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Demographic and Clinical Characteristics of COVID-19 Cases at the 112 Emergency Call Centers in İstanbul

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Abstract

Objective: The study aims to present calls received at the 112 Emergency Calls Centers in İstanbul. Algorithms were applied to analyze the demographic and clinical characteristics of coronavirus disease-2019 (COVID-19) cases.

Materials and Methods: Incoming calls at the 112 Emergency Call Centers of the European and Anatolian regions of the metropolitan city of İstanbul were assessed. In the retrospective study, the period under investigation was from March 11 to May 1 of 2020.

Results: Patients with suspected severe acute respiratory syndrome-coronavirus-2 pneumonia (n=35,443) were analyzed. The mean age of the patients was found to be 50.6±22.3. Of this total, 16,902 (47.7%) cases were female. Ambulance response times for these cases were reported as 10.2 (7.0-16.3) minutes. In terms of clinical symptoms, 18,958 (53.50%) of the cases had fever, 18,359 (51.86%) had a cough, and 21,121 (59.60%) had shortness of breath. The district with the highest number of cases was Gaziosmanpasa with 1,256 cases, 42.16 people per square meter.

Conclusion: Prehospital health services are an important link in the chain of survival. Ambulance services act as a bridge between individuals in the community and hospital care services in cases of disasters such as earthquakes, floods, pandemics. The structural establishment of a robust system to meet the incoming demands, the construction of applicable algorithms, building the optimal infrastructure for ambulances in accordance with the population intensity, will both protect the system and help to improve the quality of health services delivery.

Keywords: Command and control centers, prehospital health services, ambulance, pandemic, SARS-CoV-2, COVID-19 pneumonia

Introduction

A pneumonia cluster with unknown cause appeared in Wuhan, China, in December 2019 [1]. The National Health Commission of the People's Republic of China announced later that a new coronavirus, named severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2) by World Health Organization (WHO), was responsible for the coronavirus disease-2019 (COVID-19) outbreak [2-4]. The virus spreads rapidly around the world and in January 2020, WHO declared COVID-19 a global public health emergency [5]. The pandemic continues to threaten lives and economies globally [6]. On April 21, 2020, more than 2.4 million people tested positive for SARS-CoV-2 and the outbreak caused more than 165,000 deaths [7]. The Turkish Ministry of Health confirmed that the first COVID-19 case in Turkey was diagnosed on March 11, 2020. National and private ambulance services took safety precautions in handling potential cases, including the filtering of cases from incoming calls to 112 Emergency Call Centers, identification of potential, suspected, confirmed COVID-19 cases, dispatching teams with fully secure personal safety equipment, correct and appropriate use of the protective supplies and apparatus, compliance with safety procedures during sample-taking and transport, assuring that patients wear surgical masks, decontamination, and cleaning of the

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ambulances following transportation. These precautions were important measures in terms of the safety of patients, healthcare workers, and the general community.

The study analyzes and presents features regarding the incoming calls at the 112 Emergency Calls Centers in the metropolitan city İstanbul. In the period when emergency calls surged in İstanbul during the coronavirus outbreak, algorithms were applied to define the demographic characteristics of the COVID-19 cases from the call centers' case records. The demographic and clinical characteristics of COVID-19 cases are hereby presented.

Materials and Methods

Incoming calls at the 112 Emergency Call Centers of the European and Anatolian regions of the metropolitan city of İstanbul were assessed. In the retrospective study, the period under investigation was from March 11 to May 1 of 2020. A total of 980 healthcare staff were employed in the two call centers, where 245 personnel worked daily, on a 24-hour-a-day basis. A total of 3,432 staff were employed at 286 stations altogether, in 39 districts, at 112 Ambulance Services of İstanbul.

The Ethics Committee of University of Health Sciences Turkey, İstanbul Bagcilar Training and Research Hospital approved the research application, dated May 6, 2020 with document #EY. FR.26.

