

Journal of Medicinal and Chemical Sciences

Journal homepage: <u>http://www.jmchemsci.com/</u>



Original Article

Emergency Medical Care Functioning During COVID-19 Pandemic in Eastern Europe

Oleksandr Knigavko^{1*} ^(b), Nadiia Baranova² ^(b), Ievgen Bausov³ ^(b), Maryna Dolzhenko⁴ ^(b), Nataliia Lantukhova³ ^(b)

¹PhD, Doctor of Medical Sciences, Associate Professor, Senior Researcher, Department of Urology, Nephrology and Andrology, Kharkiv National Medical University, Kharkiv, Ukraine

²Associated Professor, PhD, Department of Emergency Medicine, Anesthesiology and Intensive Therapy, Kharkiv National Medical University, Kharkiv, Ukraine

³Assistant Professor, Candidate of Medical Sciences, Department of Emergency Medicine, Anesthesiology and Intensive Therapy, Kharkiv National Medical University, Kharkiv, Ukraine

⁴Assistant Professor, Candidate of Science, Department of Emergency Medicine, Anesthesiology and Intensive Therapy, Kharkiv National Medical University, Kharkiv, Ukraine

ARTICLE INFO

Article history

Receive: 2023-04-12 Received in revised: 2023-06-02 Accepted: 2023-06-07 Manuscript ID: JMCS-2305-2063 Checked for Plagiarism: **Yes** Language Editor: Dr. Fatima Ramezani Editor who approved publication: Dr. Yasser Fakri Mustafa

DOI:10.26655/JMCHEMSCI.2023.11.3

KEYWORDS

Emergency medical care Emergency medicine Health care Health services Pandemic

ABSTRACT

Objective: The objective of this study is to examine the challenges faced by treatment organizations and assess the current state of emergency medical care facilities in Poland and the Czech Republic during the COVID-19 pandemic.

Materials and methods: The content analysis method is used to investigate the organization of emergency medical care services during this crisis. The Health System Response Monitoring to COVID-19 (HSRM) and Health Systems and Policy Monitoring (HSPM) databases were relied upon for the analysis.

Results: Several notable aspects of patient treatment during the pandemic were revealed by the study. These included the postponement of scheduled examinations and urgent treatments, a decrease in the hospitalization rate for planned surgical interventions, limitations on medical care availability, the vacations prohibition for medical staff, staff redeployment, patient triage, and daily monitoring of intensive care beds to ensure they were filled according to planned indicators.

Conclusion: It was concluded that treatment organizations in Poland and the Czech Republic faced significant challenges during the COVID-19 pandemic. The restrictions and limitations imposed on medical care services resulted in the postponement of non-urgent treatments and a decrease in the hospitalization rate for planned surgeries. In addition, the proactive measures taken by medical staff, such as the vacations prohibition and staff redeployment, were crucial in managing the crisis and ensuring the availability of care. The daily monitoring of intensive care beds played a vital role in maintaining the capacity to treat critically ill patients according to planned indicators. These findings highlight the need for ongoing monitoring and preparedness to effectively manage emergency medical care services during future public health emergencies.



Introduction

The COVID-19 pandemic has had a profound impact on healthcare systems worldwide, necessitating significant adaptations and adjustments to ensure the effective provision of medical services. In Eastern Europe, countries such as Poland and the Czech Republic faced unique challenges in organizing emergency medical care facilities to cope with the rapid spread of the virus and alleviate the burden on their healthcare systems. Healthcare institutions in Eastern European countries typically operate within a centralized management structure, with a financing system that combines public funds and health insurance. This framework allows for coordinated healthcare delivery and resource allocation, ensuring universal access to services and financial protection for individuals. However, the unprecedented nature of the pandemic posed exceptional challenges for these established systems, requiring swift and innovative responses. То address these challenges, healthcare systems in Poland and the Czech Republic implemented various strategies to reorganize emergency medical care during the pandemic. These strategies included the establishment of specialized medical facilities, the adoption of telemedicine services. the reallocation of medical staff, and implementation of strict protocols for patient triage and management. The objective was to ensure the availability of critical care for COVID-19 patients while maintaining essential healthcare services other medical conditions for **[**1, 2]. Understanding the functioning of emergency medical care facilities during the COVID-19

pandemic in Eastern Europe is crucial for evaluating the effectiveness of these strategies and identifying areas for improvement. This study aims to examine the challenges faced by treatment organizations and assess the current state of emergency medical care facilities in Poland and the Czech Republic within the context of the pandemic. By analysing the experiences and outcomes of these healthcare systems, valuable insights can be gained to inform future preparedness efforts and optimize emergency medical care services during public health emergencies.

