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ORIGINAL ARTICLE – OPEN ACCESS

Comparison of Emergency Department Patient Visits One Year Before and After the Start of the COVID-19 Pandemic

Kadir Küçükceran, Mustafa Kürşat Ayrancı, Abdullah Sadık Girişgin, Sedat Koçak, Zerrin Defne Dündar

ABSTRACT

Objective: Planning for emergency department (ED) services based on epidemiological data is essential. This study retrospectively examined ED patient presentations at a tertiary hospital 1 year before and 1 year after the start of the coronavirus 2019 (COVID-2019) pandemic to assist with planning efforts.

Materials and Methods: The study period was March 1, 2019 to February 28, 2021. The patient cases were separated into 2 groups using a reference date of March 2020. The period between March 1, 2019 and February 29, 2020 was defined as the pre-COVID period, or ordinary circumstances, and the period between March 1, 2020 and February 28, 2021 was defined as the period following the COVID-19 outbreak, which reflected extraordinary conditions. The primary outcome was the difference in the number of patients and the mortality rate between groups.

Results: A total of 74,063 (62%) people presented at the ED in the pre-COVID period, and there were 45,397 (38%) ED visits in the post-COVID period. The median daily number of patients seen in the pre-COVID period was significantly higher than that of the post-COVID period (200.5 [181–219.25] vs. 123 [108.5–139], respectively [p<0.001]). The in-hospital mortality rate and the hospitalization rate in the post-COVID period were significantly higher than in the pre-COVID period (in-hospital mortality rate: 1105 [2.4%], 852 [1.2%], [p<0.001]; hospitalization rate: 9404 [20.7%], 9019 [12.2%], [p<0.001]).

Conclusion: Although the number of patients presenting at the ED decreased in the period after the outbreak of COVID-19, the number of those who died increased. While the number of hospitalized patients was similar between the 2 groups, the hospitalization rate was greater in the post-COVID period. This information and additional detailed study may prove useful to ED planning efforts.

Keywords: COVID-19, epidemiology, in-hospital mortality, patient admission

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Department of Emergency, Necmettin Erbakan University, Meram Faculty of Medicine, Konya, Türkiye

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Correspondence Kadir Küçükceran, Necmettin Erbakan University, Meram Faculty of Medicine, Department of Emergency, Konya, Türkiye
Phone: +90 332 223 40 53
e-mail: kadirkucukceran@hotmail.com

INTRODUCTION

Coronavirus 2019 (COVID-19) was first seen in China, in December 2019, and quickly spread all over the world. The World Health Organization declared a pandemic in March 2020 (1). More than 100 million people all over the world were infected and deaths of over 3 million have been recorded. High mortality rates were particularly observed among hospitalized patients and intensive care unit patients (2).

The emergence of COVID-19 created a new and additional source of stress for emergency departments (EDs) (3). In many countries, ED units were already operating beyond capacity (4). The novel virus outbreak had significant effects on operations in EDs (5). Planning for ED capacity based on epidemiological data is always important, however, the extraordinary circumstances of a pandemic have reinforced recognition of the necessity for adequate planning. To the best of our knowledge, at the time of writing, there were few published epidemiological studies that analyzed ED visits during the initial period of the pandemic.

This retrospective analysis was designed to analyze data of patient visits to the ED 1 year before and 1 year after the outbreak of COVID-19 in Türkiye.

MATERIALS and METHODS

Approval for this single-center study was obtained from the Necmettin Erbakan University Meram Medical Faculty Pharmaceutical and Non-Medical Device Studies Ethical Committee on March 19, 2021 (no: 2021/3158). Written, informed consent of the patients was not required because of the retrospective design.

The period examined for the study was March 1, 2019 through February 28, 2021. The hospital records of patients >18 years of age who presented at the ED of a tertiary university hospital were retrospectively analyzed using the emergency polyclinic examination service code (0017). Data of age, gender, date of presentation, length of hospital stay, in-hospital mortality, and hospitalization requirement were obtained for analysis.

