

ORIGINAL PAPER ΕΡΕΥΝΗΤΙΚΗ ΕΡΓΑΣΙΑ

The impact of SARS-CoV-2 in Greece

OBJECTIVE To quantitatively and qualitatively explore the emergency calls received by the National Center of Emergency Care (Greek acronym: EKAB) in the region of Attica for the period 2019–2021. **METHOD** Retrospective descriptive analysis of the database recording calls to EKAB for the peri-pandemic and pandemic period. **RESULTS** The average number of calls per year was 350,000, two thirds of which resulted in the further use of emergency services. In the first year of the pandemic crisis (2020), calls decreased by 14% compared to 2019. During the first lockdown calls decreased by 33%. Considerable reductions were observed for calls related to trauma and motor vehicle accidents (21%) and cardiovascular events (22%). The proportion of calls resulting in refusals of transportation to hospital increased. Moreover, calls for “psychiatric/suicide attempts” increased in 2020. **CONCLUSIONS** This was the first study using real-world data to explore the response of EKAB to the demand for emergency medical services (EMS) before and during the SARS-CoV-2 pandemic crisis. The study shed light to the composition of demand and the changes induced by SARS-CoV-2. The findings were consistent with the reported experience of other emergency services across the world.

In December 2019, a cluster of patients in the city of Wuhan, China, was diagnosed with pneumonia from a new strain of coronavirus named 2019, SARS-CoV-2.^{1,2} On March 11, the World Health Organization (WHO) declared SARS-CoV-2 as a pandemic.³ In Greece the first confirmed case of SARS-CoV-2 was recorded on the 26th of February 2020.⁴ The Greek public health authorities took an aggressive stance and implemented a set of strict mitigation measures.⁵ The National Center of Emergency Care (EKAB) is the only nationwide public provider of emergency medical services (EMS) in Greece. On an annual and nationwide basis, EKAB responds to nearly one million calls (997,248). Of these calls, 682,989 result in transfers to health facilities whereas 546,975 of these calls are emergency transfers.

Given the unprecedented SARS-CoV-2 public health crisis, EKAB had an instrumental role in the mitigation of the pandemic. The role of EKAB in the mitigation of the pandemic was reinforced by the organizational merge of EKAB with the Health Policy Center (KEPY) which had taken

place a few months before the onset of the pandemic. As expected, the pandemic had an impact on the operations of emergency services in the country.

The present study aimed to quantitatively and qualitatively assess the impact of the SARS-CoV-2 pandemic on the operations of EKAB using a retrospective database of emergency calls in the region of Attica, Greece. This study utilized the data produced by the first digitalization of the operational center of EKAB which was completed in 2019.

MATERIAL AND METHOD

Methodology

A retrospective descriptive analysis of the volume and types of emergency calls to EKAB operational center in Athens was carried out for the years 2019, 2020 and 2021 amidst SARS-CoV-2 pandemic. To assess the impact of the SARS-CoV-2 pandemic, calls to EKAB during the two lockdown periods (22.3.2020 to 4.5.2020 and 7.11.2020 to 13.5.2021) were compared to the corresponding time periods in 2019.

ARCHIVES OF HELLENIC MEDICINE 2024, 41(4):505–511
ΑΡΧΕΙΑ ΕΛΛΗΝΙΚΗΣ ΙΑΤΡΙΚΗΣ 2024, 41(4):505–511

E. Aravanis,^{1,2}
J. Yfantopoulos,²
D. Pyrros,¹
A. Zygoura,¹
N. Kotsopoulos²

¹National Center of Emergency
Care (EKAB), Athens, Greece

²Section of Economics, National and
Kapodistrian University of Athens,
Athens, Greece

Ο αντίκτυπος του SARS-CoV-2
στο Εθνικό Κέντρο
Άμεσης Βοήθειας

Περίληψη στο τέλος του άρθρου

Key words:

Emergency medical services
Greece
SARS-CoV-2

Submitted 6.6.2023

Accepted 22.7.2023

Data

The operational area of EKAB in Athens covers the prefecture of Attica with a population of 3,828,434 inhabitants.⁶ EKAB operates from 35 to 55 ambulances (basic life support ambulances and mobile medical units) depending on the time of the day.⁷ Individuals requiring ambulance services contact EKAB through the national emergency telephone number (166) or the European emergency number (112). Calls are answered by EMS specialists,

who also act as emergency call handlers and or emergency medical dispatchers. Emergency call handlers record data for the patient's condition and location, onto an information system. Depending on the severity, all calls are prioritized and assigned to a color classification. Red calls refer to ultra-urgent calls, orange calls to urgent calls, and green calls to medium- or low-severity calls with normal response. Following emergency call registration, the information is transferred to emergency medical dispatchers, who decide which staff and vehicles to dispatch, based on the sever-

