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The Impact of the COVID-19 Pandemic on Pre-Hospital Emergency Medical Services: The impact of the Covid-19 pandemic on pre-hospital services

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Abstract

Background: The novel coronavirus (COVID-19) disease outbreak started in China and went on to affect the entire world. Healthcare providers were among the communities that faced severe challenges during the pandemic, and this was especially true of Pre-Hospital Emergency Medical Services (PHEMS) providers.

Objectives: This study aims to investigate the effect of the COVID-19 pandemic on service requests submitted to PHEMS providers via calls made to emergency hotlines.

Methods: Data were obtained on calls made to 112 (the emergency hotline) during March – August 2020 (i.e., during the pandemic) and the same period the previous year (i.e., the pre-pandemic period). These 2 data sets were analyzed and compared using the SPSS 26 software package (IBM Corp., Armonk, New York, USA).

Results: The results of the analysis indicated that the total number of emergency calls received during the pandemic period (11 745) increased compared to the pre-pandemic period (10 747), whereas there was a decrease in the proportion of trauma-related emergency calls during the pandemic period (5.3%) compared to the pre-pandemic period (6.8%). Furthermore, there was a higher proportion of extended service times among ambulances serving in PHEMS during the pandemic period (ambulance movements longer than 90 seconds: 15.6%) compared to the pre-pandemic period (ambulance movements longer than 90 seconds: 8.6%). Non-emergency ambulance usage rate was 44.90% in the pre-pandemic period and 38.90% in the pandemic period.

Conclusions: As the study's results show that there was an increase in the number of calls to PHEMS during the pandemic period, especially given that a significant portion of these calls consisted of non-emergency calls, it is recommended that measures be taken to reduce the excessive load on PHEMS during a pandemic.

Background

In December 2019, China informed the World Health Organization (WHO) that several cases of pneumonia of unknown origin had occurred in Wuhan, the capital of Hubei Province. Analysis of these cases revealed that they were in fact caused by a novel coronavirus, which was then named “Severe Acute Respiratory Syndrome Coronavirus 2” (SARS-CoV-2).¹ The disease caused by SARS-CoV-2 was named COVID-19. By February 24, 2020, the number of COVID-19 cases had reached around 80 000 in 25 different countries, while by May 2021, this number had exceeded 150 million cases worldwide.²

The first confirmed COVID-19 case in Turkey was reported on March 11, 2020. From that day on, the pandemic started to spread rapidly throughout the country, and by the end of March, the daily number of COVID-19 cases began to be expressed by the Turkish Ministry of Health in thousands. The transfer of the first COVID-19 case by emergency ambulance services following a call received on the Pre-Hospital Emergency Medical Services (PHEMS) emergency hotline took place on March 14, 2020.³

Studies examining how the COVID-19 pandemic affected PHEMS have reached various conclusions. Some studies have reported that the COVID-19 measures caused a decrease in the number of service requests submitted to PHEMS providers via calls to emergency hotlines.^{4,5} However, other studies have reported the opposite, i.e., that there was an increase in the number of calls made to emergency numbers during the pandemic period compared to the pre-pandemic period.⁶

Despite the limited number of studies on the COVID-19 pandemic's effect on PHEMS, it is striking that various studies have emphasized the necessity of investigating changes in the

patterns of demand for these services during the pandemic. In 1 such study, it was argued that the anxiety, stress, and psychological effects experienced by individuals as a result of the pandemic may have resulted in changes in patterns of demand for PHEMS.⁷ Studies on service requests submitted to PHEMS providers via calls made to the emergency hotline during the pandemic period reported an increase in service requests received in connection with psychiatric cases, but a decrease in service requests in connection with other types of cases, such as cardiovascular diseases, or trauma.^{7,8} However, as mentioned before, some studies reported that the COVID-19 pandemic had the effect of increasing the number of urgent applications to emergency services. For example, studies conducted in Saudi Arabia and Italy reported significant increases in the number of emergency calls made during the pandemic period compared to the pre-pandemic period.^{6,9}

To make informed decisions about the COVID-19 pandemic and other outbreaks that may emerge in the future, it is important to understand the type and extent of the burden placed on PHEMS providers. Therefore, information on changes in the volume of emergency calls made to request the services of PHEMS providers and in usage rates of emergency medical services is required.¹⁰ It has been emphasized that increases in the volume of emergency calls made to request the services of PHEMS providers could delay attention to patients who are really in need of urgent medical attention, thus endangering them.⁹ The success of PHEMS in responding to emergency calls depends on the volume of service demand, as does optimal use of resources.¹¹ For these and many other reasons, it is crucial to investigate whether the demand for and performance of PHEMS was affected during the COVID-19 pandemic period.

