

ORIGINAL ARTICLE

Impact of COVID-19 pandemic on the utilization of emergency medical services in Nairobi, Kenya

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ABSTRACT

Introduction: Emergency medical services (EMS) are vital for providing immediate medical or trauma care to patients and stabilizing them for transportation to hospitals. Following the confirmation of the first case of coronavirus disease 2019 (COVID-19) in Kenya on March 13th, 2020, the government announced several measures to curb its spread, including movement restrictions and the use of ambulance services for confirmed or suspected COVID-19 patients. This study aimed to determine the utilization of EMS in Kenya the year before and one year into the COVID-19 pandemic.

Methods: This retrospective study collected data on all calls received from two dispatch centers in Nairobi City County from March 2019 to February 2021, encompassing the period both before and during the COVID-19 pandemic. Data collected was analyzed based on the number of calls, sex, call timing and call type.

Results: The two dispatch centers received 3,477 calls during the study period. The total number of calls made during the first year of the pandemic was 1,376, compared to 2,014 the year before, a decrease of 31.7%. The proportion of trauma-related calls increased from 15% (293/2014) to 22% (303/1376) while the proportion of nighttime calls increased from 20% (410/2014) to 35% (479/1376) during the pandemic.

Conclusion: EMS utilization decreased during the pandemic, and trauma calls increased. While most calls were made during the day, there was a notable increase in calls made during night shifts.

African relevance

- Pre-hospital care in Africa is understudied despite being an integral part of the healthcare system.
- Pandemics can lead to increased demand for the use of EMS due to increased illness. However, we have no data to show how pandemics affect EMS utilization in the African setting.
- This study can encourage documentation of data in pre-hospital settings and the publishing of related data to inform policy and management of public health emergencies.

Introduction

Responses to the COVID-19 pandemic affected the utilization of different healthcare services globally [1], with Emergency Medical

Services (EMS) mobilizing the transport and treatment of COVID-19 patients [2]. Kenya reported the first case of COVID-19 on March 13th, 2020 [3]. In response, the Ministry of Health issued guidelines on COVID-19 management recommending the use of EMS to transport suspected or confirmed COVID-19 cases for isolation or treatment to definitive care to prevent the spread of the virus [4].

EMS, also known as pre-hospital care services, are integral to the healthcare system. They offer medical or trauma care to patients, in need of urgent attention, stabilizing them for transport to hospitals for definitive care [2,5,6]. During pandemics, epidemics and disasters, EMS plays a critical role in supporting healthcare services, public safety and public health [7]. EMS response to pandemics requires the alignment of resources to evolving patient needs [7] that follow temporal trends based on social, occupational, and recreational behaviors, as well as the onset of particular acute medical diseases and injuries [8].

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The COVID-19 pandemic posed a major burden on EMS. This was largely due to the change in EMS protocols during the pandemic and the complexity of each call to cater to the patient's need [9]. The United States National EMS Information System (NEMSIS) reported a general decrease in EMS activation during the early stages of the pandemic [2, 9]. However, EMS involvement in pandemics in low- and middle-income countries (LMICs) is understudied, leading to a scarcity of literature. South Africa reported a well-functioning EMS system during the COVID-19 pandemic [10].

This study aimed to determine the effect of the COVID-19 pandemic on the utilization of EMS in Kenya.

Methods and materials

Study design and setting

We conducted a retrospective cross-sectional study that included all EMS calls recorded by two dispatch centers in Nairobi City County, and responded to by EMS personnel between March 2019 and February 2021, representing two periods: pre-COVID-19 pandemic, March 2019–February 2020 and COVID-19 pandemic period, March 2020–February 2021. Among the nine ambulance service providers operating within Nairobi City County, only two met the study criteria by possessing a dispatch center, maintaining call recordings throughout the study period, and providing informed consent to share call data. The two ambulance service providers have a fleet of four and six ambulances serving Nairobi, respectively.

Nairobi City County is the capital city of Kenya, with an estimated population of 4.8 million, a population density of about 6900/km², and an annual growth rate of 4.1%, making it the most populous of Kenya's 47 counties [11]. As of 2020, Nairobi City County has 14 ambulance service providers with 83 ambulances, but only nine ambulance service providers have fully functional dispatch centers [12].

Data collection and case definition

Data on sex, time of day, and call type from all the calls was collected. Based on EMS shifts, the time of day was categorized as daytime (0700 h to 1859 h) and nighttime (1900 h to 0659 h). The call type was recorded as medical, trauma, or other.