Table 1. Total number of calls by event type and percentage change between 2019 and 2020.

| Type of event | 2019 | 2020 | % change |
|--|--------|--------|----------|
| Non-emergency calls | 39,884 | 38,032 | -5 |
| Pathological problem/feeling unwell/non-identified | 39,226 | 32,810 | -16 |
| Fall | 23,450 | 18,757 | -20 |
| Respiratory | 19,969 | 15,084 | -24 |
| MVA | 17,783 | 13,990 | -21 |
| Cardiac | 17,015 | 13,303 | -22 |
| Collapse/unconsciousness | 12,291 | 9,056 | -26 |
| Abdominal pain | 9,737 | 8,204 | -16 |
| Stroke | 7,057 | 5,871 | -17 |
| Hemorrhage | 5,300 | 4,574 | -14 |
| Unknown | 4,923 | 3,965 | -19 |
| Non-trauma chest pain | 4,452 | 3,959 | -11 |
| Psychiatric/suicide attempt | 2,525 | 2,680 | 6 |
| Transfer for therapy | 2,092 | 2,683 | 28 |
| Seizure | 2,023 | 1,770 | -13 |
| Back pain | 1,855 | 1,408 | -24 |
| Beating/sexual abuse | 1,660 | 1,407 | -15 |
| Pregnancy/labour/abortion | 1,369 | 1,513 | 11 |
| Diagnostic exams | 1,142 | 1,143 | 0 |
| Drugs/poisoning/medication overdose | 1,140 | 1,011 | -11 |
| Headache | 1,114 | 855 | -23 |
| Cardiac arrest | 676 | 556 | -18 |
| Anaphylactic reaction/animal poisoning | 666 | 482 | -28 |
| Metabolic | 578 | 432 | -25 |
| Myocardial infraction | 568 | 519 | -9 |
| Gun shot/penetrating trauma (knife etc.) | 544 | 585 | 8 |
| Burn injuries/explosion | 335 | 330 | -1 |
| Drowning/water injuries | 198 | 188 | -5 |
| Asphyxia/foreign body | 189 | 184 | -3 |
| Animal injury | 152 | 143 | -6 |
| Eye pain | 126 | 101 | -20 |
| Poisonous inhalation/industrial accident/CBRN accident | 67 | 67 | 0 |
| Electrocution/lightning strike | 48 | 32 | -33 |
| Entrapment, non-accessible patient/except MVA | 32 | 26 | -19 |
| Heat injury/cold injury/exposion to heat, cold | 25 | 8 | -68 |

MVA: Motor vehicle accidents, CBRN accident: Chemical, biological, radiological and nuclear accident

ity of the situation and the resources available. Since 2019, data from the calls are recorded onto an information system. Calls are then categorized based on a grouping method developed by the medical services of EKAB. Specifically, calls may fall in one of 35 groups shown in table 1. The recorded calls also include calls for therapy and diagnostic tests. These are non-urgent calls mainly for transfers of chronic patients or of patients requiring transfers for re-examinations.

RESULTS

Figure 1 shows the monthly number of calls for the study period (2019–2021). The total number of annual calls were 358,398, 315,260 and 374,324 in 2019, 2020 and 2021, respectively. The corresponding total number of transportations were 220,211, 195,176, and 210,342 for the years 2019, 2020, and 2021, respectively. The ratio of calls/

transportation appeared to be consistently equal to 3:2.

Table 1 shows the composition of calls in terms of event type for the years 2019 and 2020 along with the percentage of change between these two study periods. Figure 2 illustrates the number of calls related to SARS-CoV-2.

Table 2 shows the observed changes in calls for motor vehicle accidents (MVA) and cardiovascular events for the periods under study. MVA reduced during the first pandemic year and subsequently increased in 2021. Further analysis of calls for cardiovascular events showed that calls for strokes reduced by 17% between 2019 and 2020 and increased by 6% in the following year (fig. 3). Calls for cardiovascular events decreased by 10% between the first year of the pandemic crisis whereas in the period 2020–2021 a 46% increase was observed (tab. 2).