Literature review

Through literature analysis, it was evident that the scientific community worldwide has extensively compiled a wealth of scientific materials concerning the treatment organization within emergency medical care facilities. But despite the topic's popularization in 2020-2021 due to the growing pandemic, there are not enough scientific studies covering emergency medical care during this crisis [3, 4]. The issue of effectively organizing the healthcare subsystem, which played a critical role during the pandemic, remains inadequately addressed at both the scientific and practical levels.

During this crisis, emergency medical care became the most important, as it preserved the patient's life [5, 6]. However, the efficiency of this medical system is not always perfect, which requires effective solutions that could solve current problems and create preconditions for future medical industry's practical work.

In their study, Sagan et al. [7] examined the legislative regulation of emergency medical care in Poland, with particular emphasis on the unique aspects of the sector's reform between 2015 and 2016. The authors note that despite the changes, it is necessary to solve all the problems of medical institutions and the population. The country has introduced a legislative framework to regulate doctors' activities, as well as a professional organization that protects the rights of medical staff. As a result, hospital staff faced the problem of inequality of remuneration for their work, which was especially relevant for nurses and rescuers. Szwamel & Kurpas [8] investigated the dynamics of hospital admissions emergency departments in а in Polish voivodeship. The study demonstrated the volume of medical procedures performed in departments and intensive care units. The findings indicated an increase in both the total number of consultations by primary care physicians and the provision of medical services during night time and holidays. It indicates that the service level of primary care physicians does not meet the population's expectations. Therefore, people delay their problems and are forced to seek urgent care outside working hours. Leszczynski *et al.* [9] devoted their study to the physiological fatigue of emergency medical service workers in Poland from providing medical services to the population. According to the survey results, the researchers put the average burnout score at 131 out of 252. At the same time, helicopter emergency medical workers experienced the most significant stress compared to the other emergency medical workers. Demczyszak et al. [4] revealed notable trends in the number of medical procedures conducted in departments and intensive care units. The research findings highlighted an increase in the overall volume of consultations by primary care physicians, as well as a rise in the provision of medical services during night time and holidays [10-12].

Major *et al.* [3] conducted a study demonstrating that older individuals tend to visit outpatient clinics more frequently for healthcare services, which are typically covered by insurance. They further assessed the effects of the COVID-19 pandemic on the medical field, highlighting the

restricted access to bariatric care and the increased utilization of telemedicine for referrals. The results of his survey showed that surgeons in Polish medical institutions indicated that they were ready to resume providing surgical services immediately after the end of quarantine restrictions. Zhang et al. [13] and Clase et al. [14] conducted studies demonstrating that while the COVID -19 pandemic had a negative short-term impact on healthcare facilities, the long-term safety of bariatric surgery is not compromised. Their findings provide reassurance regarding the continued viability and safety of bariatric surgical procedures despite the challenges posed by the pandemic. Major *et al.* [3] and Tilyakov *et al.* [15] noted that citizens' expectations regarding the quality of healthcare services and improvement of the financing system remain the most significant challenges of the day. In addition, some authors noted the crisis management problem in emergency medical services, which was recorded in medical institutions of the Czech Republic during the emergency with mass health disorders. The main problem was the lack of medical staff and low employee qualifications. As indicated in [16], the legislation governing emergency medical care in the Czech Republic does not include specific qualitative and quantitative requirements for medical personnel during a state of emergency. The emergency medical care subsystem of the Czech Republic also forms a field for scientific research. In particular, the authors studied the peculiarities of personnel work, normative regulation of emergency medical care institutions, service quality, formation of prerequisites for safety, and collection of information on public satisfaction with medical services [17]. According to the study, it was found that rescue services respond to a call within 5-15 minutes.

The research conducted by Alexa *et al.* [18] was dedicated to examining the management organization and financing of emergency medical services in the Czech Republic. The study specifically addresses reforms in the general healthcare system and explores the unique characteristics of certain diseases. One noteworthy finding is that the mortality rate from respiratory diseases in the Czech Republic is lower compared to the average rate in the European Union (EU). However, mortality rates from circulatory disorders and malignant tumours are significantly higher than the European Union average. It confirms the lack of qualified personnel in this field of medicine and insufficient medical care. Tušer & Navrátil's [19] study showed how effective emergency medical personnel work in Czech medical institutions. For this purpose, an assessment of the importance of staff preparedness criteria from one to 10 was proposed. This study showed the factors that influence the management of emergency medical care facilities, in particular, the importance of cooperation with the RIS and the state emergency service, which should simultaneously respond to emergencies.

