Comparison of Ambulance Patients and Outpatients Presented to the Pandemia Area of a University Hospital Emergency Department

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Abstract

Objective: In this study, we compared the coronavirus disease-2019 (COVID-19)+/suspected patients who presented to the pandemia area (outpatient enterance/ambulance enterance) of our emergency department (ED) and to determine whether the ambulance system is used appropriately or not during this pandemia process.

Materials and Methods: Patients were divided into two groups as outpatients and ambulance patients. Demographic data, sampling ratio of polymerase chain reaction (PCR) swab, PCR positivity, thorax computed tomography (CT), CT positivity, hospitalization ratio and hospitalization day, length of stay in the ED, and the outcome of the groups were compared.

Results: The mean age of ambulance patients was 53.8±20.2 (min: 18, max: 93), and the ambulance patients were 41.4±16.04 (min: 18, max: 96) and this value was significantly higher in ambulance patients. Length of stay in the ED of the ambulance patients was 6.1 h and this value was 2.9 h for the other group. Hospitalization length of discharged patients from the intensive care unit (ICU) was 20.6 days for ambulance patients and 16.9 days for outpatients. Three of the outpatients and 22 of the ambulance patients died during hospitalization and 18 of these were males.

Conclusion: The mean age, CT positivity, and PCR test positivity were significantly higher in ambulance patients. Similarly, ambulance patients' length of stay in the ED was higher who were discharged from the ED. ICU hospitalization, hospitalization length, and mortality ratio were higher in ambulance patients. Considering these results, it is important to develop appropriate strategies for ambulance and outpatients, to prevent already crowded EDs squeezing under the COVID-19 burden.

Keywords: COVID-19, ambulance, emergency department, outpatients, intensive care unit

Introduction

Emergency departments (ED) are units that provide 24 h healthcare service. This situation leads the EDs easy-reacheable and inappropriate use of these units and so over-crowdedness ocur. Other reasons for this crowdedness are disasters and contagions, so the patients present to the EDs first when these situations ocur [1-3].

Coronavirus disease-2019 (COVID-19) had first started in China and spread to most of the countries on earth. And global pandemia was announced on March 11, 2020. ED has become the first presentation unit and served as a tampon during this COVID-19 pandemic. Prehospital emergency medical services and EDs become unsufficient since the pandemia has started [4].

Yıldız et al. COVID-19 and Emergency Department

Glob Emerg Crit Care 2023;2(1):13-16

In this study, we compared the COVID-19 +/suspected patients who were presented to the pandemia area (outpatient enterance/ambulance enterance) of our ED and to determine whether the ambulance system is used appropriately or not during this pandemia process. According to our knowledge, there is a lack of data for the emergency service observation, prognosis, and outcome of COVID-19 +/suspected patients according to the presentation method. This study may contribute to the literature.

Materials and Methods

After the ethics committee approval (AUniversity of Health Sciences Turkey, Adana City Training and Research Hospital Ethics Committee -22 April 2020-827), we researched the data of outpatients ambulance patients who presented to the pandemia area of our ED and 15 March-15 May 2020 via the hospital's automation system. Patients were divided into two groups as outpatients and ambulance patients. Demographic data, sampling swab for polymerase chain reaction (PCR)-if yes the test result, chest computed tomography (CT) screening-if yes the imaging result, length of stay in the ED (hour), hospitalization length (day), hospitalization unit [inpatient clinic (IPC)/intensive care unit (ICU)], and the outcome were recorded on the study forms. These parameters were compared between the two groups. Patients under 18 years old, patients with missing data, patients who were referred to another hospital because of ICU bed, and patients become ex in the ED were excluded from the study.

Statistical Analysis

Statistical comparisons were performed using the statistical software package SPSS 25.0 (SPSS Inc., Chicago, IL, USA). The Shapiro-Wilk test was used to control for the normal distribution. The normally distributed variables were evaluated parametric, and non-normally distributed parameters were evaluated with non-parametric tests. The mean values of the independent groups were compared with t-test and Mann-Whitney U test. A chi-square test was used for comparing the ratios of two independent groups. The Kruskal-Wallis test was used to compare the grous more than two and Mann-Whitney U test was used as the post-hoc test. Benferoni correction was used for p value. The spearman correlation was used for independent parameters. The categorical variables are expressed in frequencies and percentages. Definitive statistics were expressed as a mean ± standard deviation and median (interquartile range). A p value <0.05 was considered significant.

