Araştırma Makalesi
Research Article

The Effect Of The Pandemic Process On The Number Of Patient Admissions, Hospitalizations And Referrals In A Secondary Emergency Department

İKİNCİ BASAMAK BİR ACİL SERVİSTE PANDEMİ SÜRECİNİN HASTA BAŞVURU SAYILARI İLE YATIŞ VE SEVK DURUMLARINA ETKİSİNİN İNCELENMESİ

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ABSTRACT

Objective: In December 2019, the respiratory disease caused by a coronavirus group virus, first seen in Wuhan, China, was named "coronavirus disease" (COVID-19). As a result of various decisions taken around the world to keep the disease under control, to provide healthcare services to diseases other than COVID-19, and to protect healthcare personnel from transmission, there have been some disruptions in healthcare service delivery.

Methods: In this study, the daily number of patients admitted to the emergency department of a state hospital during the pandemic period, the number of patients hospitalized and the referred to another hospital were examined. These data were compared with the pre-pandemic and post-pandemic period.
Applications made between January 01, 2019 and December 31, 2022 were examined retrospectively. Monthly data were collected on the number of patients admitted to the emergency department, the number of hospitalized patients and referred to another institution during the four-year period. The effects of the pandemic period on the total number of admissions, referrals and hospitalizations were compared before and after the pandemic.
Although the number of patients admitted to the emergency department decreased significantly during the pandemic period, the total number of patients hospitalized and referred from the emergency department did not decrease at a similar rate

Results: Considering the significant decrease in patient admissions seen with the pandemic, it would be appropriate to examine whether the emergency department is used properly by patients outside the above-mentioned group (without hospitalization or referral) in order to ensure effective and quality health services.

Keywords: Covid 19, Pandemic, Hospitalizations and Referrals, Emergency Medicine

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ÖZ

Amaç: 2019 yılının aralık ayında ilk olarak Çin'in Wuhan kentinde görülen corona virüs grubu bir virüsün sebep olduğu solunum yolu hastalığına "koronavirüs hastalığı" ismi verildi (COVID-19). Hastalığı kontrol altında tutmak, COVID-19 dışındaki hastalıklara da sağlık hizmeti verebilmek ve aynı zamanda sağlık personelini de bulaştan korumak için dünya genelinde alınan çeşitli kararlar sonucunda sağlık hizmet sunumunda bazı aksaklıklar yaşanmıştır.
Bu çalışmada pandemi döneminde bir devlet hastanesinin acil servisine başvuran günlük hasta sayısı, hastaneye yatış yapılan hasta sayısı ve başka bir hastaneye sevk edilen hasta sayısı incelenmiştir. Bu veriler pandemi öncesi ve pandemi sonrası dönem ile kıyaslanmıştır.

Yöntem: 01 Ocak 2019 ile 31 Aralık 2022 tarihleri arasında yapılan başvurular retrospektif olarak incelenmiştir. Bahsedilen dört yıllık periyottaki acil servise başvuran hasta sayıları, hospitalize edilen hasta sayıları ve başka bir kuruma sevk edilen hasta sayıları aylık veriler olarak toplanmıştır. Pandemi döneminin toplam başvuru sayısına, sevk sayısına ve yatış sayısına etkileri; pandemi öncesi ve sonrasına göre karşılaştırılmıştır.

Bulgular: Pandemi döneminde acil servise başvuran hasta sayısı belirgin olarak azalmasına rağmen, acil servisten yatış ve sevk yapılan hasta sayılarının toplamında benzer oranda azalma olmadığı saptanmıştır.

Sonuç: Pandemi ile birlikte görülen hasta başvurusundaki ciddi azalma göz önüne alındığında yukarıda bahsettiğimiz grup dışında kalan (yatış veya sevk yapılmayan) hastalar tarafından acil servisin gerekli kullanılıp kullanılmadığı konusunun irdelenmesi; etkin ve kaliteli sağlık hizmetlerinin sağlanması için uygun olacaktır.