Data analysis

Statistical analysis was performed using Microsoft Excel® 2019, version 1808, and open source Epidemiologic Statistics for Public Health (OpenEPI) Info version 3.01. The data was expressed in percentages, and differences in proportion were measured using a 95% confidence interval. Graphs and tables were plotted using Microsoft Excel® 2019.

Ethical consideration

This study was approved by the Kenyatta National Hospital–University of Nairobi Ethics and Research Committee (KNH-UON ERC), approval no. P575/07/2021

Results

Number of calls

A total of 3477 calls were recorded between March 2019 and February 2021. We excluded 87 calls from the analysis because they were transferred to another dispatch center. This transfer occurred either due to the unavailability of ambulances at the receiving dispatch center or for other reasons. During the COVID-19 pandemic period, the number of calls was 1376, marking a reduction of 31.7% compared to 2014 calls during the pre-COVID-19 pandemic period.

Prior to the onset of the pandemic, the peak number of EMS calls occurred in March 2019, with the lowest volume noted in November 2019. However, amid the COVID-19 pandemic, the highest frequency of EMS calls was observed in April 2020, and the lowest calls were recorded in August 2020 as shown in Fig. 1.

Sex

Table 1 shows the distribution of male and female patients before and during the COVID-19 pandemic. There was no difference in the distribution of patients based on sex, however, 20% of patients did not have any information on sex.

Call timing

During the study period, the majority of EMS calls (74%, n=2501) occurred during the day. However, during the COVID-19 pandemic, the proportion of daytime calls decreased from 80% (1604/2014) pre-pandemic to 65% (897/1376) during COVID-19 pandemic period. Additionally, we observed an increase in the proportion of night activations from 20% (410/2014) before the pandemic to 35% (479/1376) during the COVID-19 pandemic.

Call type

During the study period, the dispatch centers recorded 2110 medical calls, accounting for 78%, and 596 trauma calls, representing 22% of the total calls received. The proportion of medical calls increased following the COVID-19 pandemic rising to 70% (971/1376) compared to 57% calls during the pre-COVID-19 period, while the proportion of trauma calls increased from 15% (293/2014) during the pre-pandemic period to 22% (303/1376) during the COVID-19 pandemic. 28% and 8% of the calls had incomplete data on call type during pre-COVID and COVID-19 pandemic respectively hence not specified.

Discussion

To the best of our knowledge, this study represents the first attempt to assess the impact of the COVID-19 pandemic on EMS utilization in Kenya. We noted a decrease in EMS calls during the COVID-19 pandemic, which may have been attributed to stay-at-home directives and movement restrictions imposed by the Kenyan government from April 2020 in the Nairobi metropolitan area [4]. These orders resulted in decreased outdoor activities, driving and sports, as well as a decline in routine care and elective procedures. Similar findings were observed in various studies, indicating that lockdown measures and elective procedures could have led to a decrease in EMS calls [2,13]. A study done in the US reported that fear of contracting COVID-19 made people hesitate to contact EMS or seek hospital care, leading to a decrease in EMS utilization during the early stages of the pandemic [14,15].

The increase in nighttime calls could be explained by COVID-19 symptoms, which are similar to flu symptoms that worsen at night [16]. Similar results were observed in Saudi Arabia, where EMS calls increased at night during the pandemic [17].

The rise in trauma calls during the COVID-19 pandemic period might be linked to decreased access to private vehicles, a common mode of transporting trauma victims to hospitals [5,18], primarily because of movement restrictions imposed during this period [19,20]. Our results are similar to a study done in Japan, where they reported an increase in trauma calls due to an increase in suicide cases, falls among the elderly and penetrative trauma due to person-person violence [19]. However, we lacked data indicating the reason for the call type, and therefore the increase in trauma cases during the COVID-19 pandemic remains unclear. In Netherlands, movement restrictions and lockdown measures led to fewer traffic collisions, hence a decrease in trauma calls (21).