The hospital where the study was conducted was not the only hospital in the region that accepted COVID-19 patients, and the facility was open to both patients with suspected COVID-19 and those with other concerns. Patients with suspected COVID-19 were admitted from COVID-19 polyclinics and from the ED. Patients with mild symptoms usually present first at a polyclinic, however, only the ED accepts patients outside of typical work hours. Patients with symptoms severe enough to require hospitalization usually apply directly to the ED.

The participants were separated into 2 groups using the reference of March 2020, when the first COVID-19 case emerged in Türkiye. For the purposes of this study, the period between March 1, 2019 and February 29, 2020 was defined as the pre-COVID period and the period between March 1, 2020 and February 28, 2021 was defined as the post-outbreak period. The primary outcome of the study was the between-group differences in the number of patients and the in-hospital mortality and hospitalization rates.

Statistical Analysis

The statistical analysis was performed using IBM SPSS Statistics for Windows, Version 20.0 software (IBM Corp., Armonk, NY, USA). The mean±SD, median (q1-q3) and number (%) distribution were used to demonstrate the results. The Mann-Whitney U test, Student's t-test, chi-squared and Shapiro-Wilk tests were used to evaluate the data. Significance was accepted at $p<0.05$.

RESULTS

A total of 74,063 (62%) people presented at the ED in the year before March 2020, while 45,397 (38%) presented in the following year. The median daily number of patients and the mean monthly number of patients decreased significantly with the pandemic (daily number of patients: 200.5 [181–219.25]; 123 [108.5–139]; [p<0.001]; monthly number of patients: 6171.92±653.38; 3783.08±653.13; [p<0.001]). The rate of male patients was significantly different; in the pre-COVID period there were 36,574 (49.4%) and there were 24,523 (54%) in the post-COVID period (p<0.001). While the median age in the pre-COVID period was 43 years (30–60 years), it was 44 years (30–62 years) in the post-COVID period. The in-hospital mortality and hospitalization rate increased significantly with the onset of the pandemic (in-hospital mortality rate: 1105 [2.4%] and 852 [1.2%], [p<0.001]; hospitalization rate: 9404 [20.7%] and 9019 [12.2%]; [p<0.001]). The median length of stay of hospitalized patients in the pre-COVID period was 5 days (2–10 days) and it was also 5 days (2–9 days) in the post-COVID period. Detailed data are provided in Table 1.

The study parameters were examined and compared by month (Fig. 1–5). The number of patients decreased after March 2020 (Fig. 1). The in-hospital mortality rate was higher in all months following the outbreak of COVID-19 with the exception of June (Fig. 2). The hospitalization rate was similar in the 2 periods (Fig. 3). The rate of male patients increased after March 2020 (Fig. 4). The rate of patients over the age of 65 was high in the post-COVID in all months except March, June, and July (Fig. 5).

DISCUSSION

This study was a retrospective analysis of patients who visited the ED during a 2-year period before and after the outbreak of COVID-19. The results indicated that the number of patients decreased with the pandemic; however, the rates of mortality, hospitalization, male gender, and patients over age 65 increased.

Boserup et al. (6) compared a 4-week period before and after the onset of COVID-19 and noted that the number of ED visits was statistically significantly lower following the outbreak of the pandemic. Hartnett et al. (7) found that in the early pandemic period (weeks 14 to 17), ED visits had decreased by 42% compared to the previous year. In this study, the number of patients decreased by 38.7% after March 2020. Our findings revealed that the number of patients was the lowest in April, which was the first month after the beginning of the pandemic.

Several factors may have contributed to the decrease in the number of patients, including public concern about transmission of the virus. The majority of patients prior to the pandemic were classified in the non-urgent group according to the triage system applied (8). Given the initial lack of knowledge about the novel virus at the outset of the pandemic, the prioritization of COVID-19 patients, and the discouragement of contact, patients in this category who were concerned about COVID-19 transmission may have been less likely to go to the hospital unless absolutely necessary. Our results revealed that the discharge rate from the ED (non-hospitalized patients) decreased after March 2020. Although the number of hospitalized patients was similar in both time-period groups, the increase in the rate of hospitalization in the post-COVID period reflects the decreased number of patients in the non-urgent group.