Anahtar Kelimeler: COVID-19, Pandemi, Yatış ve Sevk, Acil Servis

In December 2019, the respiratory disease caused by a coronavirus group virus, first seen in Wuhan, China, was named "coronavirus disease" (COVID-19) (1). Following the rapid spread of the disease all over the world, the World Health Organization declared this outbreak a 'pandemic' in March 2020 (2). As a result of various decisions taken around the world to keep the pandemic under control, to provide healthcare services for diseases other than COVID-19, and to protect healthcare personnel from transmission, there have been some disruptions in healthcare service delivery (3). The first case was seen in our country on March 11, 2020 and as of this date, various decisions such as lockdowns, quarantine practices, compliance with hygiene rules, travel restrictions have been implemented and most hospitals have been declared as pandemic hospitals (4- 5). As a result of all these practices, the rate of applications to emergency departments decreased by 15-42% compared to the previous year (6). Scientific studies have shown that ischemic stroke cases decreased by 20% in Canada and heart attack cases by 40% in Spain during the pandemic. In our country, it was observed that there was a 25% decrease in the number of patients who applied to emergency services and needed surgical intervention during this period (1).

In this study, the daily number of patients admitted to the emergency department of a second-level district state hospital during the pandemic period, the number of patients hospitalized and the number of patients referred to another hospital were examined. The results obtained were compared with the data of the pre-pandemic and post-pandemic periods. It was aimed to evaluate whether the number of patients admitted during the pandemic period, the number of daily patient referrals and hospitalizations showed a change compared to the pre-pandemic and post-pandemic periods.

METHODS

Admissions to Akçaabat Haçkalıbaba State Hospital between January 01, 2019 and December 31, 2022 were retrospectively analyzed. The hospital where the study was conducted is a second-tier district state hospital serving a district with a total population of 130 thousand, about ten kilometers from the provincial center, and was not declared as a pandemic hospital during the pandemic period, but served both covid patients and patient groups presenting with non-covid complaints. Approval for our study was obtained from the ethics committee of scientific research at Karadeniz Technical University Faculty of Medicine (Ethics Committee Decision Date: 14.12.2023 and No: 2023/197).

Using the patient admission registration system, all patients admitted to the emergency department on the specified dates were recorded in the data recording form. Monthly data were collected on the number of patients admitted to the emergency department, the number of hospitalized patients and the number of patients referred to another institution during the four-year period.

The effects of the pandemic period on the total number of admissions, referrals and hospitalizations were compared before and after the pandemic. In addition, the effect of the decisions taken by the Ministry of Internal Affairs during the pandemic on the number of patient applications on a monthly basis, and whether this change, if any, has an effect on the number of patient referrals and hospitalizations were investigated. The conformity of the data to normal distribution was evaluated by Histogram, Q-Q graphs and Shapiro-Wilk test. One-way analysis of variance was used for comparisons between more than two groups. Tukey and Tamhane tests were used for multiple comparisons. Data analysis was performed in R 4.0.3 (www.r-project.org) software. Significance level was accepted as $p<0.05$.

RESULTS

During the study period, all admissions to the emergency department of our hospital, all patients admitted to another inpatient ward or intensive care unit from the emergency department, and all patients referred to another healthcare institution for any medical reason were analyzed monthly (Table 1).

Table 1. Distribution of the number of patients admitted, hospitalized and referred to the Emergency Department according to months

