

# How were Non-COVID pulmonary patients and diseases affected from COVID-19 pandemic period?

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## Abstract

**OBJECTIVE:** This study aimed to focus on non-COVID-19 patients during the process when all physicians focused on COVID-19 patients. Patients with pulmonary diseases in the COVID-19 pandemic period were analyzed.

**MATERIAL AND METHODS:** Non-COVID-19 cases who were hospitalized in the pulmonology clinic, outpatients, and patients who applied to the non-COVID-19 emergency service and requested a pulmonology consultation in the period from March 16, 2020 to May 15, 2020 and in the same period of the previous year (i.e., from March 16, 2019 to May 15, 2019) were included in this study.

**RESULTS:** In the pandemic period, it was found that there was an 84% decrease in outpatient admissions, a 43% decrease in inpatients, and a 75% decrease in emergency services. During the pandemic period, in outpatient setting, male and younger case admissions increased, admissions with chronic obstructive pulmonary disease (COPD), and interstitial lung diseases decreased, whereas the frequency of admission to asthma, pneumonia, and pulmonary thromboembolism increased. In the period of the pandemic, patients with asthma, COPD, and lung cancer were less hospitalized, whereas patients with pulmonary thromboembolism, pneumonia, and pleural effusion were hospitalized more. In non-COVID-19 patient treatments during the pandemic period, usage of a metered dose inhaler increased.

**CONCLUSION:** During the COVID-19 pandemic, non-COVID pulmonary pathologies decreased significantly, and there was a change in the profile of the patients. From now on, to be prepared for pandemic and similar extraordinary situations, to organize hospitals for the epidemic, to determine health institutions to which non-epidemic patients can apply, to make necessary plans in order not to neglect the non-epidemic patients, and to develop digital health service methods, especially telemedicine, would be appropriate.

**KEYWORDS:** COVID-19 pandemic, non-COVID, pulmonary

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## INTRODUCTION

In the period of the COVID-19 pandemic, which has affected the whole world, wherever the entire health system is focused on the COVID-19 disease, the demand, and delivery of healthcare services for patients with non-COVID-19 diseases has come to a halt. Patients who had been followed up regularly preferred to stay away from health institutions, except for emergency situations, during the period when the epidemic was actively continuing. In that period, emergency and pulmonologists mostly followed COVID-19 patients. With the admissions of pulmonology outpatient clinic serving nonpandemic non-COVID-19 patients, the number of inpatients in the pulmonology service, where nonpandemic patients were followed, decreased significantly. Again, during the onset and peak of the pandemic, non-COVID-19 patient admissions to the non-COVID-19 units of the emergency services and pulmonology consultation requests from the emergency service also decreased.

## MATERIAL AND METHODS

This study was planned in May 2020, when admissions related to the pandemic began to decrease, and approval was received from the Non-Interventional Clinical Research Ethics Committee of our hospital with the approval number 2020/11-22. In the period between March 16, 2020 and May 15, 2020 and the same period of the previous year (between March 16, 2019 and May 15, 2019), when this pandemic process started, was lived most intense, and began to decrease were compared; all cases who applied to the outpatient clinic, which provides tertiary care services, non-COVID cases who were hospitalized in the pulmonology in patient clinic, and patients who applied to the non-COVID emergency service and requested a pulmonology consultation from the emergency department were included in this study.

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Among the cases admitted to the pandemic period, clinical, laboratory, and radiological findings and cases that conformed to the probable COVID definition and cases diagnosed with COVID-19 by detecting COVID-19 positivity in the polymerase chain reaction (PCR) test were excluded from the study. The data of the cases were retrospectively accessed.

These were obtained by:

- Pulmonology clinic outpatients.
- Non-COVID cases hospitalized in Pulmonology inpatient clinic.
- Emergency admissions: The data related to patients and pulmonology consultations.

All data obtained with the relevant registration forms were entered into the SPSS 22.0 (IBM SPSS Corp.; Armonk, NY, USA) package program database and analyzed. In this study, the dependent variable, the patient’s referral period (pandemic–nonpandemic), and independent variables were discussed as demographic characteristics (age, gender, fate length of stay, and diagnosis). Data were summarized with mean, standard deviation, and percentage distribution. The Chi square test was used in the analysis of variables specified by counting, and the *t*-test was used in the analysis of variables specified by measurement. Statistical significance level was accepted as  $p < 0.05$ .