Ambulance decontamination procedures can take up to 8 hours, during which time the ambulances are out of service.¹² This suggests that even in cases where the volume of emergency calls has not increased, it is important to consider the possible effects of decontamination times on the performance or service quality of PHEMS. In Turkey, the institution responsible for providing the necessary healthcare services in cases of emergency illnesses and injuries is the General Directorate of Emergency Health Services under the Ministry of Health.^{13,14}

To investigate these issues, this study investigated the effect of the COVID-19 pandemic on PHEMS in Artvin Province, 1 of Turkey's 81 provinces, which has a population of 169 501.¹³ In this context, answers to the following research questions were sought: "Was the service quality of PHEMS affected during the COVID-19 pandemic period?" and "How did the volume of redundant calls change during the COVID-19 pandemic period?" By answering these questions, this study hopes to make a valuable contribution to the international research literature.

Methods

Study Group

Data on calls received on the PHEMS emergency hotline related to Artvin Province were obtained from the Emergency Health Automation System (EHAS) of the Ministry of Health of the Republic of Turkey. The process of receiving emergency requests by PHEMS providers includes the following stages: First, an emergency call is made to 112, the emergency hotline. The official on duty in the Command-and-Control Center (CCC) responds to this call and, drawing on their knowledge as an experienced

emergency healthcare worker, categorizes the case as a certain type of emergency. Then, the service request is communicated to the emergency aid team closest to the case's location. The emergency aid team provides the necessary pre-hospital emergency care, refers the case to the hospital's emergency department, and enters information about the case into the EHAS system. All the information entered by the emergency medical technicians (EMTs) and the paramedics working at the CCC and emergency aid stations is aggregated in the EHAS database. In this study, a comparative analysis was conducted on cases reported to PHEMS related to Artvin Province during the March – August 2020 period (i.e., within the pandemic period) and during the same period the previous year (i.e., within the pre-pandemic period).

Study Procedure

The total number of emergency cases recorded by PHEMS in Artvin Province over these 2 6-month periods in 2019 and 2020 (i.e., the periods covering the months of March, April, May, and June, as well as July in both 2019 and 2020) was determined to be 22 492. These cases were first analyzed in terms of variables such as notification date, gender, age group, and location, as well as cause of the emergency case. For practical reasons, 3 groupings were used in this study to reflect how the officials working in the CCC categorized the emergency cases: medical, trauma, and other cases. The officials used a more detailed set of classifications, but for the sake of simplicity, the decision was made in this study to group the applications under these 3 headings. These groupings were based on previously published studies that adopted similar classifications.^{6,11,15} In analyzing the service performance of PHEMS teams, the response times set forth in the Ministry of Health's quality standards were taken into consideration. Moreover, the analyses were conducted based on the 32 emergency parameters determined by the WHO, and cases that fell outside the scope of these parameters were categorized as non-emergency cases to identify redundant calls made to PHEMS during both the pandemic and pre-pandemic periods. The 32 international emergency parameters include events such as illness and injury that are defined as medical emergencies in the literature. These were used to determine whether the patients' conditions were emergencies.^{16,17} Other descriptive analyses carried out included, *inter alia*, the distribution of the cases by age group, and gender, and whether the emergency call was due to a confirmed or suspected COVID-19 infection.

Ethics

The necessary approval to conduct the study was obtained from the Artvin Çoruh University Ethics Committee. Furthermore, the approval of the Ministry of Health of the Republic of Turkey required to access the relevant data about this study was also obtained. Permission was obtained from the WHO to use the 32 emergency parameters to evaluate the urgency of the applications made to PHEMS.