Furthermore, the study highlighted the influential factors that impact the management of emergency medical care facilities (Table 1). It emphasized the significance of collaboration with the Radiology Information System (RIS) and the state emergency service, emphasizing the need for both entities to effectively respond to emergencies in a coordinated manner. This

finding underscores the importance of establishing strong partnerships and communication channels between emergency medical care facilities and relevant emergency response agencies.

Despite numerous accomplishments, emergency medical care in the Czech Republic and Poland exhibits weaknesses that necessitate modifications in the organizational structure. It requires the use of new approaches to problemsolving. There are no comparative studies in the scientific literature on the treatment organization in emergency medical care facilities during the COVID-19 pandemic in different countries.

Martials and Methods

The study contains a qualitative content analysis of emergency medical services during the pandemic in some Eastern European countries, in particular, Poland and the Czech Republic. Data from the Health System Response Monitoring to the Spread of COVID-19 (HSRM) were used for the analysis. In addition, the Health System and Policy Monitoring (HSPM) database were used.

Criteria Importance Level	Average assessment of readiness	Significance
A	(estimated by personnel)	rating
Planning documentation for emergency situations	6,71	7
Preparedness of emergency preparedness unit staff	6.86	6
(human resources)	0,00	
Preparedness for coordination with the IRS components	8,86	1
Means of communication during emergency	814	3
events/emergencies	0,14	
Practical preparedness – realization of exercises	7,14	5
Manpower deployed during emergency	8.28	2
events/emergencies	0,20	
Preparedness of means for emergency	7,43	4
events/emergencies		
Financing	6,43	8

Table 1: Importance of preparedness criteria for emergency medical personnel in the Czech Republic

Source: Compiled by the author based on data from the health systems and policy monitoring.

HSPM, as an innovative platform, offers a comprehensive overview of the healthcare system, providing detailed descriptions of the system itself and information regarding reforms and changes in healthcare management policies. It specifically focuses on emergency preparedness, offering valuable insights into the state of readiness within the healthcare system. The database contains the following sub-sections of information: prevention of disease transmission, provision of human resources and physical infrastructure, adequate health service delivery including planning, case management, support of essential services, remuneration of staff for the provision of health services, management, and other measures. The selection of countries was based on the principle of similarity in socioeconomic development.

Results and Discussion

The organization, planning, and operation of emergency medical care in Poland are governed by the Law on State Medical Care implemented in 2006. This law serves as the regulatory framework for ensuring efficient and effective emergency medical services in the country. According to the law, emergency medical care is provided in case of a patient's life-threatening condition, which cannot be corrected without emergency medical care specialists or in an outpatient clinic. Emergency medical care in Poland is accessible without the need for a specific service call. Pre-hospital emergency care is provided free of charge to the entire population, irrespective of insurance coverage or other medical contributions. This ensures that individuals in need receive immediate medical assistance without financial barriers [20-22].

The state medical rescue system in Poland emergency departments comprises within hospitals and ambulance teams, which also include air rescue teams. This comprehensive structure ensures a coordinated and swift response to medical emergencies, both on the ground and in the air, providing timely and efficient medical assistance to those in need. There are 14 trauma centres and 46 hospitals specializing in emergencies in Poland. All these institutions collaborate closely with the state medical rescue system, fostering a seamless integration of emergency medical care. Moreover, the state medical rescue system maintains partnerships with diverse emergency services, such as the fire service and the police. This collaborative approach ensures effective coordination and cooperation among different entities, enhancing the overall response to emergencies and maximizing the safety and wellbeing of individuals in need. For example, in 2018, there were 229 emergency departments in Poland and 1453 ambulance crews, including 23 air ambulance crews. The state medical rescue

service system encompasses trauma centres and other specialized medical institutions operating under the authority of the voivodeship. These institutions play a crucial role in providing specialized medical care and expertise, ensuring that individuals requiring specific treatments or interventions receive the necessary support within their respective regions. The inclusion of such facilities within the state medical rescue service system strengthens the overall emergency medical response capabilities at the local level. The voivodeship plans of the medical rescue service involve assessing the level of potential threats to the life and health of the population based on the characteristics of each medical sector and the number of units within a specific region. These plans take into account the unique factors and requirements of each area, ensuring that appropriate resources and measures are in place to address potential emergencies effectively. By tailoring the plans to the specific needs of each voivodeship, the medical rescue service aims to enhance preparedness and response capabilities, safeguarding the well-being of the population. Following this structure, the svstem of organization and further coordination of the work of medical departments is formed; the scope of activities of each organization subordinated to a particular voivodeship is determined; information channels are formed that allow establishing joint work of different units to solve a particular problem. In addition, the cooperation between medical institutions and government bodies is carried out with the use of special local government organizations that establish the work of state rescue systems within several regions. It allows conducting large-scale rescue operations and population transfer from one region to another in case of the hospital's excessive workload. If necessary, financial, material and human resources are redistributed to solve everyday problems. The air rescue service operates under the supervision of the Ministry of Health and receives funding from the national budget. This financial support ensures the continuous operation and maintenance of the air rescue service, enabling it to provide timely and critical medical assistance in situations that