With respect to calls for suicides and psychiatric events,

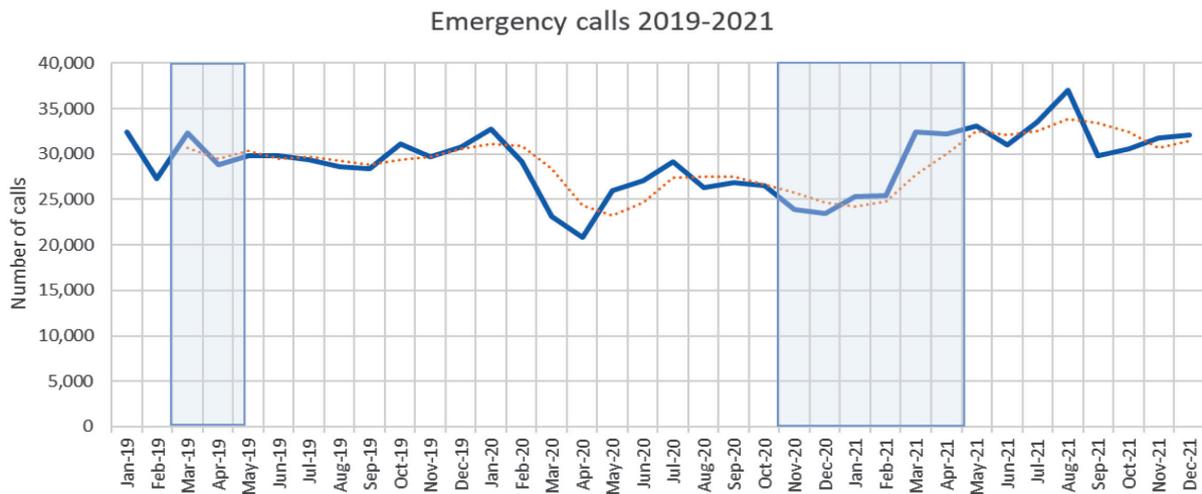


Figure 1. Total number of calls for the period 2019–2021.

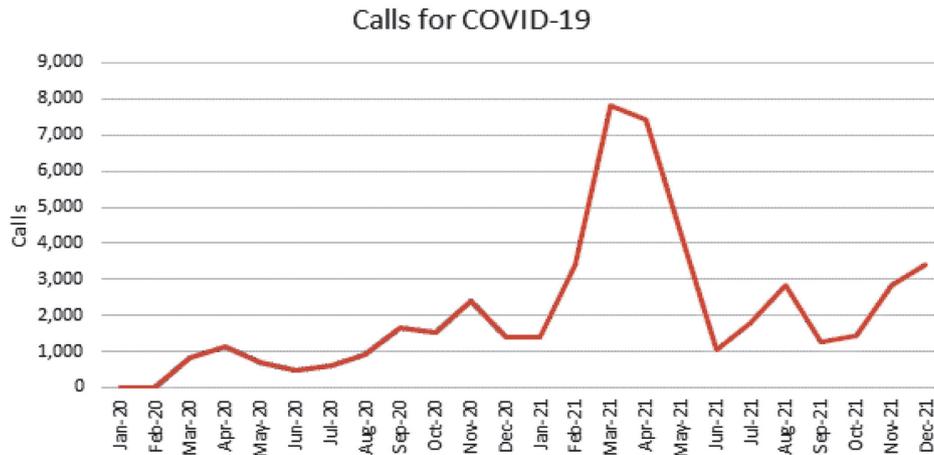


Figure 2. Total number of calls related to COVID-19.

Table 2. Observed (%) changes in calls for motor vehicle accidents (MVA) and cardiovascular events.

| | Motor vehicle accidents | | Cardiovascular events | |
|-----------|-------------------------|--------------------|-----------------------|--------------------|
| | % change 2019–2020 | % change 2020–2021 | % change 2019–2020 | % change 2020–2021 |
| January | 10 | -21 | -1 | -29 |
| February | 19 | -35 | -2 | -26 |
| March | -47 | 24 | -37 | -6 |
| April | -61 | 139 | -22 | -1 |
| May | -22 | 33 | -23 | 0 |
| June | -11 | 18 | -3 | -5 |
| July | 11 | 7 | -21 | 5 |
| August | -5 | 18 | -18 | 18 |
| September | 5 | 4 | -32 | -2 |
| October | -12 | 2 | -34 | 1 |
| November | -34 | 74 | -39 | 14 |
| December | -35 | 69 | -32 | -2 |
| Total | -16 | 19 | -22 | -4 |

the seasonality of calls was examined. Figure 4 shows the monthly distribution of such calls for the three years of the study period.

