UDC 614.88:616.831-005:616-036.21:578.834
DOI https://doi.org/10.32782/2077-6594/2026.3/17

Kohlová A.[1,2], Tichá K.[2], Vaníků T.[2], Dubovcová M.[1,3], Cmorej P. Ch.[2]

Pre-hospital emergency care for patients with suspected stroke during the COVID-19 pandemic: a retrospective analysis from the Ústí nad Labem Region

[1] Faculty of Health and Social Work of St. Ladislav, St. Elizabeth University of Health and Social Work in Bratislava, Nové Zámky, Slovakia
[2] Faculty of Health Studies, J.E. Purkyně University in Ústí nad Labem, Czech
[3] Comenius University, Jessenius Faculty of Medicine, Psychiatric Clinic, University Hospital Martin, Slovakia

Кохлова А.[1,2], Тиха К.[2], Ваніку Т.[2], Дубовцова М.[1,3], Чморей П. Ч.[2]

Долікарняна невідкладна допомога пацієнтам із підозрою на інсульт під час пандемії COVID-19: ретроспективний аналіз з Устецького краю

[1] Факультет охорони здоров'я та соціальної роботи ім. св. Ладислава, Університет охорони здоров'я та соціальної роботи ім. св. Єлизавети в Братиславі, Нове Замки, Словаччина
[2] Факультет медичних наук, Університет ім. Й.Е. Пуркіне в Усті-над-Лабем, Чеська Республіка
[3] Університет Коменського, Медичний факультет ім. Єссеніуса, Психіатрична клініка, Факультетська лікарня Мартіна, Словаччина

alena.kohlova@ujep.cz

Introduction

Cerebrovascular accident (CVA) is one of the most significant acute neurological causes of mortality and long-term disability and also represents a significant socio-economic burden in Europe, as a significant proportion of survivors remain with permanent neurological deficits requiring long-term rehabilitation and supportive care [1; 2]. In the Czech Republic, CVA is one of the leading causes of death and disability in the adult population, with the clinical outcome being largely determined by the time from symptom onset to the initiation of specific treatment [3; 4].

In ischemic CVA, the therapeutic window for intravenous thrombolysis and mechanical thrombectomy is time-limited, and even within this window, every minute of delay reduces the likelihood of a good functional outcome; this principle is illustrated by data showing that a 15-minute reduction in time to treatment can correspond to approximately one month of life without significant disability [5]. However, time urgency also applies to hemorrhagic forms, where early diagnosis, adequate transport, and rapid control of the source of bleeding reduce the risk of mortality and serious complications [3].

Pre-hospital emergency care is therefore a crucial part of the stroke care chain, as it influences the speed of recognition of suspected stroke, minimizes time delays, stabilizes the patient, and ensures proper referral to highly specialized care centers. In the Czech Republic, the organization of this care is anchored in the methodological guidelines of the Ministry of Health of the Czech Republic and the related network of stroke centers [6; 7].

The COVID-19 pandemic placed unprecedented pressure on the healthcare system, including medical operations centers and emergency services, and required the introduction of epidemiological triage, the use of personal protective equipment, and adjustments to operating procedures, which could have prolonged some process intervals [8; 9]. At the same time, changes in the search for care and regionally variable declines in hospitalizations for CVA have been described in a number of countries, with the rate of change depending on the local intensity of the waves, population behavior, and system organization [10; 11].

The Ústí nad Labem Region is involved in the Angels programme aimed at improving the quality of stroke care, and its emergency medical services have been repeatedly evaluated as part of the EMS Angels programme [12]. Nevertheless, it is desirable to quantify whether and to what extent the pandemic has affected pre-hospital processes in patients with suspected stroke in regional conditions, as even relatively small shifts in time can represent a clinically significant difference in time-critical diagnoses.

The aim of this retrospective study was to analyze the provision of prehospital emergency care to patients with suspected stroke in the Ústí nad Labem Region during the first year of the COVID-19 pandemic and to compare selected time and organizational indicators with the period one year before the outbreak of the pandemic.

Object, materials and research methods

Design: Retrospective observational comparative study based on operational dispatch records of the Ústí nad Labem Region Emergency Medical Service (EMS UR).

Data source and period: Data were obtained from the internal database of EMS UR (Electronic Patient Card operating system). The periods under review were defined as 03/2019–02/2020 (before the pandemic) and 03/2020–02/2021 (during the pandemic). To describe trends, the data were further broken down into quarters: March–May, June–August, September–November, and December–February.