Statistical Methods

Statistical analyses were carried out using the SPSS 26 (IBM Statistical Package for Social Sciences, version 26) (IBM Corp., Armonk, New York, USA) software package. A chi-squared test was used to determine whether there were significant changes in the emergency service requests recorded by PHEMS in relation to Artvin Province during the 6-month periods in 2019 and 2020 mentioned above by gender, age group, location, and cause of

emergency. Probability (P) values of < 0.05 were considered to indicate statistical significance.¹⁸

Results

Sociodemographic Profile

The distributions of the emergency service requests recorded by PHEMS in relation to Artvin Province by notification date, gender, age group, and location, as well as cause of emergency during and before the pandemic are given in [Table 1](#). They show that there were significant changes between the emergency service requests recorded by PHEMS during and before the pandemic period in terms of all variables investigated within the scope of this study. For example, there was a significant decrease in the proportion of trauma-related emergency service requests during the pandemic period (5.3%) compared to the pre-pandemic period (6.8%). Meanwhile, in terms of age groups, there was a significant increase in the proportion of emergency service requests made by or for elderly (50+) patients during the pandemic period (64.2%) compared to the pre-pandemic period (57.7%). Moreover, in terms of gender, there was a decrease in the proportion of emergency service requests made by, or for female patients during the pandemic period (45.6%) compared to the pre-pandemic period (46.8%).

The distributions of PHEMS teams' response times to emergency service requests recorded by PHEMS in relation to Artvin Province during and before the pandemic period are shown in [Table 2](#). The PHEMS teams' response times were analyzed to determine whether the pandemic affected their performance, and it was determined that response times of all types investigated within the scope of this study significantly worsened during the pandemic period compared to the pre-pandemic period. For example, the number of emergency cases for which it took longer than 120 seconds for the Command-and-Control Center to communicate the emergency case to the Emergency Aid Station was determined to have constituted 29% of the total number of cases during the pandemic period, compared to 19% of cases during the pre-pandemic period. In addition, the number of emergency cases for which more than 90 seconds elapsed before the PHEMS team set out for the emergency case was determined to have constituted 15.6% of the total number of emergency cases recorded during the pandemic period, compared to 8.6% of the emergency cases recorded during the pre-pandemic period. Furthermore, the number of emergency cases at urban emergency locations for which more than 10 minutes elapsed before the PHEMS team arrived at the emergency location was determined to have constituted 35.5% of the total number of emergency cases recorded during the pandemic period, compared to 21.7% of the emergency cases recorded during the pre-pandemic period. Meanwhile, the number of emergency cases at rural locations for which more than 30 minutes elapsed before the PHEMS team arrived at the location of the emergency was determined to have constituted 40.6% of the total number of emergency cases recorded during the pandemic period, compared to 38.0% of the emergency cases recorded during the pre-pandemic period.

The distribution of the emergency service requests by WHO critical emergency codes and causes recorded by PHEMS in relation to Artvin Province during and before the pandemic period are shown in [Table 3](#). For example, traumatic emergency cases, such as injuries to the spine and lower extremity, were 3.50% of total cases before the pandemic, and 2.30% during the pandemic period.

Meanwhile, other types of traumatic emergency cases such as traffic accidents, fell from 4.80% of total cases in the pre-pandemic period to 2.50% during the pandemic period. Another objective of this study was to investigate the unnecessary use of ambulances during the pandemic period. In this context, 49% of the emergency cases recorded by PHEMS in relation to Artvin Province during the pandemic period were classified as "critical" with respect to ambulance use, 38.9% were classified as "not critical" with respect to ambulance use, and 12% of the emergency cases were classified as either confirmed or suspected COVID-19 cases.

Medical causes constituted most of the causes on record for emergency cases both during the pandemic period (92.9%) and before the pandemic period (90.4%), followed by causes related to trauma. In terms of gender, the ratio of females to males was higher in emergency cases with a medical cause both during and before the pandemic period, whereas it was lower in emergency cases with a cause related to trauma both during, and before the pandemic period. Additionally, it was found that the gap between female and male emergency cases narrowed during the pandemic period compared to the pre-pandemic period with respect to both medical and trauma-related emergency cases.