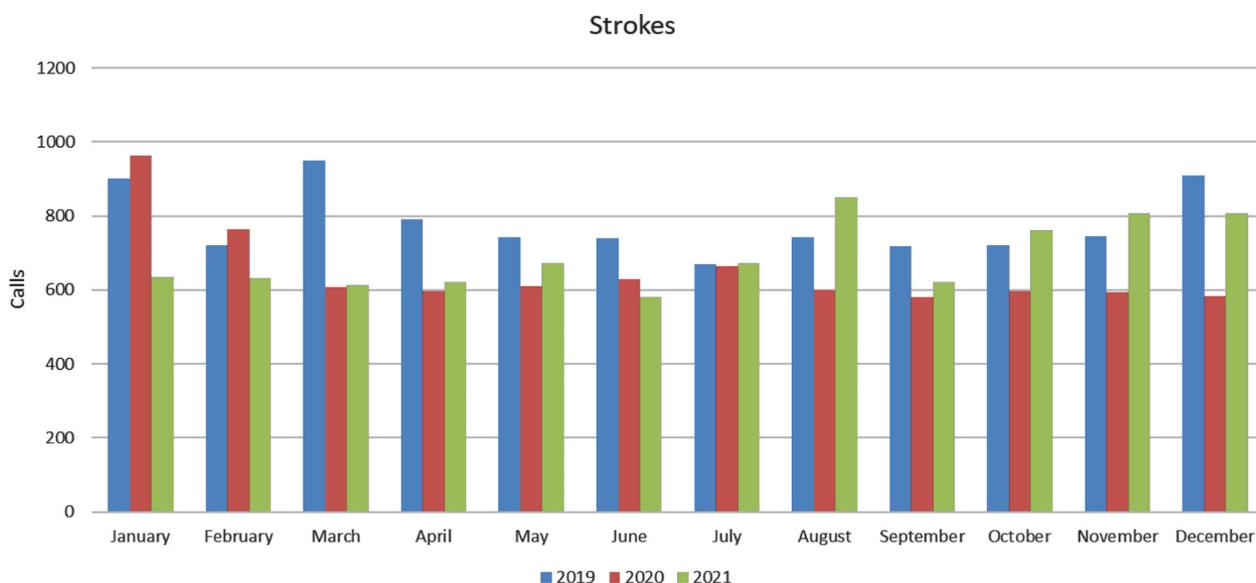
In 2019, 7.09% of the callers denied transportation. The corresponding percentage in 2020 was 8.93% and 7.41% in the years 2020 and 2021, respectively (fig. 5). In the exploratory analysis of the monthly 2019–2021 data, refusal for transportation was found to be statistically significantly correlated with cardiac arrest ($p < 0.001$).

DISCUSSION

A retrospective descriptive analysis of emergency calls in the region of Attica in the three-year period 2019–2021 was conducted for the first time after the digitization of EKAB's operational center. The aim of the study was to assess the impact of the SARS-CoV-2 pandemic crisis, to identify changes in the demand of emergency services. The findings demonstrated a different landscape in the years 2020 and 2021 compared to the pre-pandemic year of 2019. Specifically, in 2020, emergency calls to EKAB decreased by 14% compared to 2019. In 2021 the number of emergency calls increased despite the fact that in the first four months the country was in a lockdown. The increase led to higher numbers of calls compared to 2019.

During the lockdown periods, the demand for emergency services showed a greater deviation. During the first lockdown (March–April 2020) a 33% decrease, compared to the corresponding period of 2019, was observed. In the second lockdown (November 2020–April 21) a reduction (28%) in the total number of calls was also observed, compared to the same period in 2019. This finding is consistent with the data reported by other countries. The literature findings suggest a lack of uniformity with respect to the change in the volume of calls compared to the pre-pandemic period.

