



Psychiatric emergency visit trends and characteristics in a mental health epicenter in Istanbul during COVID-19 lockdown

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Abstract

Background We aimed to explore the impact of the preventive measures and partial lockdown to the psychiatric emergency department (PED) visits during COVID-19 pandemic in a mental health epicenter in Istanbul.

Methods A total of 5839 patients admitted to PED during the lockdown period (LP) between March 30 and May 31, 2020, were enrolled in this retrospective cohort study. Data of these patients were compared to those of patients in the same period in 2019 between April 1 and June 2, 2019 (non-LP). We also investigated the monthly number of PED visits and hospitalizations between March 1 and December 31, 2020, and compared it to the same period in 2019.

Results The volume of PED visits and hospitalizations in LP decreased by 12% and 41.6%, respectively. The rates of patients presenting anxiety and depressive disorders and bipolar disorders were found to significantly increase in LP than non-LP ($p < 0.001$; $p < 0.001$; $p < 0.01$, respectively). Depressive disorders, prior history of mental illness, and aggressive behavior were found to predict frequent PED visits while decrease in age and male gender found to predict hospitalizations. Regarding suicide attempt, younger patients and those with new-onset mental disorders were found to be at high risk in LP. Patients diagnosed with COVID-19 in PED visits were mostly with psychotic and bipolar disorders.

Conclusion Policy-makers should focus on studies on mental health services to reorganize and enhance such services, which are crucial to prevent and manage adverse mental health consequences of the pandemic and congestion in PEDs.

Keywords COVID-19 · Psychiatric emergency department · Lockdown · Suicide · Mental health services

Introduction

The COVID-19 pandemic has rapidly spread worldwide since the end of January 2020 and has been declared as a Public Health Emergency of International Concern by the World Health Organization [1]. Through the potentially serious health outcomes, many countries have adopted and continue to preventive measures for controlling COVID-19.

The pandemic has impacted medical, economic, and social conditions worldwide and has resulted in enormous stress, negative emotions, and a sense of uncertainty. It has affected people with pre-existing mental health conditions by worsening their psychiatric conditions, causing relapse, and leading to new-onset mental health problems such as depression, anxiety, post-traumatic stress, drug and alcohol use and suicidal behavior [2–4]. Therefore, understanding how the population is utilizing and accessing mental healthcare and emergency services during the pandemic is crucial for setting out immediate priorities and longer-term

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strategies for mental health care, thus mitigating adverse mental health consequences for vulnerable groups as well as the general population.

When examining the pandemic period in Turkey, the first COVID-19 case in Turkey was reported on 11th March 2020, in Istanbul (Ministry of Health of the Turkish Republic, 2020) [5], following which the government of the Turkish Republic imposed preventive measures by 12th March and the lockdown between 4th April and May 31st, 2020. As of 1st February 2021, Turkey reported 2,485,182 confirmed cases and 26,117 deaths [6]. Turkey is now under the second lockdown since 21st November 2020, due to the second wave of the pandemic (Ministry of Internal Affairs of the Turkish Republic, 2020) [7]. On March 21st, 2020, the Turkish Ministry of Health obligated almost all tertiary and secondary hospitals to serve for the pandemic, which meant a reorganization of inpatient and outpatient services according to the new settings. Regarding this decision, many psychiatric wards were structurally modified for admitting patients with COVID-19 and their staff was diverted to other clinical wards. Hence, the burden of managing acute psychiatric patients had to be handled by the remaining psychiatric EDs and units that were mostly in mental health hospitals.

Though the hospitals served with restricted capacities in the health care services during the pandemic, the PEDs still worked at full capacity due to the reported increase in mental health problems. This led to the immediate need to organize and prepare the PEDs for possible congestions. To date, there are still a limited number of studies on PED visits during the pandemic, including those with COVID-19 status of the patients. This study aimed to investigate PED utilization during the pandemic and assess the impact of preventive measures and partial lockdown in Turkey. To the best of our knowledge, this is the first study from Turkey to explore the sociodemographic and clinical characteristics of patients admitted to the PED, and the predictors of frequent PED visit, suicide attempt and hospitalization in a mental health epicenter under the preventive measures and partial lockdown during the COVID-19 pandemic.

Methods

Study design and sample

This was a descriptive cohort study with a retrospective design. The study was conducted in the PED of Erenköy Mental and Nervous Diseases Training and Research Hospital (ERSHEAH), which is a mental health epicenter in Istanbul and serves a population of around 5.3 million and receives around 20,000 PED visits per year. Patients present in the PED from the community either came voluntarily or compulsory via emergency medical services or law

enforcement. ERSHEAH has continued to serve as a mental health epicenter reorganized with preventive measures such as 50% reduced outpatient and inpatient unit capacity; increased implementation of telepsychiatry, restricted hospitalization criteria (suicidality, self-harm behavior, and aggressive behavior); establishment of a short stay unit in the PED for COVID-19 patients and a COVID-19-specific acute psychiatric ward; restricted psychotherapy, rehabilitation, and community mental health center services; delay of elective procedures; and flexible working arrangements.

