Original Article

Epidemiological characteristics of patients with Covid-19 suspicion applying to a university hospital: The first eighty days in a pandemic

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Abstract

Aim: The first COVID-19 case in Turkey was detected on March 11, 2020 during the COVID-19 pandemic process. Epidemiological studies are needed to be prepared for other outbreaks and to be effective in the disease management process. Based on this reason, in this study it was aimed to determine the epidemiological characteristics of Covid 19 possible and definite cases who applied to the university hospital during the pandemic process.

Materials and Methods: This retrospective epidemiological study was carried out by analyzing the data of Covid 19 possible and definite cases, who applied to the university hospital operating as a pandemic hospital between 11 March / 01 June 2020. The data were summarized with descriptive statistics, tables and graphs.

Results: Of the 1,383 patients, who applied with the suspicion of COVID-19, 55.5% were men and 84.5% were adults. The median age of children is 4.0 (1.5-10) years old; adults were 52.0 (36.0-67.0) years old. The median time between the outset of complaints and the date of admission to the hospital was 2 (1-3) days. 87.4% of adults and 87.9% of children had symptoms that supported COVID-19 infection. Among cases 7.8% were health care workers. The median age of the fatal cases was 71 (64-82) years old, 79.5% were male, 77.7% were retired. The most common comorbide diseases in these cases were hypertension (28.2%) and malignancy (28.2%). The case fatality rate was found as 2.8% in all patients and 48.4% in patients hospitalized in the intensive care unit.

Conclusions: As a result, Covid-19 affects all age groups. Hypertension and malignancy were the most common additional diseases in fatal cases. The risk of illness is higher in healthcare workers who have direct contact with the patients. According to our observations, preventive measures, rapid diagnosis and supportive treatment are valuable.

Keywords: Covid-19; epidemiological characteristics; pandemic process; university hospital

INTRODUCTION

Following there port of pneumonia case cluster with unknown etiology on December 31, 2019 in Wuhan, Hubei Province of China,'The Chinese Center for Disease Control and Prevention' explained that the virus causing the epidemic on January 9, 2020 is a new coronavirus (2019-nCoV) and is classified in the genus Betacoronavirus. After this declaration the two cases reported from Thailand and Japan on 13-14 January 2020 found out to have visit history to the Wuhan Region while two cases detected in Vietnam and Germany only having contact history with people traveling to the region and human-to-human transmission feature of the virüs has been confirmed (1). After the rapidly spreading novel coronavirus was declared as 'public health emergency' by WHO on 20 January 2020, death was reported in a country other than China (Philippine) on February 2, 2020 (2).

The official name of the disease was announced by WHO on February 11, 2020 as "Coronavirus Disease-2019; the pandemic was declared and the virus that caused the disease was named SARS-CoV-2 (3-5). The first COVID-19 case in Turkey was detected on March 11, 2020 (6). The SARS-CoV-2 incubation period is thought to be within 14 days after exposure and most cases occuring approximately four to five days after exposure (7).

Pneumonia, the most common serious clinical presentation of COVID-19 infection, is characterized primarily by fever, cough, shortness of breath, and bilateral infiltrates on chest imaging. While dyspnea that develops within a few days after the onset of the initial symptoms is remarkable, there are no specific clinical features that can reliably distinguish COVID-19 from other respiratory viral infections. Most studies that describe the clinical features of COVID-19 have been conducted in hospitalized cases. However, other symptoms are also common, including upper respiratory tract infection symptoms, myalgia, diarrhea, and smell or taste disturbances. Studies have shown that gastrointestinal symptoms such as diarrhea-nausea, fatigue, dry cough, headache, sore throat, rhinorrhoea, conjunctivitis, maculopapular rash, urticaria and vesicular pustules, dermatological findings such as reddish-purple nodules similar to the appearance of pernio (chilblains) on the distal of the fingers were detected (8). Laboratory tests, CT imaging and some hematological parameters are primary tools for disease diagnosis (9-11).