In Japan the number of calls in 2020 decreased by 12% compared to 2019,⁸ in Italy by 5%,⁹ in the United States of America (USA)¹⁰ and in Turkey by 10%.¹¹ In China¹² and Israel¹³ have been reported reductions in the demand for emergency services. However, in Northern Italy, which was

**Figure 3.** Monthly number of calls related to stroke events.

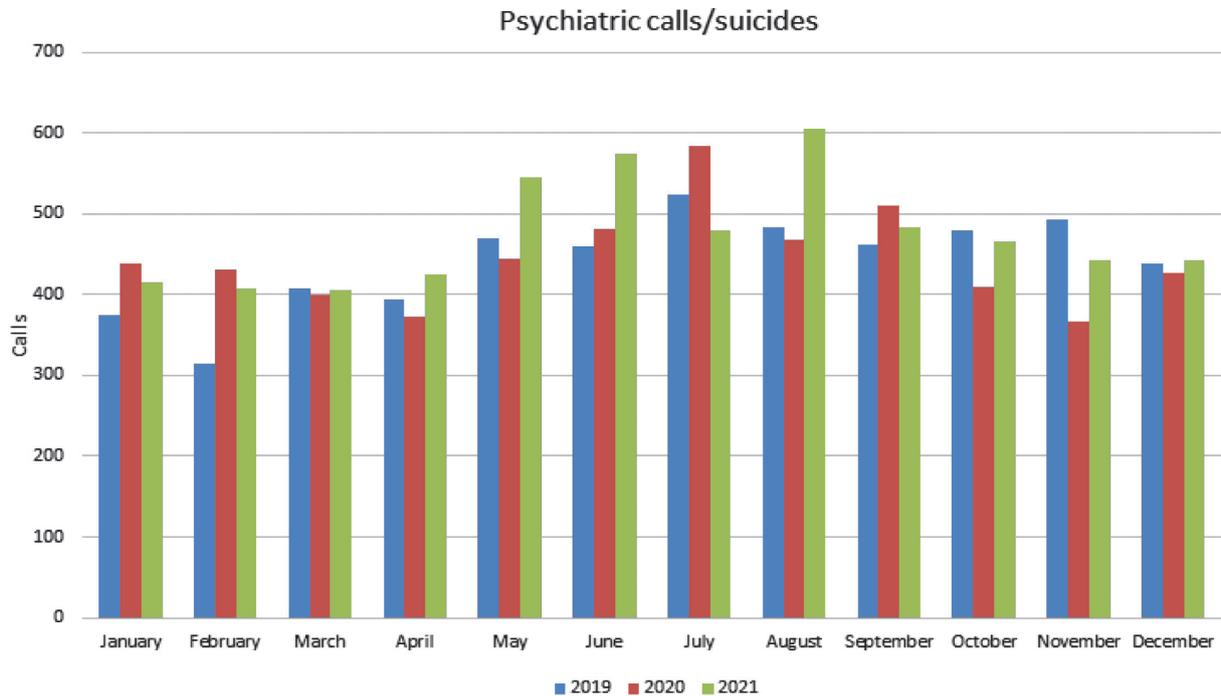


Figure 4. Monthly number of calls related to suicides/psychiatric events.

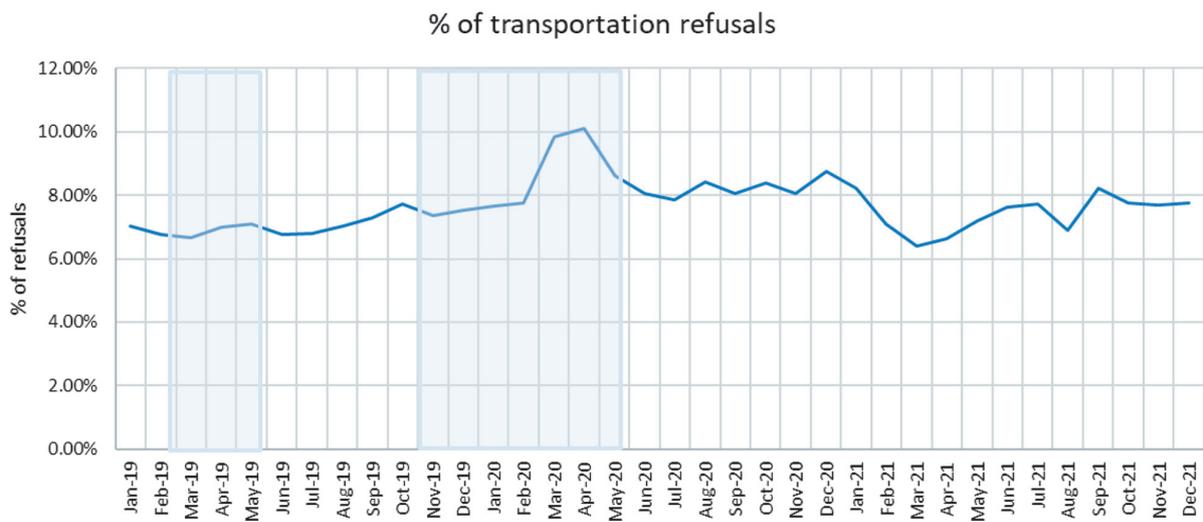


Figure 5. Proportion of calls resulting in transportation refusals.