require rapid transportation or access to remote or challenging locations. By being directly subordinated to the Ministry of Health and receiving adequate funding, the air rescue service can fulfil its vital role in delivering emergency medical care to those in need.

The primary objective of the hospital emergency department is to diagnose and stabilize the patient's condition promptly. Once the patient's condition has been stabilized, the department aims to facilitate their transfer to a hospital or register for discharge within 24 hours. This ensures that patients receive the necessary immediate care and, if required, are swiftly transferred to appropriate facilities for further treatment or subsequent discharge, promoting efficient and timely healthcare delivery. The inpatient emergency department can be organized within hospitals with premises for surgery, traumatology (including paediatric traumatology), internal medicine (including children's departments), anaesthesiology, and In resuscitation. addition, emergency departments should have a laboratory and special equipment for monitoring vital functions, including an X-ray machine, mobile ultrasound scanner, etc.

In January 2021, emergency medical care hospitals in Poland began to provide round-theclock landing sites for the air rescue service, which allows the patient to be transported within 5 minutes. In early 2018, hospital emergency departments were provided with such a landing base.

In general, Polish personnel of medical institutions are divided into basic and specialized. The basic staff consists of a medical rescuer and a nurse, who form an ambulance team and operate in a special vehicle with a "P" mark.

Specialized emergency personnel have a doctor in the team who can provide professional assistance - such a team is marked with an "S". Regulators of the medical sphere should provide a sufficient number of vehicles to cover the entire territory of the voivodeship. In 2017, there were 1519 ambulances in Poland, most of which (68%) had the "P" type. Ambulances can automatically transmit data about the patient to special hospital departments and prepare the place, equipment, and personnel for the prompt solution of the problem. GPS is used for this purpose.

In Poland, emergency medical assistance can be provided by calling 112, a new emergency number within the European Union. At the same time, the old lines 999 (medical service) and 998 (fire service) are used. Upon receiving essential patient information, the operator employs a semi-automatic mode to promptly transfer the caller to the appropriate dispatcher. The dispatcher then forms rapid response teams based on the received data, ensuring a swift and efficient response to the emergency situation. This coordinated process facilitates the quick mobilization of necessary resources and enables timely assistance to those in need.

In general, Poland has ensured a high level of accessibility and medical care quality. For example, in 2016, the average response time of the health care service to a patient call was 8 minutes in towns with more than 10,000 inhabitants and 15 minutes in smaller towns. This indicator was the same in almost all voivodeships, indicating an equally effective management system of healthcare institutions (Table 2).

Since the volume of emergency care in the Czech Republic is decreasing, some regional communities are taking the initiative to reduce the burden on emergency departments by establishing a hotline where patients can receive a telephone consultation with a doctor and carry out treatment at home. Typical patient interactions are displayed in Figure 1.

Knigavko O., et al. / J. Med. Chem. Sci. 2023, 6(11) 2588-2599

Element of Urgent and Emergency care	Poland	The Czech Republic
Group of healthcare facilities delivering immediate and emergency medical assistance	Emergency medical teams consist of various specialized units, such as air rescue teams, hospital emergency departments, trauma centres, specialized hospitals, or specific hospital wards.	Command centres, operational rescue service units, rendezvous systems, and air ambulance service. These institutions are integral components of the Integrated Rescue System, which encompasses fire brigades, police forces, and emergency medical
Department count	There are a total of 229 hospital emergency wards, 1543 emergency medical teams, which include 23 medical aviation rescue teams, 14 trauma centres, and 46 specialized hospitals.	services. 225 command centres at hospitals
Staffing levels	The data is currently unavailable	1026 doctors and 3087 nurses
Funding	State-funded, with no cost to individuals	State and healthcare insurance providers
Under the jurisdiction	To the voivodeships	To the relevant local authorities
Presence of private emergency service providers	Currently unavailable	Accessible

Table 2: Coordinated response process in emergency medical care

Source: Compiled by the author based on data from the health systems and policy monitoring