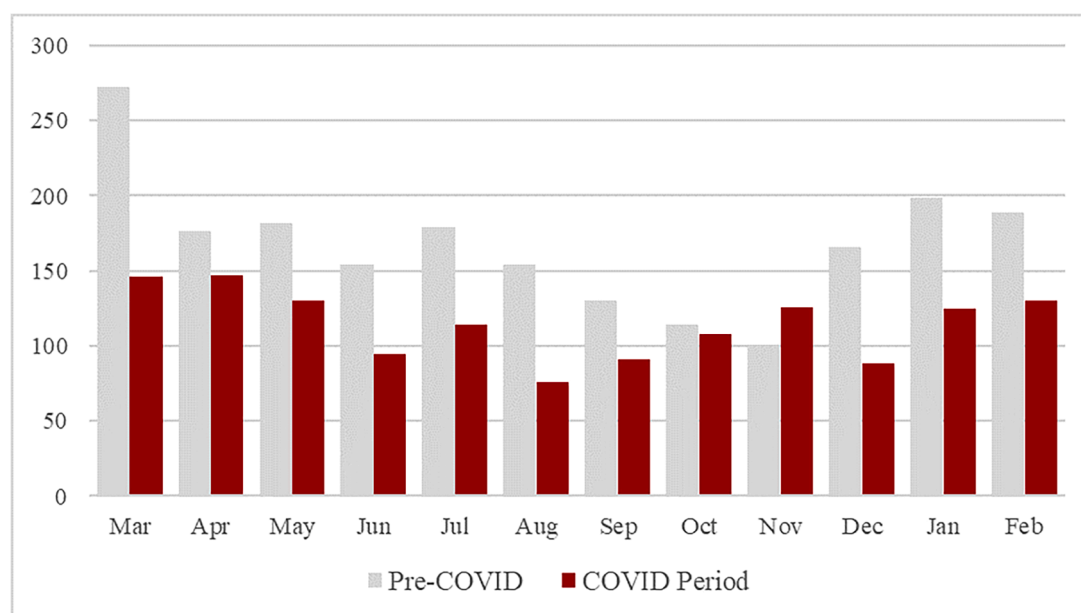


Fig. 1. Monthly distribution of EMS calls before (Mar 2019–Feb 2020) and during the COVID-19 pandemic (Mar 2020–Feb 2021).

Table 1

Characterization of EMS calls before (Mar 2019–Feb 2020) and during the COVID-19 pandemic (Mar 2020–Feb 2021).

Parameter	Pre-COVID n=2014	95% CI	COVID-19 Period n=1376	95% CI	Total n=3390
Sex					
Males	684/2014 (34%)	31.9–36.1	628/ 1376 (45%)	43.6–48.3	1312/3390 (39%)
Females	741/2014 (37%)	34.7–38.9	641/ 1376 (47%)	43.9–49.2	1382/3390 (41%)
Not specified	589/2014 (29%)	27.3–31.3	107/ 1376 (8%)	7.1–10.1	696/3390 (20%)
Call timing					
Day	1604/2014 (80%)	77.8–81.4	897/ 1376 (65%)	62.6–67.7	2501/3390 (74%)
Night	410/2014 (20%)	18.6–22.2	479/ 1376 (35%)	32.3–37.4	889/3390 (26%)
Call type					
Medical	1139/2014 (57%)	54.4–58.7	971/ 1376 (70%)	62.1–72.9	2110/3390 (62%)
Trauma	293/2014 (15%)	13.1–16.1	303/ 1376 (22%)	19.9–24.3	596/3390 (18%)
Not specified	582/2014 (28%)	26.9–30.9	102/ 1376 (8%)	6.1–8.9	684/3390 (20%)

Not specified- means the details were not recorded: CI- Confidence Interval.

Limitations

Kenya lacks comprehensive documentation of EMS utilization. As a result, we omitted crucial data from numerous dispatch centers because of incomplete data. Details such as the age of patients were often missing, and essential data points like sex and call type were documented inconsistently. We also did not have data to differentiate COVID-19-specific calls from other medical calls. Despite these limitations, the

results of our study present significant information regarding the use of EMS, giving insights into the implications for the future deployment of EMS responses during health crises.

Conclusion

We observed a decrease in EMS utilization and an increase in trauma calls during the pandemic. While most calls were made during the day, there was a notable increase in calls made during night shifts. We recommend improving the data recording culture within the EMS organization to effectively monitor EMS utilization during pandemics and disasters. These findings can inform public health about EMS involvement during health crises.

Authors' contribution

Author contributions to the conception or design of the work; the acquisition, analysis, or interpretation of data for the work; the crafting of the work or critical revision for important intellectual content is as follows: MMM 35%, BW 25%, MM 20%, and NC, SS 10% each. All authors approved the version to be published and agreed to be accountable for all aspects of the work.

Dissemination of results

The results of this study were disseminated to the participating EMS organizations.

Declaration of competing interest

The authors declared no conflict of interest.

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