The total number of patients admitted to the PED and for hospitalization in ERSHEAH during the 10-month period of the pandemic between March 1st and December 31st, 2020, was investigated and also compared with the same period of 2019 to provide trends of the PED visits and hospitalizations in COVID-19. The sociodemographic and clinical characteristics of the patients admitted to the PED during the first lockdown period, between the beginning of the week of 30th March 2020 and 31st May 2020 were also investigated in detail and compared with the same period of 2019. Data acquisition from the electronic medical records of the patients was performed between January 4th and 18th, 2021, and no subjects were excluded from the study, except for patients under 18 years of age. Data screening and extraction were made in terms of sociodemographic characteristics, psychiatric diagnosis, frequency of visits (two and more visits during 2-month period were determined as frequent visit), result of the PED visit, suicide attempt and aggressive behavior at the PED visit, referral to another hospital due to medical conditions, and the presence of confirmed COVID-19 diagnosis.

Diagnoses were classified into main diagnosis groups using the International Classification of Diseases 10 (ICD-10). Psychotic disorders include the diagnoses listed under codes F20-29 in ICD-10; depressive disorders include codes F32 and F33; and anxiety disorders include the diagnosis F40 and F41. The diagnosis of bipolar disorders includes patients with hypomanic, manic, and depressive episodes. The diagnosis of “bipolar disorder in remission” includes bipolar patients who presented with psychological symptoms (i.e., sleep problems) but were not diagnosed with a new episode of bipolar disorder following the PED visit, bipolar disorder patients who needed an immediate prescription to take their medications, or patients whose drug levels (i.e., lithium, valproic acid) needed to be monitored except for routine controls.

Time periods

The monthly number of patients admitted to the PED and for hospitalization between March 1st and 31st December 2020 was investigated and compared with the same period in 2019. The data of the patients admitted to the PED from the

week beginning on March 30th until 31st May 2020 which was the partial lockdown period (LP) in the first the wave of the pandemic were investigated in detail and also compared to the same period in 2019 between the week beginning in April 1st until June 2nd, 2019 (non-LP). The reasons to compare the data with the same period of the past year could be explained as follows: psychiatric disorders may have seasonal features [8, 9], some diseases (i.e., seasonal flu, allergic rhinitis) that mimic COVID-19 have seasonal features, and the number of visits may vary in certain periods according to social conditions. (i.e., semester and summer vacations). We supposed that 2019 was a typical year and an adequate comparator as no large-scale social or politic events, or disasters took place in Istanbul or Turkey that could influence psychiatric emergency service visits.

Statistical analysis

Data analysis was done via the www.e-picos.com New York software and MedCalc statistical package program. The Kolmogorov–Smirnov analysis was used to assess whether continuous variables displayed a normal distribution. Continuous variables were reported as means and standard deviations, while categorical variables were reported as percentages. Student's *t* test was used to compare the means of independent groups. Pearson's Chi-square and Fisher's exact test statistics were used to evaluate the relationship between sociodemographic and clinical categorical variables. Logistic regression analysis was performed for variables considered to be related to suicide attempt, aggressive behavior, frequent PED visits, and hospitalization, and the data were presented with odds ratio (OR) and 95% confidence interval (95% CI). The level of statistical significance was set at $p < 0.05$.

Results

Comparison of PED visits and hospitalizations during 10-month period in 2020 and 2019

The total number of PED visits between 1st March and 31st December in 2020 and 2019 were 16,136 and 18,342, respectively, and the decline in the PED visits was found to be 12%. When most frequent diagnoses regarding the PED visits were investigated; psychosis-related visits were decreased from 3677 (20% of total visits) to 2844 (17.6% of total visits). Anxiety disorders related visits decreased from 3522 (19.2% of total visits) to 3262 (20.2% of total visits). Bipolar disorder-related visits were decreased from 2752 (15% of total visits) 2255 (14% of total visits). Depressive disorder-related visits were decreased from 2324 (12.7% of total visits) to 1947 (12.1% of total visits). Alcohol and

substance use disorders (ASUDs) were increased from 1085 (5.9% of total visits) to 1282 (7.9% of total visits). Unspecified mood disorders were increased from 278 (1.5% of total visits) to 331 (2.1% of total visits). Obsessive compulsive disorder (OCD)-related visits were increased from 254 (1.4% of total visits) to 294 (1.8% of total visits). Considering the change in the rate of the diagnoses regarding total number of PED visits; psychosis, bipolar disorders, depressive disorders were decreased by $-2.4%$, $-1%$ and $-0.6%$, respectively, while anxiety disorders, ASUDs, unspecified mood disorders and OCD were increased by 1%, 2%, 0.6% and 0.4%, respectively. The total number of hospitalizations was found in 2020 and 2019 as being 1434 and 2413, respectively, with a 41.6% decline. The data of the total number of PED visits and hospitalizations in 2020 and 2019 are provided in Fig. 1.