Results

We included 436 (46.5%) ambulance and 501 (53.5%) outpatients, and totally 937 patients in this study. The mean age of the ambulance patients was 53.8±20.2 (min: 18, max: 93), and 41.4±16.04 (min: 18, max: 96) fort he outpatients. The mean age of the ambulance group was significantly higher (p=0.000).

The chest CT imaging ratio was significantly higher in the ambulance patients (91.7% vs. 72.9%) (p=0.000). The compatible CT result ratios of the ambulance and outpatient groups were 34.5% and 29.5% consecutevly (p=0.143).

The PCR test was ratio was significantly higher in the ambulance patients (98.2% vs. 91%) (p=0.000). PCR positivity ratio in the ambulance patients was 28.5% and this value was 30.5% in the outpatient group, but this difference was not statistically significant (p=0.508).

Fifty-six (12.8%) of the ambulance patients, and 16 (3.19%) outpatients were hospitalized in the ICU.

When we considered the patients who were discharged from the ED, the mean waiting time of the ambulance patients was 6.1±5.8 hours and this value was 2.9±4.63 hours for outpatients. Fifty-six (12.8%) of the ambulance patients and 12 (3.19%) outpatients were hospitalized in the ICU. The mean hospitalisation length of the patints who were discharged from the ICU was compared. Ambulance patients were hospitalized 20.6 days, and the outpatients were hospitalized 16.9 days (p=0.00). And this difference was statistically significant. Three of the outpatients and 22 of the ambulance patients died. Eighteen of these 25 patients were males. Length of stay in the ED and hospitalization length in the ICU/IPC of the groups are summarized in Table 1.

We found much more COVID-19 compatibility in males' chest CTs in the ambulance patient group (66.9% vs. 33.1%) (p=0.019).

In the outpatient group, the elder age was significantly correlated with the waiting time duration in the ED (p=0.000, r=0.333). Similarly, this correlation was determined in the ambulance group too (p=0.000, r=0.424). And hospitalization length was significantly correlated with age in the ambulance patients (p=0.00, r=0.187).

Discussion

Patients present to the EDs via ambulance or as an outpatient. Crowdedness of EDs has still been an important problem for most of the countries. This crowdedness has several causes, and solution suggestions are being discussed. Unnecessary presentations (both for outpatients and ambulances) constitute are the major problem and followed by a long waiting time of complicated patients in the ED for hospitalization [5,6].

ED presentations have been arose for 15 years in the UK. Treatment and dischargement within 24 and 48 h in the ED observation rooms made EDs much more attractive for people. And the circulation has become much more rapid [7].

Glob Emerg Crit Care 2023;2(1):13-16

Yıldız et al. COVID-19 and Emergency Department

Table 1. The time spent in the ED, hospitalisation length in the ICU/IPC of the groups							
Outcome	Groups	Time					p
		n	Mean	Minninum	Maximum	SD	
Discharged from the ED (hour)	Ambulance	156	6.17	1	36	5,78001	**0.000**
	Outpatient	337	2.94	0	72	4,63900	
Discharged from the ICU (hour)	Ambulance	35	20.60	1	54	12,80900	0.416
	Outpatient	13	16.92	1	62	16,45935	
Ex in the ICU (day)	Ambulance	21	16.76	1	85	20,67101	0.254
	Outpatient	3	12.00	8	17	4,58258	
Discharged from the IPC (day)	Ambulance	201	8.09	1	60	7,32366	**0.001**
	Outpatient	150	6.85	1	34	4,90362	
Ex in th IPC (day)	Ambulance	1	6.00	-	-	-	-
	Outpatients	0	0	-	-	-	-
ED: Emergency department, ICU: Intensive care unit, IPC: Inpatient clinic, SD: Standard deviation							

EDs are easy reachable units and the capacities of the EDs are being developed and enlarged each day to prevent the crowdedness, this enlargement causes new crowded masses and much more patients waiting in the ED. Determining the primary necessity of the patients and providing the priority of the critically ill patients are the most important keypoints in managing the circulation of an ED. An effective triage may help in these situations. Comprehensive and modern hospitals have separated entrances for ambulances and outpatients. This is a kind of triage because we know that critically ill patients almostly brought by ambulances, although it may have some inaproppriate use. Therefore, the ambulance patients can be accepted as red according to the triage systems and evaluated immediately [5].