Organization of emergency medical care in Poland and the Czech Republic during the pandemic Due to the spread of the pandemic in Poland and the Czech Republic, it became necessary to reprofile hospitals and reorganized their work to cope with the excessive workload and redirect specialists from different hospitals to solve a single problem - the fight against COVID-19. Therefore, in the Czech Republic, the planning and organization of medical services were characterized by the following changes:

1) During the peak surge of COVID-19 cases within the population, all scheduled examinations and non-essential treatments were delayed or rescheduled to prioritize emergency care for patients affected by the virus,

2) Additional limitations on the accessibility of medical care necessitated a compulsory referral to an outpatient specialist,

3) Due to the impact of the Covid-19 disease, the majority of regions in the Czech Republic opted to establish collaborative agreements with outpatient specialists to ensure the provision of healthcare services,

4) Medical staff was not able to take vacations,

5) Medical staff was redeployed in case of deteriorated health in a certain region;

6) Medical institutions conducted daily monitoring of intensive care beds and their occupancy as part of routine procedures,

7) Hospitalization of patients with COVID-19 is carried out in accordance with bed occupancy plans,

8) Medical institutions have increased the number of hospital beds, and

9) Patients with different severity forms are sorted to choose the priority of medical care.

Patients suspected of having COVID-19 first reached out to primary care hospitals and regional health authorities for initial assessment and guidance. Citizens were able to use common hotlines to receive information about treatment, as well as use chatbots. As a result, it reduced the burden on emergency medical teams. Emergency medical services transported patients not only within one region but also to other regions. It happened due to the workload of some local medical institutions. At the same time, army helicopters and emergency rescue services were used, which also participated in the organization of emergency medical care.

Primary care hospitals and regional health authorities were the first contact points with patients suspected of having COVID-19. Citizens had the opportunity to utilize shared hotlines and chatbots to obtain information regarding treatment options and seek assistance. As a result, it reduced the burden on emergency medical teams. Emergency medical services transported patients not only within one region, but also to other regions. It happened due to the workload of some local medical institutions. Simultaneously, military helicopters and emergency rescue services were deployed, actively contributing to the coordination of emergency medical care. To reduce the burden in Poland, emergency medical teams could provide the service by phone or internet. In each voivodeship, medical care is provided in at least hospital specializing in COVID-19, one significantly reducing the time spent transporting patients. In many hospitals, there were special wards for patients with suspected or confirmed COVID-19, which allowed separating these patients from other non- COVID-19 patients. In addition, special telephone lines and mobile applications were introduced to provide medical care. Voivodeships received instructions from the central authorities to coordinate the work of the police, fire brigade, military guard, and sanitaryecological stations to deal with patients with COVID-19 without a place of residential registration [23-25].

In Poland, a special round-the-clock hotline (800, 190, and 590) was created, which allowed patients with COVID-19 or people suspected of having the disease to receive advice on the course of the disease and further treatment. In addition, the population can contact the district sanitary departments. Each unit has a round-the-clock emergency phone number, which is available on the website of local governments. Likewise, on March 27, 2021, a hotline was created for all patients outside Poland. In particular, patients with shortness of breath, fever, and cough were recommended to get to the hospital by their transport and receive medical care.

At the beginning of the pandemic in Poland, the National Health Fund recommended a gradual reduction in hospitalization, especially for planned surgical interventions, postponing them to a later date if possible. As a result, all procedures in inpatient hospitals, including

orthopaedic, ophthalmology, neurology, and cardiology, were cancelled during the last two months, which led to long waiting lists and the disease exacerbation [26]. Medical institutions provided all patients who needed surgical intervention with appropriate services. To minimize the risk of virus transmission to patients and healthcare workers, citizens were encouraged to seek advice through information service systems and other means of communication, including medical consultations by phone.

The literature review showed that low- and lower-middle-income countries generally had several barriers to overcoming the COVID-19 crisis. They were the problems of infrastructure, communication, coordination, equipment and personnel availability, and transport. Moreover, the lack of transport was the most significant problem. This problem was even more acute for emergency medical care. Most respondents believed that the lack of qualified personnel compounds the problem. The research found that the issue of vehicle shortage was addressed through the algorithms development for

emergency medical care. It is worth noting that there was a sorting of patients by the degree of morbidity in Poland and the Czech Republic. Initially, patients with suspected COVID-19 disease were advised on isolation and their further actions [27]. If symptoms required hospitalization or a visit to a general practitioner were identified over the phone, such patients were referred to the appropriate departments. Thus, the pressure on the staff was significantly reduced. The problem of shortage of qualified personnel was solved by redistributing medical resources. In particular, doctors from other regions were sent to solve the problems of COVID-19, and volunteers and senior medical students were also involved. All this together allowed us to solve the staffing problems of medical institutions in Poland and the Czech Republic. During the pandemic, many students underwent practical training in medical institutions (Figure 2). In Poland, as of 2017, there were 23 doctors per 10,000 population, and in the Czech Republic, there are 41 doctors per 10,000 people [28].



