organization that reports to the Ministry of Health. The traffic police are subordinate to the Ministry of the Interior, the fire service of the Ministry emergency situations. All of the above services require a single information platform for rapid response in emergency situations.

National regulations and legislation

National regulations exist for ambulance services, with the exception of Croatia, Lithuania and Germany. Forms for such regulations in different countries are present in table 1.

Table 1.

National regulations in different countries [3].

Country	National Law
USA	National Model EMS Clinical Guidelines
Belgium	Law on Emergency Medical Services, except for non Emergency Medical Service ambulance care
Czech Republic	Law on Emergency Medical Services
Estonia	Health Services Organisation Act
Hungary	Health Law
Ireland	A national regulator set-up under statutory instrument
Latvia	Regulations of Cabinet of Ministers Nr.1529, regulation of Cabinet of Ministers Nr.60
The Netherlands	Temporary Ambulance Care Act Emergency Medical Services Regulation
Norway	National law on Emergency Medical Service outside hospitals
Spain	A national law with some regional applications
Turkey	Emergency Medical Services Regulation
United Kingdom	Statutory providers responsible for all emergency (999) calls & Civil Contingencies
Kazakhstan	The general rules for the provision of emergency medical care Order of the Minister of Health of the Republic of Kazakhstan dated November 30, 2020 Code of the Republic of Kazakhstan "On the health of the people and the healthcare system" dated September 30, 2019 Rules for the training of persons without medical education (paramedics) for the provision of pre-hospital medical care dated December 2020

Financing

Ambulance services are funded from the state budget, mainly through health insurance (Belgium, Croatia, Czech Republic, Germany, Ireland, Lithuania, the Netherlands, Turkey, UK), in some countries, including through donation accounting (Belgium and Ireland).

In addition, ambulance services in Estonia and Germany are also applicable to paid services. The total budget (2014) of countries for ambulance services ranges from 25 million (Belgium) to 5 Billion Euro (Norway) [3].

In all countries, the ambulance system is financed by various funds. Large proportions arise from the national or regional budget, which consists of reimbursement and compulsory health insurance. Additional resources are: voluntary private insurance, charitable donations or direct patient payments in some countries.

In Kazakhstan, the total budget for EMS in 2021 consisted of 88.6 billion tenge (0.205 billion dollars) and the organization of the provision of ambulances is a fully public administration.

None-emergency level

In most countries, there are different levels for emergency medical care. In Germany, Hungary and the Netherlands there is a difference between intensive care/intensive care unit (ICU) emergency care transport and other transports. In addition, in Germany the level depends on the duration of the route (longer and shorter distances) [25,3]. In Ireland, there are different levels for the transport of emergency medical care for adults, newborns and children. In addition, there is a separate category for transportation between objects (organizations) (in the Czech Republic and Latvia). In the event that the patient is in an emergency, the arrival time in different countries varies from 60 minutes to four hours.

Emergency level

In the case of life-threatening situations, the time of medical care in the most European countries (Czech Republic, Estonia, Germany, Hungary, Ireland, Latvia, Lithuania, the Netherlands, Norway, Spain, Turkey and the UK) is 15 minutes or less, with the exception of the Czech

Republic (20 minutes). In Latvia, the arrival time is set within 8-10 minutes. In Ireland, in case of cardiac arrest, respiratory arrest or other life-threatening situations, it is 8 minutes, in all other cases of serious but not life-threatening events, it is 19 minutes. In Estonia, the arrival time to a state (potentially life-threatening) is a maximum of 20 minutes. For non-critical situations, the arrival time is 30 minutes [3].

In Kazakhstan, the calls received by the dispatcher are divided into 4 (four) categories of urgency in accordance to these rules: 1) call of the 1st (first) category of urgency - a patient's condition that poses an immediate threat to life, requiring immediate medical care; 2) call of the 2nd (second) category of urgency - a patient's condition that poses a potential threat to life without medical assistance; 3) call of the 3rd (third) category of urgency - a patient's condition that poses a potential hazard to health without medical assistance; 4) call of the 4th (fourth) category of urgency - the patient's condition, the appearance of symptoms of a disease or an exacerbation of a chronic disease, without sudden and pronounced diseases of organs and systems, in the absence of detection and likelihood of a disease in a patient. The classification of emergency calls aims to save costs for the health system and improve the ambulance service's ability to respond more quickly to calls that are clinically urgent.