Population: The analysis included patients for whom the EMS UR dispatch team was activated due to neurological symptoms corresponding to suspected CVA and for whom a probable diagnosis according to ICD-10 I60–I64 was indicated in the documentation (I60 subarachnoid hemorrhage; I61 intracerebral hemorrhage; I62 other non-traumatic intracranial hemorrhage; I63 cerebral infarction; I64 stroke not specified as hemorrhage or infarction).

Monitored indicators: The following were evaluated: (i) the interval for processing the call by the medical operations center, (ii) the EMS response interval (from call receipt to the arrival of the first response team), (iii) time on site (from arrival on site to the start of transport) (Figure 1). The number of patients, age, and proportion of calls during the day (6:00 a.m.–6:00 p.m.) and at night (6:00 p.m.–6:00 a.m.) were also evaluated. The definitions of the intervals were based on EMS quality indicators [13].

Missing data: Due to incomplete documentation, 9 records were excluded from the analysis of time intervals (7 before the pandemic; 2 during the pandemic); all records were included in the descriptive analyses of the number of patients and age.

Statistical analysis: Continuous variables were described by mean and standard deviation and also by median. The normality of the distribution was assessed using the Shapiro-Wilk test; the two-tailed Wilcoxon rank-sum test was used to compare age and time intervals between two independent periods. The comparison of the number of patients between periods was performed using the chi-square test of independence. Differences in the proportion of day/night calls were evaluated using the two-proportion test. The level of statistical significance was set at alpha = 0.05. The analysis was performed in R (version 4.5.1) and Microsoft Excel.

Ethical aspects: The study was conducted with the consent of the management of the EMS UR. Only anonymized data without direct or indirect patient identifiers were processed.

Research results

A total of 1.783 EMS UR calls for patients with suspected CVA were included in the analysis, of which 917 were in the pre-pandemic period and 866 in the first year of the pandemic, corresponding to an absolute decrease of 51 cases (-5.6%); however, the difference in the number of patients was not statistically significant ($p = 0.488$). The number of calls in each quarter was relatively balanced in both periods (Graph 1, Table 3).

The age structure of patients did not differ between periods: the average age was 71.4 ± 12.7 years before the pandemic and 71.8 ± 12.3 years during the pandemic, with a median of 73 years in both groups; the difference was not statistically significant ($p = 0.785$). The 70–79 age group dominated in both periods (Table 1).

Analysis of time intervals (after excluding 9 incomplete records) showed a prolongation of the EMS response interval during the pandemic: the median increased from 11:03 to 11:57 (+54 s; $p < 0.001$) and the mean from 12:17 ± 5:31 to 13:11 ± 5:30. Similarly, the call processing interval