2019	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**	**Total**
Patient	17689	11217	13026	12938	12194	14558	14534	18193	13682	13339	11814	14374	**167558**
Hospitalization	331	284	335	316	253	291	317	388	328	288	330	327	3788
Referral	105	114	131	115	109	132	164	128	100	125	113	99	1435
Hospitalization+ Referral	436	398	466	431	362	423	481	516	428	413	443	426	**5223**
2020	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**	
Patient	16869	11694	10037	4453	5785	8235	9896	11024	8934	9395	13401	5664	**115387**
Hospitalization	324	261	256	342	282	277	410	369	349	384	479	469	4202
Referral	129	104	83	65	87	112	92	119	78	86	90	102	1147
Hospitalization+ Referral	453	365	339	407	369	389	502	488	427	470	569	571	**5349**
2021	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**	
Patient	6098	5810	6851	6740	8565	9737	14779	15393	11442	11330	10358	11357	**118460**
Hospitalization	329	350	369	378	294	249	303	393	345	335	346	325	4016
Referral	83	95	93	96	93	79	143	103	124	135	119	97	1260
Hospitalization+ Referral	412	445	462	474	387	328	446	496	469	470	465	422	**5276**
2022	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**	
Patient	12528	9801	9323	9422	12747	11760	16256	16265	14937	14229	15470	18922	**161660**
Hospitalization	361	347	267	209	181	190	237	240	234	288	287	277	3118
Referral	130	121	119	87	76	64	90	96	104	93	95	101	1176
Hospitalization+ Referral	491	468	386	296	257	254	327	336	338	381	382	378	**4294**

The number of applications in the first month following March 2020, the date when the pandemic process was officially announced in our country, was recorded as the lowest number of patients seen during the entire pandemic. Compared to the pre-pandemic and post-pandemic periods, the number of patients in April 2020 was the lowest number of patients (n:4453).

The number of admissions to the emergency department, the number of hospitalizations, the number of referred patients and the ratio of the total number of admissions to the total number of hospitalizations or referred patients were compared by years (Table 2).

Table 2. Comparison of variables by years

	Years				*p*
	2019	**2020**	**2021**	**2022**	
Number of patients	13963.17±2138.61[a]	9615.58±3475.38[b]	9871.67±3205.07[b]	13471.67±3066.03[a]	**0.001**
Number of hospitalizations	315.67±33.89[ab]	350.17±75.90[a]	334.67±39.37[a]	259.83±56.38[b]	**0.001**
Number of referrals	119.58±18.05[a]	95.58±18.24[b]	105.00±20.45[ab]	98.00±18.83[ab]	**0.015**
Number of hospitalizations+ referrals	435.25±39.51[a]	445.75±77.08[a]	439.67±46.38[a]	357.83±73.10[b]	**0.003**
Ratio (Number of patients/ Number of hospitalizations + referrals)	377.67±48.64[a]	265.91±45.02[b]	272.65±33.58[b]	469.51±97.05[a]	**<0.001**

Data are expressed as mean±standard deviation. The same letters in the same row indicate similarity and different letters indicate difference between years.

As a result, there was a statistically significant decrease in the total number of patients admitted to the emergency department in 2020 and 2021, the peak years of the pandemic period, compared to other years (P 0.001). When the annual number of applications is evaluated, the years 2020 and 2021 were similar among themselves, and 2019 and 2022, the years before and after the pandemic, were similar among themselves. When the total number of hospitalizations and referrals by years are evaluated, numerical similarities are observed between the pandemic and pre-pandemic years. When the ratio of the total number of patients to the number of hospitalizations and referrals was evaluated, a statistically significant difference was observed in the pandemic period compared to the pre-pandemic and post-pandemic periods ($p<0.001$), but when the data are evaluated numerically, the years 2020 and 2021 are similar among themselves, and 2019 and 2022 are similar among themselves.