Discussion

A study conducted in China in 2020 showed that the numbers of emergency calls in general and the emergency calls related to trauma in particular received by PHEMS during the pandemic period (i.e., between January 23, 2020 and March 15, 2020) were lower than during the pre-pandemic period (i.e., the same period of 2019).¹⁵ The analysis of the research data revealed a significant decrease in the number of general emergency calls and emergency calls related to trauma during the pandemic period compared to the pre-pandemic period. The authors of the study attributed this decrease in the total number of emergency calls, irrespective of the type of call, to various factors such as the decrease in the mobility of the population during this period, and economic reasons.¹⁵ However, although these findings are in contrast to those of the current study, which showed a significant increase in the number of overall emergency calls received by PHEMS in relation to Artvin Province during a certain timeframe of the pandemic period compared to the same timeframe the previous year; the results of the Chinese study, and the current study are similar in that both showed that the number of emergency calls related to trauma decreased regardless of gender.

In a study conducted in the US, calls made to a triage line were examined with a tracking system. The average age of the callers during the pandemic period was 58, and 50% of the calls were made by women. This study found that 36% of these cases received an ambulance response.¹⁹ The results obtained in the current study showed that 38.9% of incoming calls during the pandemic period were cases that did not require an ambulance indication. It is understood that the data are not like each other in terms of the context of ambulance indications. In the evaluation made in our study according to the age variable, it was concluded that most emergency calls made during the pandemic period were from individuals belonging to the 51 – 65+ age group. It seems that both studies have parallel results in the context of age.

Another study examining emergency service calls made during the pandemic period in Italy in 2020 also reached important results. According to that study, the number of emergency calls made between March 2020 and May 2020, when the pandemic was

Table 1. Distribution of the emergency service requests recorded by PHEMS in relation to Artvin Province by various variables

| Various Variables | | | | | | | | | | | | | | | | | |
|--|---------|-------|--------------|-------|---------------|-------|----------------|-------|----------------|-------|----------------|-------|----------------|-------|--------------|-------|--------|
| Notification Date | | | | | | | | | | | | | | | | | |
| Year | March | | April | | May | | June | | July | | August | | Total | | | | |
| 2019 | 1652 | 15.4% | 1612 | 15.0% | 1648 | 15.3% | 1853 | 17.2% | 1898 | 17.7% | 2084 | 19.4% | 10 747 | | | | |
| 2020 | 1836 | 15.6% | 2032 | 17.3% | 1735 | 14.8% | 1893 | 16.1% | 1918 | 16.3% | 2331 | 19.8% | 11 745 | | | | |
| Total | 3488 | 15.5% | 3644 | 16.2% | 3383 | 15.0% | 3746 | 16.7% | 3816 | 17.0% | 4415 | 19.6% | 22 492 | | | | |
| χ^2 : 30.480 ^a P: 0.000 | | | | | | | | | | | | | | | | | |
| Gender | | | | | | | | | | | | | | | | | |
| | Female | | Male | | | | | | | | | | Total | | | | |
| 2019 | 4701 | 46.8% | 5339 | 53.2% | | | | | | | | | 10 040 | | | | |
| 2020 | 5124 | 45.6% | 6104 | 54.4% | | | | | | | | | 11 228 | | | | |
| Total | 9825 | 46.2% | 11443 | 53.8% | | | | | | | | | 21 268 | | | | |
| χ^2 : 3.004 ^a P: 0.083 | | | | | | | | | | | | | | | | | |
| Age Group | | | | | | | | | | | | | | | | | |
| | Unkown | | 1 to 8 years | | 9 to 17 years | | 18 to 29 years | | 30 to 40 years | | 41 to 50 years | | 51 to 65 years | | 66 and above | | Total |
| 2019 | 766 | 7.1% | 262 | 2.4% | 430 | 4.0% | 1108 | 10.3% | 980 | 9.1% | 1008 | 9.4% | 1920 | 17.9% | 4273 | 39.8% | 10 747 |
| 2020 | 564 | 4.8% | 250 | 2.1% | 302 | 2.6% | 1061 | 9.0% | 975 | 8.3% | 1060 | 9.0% | 2393 | 20.4% | 5140 | 43.8% | 11 745 |
| Total | 1330 | 5.9% | 512 | 2.3% | 732 | 3.3% | 2169 | 9.6% | 1955 | 8.7% | 2068 | 9.2% | 4313 | 19.2% | 9413 | 41.9% | 22 492 |
| χ^2 : 143.412 ^a P: 0.000 | | | | | | | | | | | | | | | | | |
| Location | | | | | | | | | | | | | | | | | |
| | Urban | | Rural | | | | | | | | | | Total | | | | |
| 2019 | 7674 | 71.4% | 3073 | 28.6% | | | | | | | | | 10 747 | | | | |
| 2020 | 8117 | 69.1% | 3628 | 30.9% | | | | | | | | | 11 745 | | | | |
| Total | 15791 | 70.2% | 6701 | 29.8% | | | | | | | | | 22 492 | | | | |
| χ^2 : 14.410 ^a P: 0.000 | | | | | | | | | | | | | | | | | |
| Cause | | | | | | | | | | | | | | | | | |
| | Medical | | Trauma | | Other | | | | | | | | | | Total | | |
| 2019 | 9456 | 88.0% | 733 | 6.8% | 558 | 5.2% | | | | | | | | | 10 747 | | |
| 2020 | 10686 | 91.0% | 618 | 5.3% | 441 | 3.6% | | | | | | | | | 11 745 | | |
| Total | 20142 | 89.6% | 1351 | 6.0% | 999 | 4.4% | | | | | | | | | 22 492 | | |
| χ^2 : 54.428 ^a P: 0.000 | | | | | | | | | | | | | | | | | |