Comparison of PED visits and hospitalizations in detail during 2-month period in LP and non-LP

Regarding the investigation and comparison of the lockdown period in detail, the total number of patients admitted to PED on LP and non-LP was 2638 and 3201, and the total number of PED visits on LP and non-LP was 3562 and 4182, respectively. The decline in patients admitted to the PED in the LP group compared to the non-LP group was 16.6% The mean age of the patients admitted to the PED was higher in the LP group than in the non-LP group ($p < 0.05$).

While psychotic disorders were the most common diagnoses at non-LP ($N = 660$, 20.6%), patients with anxiety disorders were the most represented at LP ($N = 676$, 25.6%). A statistically significant increase was observed in visit rates at LP in patients with the diagnosis of bipolar disorder (with manic, hypomanic, or depressive episodes) ($p < 0.01$), depressive disorders ($p < 0.001$), anxiety disorders ($p < 0.001$), OCD ($p < 0.001$), and attention-deficit hyperactivity disorder (ADHD) ($p < 0.001$). A significant decrease was found in the visit rates of patients with bipolar disorder in remission ($p < 0.001$), ASUDs ($p < 0.05$), adjustment disorders ($p < 0.01$), dementia ($p < 0.05$), other psychiatric diagnoses ($p < 0.05$), and no psychiatric diagnoses ($p < 0.001$).

In the LP group, the rate of discharge from the PED significantly increased while hospitalization rate decreased ($p < 0.001$). Moreover, frequent PED visits significantly increased ($p < 0.05$), and the number of patients admitted from the nursery decreased ($p < 0.01$). Rates of suicide attempt and aggressive behavior were also significantly lower in the LP group than in the non-LP group ($p < 0.001$). The data regarding the comparison of the sociodemographic and clinical characteristics of the patients admitted to the PED in the LP and non-LP are provided in Table 1.

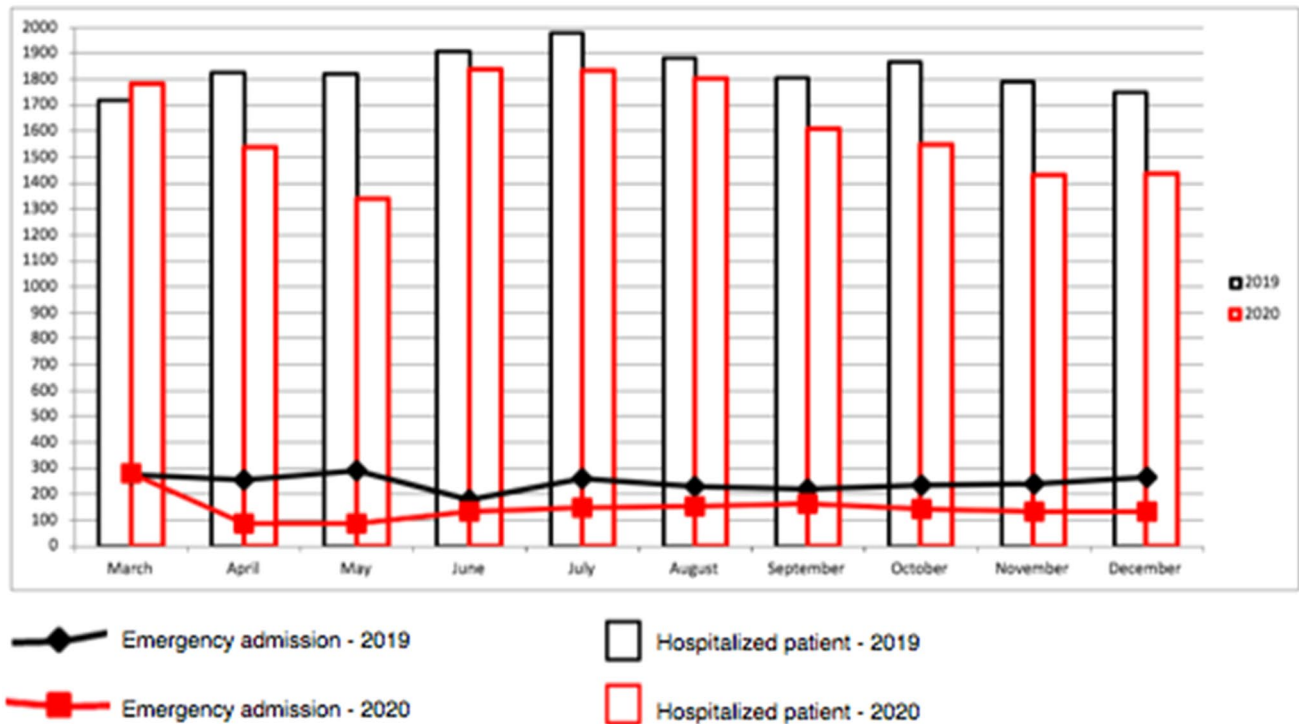


Fig. 1 Number of PED visits and hospitalizations per month from March to December 2019 and 2020. PED psychiatric emergency department