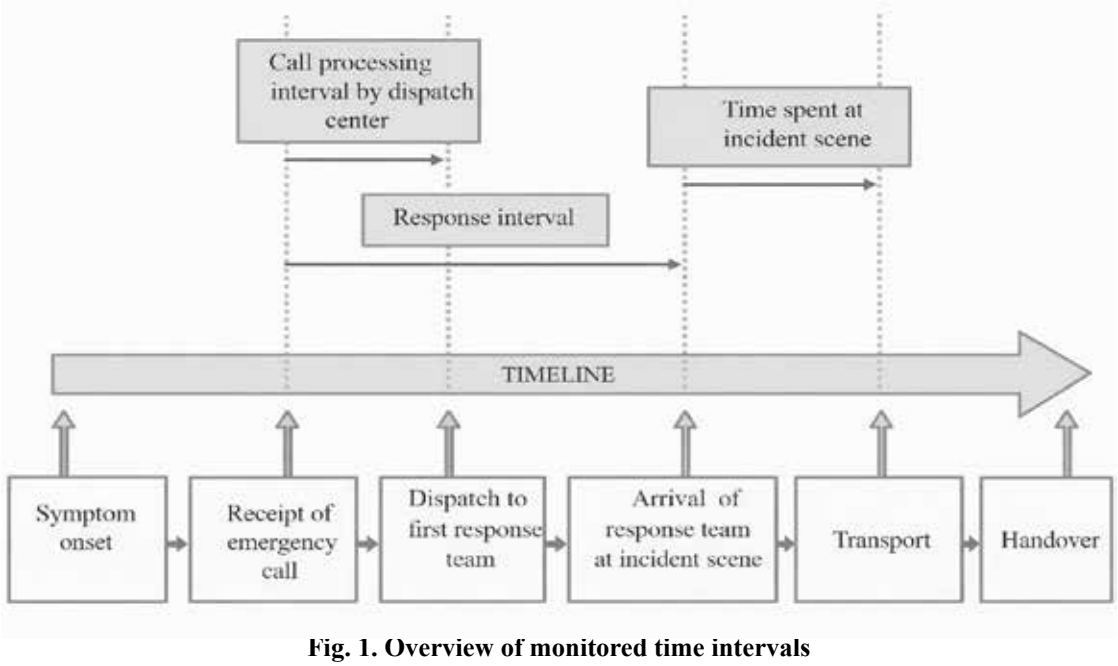
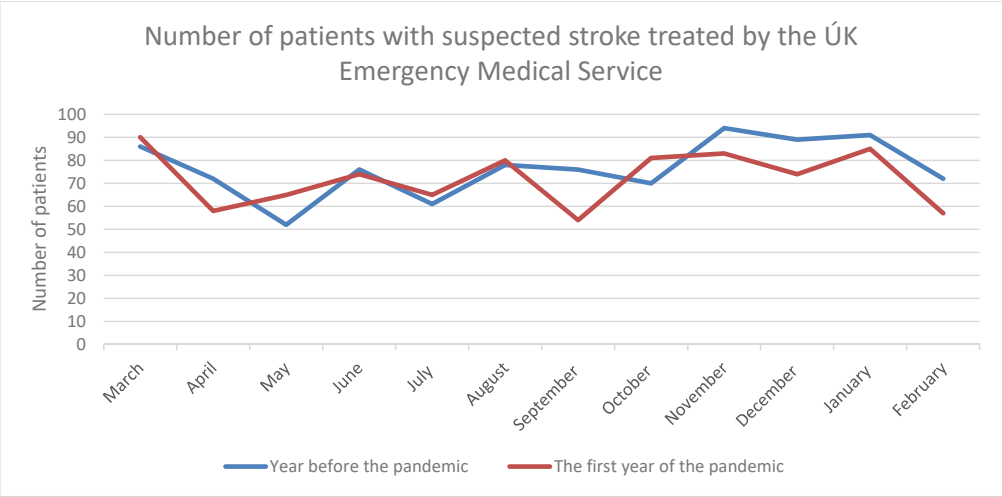


Fig. 1. Overview of monitored time intervals

Source: own, modified according to the Society of Emergency Medicine and Disaster Medicine of the Czech Medical Association of J. E. Purkyně 2020.



Graph 1. Number of patients with suspected CMP

Source: own.

by the medical operations center was prolonged: the median from 2:44 to 2:58 (+14 s; $p < 0.001$) and the mean from 3:29 ± 3:23 to 3:46 ± 3:00. In contrast, the time on site did not differ between periods (median 22:00 in both periods; $p = 0.362$; Table 2).

The proportion of calls made during the day was stable (73.5% before the pandemic vs. 74.6% during the pandemic), corresponding to approximately 674/917 and 646/866 calls; statistical comparison showed no significant difference ($p = 0.598$).

Discussion of research results

In this retrospective analysis of regional emergency medical service dispatch data from the Ústí nad Labem Region, we did not find a statistically significant change in the number of patients with suspected stroke in the first year of the COVID-19 pandemic compared to the pre-pandemic period, even though the absolute number of dispatches decreased slightly. This picture is consistent with some international observations showing that

Table 1

Age distribution of patients with suspected stroke (percentage)

Age category	Before the pandemic (%)	Pandemic (%)
Up to 29	0.44	0.46
30–39	1.31	0.81
40–49	5.89	3.93
50–59	6.87	10.62
60–69	22.57	22.06
70–79	37.4	35.1
80–89	20.5	22.29
90	5.02	4.73

Note: The proportions are expressed as a percentage of the total number of dispatches in the given

Table 2

Summary of main time intervals (total values for the period)

Indicator	Before the pandemic (03/2019–02/2020)	During the pandemic (03/2020–02/2021)	p-value
Number of patients, n	917	866	0.488
Age (years), mean ± SD; median	71.4 ± 12.7; 73	71.8 ± 12.3; 73	0.785
EMS response interval, mean ± SD	12:17 ± 5:31	13:11 ± 5:30	< 0.001
EMS response interval, median	11:03	11:57	< 0.001
Call processing interval, mean ± SD	3:29 ± 3:23	3:46 ± 3:00	< 0.001
Call processing interval, median	2:44	2:58	< 0.001
Time on site, mean ± SD	23:31 ± 9:03	23:53 ± 9:11	0.362
Time on site, median	10:00	10:00	0.362
Daytime trips (6:00–18:00), %	73.5	74.6	0.598
Nighttime trips (6:00 p.m. to 6:00 a.m.), %	26.5	25.4	0.598

Note: Time data are given in min:sec format.