In this study, the in-hospital mortality rate and number of patient who died increased after the onset of the pandemic. Relevant reasons may include the decrease in patients discharged from the ED in the post-COVID period when compared to hospitalized patients. However, since the number of patients who died is also higher after March 2020, it appears that the decrease in the denominator (number of total patients) and the increase in the numerator (number of patients who died) affected the ratio. Patients with life-threatening diseases may have presented at the ED later than usual due to concerns about COVID-19 transmission.

Lange et al. (9) compared ED visits 10 weeks before and after the beginning of the pandemic and found that the number of patients with life-threatening diseases (myocardial infarction, stroke, and hyperglycemic crisis) declined in the period after the pandemic (23%, 20%, and 10%, respectively). Delayed care for emergencies can result in additional complications and will contribute to increased mortality. In the study conducted by Ficher et al. (10), 55 patients with acute appendicitis diagnosed within 10 weeks after the pandemic and similar patients diagnosed within 5 years before the pandemic were compared and it was observed that the perforation rate was statistically significantly higher in the post-pandemic period (45%, 27%; odds ratio: 2.23; p=0.005). COVID-19 itself may be a reason for the increase in the mortality rate: the high mortality rate for hospitalized patients with COVID-19 may have increased the study in-hospital mortality rate (11). However, we cannot say anything definitive since we did not conduct a diagnostic subanalysis.

Table 1. Patient characteristics

	Pre-COVID	Post-COVID	p
12 months			
Total number of patients	74063	45397	
Daily number of patients	200.5 (181–219.25)	123 (108.5–139)	<0.001
Monthly number of patients	6171.92±653.38	3783.08±653.13	<0.001
In-hospital mortality	852 (1.2%)	1105 (2.4%)	<0.001
Hospitalization	9019 (12.2%)	9404 (20.7%)	<0.001
Male	36574 (49.4%)	24523 (54%)	<0.001
Female	37489 (50.6%)	20874 (46%)	
Age (years)	43 (30–60)	44 (30–62)	
Age			
18–39	34428 (43.8%)	18853 (41.5%)	<0.001
40–64	26761 (36.1%)	16591 (36.5%)	
>65	14874 (20.1%)	9953 (21.9%)	
Length of hospital stay (days)*	5 (2–10)	5 (2–9)	
March			
Total number of patients	5164	4990	
Daily number of patients	166.58±16.76	160.97±69.12	0.663
In-hospital mortality	59 (1.1%)	72 (1.4%)	0.180
Hospitalization	669 (13%)	650 (13%)	0.915
Male	2509 (48.6%)	2643 (53%)	<0.001
Female	2655 (51.4%)	2347 (47%)	
Age (years)	45 (31–62)	43 (29–61)	<0.001
Age			
18–39	2155 (41.7%)	2242 (44.9%)	0.005
40–64	1859 (36%)	1697 (34%)	
>65	1150 (22.3%)	1051 (21.1%)	
Length of hospital stay (days)*	5 (2–11)	4.5 (2–8)	0.029
April			
Total number of patients	5304	2408	
Daily number of patients	176.8±14.95	80.26±13.75	<0.001
In-hospital mortality	62 (1.2%)	77 (3.2%)	<0.001
Hospitalization	693 (13.1%)	779 (32.4%)	<0.001
Male	2679 (50.5%)	1335 (55.4%)	<0.001
Female	2625 (49.5%)	1073 (44.6%)	
Age (years)	45 (30–62)	48 (33–65)	<0.001
Age			
18–39	2203 (41.5%)	863 (35.8%)	<0.001
40–64	1916 (36.1%)	912 (37.9%)	
>65	1185 (22.3%)	633 (26.3%)	
Length of hospital stay (days)*	6 (3–11)	5 (3–9)	0.011
May			
Total number of patients	5343	3019	
Daily number of patients	172.35±26.48	97.38±16.67	<0.001
In-hospital mortality	50 (0.9%)	70 (2.3%)	<0.001
Hospitalization	693 (13%)	793 (26.3%)	<0.001
Male	2662 (49.8%)	1645 (54.5%)	<0.001
Female	2681 (50.2%)	1374 (45.5%)	
Age (years)	43 (30–61)	48 (33–64)	<0.001
Age			
18–39	2366 (44.3%)	1113 (36.9%)	<0.001
40–64	1870 (35%)	1161 (38.5%)	
>65	1107 (20.7%)	745 (24.7%)	
Length of hospital stay (days)*	5 (2–9.5)	5 (2–9)	0.563