Laboratory diagnosis of COVID-19 is based on detecting the RNA of the virus by using the real-time reverse-transcriptase (rRT)-PCR method. It can be detected as in-house with protocols targeting at least one of the SARSCoV-2 gene regions (N, RdRP, ORF1ab, Spike) (12). Although lower respiratory tract samples such as endotracheal aspirate, bronchoalveolar lavage are preferred for the COVID-19 PCR tests, nasopharyngeal and oropharyngeal swab samples can also be used due to convenience insample collection. Nasal swab samples alone are not sufficient for negative diagnosis, since it may cause low sensitivity in (rRT) -PCR studies performed from nasal swab samples alone, taking the

sample from two different regions is an application to increase sensitivity and should be evaluated together with oropharyngeal samples. Swab samples must be delivered to the laboratory in viral transport medium (VTB) (13). Many different laboratory test kits have been developed and used to test patient samples (14).

The best way to prevent disease is to avoid exposure to the virus (15). Recommendations to reduce exposure and contamination to SARS-CoV-2 are specified as mask, social distance, hand hygiene in standard (16). Some studies carried out in the world have indicated the epidemiological characteristics of COVID-19 (7, 17, 18). However, since determining the epidemiological characteristics of the disease will facilitate giving appropriate decisions and control the epidemic, epidemiological studies are also needed in Turkey. For this reason, this study, which is supposed to fulfill the lack of epidemiological information about Covid 19, was planned and aimed to determine the epidemiological characteristics of Covid 19 in possible and definite cases, who applied to the Meram Medical Faculty hospital, a 1300-bedded University hospital in Konya, during the pandemic process.

MATERIALS and METHODS

This retrospective observational study was conducted at Necmettin Erbakan University Meram Medical Faculty Hospital in Konya. Ethical approval was confirmed by Meram Medical Faculty Ethical Commitee (Confirmation no: 2020/2724, Date: 12th July, 2020). Patients who presented with complaints suggesting COVID 19 between March 11 and June 1, 2020 were included in the study. During the pandemic process, COVID-19 is monitored through the hospital automation system in possible or definite cases, like all other patients applied tothe Meram Medical Faculty Hospital. At the same time, a 'follow-up unit' was established by the chief physician of the hospital in order to make daily follow-ups in the hospital and to facilitate the execution of the process. The lists created in this unit are examined daily, the scan results, laboratory results and treatment processes related to Covid-19 are monitored and the necessary evaluations are made at the end of the day by the relevant clinics and the hospital chief physician. In addition, updates are made the evaluation processes based on the literature and the algorithms of the Ministry of Health science board. COVID-19 possible / definite case classifications of the patients were arranged according to the Ministry of Health guidelines valid at the time of admission to the hospital. The case definitions according to the Ministry of Health guidelines covering the period in which the study was conducted are as follows: Possible Case A: At least one of the signs and symptoms of fever or acute respiratory disease (cough and respiratory distress) and the clinical picture cannot be explained by another cause / disease and the presence of him or his relative's history of being abroad within 14 days before the onset of symptoms. Possible Case B: At least one of the signs and symptoms of fever or acute respiratory disease (cough and respiratory distress) and a history of close

contact with a confirmed COVID-19 case within 14 days prior to the onset of symptoms. Possible Case C: At least one of the signs and symptoms of fever and severe acute respiratory tract infection (cough and respiratory distress) and the need for hospitalization (severe acute respiratory infections) and another cause of the clinical picture / cannot be explained. Possible Case D: Cough or shortness of breath with sudden onset fever and no nasal discharge. Definite Case: Cases in which SARS-CoV-2 is detected by molecular methods among the cases meeting the possible case definition (6). Throat and nasal swabs were taken for the PCR tests in patients' admiting to the hospital, before April 12 and sent to another laboratory authorized by the Ministry of Health; the tests have been carried out in the Medical Microbiology Molecular Laboratory of our hospital after April 12. Therefore, in addition to the patients who applied to our hospital after this date, swab samples are also sent from other hospitals to our Medical Microbiology laboratory, as a result the number of performed PCR tests in our hospital's laboratory and the number of patients admitted to our hospital are different. The rT-PCR kit belonging to a single commercial company (Biospeedy, Bioeksen, Turkey) was used in all the centers assigned by the Ministry of Health all over the country, with in the period we shared their data. "The presence of SARS-CoV-2 RNA was evaluated by the reverse transcriptase–polymerase chain reaction (RT-PCR) analysis by using the Bio-Speedy COVID-19 RT-qPCR kit (Bioeksen, Turkey) run on Rotorgenereal-time PCR cycler (Qiagen, Germantown, Maryland, USA).