Table 3

Time intervals by quarter (mean ± SD and median). Before the pandemic (03/2019–02/2020)

Indicator		03	06	09	12-02	Total
Number of patients	n	210	215	240	252	917
EMS response interval	Average ± SD	11:58 ± 5:07	12:13 ± 5:27	12:51 ± 5:52	12:06 ± 5:32	12:17 ± 5:31
EMS response interval	Median	10:46	11:23	11:41	10:41	11:03
Call processing interval	Average ± SD	3:19 ± 2:03	3:28 ± 3:05	3:34 ± 3:54	3:35 ± 3:58	3:29 ± 3:23
Call processing interval	Median	2:54	2:37	2:42	2:46	2:44
Time on site	Average ± SD	24:37 ± 9:46	22:13 ± 7:45	22:58 ± 8:10	24:12 ± 10:05	23:31 ± 9:03
Time on site	Median	10:00	9:00 p.m.	10:00	11:00	10:00

During the pandemic (03/2020–02/2021)

Indicator		03	06	09-11	12-02	Total
Number of patients	n	213	219	218	216	866
EMS response interval	Average ± SD	13:14 ± 5:22	12:57 ± 4:57	13:11 ± 6:04	13:22 ± 5:29	13:11 ± 5:30
EMS response interval	Median	12:12	11:50	11:44	12:08	11:57
Call processing interval	Mean ± SD	3:41 ± 3:06	3:54 ± 3:18	3:46 ± 3:04	3:43 ± 2:29	3:46 ± 3:00
Call processing interval	Median	2:54	3:02	2:53	3:03	2:58
Time on site	Average ± SD	24:31 ± 9:58	23:07 ± 9:21	24:14 ± 9:25	23:38 ± 7:50	23:53 ± 9:11
Time on site	Median	11:00	9:00	10:00	11:00	10:00

Note: Quarters are defined as March–May, June–August, September–November, and December–February. Times are given in min:sec format.

declines in the use of acute care were often time-limited and regionally variable, with case numbers normalizing in some systems after the initial wave [10; 14].

In terms of process indicators, we found statistically significant increases in two intervals that mainly reflect the dispatch and logistical burden on the system: the response interval increased by a median of 54 seconds and the call processing interval by 14 seconds. Although these differences are relatively small in absolute terms, their consistency across quarters supports the interpretation of a systemic change rather than random variability. The literature describes extensions of prehospital intervals ranging from tens of seconds to minutes, the magnitude of which is usually determined by the organization of the system, the intensity of waves, the availability of crews, and the requirements for epidemiological triage and the use of protective equipment [15; 16; 17].

In contrast, on-scene time remained stable in our sample, suggesting that emergency response teams were able to adapt their clinical procedures at the scene without prolonging pre-transport times, even under conditions of increased safety requirements. Some studies describe similar stability in on-scene time, while others report prolongation associated mainly with the use of personal protective equipment and more complicated organizational coordination [18; 19].

From a practical point of view, our findings support the interpretation that the most vulnerable part of the pre-hospital chain in crisis situations may be dispatch and arrival processes, i.e., the phases in which the burden of increased call volume, triage algorithms, and logistical constraints, while actual clinical care on site may remain relatively stable if the system is sufficiently standardized and crews are prepared for changes [8; 13].

From a clinical relevance perspective, it is essential to recognize that in CVA, time to treatment is a critical determinant of outcome, and therefore even relatively small systemic shifts can mean a shift in the availability of specific treatment for some patients, especially at the edge of therapeutic windows; At the same time, however, it is true that a significant part of the total delay often occurs before the activation of the EMS, i.e., in the interval between the onset of symptoms and the call to the emergency line, which could not be evaluated in our data [5; 10].