**RESULTS**

**Outpatients**

During the pandemic period, 732 cases applied to the pulmonology outpatient clinic. In the same period of the previous year, the number of was 4360. This shows that there is an 84% decrease in the number of cases during the pandemic period. During the pandemic period, 52.9% of the patients were male and 47.1% were female, whereas in the same period of the previous year, 49.0% of the patients were male and 51.0% were female ( $p = 0.052$ ). The mean age of the patients during the pandemic period was  $54.11 \pm 16.39$  years, whereas the mean age of the patients who applied in the same period of the previous year was  $59.49 \pm 15.98$  years ( $p < 0.001$ ).

During the pandemic period, the number of admissions of patients with chronic obstructive pulmonary disease

(COPD) and interstitial lung disease decreased, whereas the frequency of admissions of patients with asthma, pneumonia, and pulmonary thromboembolism increased ( $p < 0.001$ ).

**MAIN POINTS**

- During the COVID-19 pandemic, the outpatient and emergency admissions to the pulmonology department owing to non-COVID-19 pulmonary pathologies decreased significantly.
- The number of inpatients decreased, and there were important changes in the profile of the patients during the COVID-19 pandemic.
- During the pandemic period, in an outpatient setting, male and younger case admissions increased; admissions of patients with COPD and interstitial lung diseases decreased, whereas the frequency of admissions of patients with asthma, pneumonia, and pulmonary thromboembolism increased.

**Table 1.** Treatment approaches applied to inpatients treated

Treatment approach	Pandemic (2020)		Previous year (2019)		p
	n	%	n	%	
Oxygen treatment	68	67.3	165	93.2	<0.001
Metered dose inhaler	33	32.7	22	12.4	<0.001
Treatment with nebulizer	0	0.0	129	72.9	<0.001
Non-invasive mechanical ventilation	10	9.9	38	21.5	0.014

**Table 2.** Distribution of hospitalized patients to departments where they are admitted

Where was hospitalized?	Pandemic (2020)		Previous year (2019)	
	n	%	n	%
Emergency service	72	71.3	119	67.2
Outpatient clinic	3	3.0	33	18.6
Transferred from intensive care unit	11	10.9	21	11.9
Transferred from other clinics	15	14.9	4	2.3
Total	101	100.0	177	100.0

$p < 0.001$

**Table 3.** Symptoms of patients admitted to the emergency service

Symptom	Pandemic (2020)		Previous year (2019)		p
	n	%	n	%	
Sputum	42	28.8	203	34.6	0.183
Fever	16	11.0	104	11.7	0.048
Dyspnea	85	58.2	443	75.5	<0.001
Chest pain	41	28.1	62	10.6	<0.001
Impaired consciousness	23	15.8	67	11.4	0.153

**Table 4.** Respiratory treatment approaches in cases admitted to the emergency service

Treatment approach	Pandemic (2020)		Previous year (2019)		p
	n	%	n	%	
Oxygen treatment	72	49.3	444	75.6	<0.001
Nebulizer	32	21.9	261	44.5	<0.001
NIMV	16	11.0	95	16.2	0.115
IMV	15	10.3	44	7.5	0.269

NIMV: noninvasive mechanical ventilation; IMV: invasive mechanical ventilation

### Inpatients

During the pandemic period, 101 cases were treated as inpatients, whereas the number of inpatients in the previous year was 177. This shows that there was a 43% decrease in the number of inpatients compared with the previous year. The mean age, length of hospitalization, and male–female ratios were similar ( $p=0.295$ ,  $p=0.416$ , and  $p=0.990$ ).

Although asthma, COPD, and lung cancer patients were less hospitalized, pulmonary thromboembolism, pneumonia, and pleural effusion patients had to be hospitalized more ( $p<0.001$ ). Treatment approaches applied to inpatients are summarized in Table 1. Treatment with a nebulizer has decreased significantly, and the use of a metered dose inhaler has increased. This status did not change the clinical outcomes (“positive” such as discharge or “negative” such as transfer to extubation–intubation-intensive care) in patients of airway diseases such as asthma and COPD.

The distribution of the hospitalized patients to departments where they are admitted is shown in Table 2.

### Emergency service admissions

The number of non-COVID-19 cases to the emergency room was 146 during the pandemic period, where it was 587 during the previous year period, which shows that there is a 75% decrease in the number of cases during the pandemic period. Of the 146 patients who applied to the emergency service during the pandemic period, 82 (56.2%) were admitted to the non-COVID-19 emergency room, and 64 (43.8%) applied to the COVID-19 emergency room (COVID-19 excluded). The mean age of the patients during the pandemic period was  $66.3\pm 17.2$  years, whereas the mean age in the previous year period was  $69.5\pm 16.0$  years ( $p=0.035$ ). The gender was similar between the groups.