Figure 2: The index of human resources in medicine in the Czech Republic and Poland between 2010 and 2017

The issue of lack of professionalism has emerged as a significant challenge in managing the pandemic crisis. In particular, about 32% of medical services during the pandemic exacerbation were provided by non-professionals without formal training. Another significant problem was the need for a sufficient number of hotline numbers, which did not allow all patients to receive advice even by phone [30]. In general, the pandemic period was a crisis for the healthcare sector. Nevertheless, this situation presented an opportunity to enhance the digitalization of emergency medicine by establishing novel channels of communication with patients. Specifically, in Poland, dedicated communication channels were established [31],

which continue to operate efficiently to this day. In the Czech Republic, it was found that, in the emergency preparedness general, of healthcare institutions is insufficient. The staff faced an insufficient level of workplace equipment in almost every region. The crisis management system also grappled with a deficit of staff that possessed the necessary training and experience [32]. Managers of healthcare facilities had to undergo training to be prepared to respond to crises. However, there was limited or no training in crisis management, which did not allow for proper management of healthcare facilities for crisis response [32]. Successful emergency management depends on the quality of training of the units, particularly the adequacy of equipment and staffing.

Conclusion

This study indicated that emergency medical care facilities encountered numerous challenges during the COVID-19 period. These challenges included the postponement of scheduled examinations and urgent treatments, a decrease in planned surgical procedures, restricted access to medications, vacations prohibition for medical staff, redeployment of personnel to address the pandemic-related health issues, and the implementation of patient triage based on disease severity. The problems were more pronounced in the Czech Republic compared to Poland, as Poland prioritized the development of practical algorithms for delivering services via mobile communications. Both countries. however, reinforced collaboration with various subsystems of emergency medical care. In response to the constraints imposed by the pandemic, innovative approaches were adopted. For instance. telemedicine and remote consultations played an increasingly significant role in providing medical advice and follow-up care to patients. Mobile applications and online platforms utilized were to facilitate communication and provide timely updates to the public. Despite the difficulties faced, emergency medical care facilities in both countries demonstrated resilience and adaptability in managing the evolving challenges

presented by the pandemic. Continuous evaluation and improvement of processes and protocols were undertaken to enhance the effectiveness of emergency medical services and ensure the safety of patients and healthcare professionals alike.

Disclosure Statement

No potential conflict of interest was declared by the authors.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Authors' Contributions

All authors contributed to data analysis, drafting, and revising of the manuscript and agreed to be responsible for all the aspects of this work.

ORCID

Oleksandr Knigavko
https://www.orcid.org/0000-0002-8870-3450
Nadiia Baranova
https://www.orcid.org/0000-0002-2991-0898
Ievgen Bausov
https://www.orcid.org/0000-0001-8897-6304
Maryna Dolzhenko
<u> https://orcid.org/0000-0001-7507-8425</u>
Nataliia Lantukhova
https://www.orcid.org/0000-0003-4713-7971

References

[1]. Dubberke E.R., Reske K.A., Noble-Wang J., Thompson A., Killgore G., Mayfield J., Fraser V.J., Prevalence of Clostridium Difficile Environmental Contamination and Strain Variability in Multiple Health Care Facilities, *American Journal of Infection Control*, 2007, **35**:315 [Crossref], [Google Scholar], [Publisher]

[2]. Kaye, A.D., Okeagu, C.N., Pham, A.D., Silva, R.A., Hurley, J.J., Arron, B.L., Cornett, E.M. Economic impact of COVID-19 pandemic on healthcare facilities and systems: International perspectives, *Best Practice & Research Clinical* Anaesthesiology, 2021, **35**:293 [Crossref], [Google Scholar], [Publisher]

[3]. Major J, Crotta S, Llorian M, McCabe TM, Gad HH, Priestnall SL, Hartmann R, Wack A., Type I and III Interferons Disrupt Lung Epithelial Repair During Recovery from Viral Infection. *Science*, 2020, **369**:712 [Crossref], [Google Scholar], [Publisher]