Prospects for further research

Future research should focus on a comprehensive evaluation of the entire stroke care pathway, including the interval from symptom onset to activation of the Emergency Medical Service, hospital admission, and initiation of definitive treatment. Multicentre studies involving different regions and healthcare systems are also warranted to verify the generalisability of the present findings and to identify organisational factors that may improve the resilience of pre-hospital stroke care during future public health emergencies.

Conclusions

In the Ústí nad Labem Region, the first year of the COVID-19 pandemic was associated with a slight but statistically significant increase in the response time of the EMS and the time taken to process calls by the medical operations center for patients with suspected stroke, while the time spent on site, age structure, and distribution of calls by time of day remained stable.

The results show good resilience of the pre-hospital system, but also suggest that during periods of exceptional workload, it is appropriate to target optimization measures primarily at dispatch and logistics processes, which appear to be the most sensitive to system overload.

Bibliography

1. Ambler Z, Potužník P, Polívka J. Základy neurologie. 8. aktualizované a doplněné vydání. Praha: Galén; 2023.
2. Šeblová J, et al. Urgentní medicína v přednemocniční praxi lékaře. 2. doplněné a aktualizované vydání. Praha: Grada Publishing; 2018.
3. Růžička E. Neurologie. 3. rozšířené vydání. Praha: Triton; 2024.
4. Šín R, Štourač P, et al., eds. Urgentní medicína. 1. vyd. Praha: Galén; 2025.
5. Meretoja A, Keshtkaran M, Saver JL, Tatlisumak T, Parsons MW, Kaste M, et al. Stroke thrombolysis: save a minute, save a day. Stroke. 2014;45(4):1053–1058. DOI: 10.1161/STROKEAHA.113.002910.
6. Ministerstvo zdravotnictví České republiky. Metodický pokyn – Péče o pacienty s akutní cévní mozkovou příhodou 2021 [Internet]. Praha: Ministerstvo zdravotnictví České republiky; 2021 [citováno 19. února 2026]. Available from: https://www.mzcr.cz/vestnik/vestnik-c-10-2021/.
7. Ministerstvo zdravotnictví České republiky. Souhrnný seznam center vysoce specializované péče v České republice – aktualizace červenec 2024 [Internet]. Praha: Ministerstvo zdravotnictví České republiky; 2024 [citováno 10. června 2025]. Available from: https://mzd.gov.cz/wp-content/uploads/2024/07/Vestnik-MZ-09-2024.pdf.
8. Společnost urgentní medicíny a medicíny katastrof ČLS JEP. Návrh jednotného metodického postupu přednemocniční neodkladné péče v době pandemie COVID-19 [Internet]. Praha: Společnost urgentní medicíny a medicíny katastrof ČLS JEP; 2020 [citováno 1. listopadu 2025]. Available from: https://urgmed.cz/wp-content/uploads/2020/11/Metodicky%CC%81-postup-v-PNP-podzim-2020_v_18112020a.pdf.
9. World Health Organization. Coronavirus disease 2019 (COVID-19): Situation report – 51 (2020). Available from: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200311-sitrep-51-covid-19.pdf (Accessed January 25, 2026).
10. Burton E, Aladkhen J, O'Donnell C, Masterson S, Merwick Á, McCarthy VJC, et al. Effects of the COVID-19 pandemic on prehospital emergency care for adults with stroke and transient ischaemic attack: a systematic review and meta-analysis. Prehosp Emerg Care. 2024;28(6):803–822. DOI: 10.1080/10903127.2023.2219729.
11. Vural A, Aksoy İ, Ekiz M. The change in acute ischemic stroke numbers in the emergency service during early phase of COVID-19 pandemic. Middle Black Sea J Health Sci. 2022;8(1):139–145. DOI: 10.19127/mbsjohs.1054605.
12. Angels Initiative. Angels Initiative [Internet]. [cited 2025 Oct 30]. Available from: https://www.angels-initiative.com/.
13. Společnost urgentní medicíny a medicíny katastrof ČLS JEP. Indikátory kvality činnosti zdravotnické záchranné služby [Internet]. Praha: SUMMK ČLS JEP; 2020 [cited 2025 Jul 2]. Available from: https://urgmed.cz/wp-content/uploads/2020/12/2020_indika%CC%81tory-kvality-ZZS_FINAL.pdf.
14. Blek N, Ladny JR, Szarpak L. Effect of the COVID-19 pandemic in the prehospital management of patients with suspected acute stroke: a retrospective cohort study. Int J Environ Res Public Health. 2022;19(8):4769. DOI: 10.3390/ijerph19084769.
15. Riera-López N, Aranda-Aguilar F, Gorchs-Molist M, Iglesias-Vázquez JA. Effect of the COVID-19 pandemic on advanced life support units' prehospital management of the stroke code in four Spanish regions: an observational study. BMC Emerg Med. 2023;23(1):116. DOI: 10.1186/s12873-023-00886-8.
16. Seo AR, Lee WJ, Woo SH, Moon J, Kim D. Pre-hospital delay in patients with acute stroke during the initial phase of the coronavirus disease 2019 outbreak. J Korean Med Sci. 2022;37(6):e47. DOI: 10.3346/jkms.2022.37.e47.
17. Ventura CAI, Denton EE, David JA, Schoenfelder BJ, Mela L, Lumia RP, et al. Emergency medical services prehospital response to the COVID-19 pandemic in the US: a brief literature review. Open Access Emerg Med. 2022;14:249–272. DOI: 10.2147/OAEM.S366006.
18. Hänninen P, Hällberg V, Hakala L, Koivistoinen T, Palomäki A. Prehospital time intervals in stroke care before and after the outbreak of COVID-19. Research Square [Preprint]. 2023. DOI: 10.21203/rs.3.rs-3265689/v1.
19. Sabbaghi M, Namazinia M, Miri K. Time indices of pre-hospital EMS missions before and during the COVID-19 pandemic: a cross-sectional study in Iran. BMC Emerg Med. 2023;23(1):9. DOI: 10.1186/s12873-023-00780-3.