The time of collection of paramedical and specialized (doctors) teams to the place of visiting patients from the moment of the call from the dispatcher of the emergency medical service is: 1 category of urgency - up to ten minutes; Category 2 urgency - up to fifteen minutes; Category 3 urgency - up to thirty minutes; Category 4 urgency - up to sixty minutes. The average time of arrival of the ambulance in Kazakhstan is 13.1 minute, in the city 13.3 minute and in the villages 12.9 minute.

Ambulance staff

There are now three different emergency care models. According to the first model, doctors are part of a team (21 countries). Despite this, the team of paramedics, nurses or specialists work independently. Paramedics providing care work independently. The ratio of machine assistance, staffed by doctors soon - 3:1, in rare countries - 4:1 [3].

According to the second model, first aid specialists are not doctors. This model is used by such countries as Sweden, Norway, the Netherlands, Finland, Great Britain. However, doctors work in a sanitation service or work group. Compliance with monitoring is built like a medical manager. Due to the disease, when the patient's condition becomes more revealed, it goes beyond the scope of the paramedic, the medical manager may be available to call for support [3].

The last model is the smallest. Groups in Ireland are only part of the paramedics' group, in Malta nurses are part of the working group.

Emergency medical care in Kazakhstan is provided by paramedics and specialized (doctor's) teams in accordance with the Order of the Minister of Health of the Republic of Kazakhstan dated November 30, 2020y. The paramedics team includes two paramedics and driver. The specialized (medical) team includes doctor, paramedic, driver. In the regional / city stations of the EMS, there are 1,492 mobile ambulance teams in one shift, of which 271 (18.2%) are specialized (doctors) and 1,221 (81.8%) are paramedics. For 9 months of 2022, 896 brigades operate in city departments, 596 brigades in district departments.

According to the results of the survey data, instrumental diagnostics, the dynamics of the patient's condition on the background or after the therapeutic measures, in accordance with the preliminary diagnosis, reflecting the causes of this condition, the paramedic or physician of the ambulance team takes one of the following decisions: transportation of the patient to a medical organization providing inpatient care; the patient is left at the call site; the patient is left at home (in fact of residence).

One ambulance per 3,000 to 7,000 population in Austria (3,500), USA (3,500) 1 ambulance per 7,000 to 15,000 population: Finland (7,000), Bulgaria (7,500), Canada (12,000), Sweden (11,250), Lithuania (11,700), Estonia (15,000). In Kazakhstan, one ambulance serves over 13,000 population. One ambulance per over 15,000 population is typical for Norway, for Netherlands such rate is 25,000, for UK 19,000, for Turkey 32,600 [3].

The percentage of successful resuscitation

The percentage of successful resuscitation in OECD countries is 75 percent, that is, three out of four patients are saved at the time of clinical death. In Kazakhstan in 2015 this indicator was at the level of one to four, and now it is on average one to two across the country [4]. The number of resuscitations performed by the ambulance / primary care teams in 9 month of 2022, in total 1354 of them the number of cases of successful resuscitation performed by ambulance teams 503. Given the still low rates of successful resuscitation, it is necessary to train the first responders to the scene of an accident, such as traffic police, fire services, to provide emergency care.