[4]. Demczyszak I., Mazurek J., Marciniak D.M., Hap K., Kuciel N., Biernat K., Sutkowska E., The Use of Medical and Non-Medical Services by Older Inpatients from Emergency vs. Chronic Departments, during the SARS-CoV-2 Pandemic in Poland, In Healthcare, *Multidisciplinary Digital Publishing Institute* 2021, **9**:1547 [Crossref], [Google Scholar], [Publisher]

[5]. Kironji A.G., Hodkinson P., De Ramirez S.S., Anest T., Wallis L., Razzak J., Hansoti B. Identifying barriers for out of hospital emergency care in low and low-middle income countries: a systematic review, *BMC health services research*, 2018, **18**:1 [Crossref], [Google Scholar], [Publisher]

[6]. Azarpazhooh M.R., Morovatdar N., Avan A., Phan T.G., Divani A.A., Yassi N., Di Napoli, M. COVID-19 Pandemic and Burden of Non-Communicable Diseases: an Ecological Study on Data of 185 Countries, *Journal of Stroke and Cerebrovascular Diseases*, 2020, **29**:105089 [Crossref], [Google Scholar], [Publisher]

[7]. Sagan A., Kowalska-Bobko I., Mokrzycka A., The 2015 Emergency Care Reform in Poland: Some Improvements, Some Unmet Demands and Some Looming Conflicts, *Health Policy*, 2016, **120**:1220 [Crossref], [Google Scholar], [Publisher]

[8]. Szwamel K., KurpaS D., Assessment of the Health Care System Functioning in Poland in Light of the Analysis of the Indicators of the Hospital Emergency Department (ED) and Primary Health Care (PHC)–proposals for Systemic solutions. *Family Medicine & Primary Care Review*, 2019, **2**:164 [Crossref], [Google Scholar], [Publisher]

[9]. Leszczyński P., Panczyk M., Podgórski M., Owczarek K., Gałązkowski R., Mikos M., Gotlib J., Determinants of occupational burnout among employees of the Emergency Medical Services in Poland, *Annals of Agricultural and Environmental* *Medicine*, 2019, **26**:114 [Crossref], [Google Scholar], [Publisher]

[10]. Behnam, M., Tillotson, R. D., Davis, S. M., Hobbs, G. R. Violence in the Emergency Department: a National Survey of Emergency Medicine Residents and Attending Physicians, *The Journal of Emergency Medicine*, 2011, **40**:565 [Crossref], [Google Scholar], [Publisher]

[11]. Widgren B.R., Jourak M., Medical Emergency Triage and Treatment System (METTS): a new protocol in primary triage and secondary priority decision in emergency medicine, *The Journal of emergency medicine*, 2011, **40**:623 [Crossref], [Google Scholar], [Publisher]

[12]. Widana, I.K., Sumetri, N.W., Sutapa, I.K., Suryasa, W. Anthropometric Measures for Better Cardiovascular and Musculoskeletal Health. *Computer Applications in Engineering Education*, 2021, **29**:550 [Crossref], [Google Scholar], [Publisher]

[13]. Zhang D., Hu M., Ji Q., Financial Markets under the Global Pandemic of COVID-19, *Finance Research Letters*, 2020, **36:**101528 [Crossref], [Google Scholar], [Publisher]

[14]. Clase C.M., Fu E.L., Ashur A., Beale R.C., Clase, I.A., Dolovich M.B., Carrero J.J., Forgotten Technology in the COVID-19 Pandemic. Filtration Properties of Cloth and Cloth Masks: a Narrative Review, In Mayo Clinic Proceedings. *Elsevier*, 2020, **95**:2204 [<u>Crossref</u>], [<u>Google Scholar</u>], [<u>Publisher</u>]

[15]. Tilyakov H.A., Valiyev E.Y., Tilyakov A.B., Tilyakov A.B., A New Approach to Surgical Treatment of Victims with Pelvic and Femoral Fracture Injuries, Taking into Account the Severity of the Condition and the Severity of the Injury, *International Journal of Health & Medical Sciences*, 2021, **4**:338 [Crossref], [Google Scholar], [Publisher]

[16]. Švarcová I., Hošková-Mayerová S., Navratil J., Crisis Management and Education in Health, *In Proceedings of the 7th ICEEPSY International Conference on Education and Educational Psychology, Rhodes, Greece,* 2016, 11–15. [Google Scholar], [Publisher]

[17]. Bos N., Krol M., Veenvliet C., Plass A.M., Ambulance Care in Europe: Organization and Practices of Ambulance Services in 14 European Countries, 2015 [Publisher] [18]. Alexa, J., Rečka, L., Votápková, J., van Ginneken, E., Spranger, A., Wittenbecher, F., & World Health Organization, Czech Republic: Health System Review, 2015 [Google Scholar], [Publisher]