During the pandemic period, the number of admissions of patients with COPD, asthma, pneumonia, lung cancer, and interstitial lung disease decreased, whereas the frequency of admissions of patients with pneumonia and pulmonary thromboembolism increased ( $p=0.004$ ).

The clinical course or outcomes of the cases admitted to the emergency service and evaluated by the pulmonologist are similar between the two groups ( $p>0.05$ ). The symptoms on admission are shown in Table 3, and the treatment approaches are shown in Table 4.

During the pandemic period, a total of 979 non-COVID-19 cases were evaluated or followed in the pulmonology department. In the same period of the previous year, a total of 5333 cases were evaluated; a total of 81.6% decrease in non-COVID-19 cases was observed. Although the mean age of non-COVID-19 cases followed during the pandemic period was  $57.14\pm 17.35$  years, the mean age of the cases followed up in the same period of the previous year was  $60.93\pm 16.35$  years ( $p<0.001$ ).

### DISCUSSION

In a process in which health authorities and physicians focus on pandemics, how a nonpandemic patient has to live in this chaotic health presentation environment is rarely explored,

is neglected, is not discussed, and is ignored [1]. Non-COVID-19 diseases, other than those that are very urgent owing to the health system and the fear of transmission of the community, which focus on COVID-19 cases due to pandemic, have been pushed to the second plan [2–11].

Scientific studies focused on the COVID-19 pandemic during the period [12]. Compared with the application data from the same period of the previous year, we tried to reveal the characteristics and dimensions of the effects of non-COVID respiratory cases from pandemic. At a time when almost every segment focused on the pandemic, we wanted to look at the process differently and to consider a neglected patient group.

The first COVID-19 case in Turkey was declared on March 10, 2020 [13]. The first case was seen in our hospital on March 18, 2020, and the same day pandemic outpatient clinic and service was opened. The cases increased rapidly day by day.

In order to reduce the risk of transmitting the virus to patients or other co-workers, physicians postponed their regular annual or monthly examinations and checks and continued their communication with their patients through telemedicine admissions as much as possible. Patients, in contrast, avoided both the curfews and the “stay-at-home” strategy and hospital visits to reduce the risk of infection [14,15].

During the pandemic period, patients with non-COVID-19 lung diseases did not apply to emergency services or outpatient clinics unless they had to reduce regular or planned hospital admissions. The number of inpatients has decreased, and the inpatient profile has changed.

At the beginning of the pandemic, all the strength, beds, and intensive care of our hospital were channeled into COVID-19 cases.

When all of the cases are evaluated together, it is seen that the rate of male patients increased in the pandemic period, whereas the rate of application in female cases decreased. This may be related to the fact that female cases tend to stay at home with disease anxiety or male cases are more courageous. In addition, the average age of the patients who applied during the pandemic period was lower than those who applied in the nonpandemic period; older cases were more reluctant to go out or apply to the hospital owing to the curfew imposed on the elderly.

In an evaluation by Harvard University, although outpatient admissions recovered after a fall of about 60%, visits were still found to be approximately one-third lower than before the pandemic [15].

Patients with different causes of symptoms that do not apply to hospitals with fear during the pandemic period are likely to suffer from the process, and this has been expressed in different studies [16,17].

Although the rates of admission caused by COPD and interstitial lung disease have decreased in the pandemic, there has been a decrease in admission rates in cases of asthma, lung cancer, pneumonia, pleural fluid, and pulmonary thromboembolism. The fact that COPD and interstitial lung disease

cases are afraid to leave the house because they are susceptible to infection may be the explanation for the decrease in the application rates of this case group. Factors such as stress and intense disinfectant exposure may be associated with an increase in outpatient clinic admissions.

Patients hospitalized during the pandemic period were found to be similar to last year in terms of immobility, average length of stay, and average age. This suggests that the population hospitalized in the pandemic period indirectly needs maintenance or the clinical picture severities are similar to the last year.

The rates of hospitalization due to pleural fluid, such as malignant pleural fluid or increased embolism or pneumonia, may be associated with a complicated course. It was thought that the increase in the hospitalization rate owing to pulmonary thromboembolism may be associated with the increase in the tendency of immobility or undiagnosed COVID-19-related thrombosis because of forced curfews brought to the elderly population by the health authorities [18].

In the pandemic period, elective diagnostic bronchoscopic procedures have also come to a standstill, except in very emergency situations [19-21].