at its most intense, decreased compared to 2019 and 2018. In addition, because of the quarantine imposed during this period, there was a significant decrease in the number of emergency calls made due to trauma.²⁰ The Italian study presented interesting points of similarity and contrast with the current study. In contrast to the findings of that study, our research showed that the total number of emergency calls made during the pandemic period increased compared to the previous year. However, both our study and the Italian study found that the number of trauma-related emergency calls decreased during the pandemic period.

Another study investigated the effect of the pandemic on the number of emergency calls related to cardiac emergencies and found that the number of cardiac-related emergency calls made during the pandemic period decreased compared to 2019. Our study showed similar results, with a slight decrease in cardiac emergency calls during the pandemic period.²¹

Another study examining emergency calls made during the pandemic period found that there was a decrease in the number of calls to the emergency room in 2020 compared to 2016–2019. That study also noted that traffic accidents, which are a serious cause of trauma, tended to decrease in 2020 compared to before the

pandemic.²² In terms of the number of calls, our study concluded that the total number of emergency calls made during the pandemic period increased, while trauma-related emergency calls decreased.

Another study of emergency call volume found a significant decrease in the number of both ambulance calls and serious emergency calls during the pandemic period.²³ Although our research showed opposite results regarding call volume, the two studies agree in terms of the decrease in emergency calls (ambulance indication) that will cause serious situations during the pandemic period.

A study conducted in China, where the pandemic emerged, concluded that the number of emergency calls related to situations that did not require an ambulance indication, call volume, and the number of calls related to mental health conditions decreased during the pandemic period compared to 2019.²⁴ Our study shows both parallel and opposite results. For example, in our study, it was found that the number of nonemergency calls decreased. An increase was detected in the general number of calls.

A similar study was conducted on the calls received by PHEMS in Romania during the pandemic period.⁴ In that study, the number and type of calls received between March 16 2020 and May

Table 2. Distribution of the emergency service requests recorded by PHEMS in relation to Artvin Province by the response times of the PHEMS teams