COVID-19 infection started in China in December 2019 and spread worldwide in 2020 and called pandemia [7,8]. ED s have been the fisrt admission unit of COVID-19 +/suspected patients. Besides, admissions of patiens with mild symptoms made the situation unsolvable for emergency healthcare workers [9]. Recently, precautions and knowing more about the disease made it easier to struggle. But nowadays, the second wave has started and it looks much more destructive than the previous. Therefore, it is going to be an important keypoint to differentiate critically ill-moderate-mild patients for a better ED circulation.

In our study, 46.5% patients were ambulance patients. And 58.3% of the total presentations to the pandemia area were males. The mean age of the ambulance patients was 53.8, and 41.4 for the outpatients in an Australia emergency -based study, 55% of the suspected COVID-19 patients were male and the mean age was 60. In the same study 59% patients were presented with an ambulance. This study was based on the complaints and findings of the suspected patients [4]. In the same study, 29% of the patients were hospitalized in the ICU,

and 13% of the patients who were hospitalized into the IPC were referred to another hospital. We are a third -degree hospital so we did not refer any patients to the other hospitals' ICU or IPCs. According to Spanish data, 74.6% of the COVID-19 suspected patients were hospitalized. 5.9% of those were to the ICU, and 14.6% of the hospitalized patients died [9].

The mean age of the ambulance patients was higher than the outpatients in our study. Because older people have many comorbidity and their COVID-19 process is progresses mugh more severe and they cannot present as an outpatient. Similarly COVID-19 mortality ratio is higher in elder patients. In some studies, mortality is related especially to ischemic heart diseas, pneumonia, demans, and chronic obstructive pulmonary disease [10-12].

The thorax CT rate was higher in ambulance patients in our study compared with the outpatients. The conformity ratio of CT with COVID-19 was 34.5% and 29.5% in outpatients. When its thought that elder patients present with an ambulance and with significant breathing problems usage of CT imaging doesnot seem confusing.

According to these results, emergency room areas can be re-planned during the evaluation process of COVID-19 patients in emergency services. A separate area can be created for ambulance and ambulatory entrances of patients. This area to be created can be in the emergency room or in another hospital area. In these areas, patients can be managed with a multidisciplinary approach.

Conclusion

While a many uncertainty of COVID-19 infection continue, prehospital emergency medical systems and emergency services are exposed to a high weight, especially this second wave, emergency clinicians must prepare themselves and the

Yıldız et al. COVID-19 and Emergency Department

Glob Emerg Crit Care 2023;2(1):13-16

plan of for EDs for COVID-19 suspected/+ ambulance and outpatients. We should predict the fort he clinical situations we will meet, which diagnostic tests we should see, which hospitalization clinic is the best fort he patients and the outcome. If we can not dope out, there is no way to plan the circulation of the department. This predictable study may be a light for EDs for not to squeeze under the COVID-19 burden, which are overcrowdening day by day.

Ethics

Ethics Committee Approval: University of Health Sciences Turkey, Adana City Training and Research Hospital Ethics Committee, date: 22.04.2020, decision no: 827.

Informed Consent: Since the data were obtained from the hospital automation system and our study was a retrospective cross-sectional study, informed consent forms were not obtained.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: D.Y., D.M.U., A.B.U., S.B.Y., A.A., S.Y., Concept: D.Y., A.B.U., S.B.Y., K.Ş., A.A., S.Y., Design: D.Y., A.B.U., S.B.Y., K.Ş., A.A., S.Y., Data Collection or Processing: D.Y., D.M.U., A.B.U., S.B.Y., Analysis or Interpretation: D.Y., D.M.U., S.B.Y., K.Ş., A.A., S.Y., Literature Search: D.M.U., A.B.U., K.Ş., A.A., S.Y., Writing: D.Y., A.A., S.Y.

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