EMS system in Kazakhstan

The total number of calls for 9 months of 2022 is 6,189,164. Category 1 - 307,027; Category 2 - 1,703,338; Category 3 - 1,849,527; the number of unsuccessful calls is 2.8% of the total call. Calls per 1,000 population in the reporting period covered 316.4. In the regional / city stations of the EMS, there are 1,492 mobile ambulance teams in one shift, of which 271 (18.2%) are specialized (doctors) and 1,221 (81.8%) are paramedics. For 9 months of 2022, 896 brigades operate in city departments, 596 brigades in district departments. The average time of arrival of the brigade is 13.1 min. in the city 13.3 min., and in the villages 12.9. The share of unsuccessful calls is 2.8% of the total call. The unsuccessful calls of the ambulance and emergency medical team - the departure of the ambulance team, which ended in the failure to provide the patient due to the unreliability of the address of the ambulance team call, or the absence of the patient at the address, or the false departure of the ambulance team. Priority based dispatch systems will help to resolve the problem of unsuccessful calls. The UK emergency ambulance service is reportedly used inappropriately in a number of studies, with numbers ranging from 16% to 52% [11,20,22,29]. While the majority of calls to the London Ambulance Service required a 999 response, 40% of them might have been handled by primary care, psychiatric services, or social services, according to a recent study by Victor et al [29].

Analysis of the training system for emergency medical professionals

Practice of medical care requires compliance with almost practical skills in providing emergency medical care. It is very crucial to receive training in standardized algorithms for determining the level of emergency medical care. At the same time, one of the important issues in the process of training employees of the ambulance service is the continuity of improving and maintaining the level of acquired practical skills in providing emergency medical care.

US Emergency Medicine Training System consist of 4 qualification levels: Emergency Medical Responder (EMR), Emergency Medical Technicians (EMT), Advanced Emergency Medical Technicians (AEMT), Paramedic [27].

Emergency Medical Responder

Emergency Medical Responder personnel provide emergency medical care to critically ill patients, have the knowledge and skills to provide immediate life-saving interventions while awaiting the arrival of additional emergency medical resources. Under medical supervision, emergency medical personnel perform basic interventions with minimal equipment. Individuals applying for an EMR certificate must meet the following requirements: successful completion of a state-approved Emergency Medical Response (EMR) course that meets or exceeds the National Emergency Medical Education Standards for Emergency Medical Response Applicants must have completed the course within the last two years, the course trainer must confirm successful completion of the course on the National Registry website .Possession of a valid CPR-BLS certificate and successful completion of a theory exam and a government-approved practical exam. Training period is 48-60 hours [30].

Emergency Medical Technicians (EMT)

Emergency medical technicians provide pre-hospital emergency medical care and transportation to critical and emergency patients. EMTs have the basic knowledge and skills needed to stabilize and safely transport patients from emergency transfers to life-threatening emergencies. Emergency medical technicians carry out interventions with the help of basic equipment that is in the ambulance. Individuals applying for an EMT certificate must meet the following requirements: successful completion of a state-approved Emergency Medical Response (EMT) course that meets or exceeds National Emergency Medical Education Standards for Emergency Medical Response. Applicants must have completed the course within the last two years, the course trainer must confirm successful completion of the course on the National Registry website. Possession of a valid CPR-BLS certificate with successful completion of a theory exam and a government-approved practical exam. Training period is 150-190 hours [27].

Advanced Emergency Medical Technicians (AEMT)

Emergency medical technicians provide pre-hospital emergency medical care and transportation to critical and emergency patients. EMTs have the basic knowledge and skills needed to stabilize and safely transport patients from emergency transfers to life-threatening emergencies. Emergency medical technicians carry out interventions with the help of basic equipment that is in the ambulance. Training period is 150-250 hours.

Paramedic

A paramedic is an associate member of the ambulance service. Paramedics have the basic knowledge and skills needed to stabilize and safely transport patients, from emergency transfers to life-threatening emergencies. Emergency medical technicians carry out interventions with the help of basic equipment that is in the ambulance.

Paramedic training programs can last anywhere from six months to four years. The associate's degree program lasts two years and is often offered at a community college. Degree programs are the most common, although four-year bachelor's degree programs also exist. Unlike countries such as Canada, the United Kingdom, Australia and New Zealand, in the United States, the minimum period of study is usually two to three years at an accredited college or university for entry-level paramedical education, and is a basic education, however, four years of paramedical education is desirable.

Many paramedical programs in the United States are delivered through technical schools that issue a program completion certificate upon completion. All programs must comply with current National Standards of Education.