| Year | Time elapsed till the Command-and-Control Center communicated the emergency case to the Emergency Aid Station | | | | | | χ^2 | P |
|-------|---|--------|------------------|--------|--------|------|----------------------|-------|
| | Under 120 seconds | | Over 120 seconds | | Total | | | |
| 2019 | 8669 | 80.90% | 2058 | 19.10% | 10 747 | 100% | 296.529 ^a | 0.000 |
| 2020 | 8338 | 71% | 3407 | 29% | 11 745 | 100% | | |
| Total | 17 027 | 75.70% | 5465 | 24.30% | 22 492 | 100% | | |
| Year | Time elapsed till the PHEMS team set out for the emergency case | | | | | | χ^2 | P |
| | Under 90 seconds | | Over 90 seconds | | Total | | | |
| 2019 | 9820 | 91.40% | 927 | 8.60% | 10 747 | 100% | 255.133 ^a | 0.000 |
| 2020 | 9910 | 84.40% | 1835 | 15.60% | 11 745 | 100% | | |
| Total | 19 730 | 87.70% | 2762 | 12.30% | 22 492 | 100% | | |
| Year | Time elapsed till the PHEMS team arrived at the location of the emergency (Urban) | | | | | | χ^2 | P |
| | Under 10 minutes | | Over 10 minutes | | Total | | | |
| 2019 | 6008 | 78.30% | 1666 | 21.70% | 7674 | 100% | 365.524 ^a | 0.000 |
| 2020 | 5236 | 64.50% | 2881 | 35.50% | 8117 | 100% | | |
| Total | 11 244 | 71.20% | 4547 | 28.80% | 15 791 | 100% | | |
| Year | Time elapsed till the PHEMS team arrived at the location of the emergency (Rural) | | | | | | χ^2 | P |
| | Under 30 minutes | | Over 30 minutes | | Total | | | |
| 2019 | 1905 | 62% | 1168 | 38% | 3073 | 100% | 4.584 ^a | 0.032 |
| 2020 | 2156 | 59% | 1472 | 40.60% | 3628 | 100% | | |
| Total | 4061 | 60.60% | 2640 | 39.40% | 6701 | 100% | | |

^a 0 cells (0.0 %) have expected count less than 5.

14, 2020, during the pandemic period were compared with the number and type of calls received during the same period of 2019. The study found that the numbers of emergency and non-emergency calls received in 2020 were lower than in 2019, and that only 5% of the calls received in 2020 were related also COVID-19 infections. The authors attributed this decrease in the number of calls—irrespective of the type of call—to the fear of hospital-borne contamination hazards.⁴ In contrast, this study observed an increase in the overall number of emergency calls received during the pandemic compared to the previous year. Moreover, our study found that if emergency calls related to COVID-19 infections were excluded, there was a decrease in the number of redundant emergency calls received during the pandemic period compared to the pre-pandemic period. However, if COVID-19-related emergency calls were included, there was no statistically significant difference in the number of redundant emergency calls.

In another study that was carried out in Israel in 2020, calls received by PHEMS during the period of December 1, 2019 to March 2, 2020 (i.e., during the pre-pandemic period) were compared to calls received during the period of March 3, 2020 to April 15, 2020 (i.e., during the pandemic period).⁷ A slight increase was observed in the number of emergency calls made during the pandemic period due to respiratory distress and high fever, which are symptoms of COVID-19 infection, and due to psychotic causes, whereas a decrease was observed in injury-related emergency calls.⁷ Similarly, our study found that there was an increase in the number of emergency calls received by PHEMS due to high fever (a symptom of COVID-19 infection). Moreover, in our study, a decrease was observed in emergency calls related to trauma, such as injuries, as was observed in the Israeli study. However, in contrast to the findings of the Israeli study, our study detected no increase in the ratio of emergency calls due to psychotic causes to the total

number of calls made during the pandemic period compared to the pre-pandemic period, even if there was an increase in the number of this type of emergency call in absolute terms.

Limitations

In conducting this study, we faced some limitations in terms of the availability of ready data. The choice of variables in our data reflects these limitations. For example, since there is no data set that provides information about the personal attributes of callers to the emergency number, such as home, and school, or workplace, no investigation could be made with respect to these aspects. Another limitation was that only 2 years of data were obtained. Longer-term data could be used to better understand how COVID-19 has impacted PHEMS (for example, data from the last 5 years).