Statistical Analysis

This study was planned for epidemiological evaluation and, carried out by analyzing the hospital data between 11 March / 01 June 2020 in Necmettin Erbakan University Meram Medical Faculty Hospital. Charts were created with Microsoft Office Excel and Flourish Studio (19). We used SPSS 24.0 statistical software package (IBM SPSS, Chicago, IL, USA) version for all analyses.

RESULTS

Of the 1383 patients who applied with the suspicion of COVID-19, 55.5% were men and 84.5% were adults. The median age of children is 4.0 (1.5-10) years old, adults were 52.0 (36.0-67.0) years old (Table1).The median time between the outset of complaints and the date of admission to the hospital was 2 (1-3) days. Eight (0.6%) of the cases were pregnant and applied with the symptoms of COVID-19. 34.6% of adults and 11.2% of children had more than one comorbidity. While 22.3% of adults have hypertension, 19.3% have respiratory system diseases (asthma, COPD); 6.1% of the children had malignancy 87.4% of adults and 87.9% of children had symptoms that supported COVID-19 infection.

93.5% of adults and 98.1% of children were followed up by hospitalization (Table 2). The total number of cases, distribution of new cases, and the total number of patients in the inpatient services and intensive care units besides PCR test results of the cases who applied and followed up in our hospital, are given in Figure 1-4.

Table 1. Sociodemographic features	
Variables	n (%)
Age (n=1383)	
Adults	1169(84.5)
18 years old and younger	214(15.5)
Gender (n=1383)	
Man	768 (55.5)
Women	615 (44.5)
Gender	
Adult (n:1169)	
Man	655(56.0)
Women	514(44.0)
Child(n:214)	
Man	113(52.8)
Women	101(47.2)
Occupation	
Adult (n:1169)	
Housewife	427(36.6)
Retired	332(28.4)
Industry Worker, Tradesman	132(11.3)
Health employee	95(8.2)
Public Employee*	76(6.5)
Food Worker	32(2.7)
Livestock, Farmer	25(2.1)
Driver, Courier	25(2.1)
Student	25(2.1)

*Public Employee: Officer in a public institution, Police, Guardian, Teacher, Religious Officer

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Table 2. Characteristics of the cases	
Variables	n (%)
The clinic where the patient is hospitalized	
Adult (n:1169)	
COVID Service	1093(93.5)
Reanimation	59(5.0)
Emergency	17(1.5)
Child (n:214)	
Child Service	210(98.1)
Child Reanimation	4(1.9)
Presence of symptoms	
Adult (n:1169)	
No	147(12.6)
Yes	1022(87.4)

Child (n:214)	
No	26(12.1)
Yes	188(87.9)
Comorbidity	
Adult (n:1169)	
No	492(42.1)
Just one comorbidity	272(23.3)
Multiple comorbidity	405(34.6)
Child (n:214)	
No	154(72.0)
Just one comorbidity	36(16.8)
Multiple comorbidity	24(11.2)
Comorbide diseases	
Adult*	
Hypertension	261(22.3)
Respiratory Disease	226(19.3)
Cardiovascular Disease	196(16.7)
Diabetes	186(15.9)
Malignity	94(8.1)
Child*	
Malignity	13(6.1)
ImmuneDeficiency	9(4.2)
Epilepsy	6(2.8)
CP	5(2.4)
Down/West/Seckels	5(2.4)
Respiratory Disease	4(1.9)
*Some of the cases have more than one comorbidity	

Thorax CT reports were compatible with COVID-19 (COVID pneumonia) in 5.9% (n: 82) of COVID-19 suspected cases. Among PCR positive cases, 16.3% (n=63) had thorax CT images compatible with COVID-19 (Figure 5).

Of the cases, 40.8% were living in Meram district, one of the three central districts of Konya. Among cases, 97.4% were of domestic sourced and 7.8% were health care workers. Four point eight percent of inpatients were treated in intensive care units and 65.2% of those under intensive care were intubated. Home isolation was recommended in 24.5% of the cases, and COVID-19 was excluded in 5.5% (Table 3).
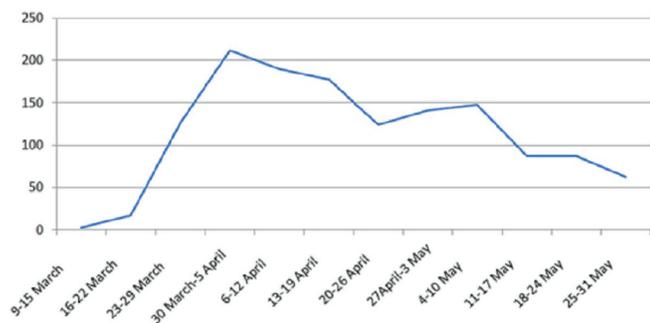