The triage questions to 112 emergency call centers were as follows:

1. Do you have a cough?

2. Do you have difficulty breathing or respiratory distress?

3. Do you have fever or a history of fever?

4. Have any of your relatives been hospitalized within the last 14 days due to respiratory disease?

5. Have any of your relatives been diagnosed with COVID-19 within the last 14 days?

These five questions were asked and if the answer to at least two of these questions were "yes", the case was considered potential COVID-19. If the answers to the first two questions were "yes", it was recommended for 112 personnel to wear N95/FFP2 masks and goggles/face protectors. In handling the remaining cases, it was recommended for them to wear medical masks and goggles/face protectors. While attendants were not allowed in the ambulances for adult patients, as mandatory exceptions, they were required to wear medical face masks.

Call data from 112 Emergency Call Centers calls were reviewed retrospectively and analyzed. WHO recommendations were followed for contact tracing. Fever, cough, shortness of breath complaints, comorbid diseases, malignity, thorax-computed tomography (CT) results were noted. History-taking included the question of whether anyone was diagnosed with COVID-19 in the household; and if that was the case, international travels was questioned.

To assess the pattern and trend of COVID-19 spread, the calls corresponding to the same period in 2018 and 2019 were recorded, and the increase rate for calls for in 2020 was calculated using simulation methods. Simulations were then run for 2020, to compare actual numbers in the existence of COVID-19 and results if the disease did not exist.

Statistical Analysis

Statistical analysis was performed using data obtained retrospectively from case records. Data were recorded and analyzed using SPSS 24.0 (Armonk, NY: IBM Corp.) software. Data were expressed as numbers and percentages for categorical variables and as mean ± standard deviation (SD) for continuous variables. Continuous data are given as mean ± SD and median (25^{th}-75^{th}).

Results

Patients with suspected SARS-CoV-2 pneumonia (n=35,443) were analyzed. The mean age of the patients was found to be 50.6±22.3. Of this total, 16,902 (47.7%) cases were female, while 502 (1.4%) of the cases were of foreign nationality. Geriatric patients, older than 65 years, constituted 10,948 (30.9%) of the cases (Table 1). Ambulance response times for these cases were reported as 10.2 (7.0-16.3) minutes, the median (25^{th}-75^{th}). In terms of clinical symptoms, 18,958 (53.50%) of the cases had fever, 18,359 (51.86%) had a cough, and 21,121 (59.60%) had shortness of breath. The district with the highest number of cases was Gaziosmanpasa with 1,256 cases, 42.16 people per square meter. While 29,729 (83.9%) of the calls received were emergency calls, 5,704 (16.1%) of them were transport calls. Of the transport cases, 288 (5.0%) were transferred to intensive care units, and 197 (68.4%) of these cases were intubated.

Table 1. Age and gender demographics of SARS-CoV-2 suspected calls in İstanbul

Characteristic		Mean ± SD
Age (year)		50.6±22.3
	Age group	n (%)
	0-14	2208 (6.2)
	15-49	14315 (40.4)
	50-64	7962 (22.5)
	≥65	10948 (30.9)
Sex	Female	16902 (47.7)
	Male	18531 (52.3)

SD: Standard deviation, SARS-CoV-2: Severe acute respiratory syndrome-coronavirus-2

The distribution of these cases according to hospital type is presented in this study (Table 2). The distribution of the cases with fever, cough and shortness of breath complaints is presented graphically (Figure 1). In terms of the symptoms, 9,619 cases had all three symptoms, 18,958 (53.50%) cases had fever, 18,359 (51.86%) cases had cough, and 21,121 (59.60%) cases had shortness of breath. Of 35,433 suspected or potential COVID-19 cases transported, shortness of breath was present in 28,075 (79.2%) and 3,065 (8.65%) cases were thorax CT positive. While 3,428 (9.7%) of the cases had a history of contact, 363 (1.0%) had a history of traveling to abroad. The district with the lowest number of cases in İstanbul was Sile with 128 cases, 0.5 people per square meter; the district with the highest number of cases was Gaziosmanpasa with 1,256 cases, 42.16 people per square meter. A statistically significant correlation was found between the population per square meter and the rate of cases in the districts of İstanbul ($p<0.001$, $r=0.636$).