When we look at the patients hospitalized during the pandemic period, we see that patient admissions from the outpatient clinic decreased significantly, and patient admissions from the emergency service increased in parallel. Another remarkable point is that the transfer of patients from other clinics to the pulmonology clinic has increased, and almost all of these cases are composed of patients whose treatment has been completed in the pandemic services, and the COVID-19 PCR test has been negative and transferred to our service for follow-up and treatment. With patients treated as inpatients; it is observed that mask oxygenation, nebulizer therapy, and noninvasive mechanical ventilation admissions are significantly reduced in order to reduce the risk of transmission by aerosol generation. In contrast, mild asthma and COPD patients admitted to the hospitalized in both the emergency room and the service may have led to the preferences of applying less oxygen and less nebulization.

In the pandemic period, it is seen that the number of non-COVID-19 case admissions of male cases decreased and of female cases increased to the emergency room. These findings were similar to the studies from Italy and the USA [22, 23]. In addition, the mean age who applied to the emergency service was lower in the same period of the previous year. This may be related to the fact that the elderly refrain from coming to the emergency room, even if their condition is urgent, owing to the fear of being infected. In addition, it would be related to that some of the elderly patients are followed up in pandemic services because of the possibility of COVID infection.

When the symptoms of admission to the emergency room were examined during the pandemic period, it was seen that fever and dyspnea were less and chest pain was higher. Excessive chest pain may have been associated with increased gastroesophageal reflux, stress, and thrombotic events. The

cases with fever and dyspnea might be referred to the pandemic outpatient clinic and their rates were low; therefore, they were excluded from our study.

When the distribution of the diagnoses of the patients who applied to the emergency room during the pandemic period was examined; it is noteworthy that admissions for COPD, asthma, lung cancer and pneumonia decreased, and admissions for pulmonary thromboembolism, empyema, pleural effusion, and hemoptysis decreased. COPD and asthma cases may have applied less frequently because they are experienced and trained in attack treatment on their own. Pneumonia cases may have been decreased because they were excluded from our study and were referred to another unit (pandemic outpatient clinic) during the pandemic period and were managed there and evaluated as possible COVID-19 cases. The rate of hospitalization was slightly higher in pandemic, whereas hospitalization and emergency care were slightly lower.

Interestingly, in patients admitted to the emergency service during the pandemic period, the hospital mortality rate was 3.4%, whereas this rate was 9.7% in the same period of the previous year. Although it is difficult to explain the difference found statistically, it is seen that the majority of the patients who died in the hospital after the emergency service application in the previous year were terminal cancer patients and patients with advanced elderly and multiple medical problems. Therefore, it was thought that elderly patients with multiple medical problems and terminal cancer patients may have preferred to stay at home or die at home, rather than applying to the hospital. In addition, most of the patients admitted with a severe clinical picture that may be lost in the hospital may have been taken into service or intensive care for this pandemic period, considering that COVID-19 may be possible; therefore, they were not included in our study.

In cases presenting to the emergency service, oxygen therapy and nebulizer therapy were less frequently applied in the pandemic period, whereas noninvasive mechanical ventilation (NIMV) and invasive mechanical ventilation (IMV) application rates did not change. This shows that in the approach to critical and respiratory failure, emergency staff did not avoid NIMV or IMV admissions despite the risk of infection.

This study aimed to draw attention to a very important problem. However, our study has some limitations. Although we are a tertiary healthcare provider, we reflect the data of only one district or hospital; naturally, we may not be sampling the whole country. Some data may not be available because the data were accessed retrospectively. In addition, interviews or services with telemedicine methods during this period were not recorded and evaluated.

In conclusion, during the COVID-19 pandemic, the outpatient and emergency admissions to the pulmonology department owing to non-COVID-19 pulmonary pathologies decreased significantly, the number of inpatients decreased, and there were important changes in the profile of the patients. From now on, to be prepared for pandemic and similar extraordinary situations, to organize hospitals for the epidemic, to determine health institutions to which nonepidemic patients

can apply, to make necessary plans in order not to neglect the nonepidemic patients, and to develop digital health service methods, especially telemedicine, would be appropriate.

**Ethics Committee Approval:** This study was approved by Ethics committee of Dokuz Eylül University Non-interventional Ethical Committee. (Approval No:2020/13-28).

**Informed Consent:** Verbal informed consent was obtained from the patients who agreed to take part in the study.

**Peer-review:** Externally peer-reviewed.

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**Conflict of Interest:** The authors have no conflict of interest to declare.

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