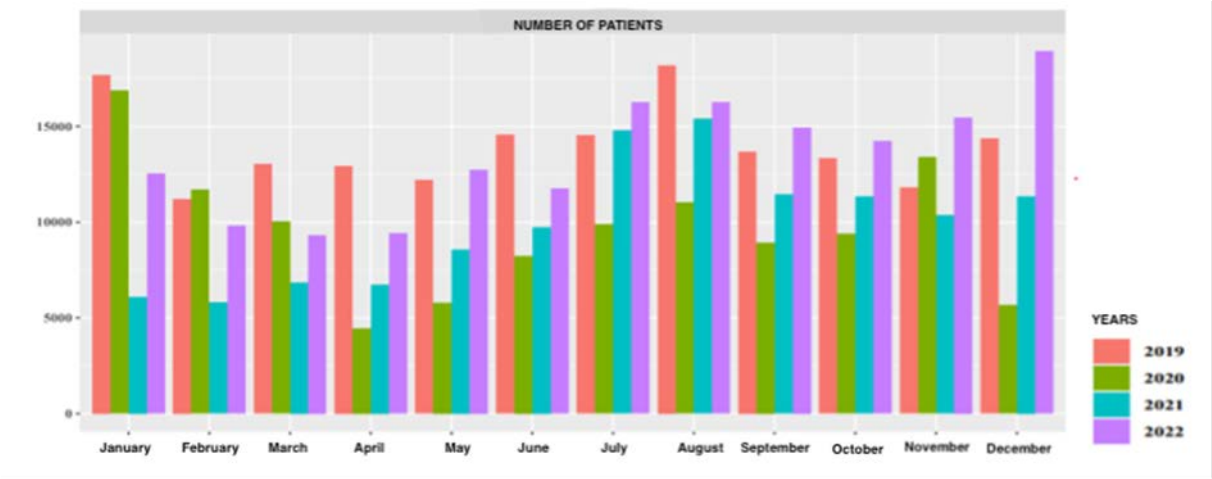
The reason for the similarity in numerical data despite the decrease in rates may be that although the total number of patients decreased significantly during the pandemic period, the number of hospitalized and referred patients did not decrease at the same rate.

After the first case in March 2020, the Ministry of Internal Affairs issued pandemic decisions with various measures for about two years (7). When the number of patients by years and months were evaluated within the framework of these decisions, it was determined that the number of patients in April 2020 showed a sudden decrease compared to the previous months (n:4453). According to the pandemic circulars, decisions such as lockdowns and travel restrictions between cities started to be implemented for the first time in this month (8). Lockdowns continued until June 2020 and were lifted in June. Although the number of patients started to increase in the months following April, the number of admissions was lower compared to other years. In June 2020, the lockdown was lifted and the curfew was reimposed in December 2020, and as can be seen in the graph, the number of patients in December decreased significantly compared to the previous month (November 2020: 13401 patients, December 2020: 5664 patients).

This decline in the number of patients continued until the first quarter of 2021 due to the pandemic decisions, including the full lockdown implemented during this period. In 2021, with the gradual normalization announced in May and the normalization decisions announced in June

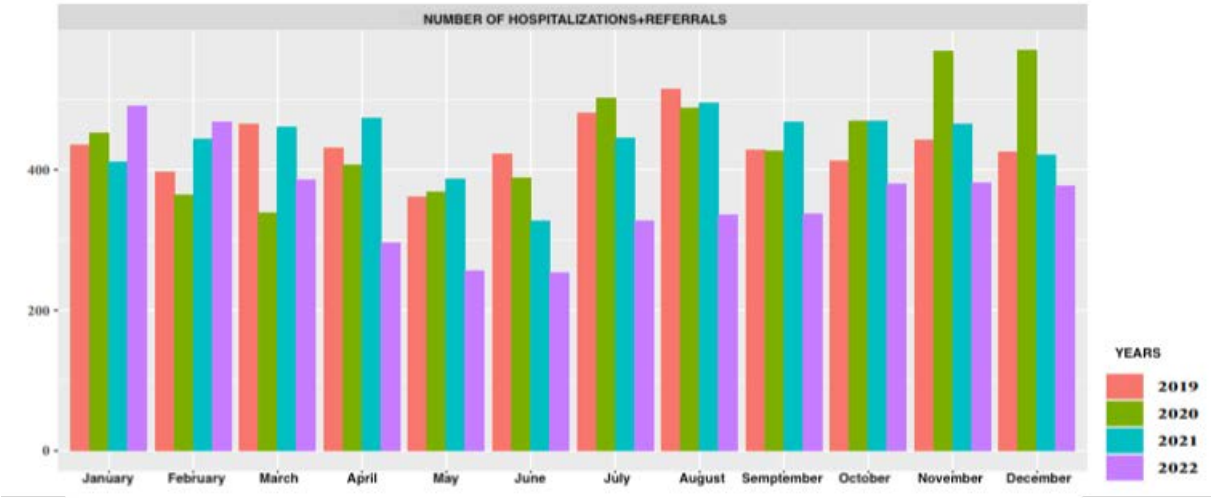
(despite the continuation of the lockdown), the increase in the number of patients gained momentum. On July 1, 2021, after the lockdown was lifted completely, July and August were the months with the highest number of patient admissions in 2021. On January 1, 2022, the PCR test requirement was completely abolished, and the number of patients in 2022 was numerically higher on a month-by-month basis than in all months of the pandemic (except March 2020) (Graph 1).