Conclusion

The COVID-19 pandemic-imposed changes on our daily lives, as well as on our health systems. It is important to determine which aspects of the health system are vulnerable to such changes. During extraordinary situations such as a pandemic, high rates of redundant calls (44.90% of total calls in the pre-pandemic period and 38.9% of all calls in the pandemic period) restrict access to emergency health services. Hence, certain preparatory work should be carried out to filter redundant calls to avoid placing too much stress on PHEMS, as these services already come under a great deal of stress during a pandemic. In addition, negative effects of the pandemic were detected in the indicators regarding ambulance transportation times. For example, the proportion of ambulance movements for emergency cases that took less than 90 seconds

Table 3. Distribution of the emergency service requests recorded by PHEMS related to Artvin Province by the 32 critical emergency codes determined by WHO and Cause

| | 2019 | | | | | | 2020 | | | | | | X ² | P | |
|--|---------------|----------------|---------------|----------------|-----------------------|----------------|--|----------------|-------------|----------------|--------------|--------------------|----------------------|-------|----------------------|
| | Gender | | | | | | Gender | | | | | | | | |
| | Female | | Male | | Total | | Female | | Male | | Total | | | | |
| Fall from height | 332 | 7.10% | 425 | 8.00% | 757 | 7.50% | 324 | 6.30% | 452 | 7.40% | 776 | 6.90% | 258.421 ^a | 0.000 | |
| MI, arrhythmia, other cardiac emergencies | 622 | 13.20% | 829 | 15.50% | 1451 | 14.50% | 710 | 13.90% | 866 | 14.20% | 1576 | 14.00% | | | |
| Acute abdomen | 234 | 5.00% | 211 | 4.00% | 445 | 4.40% | 220 | 4.30% | 234 | 3.80% | 454 | 4.00% | | | |
| Fever | 83 | 1.80% | 103 | 1.90% | 186 | 1.90% | 98 | 1.90% | 142 | 2.30% | 240 | 2.10% | | | |
| Any situation that causes unconsciousness | 194 | 4.10% | 161 | 3.00% | 355 | 3.50% | 128 | 2.50% | 130 | 2.10% | 258 | 2.30% | | | |
| Traffic accidents | 150 | 3.20% | 327 | 6.10% | 477 | 4.80% | 76 | 1.50% | 209 | 3.40% | 285 | 2.50% | | | |
| Knifing, fights | 14 | 0.30% | 79 | 1.50% | 93 | 0.90% | 16 | 0.30% | 72 | 1.20% | 88 | 0.80% | | | |
| Obstetrics emergency | 42 | 0.90% | 1 | 0.00% | 43 | 0.40% | 66 | 1.30% | 1 | 0.00% | 67 | 0.60% | | | |
| Strokes | 247 | 5.30% | 179 | 3.40% | 426 | 4.20% | 194 | 3.80% | 199 | 3.30% | 393 | 3.50% | | | |
| Respiratory emergencies | 298 | 6.30% | 362 | 6.80% | 660 | 6.60% | 270 | 5.30% | 347 | 5.70% | 617 | 5.50% | | | |
| Headaches | 65 | 1.40% | 36 | 0.70% | 101 | 1.00% | 50 | 1.00% | 43 | 0.70% | 93 | 0.80% | | | |
| Poisoning | 39 | 0.80% | 60 | 1.10% | 99 | 1.00% | 40 | 0.80% | 80 | 1.30% | 120 | 1.10% | | | |
| Diabetic emergencies, uremic coma | 32 | 0.70% | 34 | 0.60% | 66 | 0.70% | 33 | 0.60% | 40 | 0.70% | 73 | 0.70% | | | |
| Acute psychotic cases | 15 | 0.30% | 55 | 1.00% | 70 | 0.70% | 29 | 0.60% | 49 | 0.80% | 78 | 0.70% | | | |
| Severe allergy anaphylaxis | 50 | 1.10% | 64 | 1.20% | 114 | 1.10% | 44 | 0.90% | 78 | 1.30% | 122 | 1.10% | | | |
| Dialysis patient with general condition disorder (GCD) | 31 | 0.70% | 35 | 0.70% | 66 | 0.70% | 48 | 0.90% | 27 | 0.40% | 75 | 0.70% | | | |
| Spine and lower extremity injuries | 134 | 2.90% | 222 | 4.20% | 356 | 3.50% | 94 | 1.80% | 166 | 2.70% | 260 | 2.30% | | | |
| Diagnosed and Suspected COVID-19 infection | | | | | | | 606 | 11.80% | 808 | 13.20% | 1414 | 12.60% | | | |
| Cases without an ambulance indication according to WHO criteria | 2069 | 44.00% | 2044 | 38.30% | 4113 | 41.00% | 2012 | 39.30% | 2038 | 33.40% | 4050 | 36.10% | | | |
| Other relevant cases ^a | 50 | 1.10% | 112 | 2.10% | 162 | 1.60% | 66 | 1.30% | 123 | 2.00% | 189 | 1.70% | | | |
| Total | 4701 | 100.00% | 5339 | 100.00% | 10040 | 100.00% | 5124 | 100.00% | 6104 | 100.00% | 11228 | 100.00% | | | |
| Emergency Calls, Nonemergency Calls and Calls related to COVID-19 | | | | | | | Emergency Calls, Nonemergency Calls (without the calls related to COVID-19) | | | | | | | | |
| Type of Emergency Calls^b | 2019 | | 2020 | | X² | P | Type of Emergency Calls | | 2019 | | 2020 | | | | X² |
| Emergency | 5923 | 55.10% | 5764 | 49% | 1381.634 ^a | 0.000 | Emergency | 5923 | 55.10% | 5764 | 55.80% | 0.987 ^a | 0.321 | | |
| Nonemergency | 4824 | 44.90% | 4567 | 38.90% | | | Nonemergency | 4824 | 44.90% | 4567 | 44.20% | | | | |
| Related to COVID-19 | 0 | 0.00% | 1414 | 12.00% | | | Total | 10 747 | 100% | 10 331 | 100.00% | | | | |
| Total | 10 747 | 100.00% | 11 745 | 100.00% | | | | | | | | | | | |