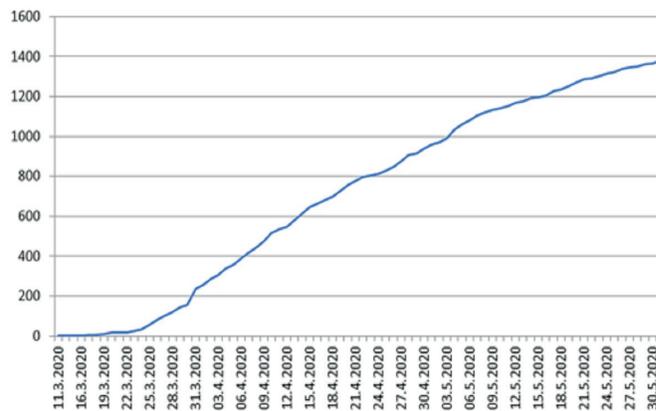**Figure 1.** Weekly distribution of new cases

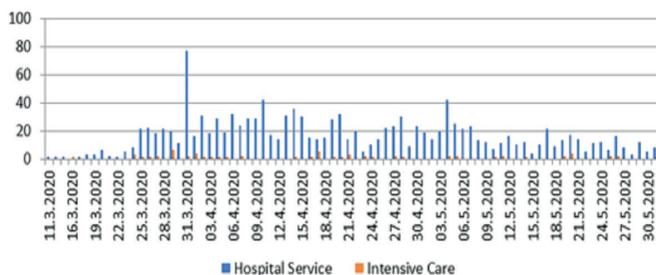**Figure 2.** Distribution of the total cases by time periods

Figure 3. Distribution of the total number of hospital services and intensive care patients by time
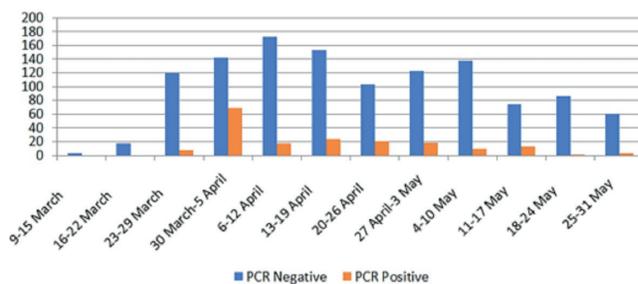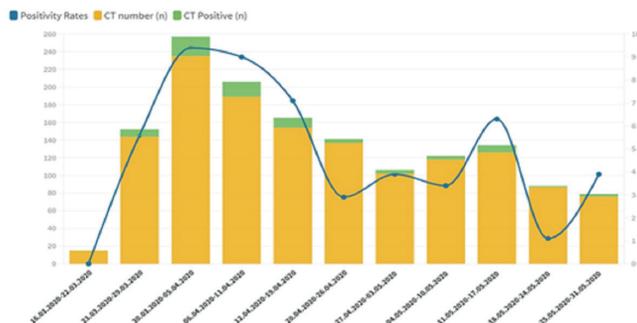

Figure 4. Weekly PCR results of cases followed in our hospital

The median age of the fatal cases (n = 39) was 71 (64-82) years old, 79.5% (n = 31) were male, 77.7% were retired. In these cases, hypertension (28.2%) and malignancy (28.2%), respiratory system diseases (23.1%) and cardiovascular system diseases (23.1%), diabetes (20.5%) comorbided respectively. All of them were followed in the hospital, and none of them had a travel history. Of these cases, 20.5% (n=8) had at least one positive PCR test result. Of the deceased cases, 82.1% (n = 32) died in there reanimation unit, 15.3% (n=6) in the COVID inpatient clinics, and 2.6% (n =1) in the emergency service unit.The case fatality rate was found as 2.8% in all patients and 48.4% in patients hospitalized in the intensive care unit. Among 529 oronasopharyngeal swab samples which were sent to the external laboratory for PCR testing before April 12, 2020, the positivity rate was 17.3% (n=92). Since the PCR tests on the swab samples from the patients who applied to our hospital and other hospitals were done in our hospital, 4474 PCR tests were performed in total; 8.6% (n=386) of the PCR tests were positive (Figure 6).