Simulations were run for 2020, to compare actual numbers in the existence of COVID-19 and results if the disease did not exist. Calls from the same period in 2018 and 2019 were recorded and compared for the assessment (Figure 2a-d). Sanitizing and disinfecting the ambulance after transporting a COVID-19 patient is important; a key step is the disposal of medical gowns worn by staff. Sterilization procedures for ambulances are applied at the stations after each case. In the transportation of 35,433 cases, 180,708 gowns (5.1 per case), 163,992 N95/FFP2 masks and goggles (4.6 per case) for each personnel, 77,953 surgical masks (2.2 per case) and many gloves were used.

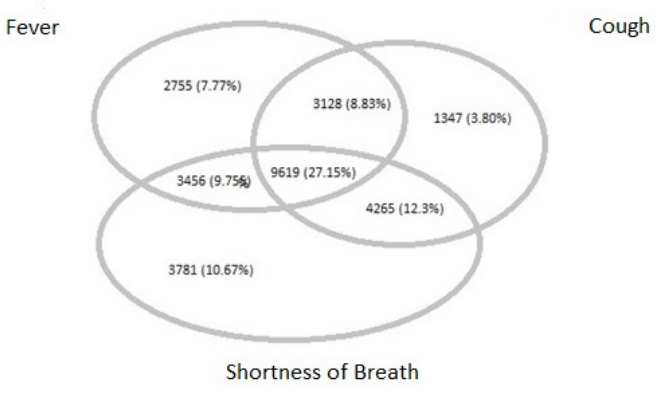

Figure 1. Intersecting sets of fever, cough, shortness of breath complaints of the SARS-CoV-2* suspected calls

*SARS-CoV-2: Severe acute respiratory syndrome-coronavirus-2

Discussion

This research is one of the first studies to present data, analysis, and experiences in prehospital patient services during the COVID-19 pandemic. The authors conclude that, for quality service in disasters such as the COVID-19 pandemic, feasible algorithms should be created. Another finding of the study was that the adequacy of personal protective equipment, along with the safety of a healthy work environment, increased the quality of health service delivery. It was observed that individuals in the population were late in adopting the measures taken and early in giving up.

In Choi's [8] study, the median age was found as 77 years of age (range 35-93 years), and the female-to-male ratio was found as 44:56. Lian et al. [9] found mean age was 45 (5-88) and ages were mostly between the range of 15 and 49. In this study, while the average age was 50.6±22.3 (mean ± SD), ages were in the range of 15 to 49, in compliance with current literature. The female-to-male ratio in the current study was 48:52.

In the general population, the most frequent symptoms were fever (98%), cough (76%), dyspnea (55%) and myalgia or fatigue (up to 44%) [1,10]. In a study conducted on 21 critical patients with SARS-CoV-2 infection, the most frequent symptoms were shortness of breath (76%), fever (52%) and cough (48%) [11]. Studies have shown that complaints are variable, depending on the severity of the cases. The distribution of the complaints showed close numbers in this research. The most frequent symptom was shortness of breath in Arentz et al.'s [11] study. In the station assessment study by Venkatraman et al. [12] found "call received" to "arrived at the scene" 17.0 (7.0-60.0) minutes. In this study, although wearing protective gear increased ambulance response time in the cases reported as suspected or potential by the command and control center, the time was found as 10.2 (7.0-16.3). This finding can be explained by the fact that the metropolitan city of İstanbul is surrounded by a network of 112 stations.