Factors related to suicide attempt, frequent PED visit, aggressive behavior and hospitalization during LP

Factors related to suicide attempt, frequent PED visit, aggressive behavior, and hospitalizations in the LP were assessed via logistic regression analysis. Factors related to suicide attempt were younger age ($p < 0.05$; OR 0.97; 95% CI 0.96–0.98) and new-onset mental illness ($p < 0.05$; OR 2.34; 95% CI 1.55–3.54). Factors related to frequent PED visits were depressive disorders ($p < 0.05$; OR 1.26; 95% CI 1.07–1.49), prior history of mental illness ($p < 0.05$; OR 1.86; 95% CI 1.42–2.44), and aggressive behavior ($p < 0.05$; OR 1.38; 95% CI 1.06–1.79). Factors related to aggressive behavior were younger age ($p < 0.05$; OR 0.98; 95% CI 0.97–0.99), male gender ($p < 0.05$; OR 2.06; 95% CI 1.62–2.61), and frequent PED visits ($p < 0.05$; OR 1.38; 95% CI 1.06–1.79). Factors related to hospitalization were younger age ($p < 0.05$; OR 0.98; 95% CI 0.97–0.99), male gender ($p < 0.05$; OR 1.68; 95% CI 1.42–2), suicide attempt ($p < 0.05$; OR 15.38; 95% CI 11.09–21.32) and aggressive behavior ($p < 0.05$; OR 1.71; 95% CI 1.24–2.37). Data regarding factors related to suicide attempt, frequent PED visits, aggressive behavior, and hospitalizations are shown in Table 2.

Characteristics of the patients diagnosed with COVID-19 in PED visits during LP

In the LP, 25 (0.9%) of the patients admitted to the PED were diagnosed with COVID-19. Psychiatric diagnoses of these patients were psychotic disorder ($n = 13$, 52%), bipolar disorder ($n = 5$, 18%), depressive disorder ($n = 3$, 12%), substance use disorder ($n = 3$, 12%), and one patient had no psychiatric diagnosis. Patients with COVID-19 had high rates of frequent PED visits (32%), hospitalization (36%), and new-onset mental illness (24%), but had no suicide attempt. Sociodemographic and clinical characteristics of the patients diagnosed with COVID-19 in PED visit are provided in Table 3.

Discussion

The main findings of our study are that (1) overall, there was a decline of 12% in PED visits during the 10-month pandemic period and a decline of 16.8% during the lockdown compared to the same periods of 2019, (2) there was a significant increase in frequent PED visits, (3) the rates of patients admitted to the PED with anxiety, depressive and bipolar disorders, OCD and ADHD increased while

Table 1 Sociodemographic and clinical characteristics, and comparison of LP and non-LP groups