Regardless of educational level, all students must meet the same state requirements for certification exams, including National Registry exams, which consist of the Psychomotor Practice Test and Computer Based Testing (CBT).

In addition, most states require paramedics to take continuing education courses and continue their medical education in order to maintain their license or certification. In addition to state examinations and examinations for inclusion in the national certification registry, most paramedics must be certified in pediatrics, pediatric prehospital care, prehospital trauma care, advanced cardiac resuscitation, with certification from organizations such as the American Heart Association and others [27].

Emergency Medicine Training System in Germany

In the German EMS system, paramedics provide the initial stage of pre-hospital emergency care, backed by an on-site emergency physician in life-threatening conditions. Because of this, paramedics must perform a set of advanced life support (ALS) procedures until an emergency physician arrives. The doctor then provides direct medical supervision to the paramedics and other medical personnel present. The paramedic ambulances (without doctors) can manage other (non-life-threatening) emergencies [12].

Paramedic level

German federal legislation regulates and protects two non-physician emergency professions: Rettungsassistent (two-year education, out of date as of the end of 2014) and Notfallsanitäter (three-year education, effective since 2015).

Emergency Medical Technician (EMT) Level

The Rettungssanitäter (520 hours of training) and the Rettungshelfer (not standardized, about 240 hours out of the Rettungssanitäter curriculum) are lower-level credentials that allow a person to work in EMS. Typically, people in the Rettungshelfer function are the drivers of non-emergency patient transports, with a Rettungssanitäter serving as the vehicle's crew commander, depending on the state in which they work. Those in the Rettungssanitäter role are frequently the emergency ambulance drivers in the

majority of German states, acting as an assistant to the Rettungsassistent and Notfallsanitäter [28].

Emergency physician (*Notarzt*)

The notarzt, or Emergency physician, must hold a board certification in emergency medicine, from the State Chamber of Physicians. A minimum year of residency in a critical care medicine-related speciality, additional training in anesthetics and critical care medicine, and passing a board exam are requirements for board certification. Technically, any physician who completes the board certification procedure is eligible for the position.

Once on the scene, the Emergency physician serves as the crew chief, is in charge of all physician-related duties, and gives medical guidance to all subordinate EMS personnel [12,28].

Emergency Medicine Training System in Kazakhstan

According to Order of the Minister of Health of the Republic of Kazakhstan dated November 24, 2009 No. 774. “On Approval of the Nomenclature of Medical and Pharmaceutical Specialties” approved specialties for the emergency medical service: with higher medical education - “Ambulance and emergency medical care” and «Paramedic», «General practice paramedic»).

By order of the Minister of Health of the Republic of Kazakhstan dated May 31, 2019 No. KR DSM-89, the list of clinical specialties for training in internship and residency was supplemented with the specialty "Ambulance and emergency medical care". The previous level of education of persons wishing to master the educational residency programs is basic medical education, higher medical education, internship. The residency program in Kazakhstan lasts 3 years. According to the European Society for Emergency Medicine curriculum of emergency medicine includes a 5-year specialty education, three of which are spent in an emergency department [9].

Currently, there are 26 educational institutions in the republic that provide training for paramedics in the specialty 0301000 "General Medicine", classification 0301013 "Paramedic"

Order of the MZRK dated April 14, 2017 No. 165 (hereinafter referred to as Order No. 165) approved Model programs for advanced training and retraining of medical personnel in the specialty "Ambulance and emergency medical care" and "General Medicine (paramedic, general practice paramedic)".

The duration of training for doctors in advanced training cycles is from 54/1 to 216/4 hours (weeks), in certification cycles - 108/2 hours (weeks), in the retraining cycle for specialists with higher medical education in the specialty "General Medicine", "Pediatrics", "General Medicine", "Oriental Medicine" and internship - 864/16 hours (weeks). Training for a paramedic in Kazakhstan ranges from 2 years 10 months to 3 years 10 months.

Training of persons without medical education in the Republic of Kazakhstan.