Thorax CT is a critical tool in the initial screening of COVID-19 pneumonia. Shi et al. [13] analyzed the CT images of 81 patients with COVID-19 pneumonia and found that in chest CT scan, COVID-19 pneumonia mostly presented with bilateral and sub-pleural ground glass opacities. Ai et al. [14] showed that diagnostic results of CT images were consistent with reverse-transcriptase polymerase chain reaction analyses for the diagnosis of COVID-19 pneumonia. Additionally, they

Table 2. Characteristics of suspected SARS-CoV-2 calls and distribution of the hospitals the cases were transported to

	State hospital n (%)	University hospital n (%)	Private hospital n (%)
Emergency	26372 (88.7)	553 (1.9)	2804 (9.4)
Transport	3420 (60.0)	119 (2.1)	2165 (38.0)

SARS-CoV-2: Severe acute respiratory syndrome-coronavirus-2

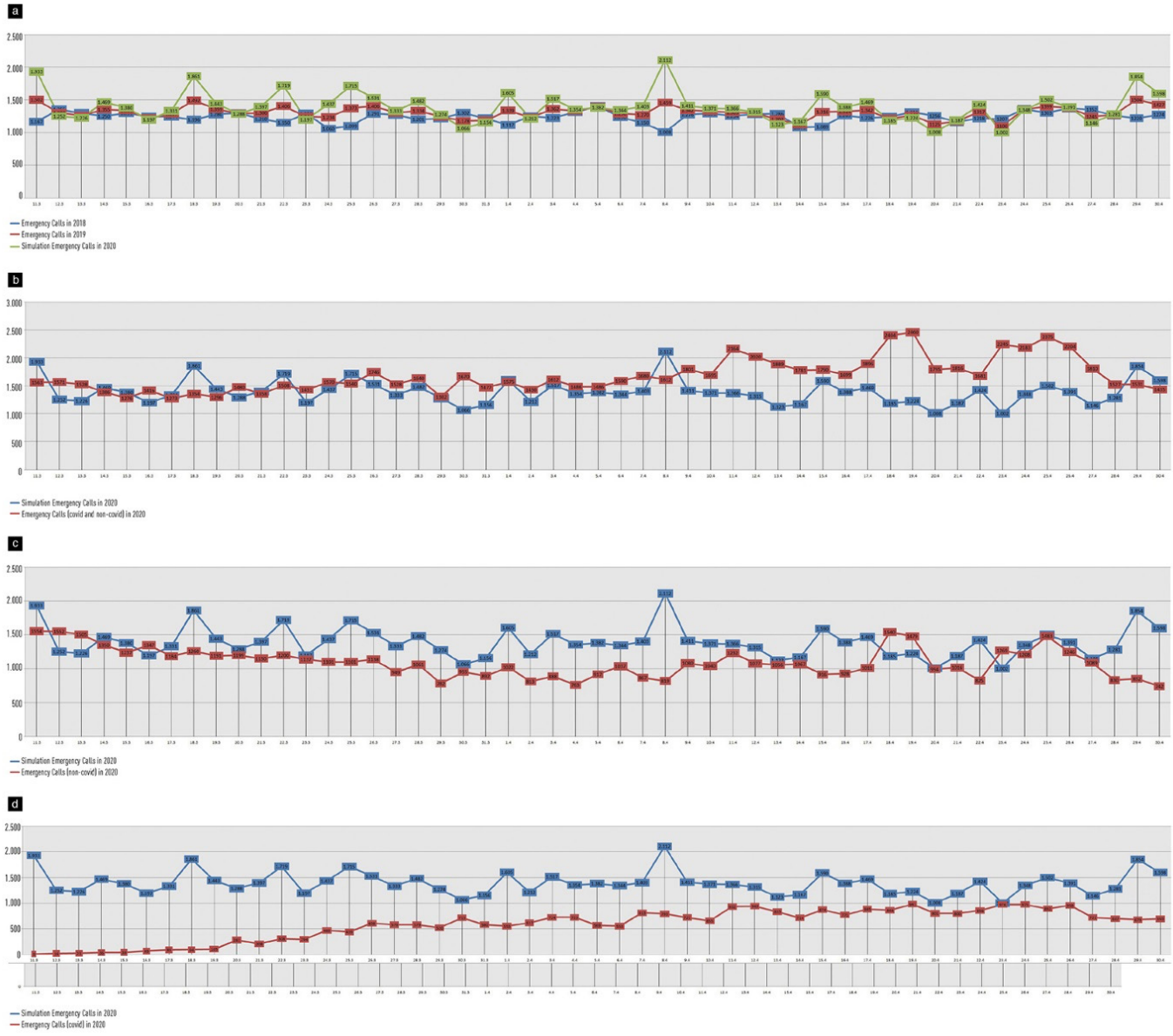

Figure 2. Timeline of calls to the emergency call center

found that CT has a very high sensitivity for the diagnosis of COVID-19 pneumonia [14]. Although CT images show a great potential in the diagnosis of COVID-19 pneumonia, currently radiographic features of COVID-19 pneumonia should be defined manually from all thin layer CT images (an average of 300 layers per patient) by trained radiologists. This will significantly increase the work load of radiologists and delay diagnosis [15]. CT is recommended for COVID-19 patients with initial moderate to severe symptoms and with advancing clinical symptoms [16]. CT also plays a role in predicting the severity of COVID-19 and guiding clinical management. For instance, CT results can provide an estimate of the proportion of unaffected, normally ventilated lungs associated with better outcomes [17]. A comprehensive analysis should be conducted on the potential benefits of examination against financial costs and being exposed to ionizing radiation. The radiation dose, movement artefacts and beam hardening artefacts can be reduced significantly by using modern CT scanners [18]. Notably a negative chest CT does not exclude COVID-19, especially when it is performed within the first few days after the symptoms start [19-21]. CT rate was found to be low in our study since diagnosis is first made with tomography and then test and clinic and since contacts are tracked.