(Resource:https://public.flourish.studio/visualisation/3312652/)
Figure 5. Thorax CT results and COVID-19 positivity rates
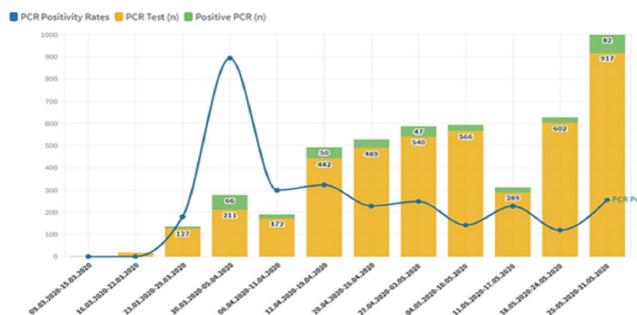
(Resource:https://public.flourish.studio/visualisation/3312130/)
Figure 6. PCR test results and COVID-19 positivity rates performed in the hospital microbiology laboratory

Table 3. Other characteristics of cases	
Variables	**n (%)**
Location of cases (n:1383)	
Meram	478(40.8)
Selcuklu	442(32.2)
Karatay	239(17.3)
Other Districts	89(6.4)
Different provinces	49(3.5)
Travel history (n:1383)	
Yes	65(4.7)
No	1318(95.3)
Contact history (n:1383)	
Unknown	333(24.1)
Yes	361(26.1)
No	689(49.8)
Contact person (n:361)	
Family	268(74.3)
Patient	20(5.5)
Relative	37(10.3)
Other (Friend, Neighbor etc.)	36(9.9)
Healthcare worker (n:1383)	
Yes	108(7.8)
No	1275(92.2)
Healthcare professionals (n:108)	
Doctor	45(41.7)
Nurse / Health officer	38(35.2)
Caregiver / Cleaning Staff	10(9.3)
Radiology Technician	7(6.5)
Secretary	5(4.6)
Dentist	2(1.8)
Laboratory assistant	1(0.9)
Hospitalized in intensive care unit (n:1383)	
Yes	66(4.8)
No	1317(95.2)
Intubation (n:66)	
Yes	43(65.2)
No	23(34.8)
Latest status of the patient (n:1383)	
Not Covid-19	76(5.5)
Home Isolation	339(24.5)
Hospitalized	929(67.3)
Exitus	39(2.6)

While there was no significant difference between the patient's final status and gender, the patient's final status showed a significant difference according to age (Table 4).

Table 4. The relationship between the patient's status and age and gender					
	Gender			**Age**	
	Male n(%)	**Female n(%)**	**p**	**Median (25th-75th)**	**p**
Latest status of the patient (n:1344)					
Home Isolation	181(53.4)	158(46.6)	.662	34(21-51)	<.00*
Not Covid-19	44(57.9)	32(42.1)		15(4-37.5)	
Hospitalized	519(55.9)	410(44.1)		53(33-67)	
*There is a significant difference between the pairwise comparisons of all groups					

DISCUSSION

The hospital where our study was conducted is a center that serves a large population and provides health services to huge number of patients from the surrounding provinces. For this reason, many cases were followed up during the pandemic process. During the study period; as of June 01, the total number of cases in the world is 6,057,853, the total number of deaths is 371,166 (20); the total number of cases is 164 769, the total number of deaths is 4 563 in Turkey (21) been reported.

The majority of the cases in this study, which aims to share information about the epidemiology and interventions conducted during the pandemic process, are adults. Numbers of the male patients are higher in both children and adults. Similar to our study, the median age of the cases was 63.0 (52.0-75.0) in a multi-centered study at the New York region in United States (22) and 53.0 (40.0-64.0) in a study conducted at 3 different hospitals in China (23). In another multi-centered study in the European region (24) the median age of pediatric cases was 5.0 (0.5-12.0) similar to our study and also the rate of men was found to be higher in these studies.