<i>n</i> = 5839	Total	LP <i>n</i> = 2638 <i>n</i> (%)/ <i>x</i> ± SD	Pre-LP <i>n</i> = 3201 <i>n</i> (%)/ <i>x</i> ± SD	<i>p</i>
Gender				
Female	2877 (49.3)	1275 (48.3)	1602 (50)	0.19 ^a
Male	2962 (50.7)	1363 (51.7)	1599 (50)	
Age	40.7 ± 15	41.2 ± 15	40.3 ± 15.1	0.03^b
Length of hospitalization (days)	22.4 ± 13.2	22.6 ± 12.5	22.3 ± 13.4	0.82 ^c
Number of PED visits				
1	4649 (79.6)	2070 (78.5)	2579 (80.6)	0.04^a
Frequent (2 and more visits during 2-month period)	1190 (20.4)	568 (21.5)	622 (19.4)	
Habitation				
Alone/Family	5791 (99.2)	2627 (99.6)	3164 (99)	0.007^a
Homeless/Nursery	44 (0.8)	11 (0.4)	33 (1)	
Oneself/family	5310 (90.9)	2380 (90.2)	2930 (91.5)	
PED visit routes				
Ambulance	437 (7.5)	238 (9)	199 (6.2)	< 0.001^a
Forensic (via law enforcement)	92 (1.6)	20 (0.8)	72 (2.2)	
History of mental illness				
New-onset mental illness	509 (8.7)	230 (8.7)	279 (8.7)	0.99 ^a
Prior history of mental illness	5330 (91.3)	2408 (91.3)	2922 (91.3)	
Suicide attempts at PED visits				
No	5676 (97.2)	2590 (98.2)	3086 (96.4)	< 0.001^a
Yes	163 (2.8)	48 (1.8)	115 (3.6)	
Aggressive behavior at PED visits				
No	5520 (94.5)	2527 (95.8)	2993 (93.5)	< 0.001^a
Yes	319 (5.5)	111 (4.2)	208 (6.5)	
Result of the PED visits				
Discharge	5212 (89.2)	2439 (92.5)	2773 (86.6)	< 0.001^a
Hospitalization	581 (10)	180 (6.8)	401 (12.5)	
Referral to other hospital	46 (0.8)	19 (0.7)	27 (0.9)	
Diagnoses				
Psychotic disorders	1155 (19.8)	495 (18.8)	660 (20.6)	0.08 ^a
Anxiety disorders	1291 (22.1)	676 (25.6)	615 (19.2)	< 0.001^a
Depressive disorders	924 (15.8)	471 (17.9)	453 (14.2)	< 0.001^a
Bipolar disorders (hypomanic, manic, depressive episode)	211 (3.6)	116 (4.4)	95 (3)	0.004^a
Bipolar disorder in Remission	801 (13.7)	267 (10.1)	534 (16.7)	< 0.001^a
Alcohol and substance use disorders	324 (5.5)	127 (4.8)	197 (6.2)	0.03^a
Adjustment disorders	171 (2.9)	57 (2.2)	114 (3.6)	0.002^a
Mental retardation	101 (1.7 ^a)	46 (1.7)	55 (1.7)	0.94 ^a
Neurodevelopmental disorders	21 (0.4)	9 (0.3)	12 (0.4)	0.83 ^a
OCD	126 (2.2)	79 (3)	47 (1.5)	< 0.001^a
Dementia	53 (0.9)	17 (0.6)	36 (1.1)	0.054 ^a
Unspecified mood disorders	78 (1.3)	41 (1.6)	36 (1.1)	0.15 ^a
Personality disorders	56 (1)	26 (1)	30 (0.9)	0.85 ^a
Somatic symptom and related disorders	113 (1.9)	42 (1.6)	71 (2.2)	0.08 ^a
ADHD	57 (1)	47 (1.8)	10 (0.3)	< 0.001^a
Other psychiatric diagnoses	123 (2.1)	43 (1.6)	80 (2.5)	0.02^a
No psychiatric diagnose	234 (4)	79 (3)	155 (4.8)	< 0.001^a

ADHD attention-deficit hyperactivity disorder, *on-LP* lockdown period, *OCD* obsessive-compulsive disorder, *PED* psychiatric emergency department, *Pre-LP* pre-lockdown period, *p* value is significant at < 0.05 (^aChi-square test/^bStudent's *t* test)

Bold print indicates statistical significance at 0.05 level

Table 2 Factors related with frequent visit, suicide attempt, aggressive behavior and hospitalization in LP group

Variable	Visit	Odds ratio	Lower (%95 CI)	Upper (%95 CI)
Frequent PED visits	Depressive disorders	1.26	1.07	1.49
	Psychotic disorders	0.93	0.79	1.02
	Anxiety disorders	0.94	0.81	1.1
	Age	0.97	0.98	1.01
	Gender	1.02	0.9	1.16
	Prior history of mental illness	1.86	1.42	2.44
	Hospitalization	1.13	0.92	1.39
	Suicide attempt	1.19	0.83	1.73
	Aggressive behavior	1.38	1.06	1.79
	Suicide attempt	Depressive disorders	1.16	0.77
Psychotic disorders		1.03	0.7	1.52
Anxiety disorders		0.82	0.55	1.22
Age		0.97	0.96	0.98
Gender		1.23	0.9	1.69
New-onset mental illness		2.34	1.55	3.54
Aggressive behavior		0.77	0.36	1.66
Aggressive behavior		Depressive disorders	0.96	0.7
	Psychotic disorders	1.13	0.86	1.48
	Anxiety disorders	1.21	0.93	1.57
	Age	0.98	0.97	0.99
	Gender	2.06	1.62	2.61
	Prior history of mental illness	1.08	0.72	1.63
	Frequent PED visit	1.38	1.06	1.79
	Suicide attempt	0.77	0.36	1.66
Hospitalizations	Depressive disorders	0.81	0.63	1.03
	Psychotic disorders	0.98	0.8	1.22
	Anxiety disorders	1.02	0.83	1.25
	Age	0.98	0.97	0.99
	Gender	1.68	1.42	2
	Prior history of mental illness	0.95	0.7	1.23
	Hospitalizations	1.13	0.92	1.39
	Suicide attempt	15.38	11.09	21.32
	Aggressive behavior	1.71	1.24	2.37

LP lockdown period, PED psychiatric emergency department, SD standard deviation, *Frequent PED Visit: two and more visit during on-LP

Bold print indicates statistical significance at 0.05 level

rates of patients with psychotic disorders remained at similar levels, and (4) patients presenting in the PED were more likely to be diagnosed with anxiety, mood disorders, and psychotic disorders, and less likely to present with suicide attempts and aggressive behavior (5) depressive disorders, prior history of mental illness, and aggressive behavior were found to predict frequent PED visits while decrease in age and male gender found to predict hospitalization. Regarding suicide attempt, younger patients and those with new-onset mental patients were found to be at high risk in the LP.