According to the Order of the Minister of Health of the Republic of Kazakhstan dated December 15, 2020, in our country, first aid can be provided by persons without medical education who have received appropriate training and are trained in first aid skills. The curriculum "Training of persons without medical education (paramedics)" must undergo theoretical training for at least 18 hours of study and practical training. Training of persons without medical education in first aid skills is carried out once every 3 years. It should be noted that in America people without medical education (medical technicians) are trained from 150-250 hours, in Germany 240-520 hours, while in Kazakhstan training is only 18 hours. Taking into account international experience, the number of hours of training for people without medical education should be increased.

Conclusion. In order to form a single information space (integrated communication platform) for emergency services for the prompt and effective exchange of information, it is necessary to unify the response processes: the creation of a single interdepartmental classifier of events, incidents and emergencies, as well as the approval of a single response process for all operational and emergency services.

It will be easier to handle the issue of dropped calls using priority-based dispatch systems.

The first people to arrive at the site of an accident, such as traffic police, firefighters, and drivers, must be trained to administer emergency care. Taking into account international experience, the number of hours of training for people without medical education should be increased.

Author Disclosures *The authors report there are no competing interests to declare*

Funding. *The study is performed in the frame of the Project AP 14871609 “Optimizing the structure and improving the efficiency of the emergency medicine service in Kazakhstan by conducting training for people without medical education (medical technicians)”. Ethical approval details. The study has approval of the Local Ethics Commission of the Semey Medical University on March 16, 2022.*

References:

1. *Anderson P., Petrino R., Halpern P., Tintinalli J.* The globalization of emergency medicine and its importance for public health // Bulletin of the World Health Organization. 2006. Vol. 84. N10. P. 835–9.

2. *Anderson P., Suter R., Mulligan T., Bodiwala G., Razzak J., Mock C.* International Federation for Emerency Medicine (IFEM) Task Force on Access and Availability of Emergency Care. World Health Assembly Resolution 60.22 and its importance as a health care policy tool for improving emergency care access and availability globally // Annals of Emergency Medicine. 2012. Vol. 60. N1. P. 35–44.

3. Ambulance care in Europe Organization and practices of ambulance services in 14 European countries. Ambulance care in Europe, NIVEL 2015. 46p.

4. *Arnold J.L.* International emergency medicine and the recent development of emergency medicine worldwide // Ann Emerg Med. 1999. Vol. 33. N1. P. 97-103.

5. *Arnold J., Holliman C.* Lessons learned from international emergency medicine development // Emergency Medicine Clinics of North America. 2005. Vol. 23. N1. P. 133–47.

6. *Alagappan K., Schafermeyer R., Holliman C. et al.* International emergency medicine and the role for academic emergency medicine // Academic Emergency Medicine. 2007. Vol. 14. N5. P. 451–6.

7. *Becker T., Trehan I., Hayward A. et al.* Global emergency medicine: A review of the literature from 2017 // Academic Emergency Medicine. 2018. Vol. 25. P. 1287–98.

8. *Calvello E., Broccoli M., Risko N., Theodosis C., et al.* Emergency care and health systems: Consensus-based recommendations and future research priorities. // Academic Emergency Medicine. 2013. Vol. 20. P. 1278–88.

9. *Cameron P., Hobgood C., Mulligan T.* Developments in international emergency medicine // Emergency Medicine Australasia. 2009. Vol. 21. N5. P. 339–41.

10. *Fleischmann T., Fulde G.* Emergency medicine in modern Europe // Emergency Medicine Australasia. 2007. Vol. 19. P. 300-302.

10. *Gardner G.J.* The use and abuse of the emergency ambulance service: some of the factors affecting the decision whether to call an emergency ambulance // Arch Emerg Med. 1990. Vol. 7. P. 81–9.

11. *Hecker N., Domres B.D.* The German emergency and disaster medicine and management system-history and present // Chin J Traumatol. 2018. Vol. 21. N2. P. 64-72.

12. *Holliman C., Kirsch T., Green G., Wolfson G., Tom P.* Guidelines for evaluation of international emergency medicine assistance and development projects // Annals of Emergency Medicine. 1997. Vol. 30. N6. P. 811–5.