struck very hard by the pandemic, demand for emergency services increased.¹⁴

In addition to the total volume of calls and the overall change in demand, the present study focused on specific call types as per the categorization conducted by the emergency medical services of EKAB. The data showed that calls for MVA considerably diminished (61%) during the first lockdown. This finding is consistent with the results of similar studies¹⁵ that reported a significant reduction in

the number of vehicle collisions. Furthermore, published data from a large hospital in Athens showed substantially reduced admissions to the surgical department during the lockdown periods.¹⁶ Internationally, reductions in trauma calls were reported in Finland (23%), in Israel (23%), and in Italy (5%).^{13,17,18} The decrease in this type of calls appears to be related to social distancing measures and the travel restrictions of individuals.¹⁹

The data also showed patients' reluctance to be trans-

ferred to hospitals' emergency departments. This was reflected by the high rates of refusal to be transferred by EKAB's ambulances. During lockdowns one in 10 patients who called EKAB ultimately refused to be transferred to a hospital.

The data showed that refusal of transport is likely associated with cardiac arrest events. This is because of cardiac arrest events which cardiopulmonary resuscitation was not performed for or cardiopulmonary resuscitation was terminated at the scene as a result of no return of spontaneous circulation (ROSC). It is noteworthy that calls for cardiac arrest increased during the pandemic period and that data analysis showed a strong positive correlation between refusal of transfer and cardiac arrest.

It is suggested that measures against SARS-CoV-2 such as quarantine, social distancing and lockdown restrictions combined with fear of contamination, anxiety and stigma seem to have negatively affected mental health.²⁰ One of the few categories of calls that increased in the period under analysis was that for psychiatric/suicide attempts. This type of calls increased by 1% in 2020 compared to 2019 and by 7% in 2021. This finding is consistent with the findings of

a Greek study,²¹ that reported increased cases of suicidal ideation in the first two weeks of the lockdown. Similar increases in calls for psychiatric incidents were recorded in the USA,²² New Zealand,²³ and Israel.²⁴ The present analysis also showed a seasonality in calls related to mental health. Throughout the three years under study, this type of call increased during the summer months (May–August). This finding appears to be consistent with published evidence suggesting that suicides increase and peak during spring and early summer.^{25,26} Locally, a previous study has shown that suicides increased in June.²⁷

This study analyzed the first available dataset recording the utilization of emergency medical services (EMS) in the largest and most populated region of Greece. The aim was to explore the impact of the SARS-CoV-2 pandemic on the demand for EMS. The findings are consistent with the international literature and experience. This was the first study using real-world data exploring the operational response of emergency medical services in Greece. The study shed light to the composition of regular demand for EMS and how demand was differentiated amidst a large-scale public health crisis. The findings were consistent with the reported experience of other EMS across the world.

ΠΕΡΙΛΗΨΗ

Ο αντίκτυπος του SARS-CoV-2 στο Εθνικό Κέντρο Άμεσης Βοήθειας

Ε. ΑΡΑΒΑΝΗΣ,^{1,2} Ι. ΥΦΑΝΤΟΠΟΥΛΟΣ,² Δ. ΠΥΡΡΟΣ,¹ Α. ΖΥΓΟΥΡΑ,¹ Ν. ΚΟΤΣΟΠΟΥΛΟΣ²

¹Εθνικό Κέντρο Άμεσης Βοήθειας (ΕΚΑΒ), Αθήνα, ²Τομέας Οικονομικών Επιστημών, Εθνικό και Καποδιστριακό Πανεπιστήμιο Αθηνών, Αθήνα