Comparison of PED Visits and hospitalizations during 10-month period in 2020 and 2019

An increase in the PED visits might be expected during the pandemic as pandemics are well known to lead to psychological distress, which may cause exacerbation or relapse in people with pre-existing mental illness as well as new-onset illness. Some authors suggested that there will be a large backlog of patients requiring mental health care due to the pandemic which may even result in a “tsunami” effect on mental health services after lockdown

Table 3 Sociodemographic and clinical characteristics of the patients diagnosed with COVID-19 in PED visit

<i>n</i> = 25	<i>N</i> (%) / (<i>x</i> ± <i>SD</i>)
Age	40.48 ± 11.91
Gender	
Female	6 (%24)
Male	19 (%76)
Diagnoses	
Psychotic disorders	13 (52%)
Bipolar disorder	5 (20%)
Depressive disorder	3 (12%)
Substance use disorder	3 (12%)
No psychiatric diagnose	1 (4%)
History of mental illness	
New-onset mental illness	6 (24%)
Prior history of mental illness	19 (76%)
Frequent PED visits	
No	17 (68%)
Yes	8 (32%)
Aggressive behavior	
No	17 (68%)
Yes	8 (32%)
Referral to general hospital	
No	20 (80%)
Yes	5 (20%)
Hospitalizations	
No	9 (36%)
Yes	16 (64%)

PED psychiatric emergency department, *SD* standard deviation

[10, 11]. However, health behaviors which reflect an interplay between individual and contextual factors are complex and sometimes unpredictable [12], and clinical data are required to determine the actual clinical impact of the pandemic on the psychiatric emergency services. Contrary to these expectations, suggesting an increase in help-seeking behavior for mental health; emergency department utilization in psychiatry and other disciplines have found to be decreased in many countries despite emergency departments have been operating unrestrictedly [13–20]. In our study, the volume and rate of hospitalizations following PED visits in both the 10-month period in 2020 found to decreased by 12% compared to 2019. However, there are also contradictory reports on the volume of psychiatric hospitalizations and hospitalization rates during the pandemic, as well as in periods of previous large-scale disasters [14, 21]. This probably resulted from the governments' policy and local preventive measures taken by hospitals in which the study was conducted. In ERSHEAH, the hospitalization criteria were restricted to severe psychiatric conditions such as agitation, suicidal

and homicidal ideation/attempts, which mostly required involuntarily hospitalization. This was probably one of the main reasons for the decline in hospitalization volume and rates, along with the impact of the pandemic which caused avoidance of hospitals due to the fear of contamination and more common implications of telepsychiatry services. Our results indicated prominent decreases in PED visits following the two lockdown implementations (first was from the end of March 2020 to June 1st, 2020, and the second started at the end of October 2020) by the Government of the Turkish Republic, which resulted from an alarmingly increasing number of new COVID-19 cases. Therefore, despite a sharp increase after the ease of preventive measures at the end of the first lockdown in June 2020, the monthly amount of PED visits from April to December 2020 during the pandemic period remained lower than 2019, as reported in previous studies.

Possible explanations for the decline in PED visits might be also as follows: individuals had to balance their need for emergency mental healthcare against the risk of infection in healthcare settings, fear of contracting SARS-CoV-2 and also infecting their relatives following hospital visits, decreased population mobility due to the preventive measures of social distancing and lockdown, failure by patients with serious acute or chronic conditions to seek care including conditions unrelated to COVID-19, avoidance of PED visits for non-emergency conditions, more common use of telemedicine and home care services, and compliance with the restrictions and health recommendations that implied admitting to the healthcare facilities only when strictly necessary. Additionally, due to the higher vulnerability of patients with severe mental illness (SMI) [22, 23], despite the cancelation of daily activities in the six community health centers affiliated with ERSHEAH, staff of the centers have continued to closely follow up patients via telemedicine, and have also assessed patients in person for necessary cases.

When the change in the rates of diagnoses regarding the total number of PED visits were compared between 2020 and 2019; the increase in the rate of ASUDs was remarkable in 2020. Alcohol and substances are being used during the pandemic as a way to cope with psychological distress concerning COVID-19 [24]. Recent studies reported that COVID-19 pandemic has had considerable impact that increased alcohol and substance use and related emergencies, and alcohol and drug users have difficulties in treatment access and adherence which can aggravate the ASUDs [25–28]. Our result showing the increase in the volume and the rate of ASUD-related PED visits within the 10-month period in 2020 was probably resulted from the increased use of the alcohol and drugs in general population in spite of the decreased capacity of the ASUD outpatient units as consistent with the literature.