Purpose is to evaluate the impact of the first year of the COVID-19 pandemic on selected temporal and organizational parameters of prehospital emergency care for patients with suspected stroke in the Ústí nad Labem Region by comparing system performance before and during the pandemic.

Materials and Methods. A retrospective observational study was conducted using data from the Electronic Patient Record system of the Ústí nad Labem Region Emergency Medical Service. Patients with suspected stroke (ICD-10 codes I60–I64) treated between March 2019 and February 2021 were included. Two 12-month periods were compared: pre-pandemic (March 2019–February 2020) and pandemic (March 2020–February 2021). Primary outcomes were dispatch call-processing time, response time, and on-scene time. Statistical analyses were performed in R (version 4.5.1) using the Wilcoxon rank-sum test, chi-square test, and two-proportion test ($\alpha = 0.05$).

Results. A total of 1.783 emergency calls were analysed (917 pre-pandemic, 866 pandemic). No significant differences were found in the number of patients ($p = 0.488$), median age (73 years; $p = 0.785$), or distribution of calls by time of day ($p = 0.598$). During the pandemic, median response time increased from 11:03 to 11:57 ($p < 0.001$), while dispatch call-processing time increased from 2:44 to 2:58 ($p < 0.001$). On-scene time remained unchanged at 22:00 minutes ($p = 0.362$).

Conclusions. The prehospital emergency care system remained resilient during the COVID-19 pandemic. Although dispatch and response times increased slightly, stable on-scene times indicate effective adaptation of emergency medical teams. Dispatch centres appear to be the most vulnerable component of the prehospital stroke care pathway and should be prioritised in future emergency preparedness planning.

Key words: stroke, COVID-19, prehospital emergency care, emergency medical services, response times.

Мета. Це ретроспективне дослідження мало на меті оцінити вплив першого року пандемії COVID-19 на окремі часові та організаційні параметри долікарняної невідкладної допомоги пацієнтам із підозрою на інсульт у регіоні Усті-над-Лабем. З огляду на те, що час є критичним чинником, який визначає прогноз та якість життя у лікуванні інсульту, було вкрай важливо кількісно оцінити потенційні затримки в ланцюгу долікарняної допомоги. Дослідження було зосереджено на порівнянні ефективності системи в період надзвичайного епідеміологічного навантаження зі стандартними операціями, що здійснювалися до кризи, з урахуванням специфічних особливостей регіону, який бере активну участь у міжнародних програмах з підвищення якості допомоги у разі інсульту.