Graph 1. Number of patients admitted to the emergency department by years and months



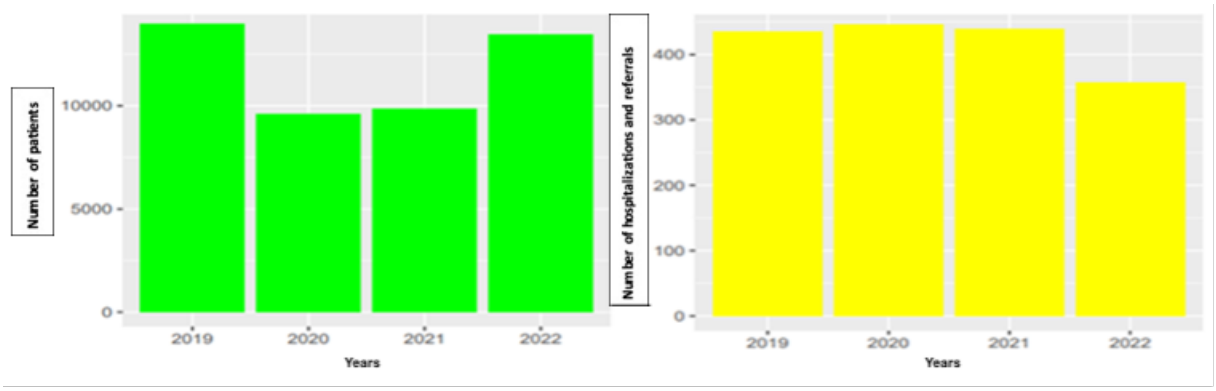
When the number of patients admitted to the emergency department between January 1, 2019 and December 31, 2022 is compared with the total number of patients referred or hospitalized from the emergency department; despite the sudden decrease in the number of patients in April 2020 according to the declaration of the pandemic and the decrees issued by the Ministry of Interior, a similar decrease in the total number of referrals and inpatients is not observed. In 2020, while there was a significant difference in the number of patients between November and December, the total number of referrals and inpatients was almost the same in these two months. Looking at 2021, especially in the first quarter, there was no significant change in the total number of hospitalizations and referrals compared to non-pandemic years (Graph 2).

Graph 2. Total number of patients hospitalized and referred from the emergency department by years and months



During the COVID-19 pandemic period, which officially started in March 2020 and is considered to have ended in January 2022 with the lifting of the PCR test requirement, the decrease in the number of patients is noteworthy when compared to previous and subsequent years. On the other hand, on a yearly basis, there was no significant change in the total number of hospitalizations and referrals in the pre-pandemic period and during the pandemic (Graph 3)

Graph 3. Total number of variables by years



CONCLUSION

The COVID-19 pandemic has affected all systems worldwide, but the healthcare system has been the most affected system. During this period, the number of hospital admissions and complaints of patients varied considerably, and the same variability was seen in the management of patients within the hospital (9). In our study, the decrease in the number of patients admitted to the emergency department during the pandemic period is similar to studies conducted in our country and in different countries of the world. (10; 11). The reason for the significant decrease in the number of patients admitted to emergency

departments with the onset of the pandemic may be that patients hesitate to apply to the hospital because they are worried about being infected, or it may be the effect of the decisions taken by the country administrations on this issue (12). In our study, like the examples in the literature, a significant decrease was observed in the number of patients admitted to emergency departments throughout the pandemic within the framework of the measures published by the Ministry of Internal Affairs.