Αρχεία Ελληνικής Ιατρικής 2024, 41(4):505–511

ΣΚΟΠΟΣ Η ποσοτική και η ποιοτική ανάλυση των κλήσεων προς το Εθνικό Κέντρο Άμεσης Βοήθειας (ΕΚΑΒ) στην περιοχή της Αττικής, την περίοδο 2019–2021. **ΥΛΙΚΟ-ΜΕΘΟΔΟΣ** Διεξήχθη αναδρομική, περιγραφική ανάλυση της βάσης δεδομένων των κλήσεων προς το ΕΚΑΒ για την περίοδο πριν και κατά τη διάρκεια της πανδημικής κρίσης του SARS-CoV-2. **ΑΠΟΤΕΛΕΣΜΑΤΑ** Ο μέσος ετήσιος αριθμός κλήσεων προς το ΕΚΑΒ ήταν για την υπό εξέταση περίοδο 350.000 κλήσεις. Από τις κλήσεις αυτές, τα 2/3 διακομίστηκαν σε νοσοκομείο. Κατά το πρώτο έτος της πανδημικής κρίσης (2020) ο αριθμός των κλήσεων μειώθηκε κατά 14% σε σχέση με το 2019. Στη διάρκεια του πρώτου lockdown οι κλήσεις μειώθηκαν κατά 33%. Αξιοσημείωτες ήταν οι μειώσεις στις κλήσεις που αφορούσαν σε περιστατικά τραύματος και τροχαίων (21%) και σε καρδιαγγειακά συμβάματα (22%). Επίσης, το ποσοστό των κλήσεων που κατέληξαν σε άρνηση διακομιδής σε νοσοκομείο αυξήθηκε. Επί πλέον, οι κλήσεις που αφορούσαν σε ψυχιατρικά περιστατικά/ απόπειρες αυτοκτονίας αυξήθηκαν το 2020. **ΣΥΜΠΕΡΑΣΜΑΤΑ** Η παρούσα μελέτη είναι η πρώτη στην Ελλάδα όπου χρησιμοποιήθηκαν πραγματικά δεδομένα για τη διερεύνηση της ζήτησης υπηρεσιών προνοσοκομειακής φροντίδας πριν και κατά τη διάρκεια της πανδημικής κρίσης. Η μελέτη αναλύει τη σύνθεση της ζήτησης για τις εν λόγω υπηρεσίες, καθώς και τις αλλαγές που προέκυψαν κατά τη διάρκεια της πανδημικής κρίσης και καταλήγει σε ευρήματα συναφή με αυτά αντίστοιχων διεθνών μελετών.

Λέξεις ευρητηρίου: Ελλάδα, SARS-CoV-2, Υπηρεσίες επείγουσας προνοσοκομειακής φροντίδας