According to our data, adults and children mostly have complaints suggesting Covid-19 infection during hospital admissions. Similarly, in Wang (2020)'s study, there are symptoms suggesting Covid-19 infection in most of the hospital admissions (25).

More than half of adults and just over a quarter of children have additional illnesses. Hypertension and respiratory system diseases in adults, malignancy and immunodeficiency in children were the most comorbidity agent. While in the study conducted by Richardson (2020), hypertension was the most, obesity was the second and diabetes was third frequent comorbidity in adults (22); in the study conducted by Gotzinger (2020), malignancy, chronic lung diseases and comorbidities requiring immunosuppressive treatment were at the top of the list (24). In the study of Richardson (2020), the need for intensivecare was found to be high in both adults and children (22). More than half of the adults and just over a quarter of the children have additional illnesses. Hypertension and respiratory system diseases in adults, malignancy and immunodeficiency in children were the most seen comorbidities. While in the study conducted by Richardson (2020), hypertension was the most, obesity was the second and diabetes was third frequent comorbidity in adults (22); in the study conducted by Gotzinger (2020), malignancy, chronic lung diseases and comorbidities requiring immunosuppressive treatment were at the top of the list (24). In the study conducted by Cura Yayla (2020), most additional illnesses in children were neurological disease 1.8%, chronic pulmonary disease 1.8%, and endocrine disease 1.8%, malignancy 0.9% (26).

The majority of cases do not have a travel history. In the study by Popescu (2020) in which applications to a tertiary hospital in Romania were evaluated, almost half of the cases were imported and it was reported that these travels were from outside of China or Southeast Asia (27).

In our study, doctors were the most and the nurse / health officers were the second frequently affected patients among the healthcare professionals. Unlike our study, in Lai (2020)'s study, more than half of the health care Professional patients were nurses, while a quarter of them were doctors (28). Also, intubation was more common in those who are treated in the intensive care units at our hospital. In the study conducted by Richardson (2020), 85% of those who were treated in intensivecare units, needed intubation (22).

According to our data, all of the fatal cases were of advanced age; most of them were male and retired. In addition, most of these cases died in intensive care. In the study conducted by Richardson (2020), three-quarters of the dead cases were 65 years old and above, and more than half of them were treated in intensive care (22).

In our study, 16.3% of the cases with PCR positivity also had compatible with COVID-19 in thorax CT. Since the PCR test result becomes negative in the later stages of the disease, the PCR test positivity may be lower in patients whose CT imaging is compatible with COVID-19. In the study conducted by Bernheim (2020) at 4 different centers in China, 78% of 121 PCR positive cases had lesions compatible with COVID-19 on CT, and it was higher than our study (29).

After the PCR tests were initiated at our hospital laboratory, swab samples were delivered to our Medical Microbiology laboratory also from other health institutions. Therefore the number of PCR tests performed was higher than the number of cases in our hospital. 13.4% of the cases admitted to the hospital have positive PCR, therate of positivity in the PCR results studied in the Medical Microbiology laboratory of our hospital varies between 4.1% and 11.3%. This situation may be affected by many factors such as the symptoms and the decision of the doctor during the examination, the way the swab is taken, and the reliability of the test. One of the reasons may be the dilution effect of high negativity obtained from PCR results performed for screening purposes (soldiers, prisoners, athletes) at certain periods.

Images compatible with COVID-19 were reported in 5.9% of thorax CTs taken in suspicious cases. In the study of Fang (2020), 51 suspected cases admitted to a hospital and 98% of all cases had CT lesions compatible with COVID-19 while, 71% of all cases had PCR positivity (9).

While in the period until 01 June, the case fatality rate in Turkey was 2.7%, similar to the results of our hospital (2.8%); in the same period, this rate was 5.4% in China, 14.3% in Italy, 5.9% in America, 5.7% in Brazil, 12.1% in Spain, 4,6% in Germany, 1.1% in Russia, 14% in England and 5.1% in Iran (30).

CONCLUSION

As a result, Covid-19 affects all age groups. While hypertension is the most common additional disease in adults, hypertension and malignancy were more frequent in fatal cases. The risk of illness is higher in healthcare workers who have direct contact with the patients. Most of the patients were followed in the service. 'Controlled social life' called 'new normalization period'was due to begin in Turkey from June 1, 2020, so epidemiological studies should also be carried out after this date. Sharing experiences will contribute to the process and support being prepared for different possible pandemic processes.

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