Studies conducted have reported that the COVID-19 pandemic is observed intensely in crowded societies or mass living or working centres [22,23]. In our study, the number of calls evaluated as potential or suspected cases was found to be high

in our districts with high intensity of population. Additionally, social distancing adjustments were made quickly and safe working areas were created in 112 Emergency Call Centers with a crowded working environment.

Although it varies from society to society, especially during the pandemic period, it takes time for the population to perceive the risks and make the necessary behavioral adjustments, to put the recommended precautions into action, to practice and sustain safe healthy lifestyle measures. During the pandemic, while the number of regular calls decreased after March 11, 2020 with the rise of calls received for COVID-19, calls for other cases began to increase again as of April 9, 2020 (Figure 2d).

Conclusion

Prehospital health services are a bridge between individuals in the community and hospital care services in cases of disasters such as earthquakes, floods, pandemics. The structural establishment of a robust system to meet the incoming demands, the construction of feasible algorithms, building the optimal infrastructure for ambulances in accordance with the population intensity, will both protect the system and help to improve the quality of health services delivery.

Ethics

Ethics Committee Approval: TR MoH Bagcilar Research and Training Hospital Ethics Committee approved the research application, dated May 6, 2020 with document #EY.FR.26.

Informed Consent: Standard patient informed consent requirements were met before the research was initiated.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Concept: Y.A., Ş.Ö.H., İ,Ö., G.E., K.A.T., Design: V.T., Y.A., Ş.Ö.H., İ.Ö., G.E., Data Collection or Processing: Y.A., Ş.Ö.H., Analysis or Interpretation: V.T., Y.A., Ş.Ö.H., İ.Ö., G.E., K.A.T., Literature Search: Y.A., Ş.Ö.H., İ.Ö., G.E., V.T., Writing: V.T., Y.A., Ş.Ö.H.

Conflict of Interest: No conflict of interest was declared by the authors.

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