13. *Holliman C., VanRooyen M., et al.* Planning recommendations for international emergency medicine and out-of-hospital care system development // Academic Emergency Medicine. 2000. Vol. 7. N8. P. 911–7.

14. Huecker M.R, Shreffler J., Platt M., O'Brien D., Stanton R., Mulligan T., Thomas J. Emergency Medicine History and Expansion into the Future: A Narrative Review // Western Journal of Emergency Medicine: Integrating Emergency Care with Population Health. 2022. Vol. 23. N3. P.418-423.

15. *Huemer G., Pernerstorfer T., Mauritz W. Prehospital emergency medicine* services in Europe: structure and equipment // Eur J Emerg Med. 1994. Vol. 1.N2. P. 62-8.

16. *Huiyi T.* A study on prehospital emergency medical service system status in Guangzhou. Hong Kong: University of Hong Kong; 2007. Retrieved from http://dx.doi.org/10.5353/th_b4005216

17. *Kirsch T., Holliman C., Hirshon J., Doezema D.* The development of international emergency medicine: a role for U.S. emergency physicians and organizations. SAEM International Interest Group // Academic Emergency Medicine. 1997. Vol. 4. N10. P. 996–1001.

18. *Kobusingye O., Hyder A., Bishai D., Hicks E., Mock C., Joshipura M.* Emergency medical systems in low- and middle-income countries: Recommendations for action // Bulletin of the World Health Organization. 2005. Vol. 83. N8. P. 626–31.

19. *Morris D.L., Cross A.B.* Is the emergency ambulance service abused? // BMJ. 1980. P. 121–3.

20. Nowacki A., Landes M., Azazh A., Puchalski Ritchie L. A review of published literature on emergency medicine training programs in low- and middle-income countries // International Journal of Emergency Medicine. 2013. Vol. 6. N1. P. 16-26.

21. *Palazzo F.F., Warner O.J., Harron M. et al.* Misuse of the London Ambulance Service: how much and why? // J Accid Emerg Med. 1998. Vol. 15. P. 368–70.

22. *Razzak J., Kellermann A.* Emergency medical care in developing countries: is it worthwhile? // Bulletin of the World Health Organization. 2002. Vol. 80. N11. P. 900–5.

23. *Roudsari B.S., Nathens A.B., Arreola-Risa C., Cameron P., Civil I., Grigoriou G. et al.* Emergency Medical Service (EMS) systems in developed and developing countries // Injury. 2007. Vol. 38. N9. P. 1001-1013.

24. *Roessler M., Zuzan O.* EMS systems in Germany // Resuscitation. 2006. Vol. 68. N1. P. 45-49.

25. *Sayre M.R., White L.J., Brown L.H., McHenry S.D.* National EMS Agenda Writing Team. National EMS Research Agenda // Prehosp Emerg Care. 2002. Vol. 6. N3. P. S1-43.

26. *Taylor D.M., Jelinek G.A.* A comparison of Australasian and United States emergency medicine training programmes // Emergency Medicine. 1999. Vol. 11. P. 49-56.

27. *Thomas T.* Developing and implementing emergency medicine programs globally // Emergency Medicine Clinics of North America. 2005. Vol. 23. N1. P. 177–97.

28. *Victor C.R., Peacock J.L., Chazot C. et al.* Who calls 999 and why? A survey of the emergency workload of the London Ambulance Service // J Accid Emerg Med. 1999. Vol. 16. P. 174–8.

29. *Wyatt J.P., Weber J.E.* A transatlantic comparison of training in emergency medicine // J Accid Emerg Med. 1998. Vol. 15. N3. P. 175-80.

30. *Wyatt J.P., Weber J.E.* A transatlantic comparison of training in emergency medicine // J Accid Emerg Med. 1998. Vol. 15. N3. P. 175-80.

Contact Information
Messova Assylzhan - associated professor, Emergency Department, NCJSC «Semey Medical University», Semey c., Republic of Kazakhstan;
Address: Republic of Kazakhstan, 071400, Semey c., Abaya 103.
E-mail: assylzhan2006@mail.ru
Phone: +7 7772138307