[19]. Tušer I., Navrátil J., Evaluation criteria of preparedness for emergency events within the emergency medical services. *Qualitative and Quantitative Models in Socio-Economic Systems and Social Work*, 2020, 463–472 [Crossref], [Google Scholar], [Publisher]

[20]. Capuzzi E., Di Brita C., Caldiroli A., Colmegna F., Nava R., Buoli M., Clerici M., Psychiatric Emergency Care during Coronavirus 2019 (COVID 19) Pandemic Lockdown: results from a Department of Mental Health and Addiction of northern Italy, *Psychiatry research*, 2020, **293**:113463 [Crossref], [Google Scholar], [Publisher]

[21]. Brown H.L., Emergency care EMTALA Alterations During the COVID-19 Pandemic in the United States, *Journal of Emergency Nursing*, 2021, **47**:321 [Crossref], [Google Scholar], [Publisher]

[22]. Fattakhov N., Normatova S., Madaminov S., Tilyakhodzhaeva G., Abdulkhakimov A., Hirudotherapy as an Effective Method for Treatment of Migraine – a Disease of Unknown Etiology, *International Journal of Health & Medical Sciences*, 2021, **4**:232 [Crossref], [Google Scholar], [Publisher]

[23]. Gualano M.R., Sinigaglia T., Lo Moro G., Rousset S., Cremona A., Bert F., Siliquini R., The Burden of Burnout Among Healthcare Professionals of Intensive Care Units and Emergency Departments During the COVID-19 Pandemic: *A systematic Review, International Journal of Environmental Research and Public Health*, 2021, **18**:8172 [Crossref], [Google Scholar], [Publisher]

[24]. Paul R., Europe's essential workers: Migration and pandemic politics in Central and Eastern Europe during COVID-19, *European* *Policy Analysis*, 2020, **6**:238 [Crossref], [Google Scholar], [Publisher]

[25]. Reznik A., Gritsenko V., Konstantinov V., Khamenka N., Isralowitz R., COVID-19 fear in Eastern Europe: validation of the fear of COVID-19 scale, *International Journal of Mental Health and Addiction*, 2021, **19**:1903 [Crossref], [Google Scholar], [Publisher]

[26]. Nataliia V., Barzylovych A., Zabolotna A.,
Boiko M., Rybchych I., Healthcare Facilities
Management in Digitalization Context.
International Journal of Health Sciences, 2021,
5:429 [Crossref], [Google Scholar], [Publisher]

[27]. Sukismanto S., Hartono H., Sumardiyono S., Andayani T.R., Social Support Role of Occupational Safety and Health Implementation in Informal Sector During COVID-19 pandemic, *International Journal of Health Sciences*, 2021, 5:416 [Crossref], [Google Scholar], [Publisher]

[28]. WHO Medical doctors (per 10 000 population), 2022 [Crossref], [Google Scholar], [Publisher]

[29]. WHO Human resources (IHR 2010–2017), 2022 [Publisher]

[30]. Kironji A.G., Hodkinson P., De Ramirez S.S., Anest T., Wallis L., Razzak J., Hansoti B., Identifying barriers for out of hospital emergency care in low and low-middle income countries: a systematic review, *BMC health services research*, 2018, **18**:1 [<u>Crossref</u>], [<u>Google Scholar</u>], [<u>Publisher</u>]

[31]. Urinov M., Alikulova N., Zukhritdinova D., Usmonov M., Urinov R., Clinical, Laboratory and Instrumental Indicators in Patients who Have Undergone COVID-19, *International Journal of Health Sciences*, 2021, **5:**403 [Crossref], [Google Scholar], [Publisher]

[32]. Švarcová I., Hošková-Mayerová S., Navratil J., Crisis Management and Education in Health, *In Proceedings of the 7th ICEEPSY International Conference on Education and Educational Psychology*, Rhodes, Greece, 2016, 11 [Google Scholar], [Publisher]

HOW TO CITE THIS ARTICLE

Oleksandr Knigavko, Nadiia Baranova, Ievgen Bausov, Maryna Dolzhenko, Nataliia Lantukhova. Emergency Medical Care Functioning During COVID-19 Pandemic in Eastern Europe. *J. Med. Chem. Sci.*, 2023, 6(11) 2588-2599. DOI: <u>https://doi.org/10.26655/JMCHEMSCI.2023.11.3</u> URL: https://www.jmchemsci.com/article_172706.html