References

- ZHU N, ZHANG D, WANG W, LI X, YANG B, SONG J ET AL. A novel coronavirus from patients with pneumonia in China, 2019. *N Engl J Med* 2020, 382:727–733
- HARTLEY DM, REISINGER HS, PERENCEVICH EN. When infection prevention enters the temple: Intergenerational social distancing and COVID-19. *Infect Control Hosp Epidemiol* 2020, 41:868–869
- WORLD HEALTH ORGANIZATION. WHO Director-General's opening remarks at the media briefing on COVID-19 – 11 March 2020. Available at: <https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020>
- WORLD HEALTH ORGANIZATION. Situation report: World Health Organization. Coronavirus disease 2019 (COVID-19). 2020; 2019 (February):11
- SAKELLIADIS EI, KATSOS KD, ZOUZIA EI, SPILIOPOULOU CA, TSIODRAS S. Impact of Covid-19 lockdown on characteristics of autopsy cases in Greece. Comparison between 2019 and 2020. *Forensic Sci Int* 2020, 313:110365
- ΕΛΛΗΝΙΚΗ ΣΤΑΤΙΣΤΙΚΗ ΑΡΧΗ. Στατιστικές. ΕΛΣΤΑΤ, Αθήνα, 2022. Διαθέσιμο στο: <https://www.statistics.gr/el/statistics/-/publication/SAM03/->
- ΕΘΝΙΚΟ ΚΕΝΤΡΟ ΑΜΕΣΗΣ ΒΟΗΘΕΙΑΣ. Ημερήσια δύναμη μέσωσν διακομιδής κεντρικής υπηρεσίας ΕΚΑΒ. Διαθέσιμο στο: <https://www.ekab.gr/imerisia-dynami/>
- IGARASHI Y, YABUKI M, NORII T, YOKOBORI S, YOKOTA H. Quantitative analysis of the impact of COVID-19 on the emergency medical services system in Tokyo. *Acute Med Surg* 2021, 8:e709
- STIRPARO G, ORADINI-ALACREU A, MIGLIORI M, VILLA GF, BOTTERI M, FAGONI N ET AL. Public health impact of the COVID-19 pandemic on the emergency healthcare system: A region-wide analysis. *Eur J Public Health* 2021, 31(Suppl 3):e149–e152
- HANDBERRY M, BULL-OTTERSON L, DAI M, MANN NC, CHANEY E, RATTO J ET AL. Changes in emergency medical services before and during the COVID-19 pandemic in the United States, January 2018–December 2020. *Clin Infect Dis* 2021, 73(Suppl 1):S84–S91
- ŞAN İ, USUL E, BEKGÖZ B, KORKUT S. Effects of COVID-19 pandemic on emergency medical services. *Int J Clin Pract* 2021, 75:e13885
- CHEN J, CHENG YR, FU XY, WANG CY, WEN W, NI J ET AL. Exploring the impact of the COVID-19 epidemic on the medical emergency calls and calls for cardiovascular diseases in Hangzhou, China. *Ir J Med Sci* 2022, 191:563–567
- JAFFE E, SONKIN R, STRUGO R, ZERATH E. Evolution of emergency medical calls during a pandemic – an emergency medical service during the COVID-19 outbreak. *Am J Emerg Med* 2021, 43:260–266
- PERLINI S, CANEVARI F, CORTESI S, SGROMO V, BRANCAGLIONE A, CONTRI E ET AL. Emergency department and out-of-hospital emergency system (112-AREU 118) integrated response to coronavirus disease 2019 in a Northern Italy centre. *Intern Emerg Med* 2020, 15:825–833
- VANDOROS S. COVID-19, lockdowns and motor vehicle collisions: Empirical evidence from Greece. *Inj Prev* 2022, 28:81–85
- PIKOULIS E, KOLIAKOS N, PAPACONSTANTINOU D, PARARAS N, PIKOULIS A, STAVRATIS FC ET AL. The effect of the COVID pandemic lockdown measures on surgical emergencies: Experience and lessons learned from a Greek tertiary hospital. *World J Emerg Surg* 2021, 16:22
- AZBEL M, HEINÄNEN M, LÄÄPERI M, KUISMA M. Effects of the COVID-19 pandemic on trauma-related emergency medical service calls: A retrospective cohort study. *BMC Emerg Med* 2021, 21:102
- VALENT F, LICATA S. Emergency medical services calls during Italy's COVID-19 lockdown. *Ann Emerg Med* 2020, 76:812–814
- SEN-CROWE B, MCKENNEY M, ELKBULI A. Social distancing during the COVID-19 pandemic: Staying home save lives. *Am J Emerg Med* 2020, 38:1519–1520
- LONG D, HAAGSMA JA, JANSSEN MF, YFANTOPOULOS JN, LUBETKIN EI, BONSEL GJ. Health-related quality of life and mental well-being of healthy and diseased persons in 8 countries: Does stringency of government response against early COVID-19 matter? *SSM Popul Health* 2021, 15:100913
- PAPADOPOULOU A, EFSTATHIOU V, YOTSIDI V, POMINI V, MICHOPoulos I, MARKOPOULOU E ET AL. Suicidal ideation during COVID-19 lockdown in Greece: Prevalence in the community, risk and protective factors. *Psychiatry Res* 2021, 297:113713
- CZEISLER MÉ, LANE RI, PETROSKY E, WILEY JF, CHRISTENSEN A, NJAIR ET AL. Mental health, substance use, and suicidal ideation during the COVID-19 pandemic – United States, June 24–30, 2020. *MMWR Morb Mortal Wkly Rep* 2020, 69:1049–1057
- DICKER B, SWAIN A, TODD VF, TUNNAGE B, McCONACHY E, DRAKE H ET AL. Changes in demand for emergency ambulances during a nationwide lockdown that resulted in elimination of COVID-19: An observational study from New Zealand. *BMJ Open* 2020, 10:e044726
- JAFFE E, SONKIN R, PODOLSKY T, ALPERT EA, SIMAN-TOV M. The role of Israel's emergency medical services during a pandemic in the pre-exposure period. *Disaster Med Public Health Prep* 2022, 16:477–481
- CHEW KS, McCLEARY R. The spring peak in suicides: A cross-national analysis. *Soc Sci Med* 1995, 40:223–230
- KEVAN SM. Perspectives on season of suicide: A review. *Soc Sci Med Med Georg* 1980, 14:369–378
- BAZAS T, JEMOS J, STEFANIS K, TRICHOPOULOS D. Incidence and seasonal variation of suicide mortality in Greece. *Compr Psychiatry* 1979, 20:15–20

Corresponding author:

E. Aravanis, 92 E. Benaki street, 106 81 Athens, Greece
e-mail: aravanis_e@hotmail.com