| Year | Gender | | Type of Cause | | | | χ^2 | P |
|-------|--------|-------|---------------|--------|--------|--------|----------------------|-------|
| | | | Medical | Trauma | Other | Total | | |
| 2019 | Female | N | 4387 | 209 | 105 | 4701 | 101.474 ^a | 0.000 |
| | | % | 93.3% | 4.4% | 2.2% | 100.0% | | |
| | | Male | N | 4693 | 513 | 133 | | |
| | % | 87.9% | 9.6% | 2.5% | 100.0% | | | |
| | Total | N | 9080 | 722 | 238 | 10 040 | | |
| | % | 90.4% | 7.2% | 2.4% | 100.0% | | | |
| 2020 | Female | N | 4838 | 170 | 116 | 5124 | | |
| | | % | 94.4% | 3.3% | 2.3% | 100.0% | | |
| | | Male | N | 5509 | 431 | 164 | | |
| | % | 90.3% | 7.1% | 2.7% | 100.0% | | | |
| | Total | N | 10 347 | 601 | 280 | 11 228 | | |
| | % | 92.2% | 5.4% | 2.5% | 100.0% | | | |
| Total | Female | N | 9225 | 379 | 221 | 9825 | | |
| | | % | 93.9% | 3.9% | 2.2% | 100.0% | | |
| | | Male | N | 10 202 | 944 | 297 | | |
| | % | 89.2% | 8.2% | 2.6% | 100.0% | | | |
| | Total | N | 19 427 | 1323 | 518 | 21 268 | | |
| | % | 91.3% | 6.2% | 2.4% | 100.0% | | | |

Abbreviations: MI, myocardial infarction

^aThe relevant term generally refers to very rare cases such as rape, drowning, and electric shock.

^bAll cases that met the criteria in [Table 3](#) were coded as emergency, and all cases that did not meet the criteria in [Table 3](#) were coded as non-emergency and analyzed.

decreased from 91.40% in the pre-pandemic period to 84.40% during the pandemic period. Similar deteriorations were detected in all other indicators regarding ambulance times. Plans should be developed to minimize the negative impact of ambulance times during pandemic periods.

Authors' contribution

KC: Conceptualization, Writing – original draft, Writing – review & editing, data collection, statistical analyses and interpretation of data. MA: Conceptualization, Writing – original draft, Writing – review & editing, data collection, statistical analyses and interpretation of data. AAK: Conceptualization, Supervision, Writing – original draft, Writing – review & editing, data collection, statistical analyses and interpretation of data.

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