Comparison of PED visits and hospitalizations in detail during 2-month period in LP and non-LP

PED visit rates of patients presenting with anxiety and depressive and psychotic disorders comprised the majority of the LP group. The rates of anxiety and depressive and bipolar disorders were higher in the LP group than in the non-LP group, while the rate of psychotic disorders decreased slightly but did not differ significantly. It is well documented that the consequences of the COVID-19 pandemic related medical, social and financial worries could result in new-onset, relapsed or exacerbated mental health conditions, with anxiety and depressive symptoms being reported as among the most common psychological consequences of the pandemic [3, 4, 29–33]. However, there are contradictory reports in the literature on the rates of PED visits of patients with anxiety and depressive disorders [13, 14, 34]. For instance, Gómez-Ramiro et al. (2020) and Capuzzi et al. (2020) reported lower visit rates of patients with anxiety disorders and depressive disorders, respectively. The authors suggested that the implementation of telemedicine, and the fear of infection could decrease the admission of patients with mild-to-moderate illnesses. However, these factors are not specific for anxiety and depressive disorders and are expected to decrease visit rates for all diagnoses. Studies have reported no significant change regarding the visit rates bipolar disorder patients during the pandemic [35, 36]. Possible explanations of these contradictory findings on anxiety, depression, and bipolar disorders are the relatively small sample size and different methodology of these studies, as well as cultural differences of the countries that affect psychological reactions of the populations.

Our results also revealed increased rates of patients presenting with OCD and ADHD in the LP. Stressful live events may worsen the course of OCD or trigger new-onset symptoms in predisposed individuals, as shown during the COVID-19 pandemic. Our findings are consistent with the literature that indicates worsening in OCD symptoms during the pandemic [37–40]. There is still limited data on the course of ADHD in adult patients during the pandemic. We suggest that the increase in the rate of patients presenting with ADHD in the LP could be associated with an increase in the rate of anxiety disorders, which were previously reported to worsen ADHD symptoms [41, 42].

Rates of patients who presented to the PED with alcohol and substance disorders, bipolar disorders in remission, adjustment disorders, dementia, other psychiatric diagnoses, and no psychiatric diagnoses significantly decreased in the LP group, as compared to the Pre-LP group. Regarding the alcohol and substance disorders there are contradictory reports from different clinical setting and population based studies [13, 14, 24, 43, 44]. These contradictory results could probably be associated with the policy of the governments

regarding the restriction in alcohol and cannabis sale, and also with differences in access to drugs during the pandemic among various countries. The decline in the rates of patients presenting to the PED with bipolar disorders in remission, adjustment disorders, dementia, other psychiatric diagnoses, and no psychiatric diagnoses probably resulted from the delay of psychiatric admission due to stay-home urges and fear of contracting SARS-CoV-2 in health care facilities. Regarding the result of the PED visit, the significant increase in the rate of discharge from the PED and the decline in hospitalization rate was probably due to restrictions in hospitalizations during the visit.

Factors related to suicide attempt, frequent PED visit, aggressive behavior and hospitalization during LP

Regarding suicidality, we only collected data on suicidal attempts, not suicidal ideation, due to limitations in data acquisition from electronic records, thus limiting ourselves in the ability to assess the effect of suicidality. We found significantly decreased rates of suicide attempt in patients admitted to the PED in the LP ($p < 0.001$). Mental illness, including psychotic, mood, anxiety, sleep, and substance use disorders, were found to be associated with suicidality during the pandemic [45, 46]. However, the etiology of suicidal behavior is complex, and the pandemic could affect suicidal behavior in various ways. Therefore, contradictory results have been reported in other countries [13, 14, 34, 43, 47]. We assume that these results were also due to the difference in the sample size and methodology of these studies and the period of the pandemic when the studies were conducted. For instance, some authors have combined suicide attempt rate and suicidal ideation or self-harm in their reports. However, suicide attempts are a less frequent but much more serious condition than suicidal ideation and self-harm. In a recent study from Japan, the rates of suicide were reported to decline in early periods of the pandemic but were reversed in the second wave, with a larger increase in women, children, and adolescents [48]. Although suicidality may vary over time and differ regarding the conditions of different countries, an increase in suicide rates in the later periods of COVID-19 is expected due to the prolonged effects of preventive measures and adverse economic consequences [49]. Besides representing early periods of the pandemic, another factor which might have impacted the decline in suicide attempt rates in our sample was probably the common use of telepsychiatry services in Istanbul such as KORDEP (Remote Mental Health Support Program for Coronavirus) organized by the Health Directorate of Istanbul and in which ERSHEAH had participated as one the main components. Decrease in age and new-onset mental illness were found to predict suicide attempt in patients admitted to the PED