In the study conducted by Catal et al. it was observed that patient admissions generally decreased in all seasons during the pandemic period, and the maximum decrease on a month basis was in April, in the same study, there is a significant decrease in the number of patients in the transition from November to December 2020 (1). In the study conducted by Yakar et al. the least number of patient applications was in April 2020 (11). Similar to our study, the number of patients decreased in all seasons throughout the pandemic, the month with the highest decrease was April 2020, and a 57% decrease in the number of patients was observed from November to December in the same year. In April and December 2020, these similar changes can be attributed to the measures taken across the country and the public's compliance with these measures.

Looking at the patient hospitalization profile during the pandemic period; In a study conducted in the United States of America (USA), hospitalization due to heart attack decreased by 38% in March 2020 compared to the previous year (13), another study shows a 39% reduction in stroke patients in the US during this period (14). In the study by Leow et al., although the number of patients admitted to the emergency department decreased during the pandemic period compared to the pre-pandemic period, no significant change was observed in the hospitalization rate (10). In a study conducted by Görmeli Kurt et al. a decrease in the hospitalization of acute coronary syndrome and stroke patients was observed during the pandemic period compared to the pre-pandemic period, while an increase in hospitalizations due to pneumonia was observed (15). In the study conducted by Alataş et al. in our country, an increase in the hospitalization of patients from the emergency department was observed in 2020 compared to 2019 (9). In our study, similar to the studies conducted in our country, an increase in the number of patient hospitalizations during the pandemic period was observed compared to the pre-pandemic and post-pandemic periods. The fact that the number of hospitalizations decreased during the pandemic period in some studies, increased in others, and did not change proportionally in others may have been due to whether the hospitals where the studies were conducted were pandemic hospitals or branch hospitals.

In our study, when the number of patients referred to another institution for any reason from the emergency department of our hospital is examined, a numerical similarity is observed between the pandemic period and the post-pandemic period. Since the hospital where the study was conducted is a second-tier district state hospital that is not a pandemic hospital, it can be considered that patients who cannot be treated with the existing hospital facilities are referred for further examination and treatment. The similarity in the number of referrals during and after the pandemic can be justified by the fact that referrals to higher institutions or branch hospitals (regardless of the pandemic) are due to the routine functioning of the hospital. Since scientific studies on the pandemic are mostly conducted in pandemic hospitals in provinces and pandemic hospitals are generally composed of tertiary hospitals in provinces, there is not much data on referrals to other institutions in the literature . However, in the study conducted by Erdem A. in a tertiary university hospital, when the number of patients referred from the emergency department was compared, no statistically significant difference was observed between the pandemic period and the pre-pandemic period (16). In this perspective, the results obtained in our study are similar to this study.

In our study, patients admitted to the emergency department in a four-year period including the pandemic period, before and after the pandemic were examined. Although the number of patients admitted to the emergency department decreased significantly during the pandemic period, it was found that the total number of patients hospitalized and referred from the emergency department did not decrease at a similar rate. Within the framework of this information, we can say that among the

patients who applied to the hospital, patients who needed to be hospitalized or who needed to be referred to another institution because treatment was not possible under hospital conditions received the necessary health services both during the pandemic period and before and after the pandemic. Considering the significant decrease in patient admissions seen with the pandemic, it would be appropriate to examine whether the emergency department is used properly by patients outside the above-mentioned group (without hospitalization or referral) in order to ensure effective and quality health services.

LIMITATIONS

The most important limitation of the study is that it was single-center and retrospective. In our study, only numerical data were compared and there is no data on whether the profile of hospitalized or referred patients changed in terms of clinical diagnoses during the pandemic period. It is thought that multi-center studies with more detailed data will contribute to the literature.

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