Матеріали та методи. Було проведено ретроспективне, обсерваційне, порівняльне дослідження з використанням даних із системи електронних медичних карток Служби екстреної медичної допомоги Усті-над-Лабемського краю. До вибірки дослідження увійшли пацієнти, до яких було направлено бригаду швидкої допомоги через симптоми, що відповідають діагнозам МКХ-10 I60–I64. Аналіз порівняв два 12-місячні періоди: допандемічний (березень 2019 р. – лютий 2020 р.) та пандемічний (березень 2020 р. – лютий 2021 р.). Основними показниками, що відстежувалися, були час обробки виклику медичним диспетчерським центром, загальний час реагування та час перебування бригади на місці події. До вторинних показників належали демографічна структура та розподіл викликів у часі. Дев'ять записів було виключено з часового аналізу через неповну документацію. Статистичний аналіз було проведено в програмі R (версія 4.5.1) із використанням тесту суми рангів Вілкоксона, тесту хі-квадрат та тесту двох пропорцій, при цьому рівень значущості було встановлено на рівні $\alpha = 0,05$.

Результати. Загальний набір даних складався з 1 783 викликів швидкої допомоги, з яких 917 надійшли в допандемічний період, а 866 – під час пандемії. Не було виявлено значущого зменшення кількості пацієнтів, яким надано допомогу ($p = 0,488$), або їхнього вікового розподілу, оскільки медіанний вік залишався стабільним на рівні 73 років в обох періодах ($p = 0,785$). Однак часові показники продемонстрували очевидне подовження. Медіанний час реагування збільшився з 11:03 до 11:57, що становить зростання на 54 секунди ($p < 0,001$). Аналогічно час обробки виклику диспетчерським центром зріс з 2:44 до 2:58 ($p < 0,001$). Натомість час, проведений бригадою на місці події, не зазнав статистично значущих змін, залишаючись на рівні медіани 22:00 в обох періодах ($p = 0,362$). Це свідчить, що пандемія не мала негативного впливу на клінічну роботу на місці події. Частка викликів у денний та нічний час також залишалася стабільною без значних коливань ($p = 0,598$).

Висновки. Система долікарняної допомоги в регіоні Усті-над-Лабем продемонструвала високу стійкість під час пандемії. Хоча час диспетчеризації та реагування збільшився на десятки секунд через логістичні навантаження та використання засобів індивідуального захисту, стабільний час перебування на місці події свідчить про професіоналізм та стандартизацію клінічних процедур. Ці результати вказують на диспетчерські центри як на найбільш вразливу ланку, що свідчить про необхідність надати їм пріоритет у майбутньому плануванні дій у надзвичайних ситуаціях. Незважаючи на незначні затримки, доступ до невідкладної допомоги у разі інсульту був успішно забезпечений у всьому регіоні.

Ключові слова: інсульт, COVID-19, долікарняна невідкладна допомога, служби екстреної медичної допомоги, час реагування.

Conflict of interest: absent.
Конфлікт інтересів: відсутній.

Information about the authors

Kohlová Alena – Assistant Professor, Head of the Department of Emergency Medical Services, Radiology, and Biomedical Technology, Faculty of Health Studies, J.E. Purkyně University in Ústí nad Labem; doctoral student in the Nursing program, Faculty of Health and Social Work, St. Ladislav and St. Elizabeth University of Health and Social Work in Bratislava, Nové Zámky, Slovakia.
alena.kohlova@ujep.cz, ORCID ID: 0000-0001-7017-2404 [A, B, D, F]

Tichá Kateřina – Assistant Professor, Vice Dean for Academic Affairs at the Faculty of Health Studies, J.E. Purkyně University in Ústí nad Labem.
katerina.ticha@ujep.cz, ORCID ID: 0009-0002-7432-8706 [B, C]

Vaníků Tony – Graduate of the Emergency Medical Services program at the Faculty of Health Studies, J.E. Purkyně University in Ústí nad Labem.
tony.vanik@gmail.com, ORCID ID: 0009-0002-2816-486X [B, C]

Dubovcová Martina – Associate Professor at Comenius University, Jessenius Faculty of Medicine, Psychiatric Clinic, University Hospital Martin, Slovakia.
m.dubovcova@gmail.com, ORCID ID: 0000-0003-0634-2741 [A, E]

Cmorej Patrik Christian – Assistant Professor, Vice Dean for Science and Research, Faculty of Health Studies, J.E. Purkyně University in Ústí nad Labem. patrik.cmorej@ujep.cz, ORCID ID: 0000-0003-3046-2970 [E, F]

Дата першого надходження статті до видання: 10.07.2026
Дата прийняття статті до друку після рецензування: 14.09.2026
Дата публікації (оприлюднення) статті: 28.10.2026