in the LP. We suggest that this finding probably resulted from the acute traumatic effect of the pandemic in its early periods which paralyzed coping mechanisms of individuals with new-onset mental illness who were unexperienced in seeking mental healthcare. As this effect could be changed in later periods of the pandemic, new studies are needed in this issue. Since most suicide attempts are assessed and treated in the PED, it should be considered as the last bastion against suicide prevention at the individual level. Our results indicated that younger patients and those with first onset mental illness admitted to the PED during the pandemic should be investigated in detail regarding suicide risk, and closely monitored after discharge.

Due to the relatively short lockdown period, we determined frequent PED visits as two and more visits during 2 months instead of four and more PED visits during 1 year, which is generally accepted for the determination of frequent emergency visit [50, 51]. Frequent utilization of the PED was previously reported to be associated with anxiety, depressive and psychotic disorders, and suicidality [52–56]. The increased rate of frequent PED admission in the LP group could probably be explained by the increased rates of patients presenting with anxiety and depressive disorders in the LP. Results of logistic regression analysis also indicated that depressive disorders, prior history of mental illness, and aggressive behavior were related to frequent PED visits in the LP.

In our study, the rate of patients admitted to the PED with aggressive behavior had decreased in the LP. This could have resulted from the decrease in the rates of psychotic disorders. Decrease in age, male gender, and frequent PED visits were determined as risk factors that may predict aggressive behavior in patients presenting to the PED in the LP, which is in line with pre-pandemic literature [50].

Factors predicting the hospitalization in LP were decrease in age, male gender, suicide attempt, and aggressive behavior. Females and young adults were found to have a higher risk for mental illness during the pandemic period [57, 58]. However, our results suggest that young patients and males probably experienced more severe mental conditions that resulted in hospitalization. Suicide attempt and aggressive behavior were related to hospitalization which was in line with the restricted hospitalization criteria which included such cases.

Characteristics of the patients diagnosed with COVID-19 in PED visits during LP

Our results indicated that COVID-19-positive patients were significantly more likely to have severe mental illness (SMI) as psychosis and bipolar disorder, and have a relatively higher rate of new-onset mental illness. These findings could be associated with the literature suggesting increased rates

of new-onset psychotic episodes in patients with COVID-19, and that the patients with SMI may have an increased risk of contracting SARS-CoV-2 [22, 23, 59, 60]. However, these results do not reflect the rates of psychiatric disorders in patients with SMI in the community during the COVID-19 pandemic as we only investigated PED visits in our study and not all patients were tested for COVID-19.

Limitations

This study has several limitations. This study is retrospective, cross-sectional and has a time-limited design. It was conducted in a single mental health epicenter in Istanbul, and the results may not be generalized to the general population and does not represent the patients admitted to the PED in general hospitals during COVID-19. Due to the limitations of retrospective data collection in the study, the authors could not provide some characteristics of the patients admitted to PED such as suicidality and treatment response. Due to the relatively short period of the lockdown, frequent PED visits were determined as two and more visits during two months instead of four and more PED visits during one year, which is generally accepted for the determination of frequent emergency visit. The rate of patients with COVID-19 was probably higher than reported as not all patients admitted to PED were tested for COVID-19, due to both lack of symptoms that would warrant testing and testing limitations.

Conclusion

To the best of our knowledge, this study has the largest sample on PED visits and is the first to provide data on the trends and factors related to PED visits and hospitalizations during the 10-month period of the pandemic, until the end of 2020. Despite the well-documented increase in mental health problems in the general population as well as those with pre-existing mental illness, our findings indicated a significant decline in the volume of PED visits and hospitalizations. Patients have probably found other ways to provide mental health care, such as telepsychiatry services, which are found to be effective in mental health care [61, 62]. Our results also confirmed that patients with SMI have a higher risk of contracting SARS-CoV-2. Adverse mental health consequences have acute and long-lasting effects, which will probably peak later than the actual pandemic. Therefore, mental health policy-makers should focus on studies on mental health services to reorganize and enhance mental health services which are crucial to manage adverse mental health consequences of the pandemic. Our study provides important data from the frontline and may contribute to mental health implications for the organization of mental health services, which are critical to prevent adverse mental health consequences and

congestions in PEDs, as well as for the immediate mental health needs of future pandemics and large-scale disasters.

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Declarations

Conflict of interest The authors have no conflicts of interest to declare that are relevant to the content of this article.

Ethical considerations All participants gave informed consent. The study has been carried out in accordance with 1964 Declaration of Helsinki and its later amendments and was approved by Ethics Committee of ERSHEAH and COVID-19 Scientific Review Board of Turkish Ministry of Health.

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