Table 1 (cont.). Patient characteristics

	Pre-COVID	Post-COVID	p
June			
Total number of patients	5906	3618	
Daily number of patients	196.86±24.11	120.6±15.14	<0.001
In-hospital mortality	75 (1.3%)	61 (1.7%)	0.097
Hospitalization	838 (14.2%)	911 (25.2%)	<0.001
Male	2947 (49.9%)	2021 (55.9%)	<0.001
Female	2959 (50.1%)	1597 (44.1%)	
Age (years)	46 (31–62)	44 (30–61)	0.050
Age			
18–39	2352 (39.8%)	1521 (42%)	0.102
40–64	2253 (38.1%)	1327 (36.7%)	
>65	1301 (22%)	770 (21.3%)	
Length of hospital stay (days)*	5 (2–11)	4 (2–9)	0.001
July			
Total number of patients	6130	4090	
Daily number of patients	197.74±21.09	131.93±14.24	<0.001
In-hospital mortality	74 (1.2%)	101 (2.5%)	<0.001
Hospitalization	800 (13.1%)	956 (23.4%)	<0.001
Male	3024 (49.3%)	2210 (54%)	<0.001
Female	3106 (50.7%)	1880 (46%)	
Age (years)	43 (30–61)	43 (30–61)	0.368
Age			
18–39	2617 (42.7%)	1767 (43.2%)	0.487
40–64	2195 (35.8%)	1484 (36.3%)	
>65	1318 (21.5%)	839 (20.5%)	
Length of hospital stay (days)*	5 (2–9)	5 (2–9)	0.023
August			
Total number of patients	6885	4313	
Daily number of patients	222.09±26.65	139.12±28.05	<0.001
In-hospital mortality	78 (1.1%)	121 (2.8%)	<0.001
Hospitalization	886 (12.9%)	884 (20.5%)	<0.001
Male	3340 (48.5%)	2415 (56%)	<0.001
Female	3545 (51.5%)	1898 (44%)	
Age (years)	43 (30–59)	43 (29–61)	0.796
Age			
18–39	2956 (42.9%)	1869 (43.3%)	0.313
40–64	2593 (37.7%)	1569 (36.4%)	
>65	1336 (19.4%)	875 (20.3%)	
Length of hospital stay (days)*	5 (2–10)	4 (2–9)	0.058
September			
Total number of patients	6163	3545	
Daily number of patients	205.43±19.1	118.16±13.12	<0.001
In-hospital mortality	68 (1.1%)	95 (2.7%)	<0.001
Hospitalization	772 (12.5%)	723 (20.4%)	<0.001
Male	3054 (49.6%)	1997 (56.3%)	<0.001
Female	3109 (50.4%)	1548 (43.7%)	
Age (years)	42 (29–59)	43 (29–60)	0.639
Age			
18–39	2790 (45.3%)	1568 (44.2%)	0.504
40–64	2188 (35.5%)	1299 (36.6%)	
>65	1185 (19.2%)	678 (19.1%)	
Length of hospital stay (days)*	5 (2–11)	4 (2–9)	0.001

Table 1 (cont.). Patient characteristics

	Pre-COVID	Post-COVID	p
October			
Total number of patients	6368	4201	
Daily number of patients	205.41±17.76	135.51±16.94	<0.001
In-hospital mortality	71 (1.1%)	112 (2.7%)	<0.001
Hospitalization	733 (11.5%)	845 (20.1%)	<0.001
Male	3121 (49%)	2368 (56.4%)	<0.001
Female	3247 (51%)	1833 (43.6%)	
Age (years)	42 (29–59)	44 (30–61)	<0.001
Age			
18–39	2935 (46.1%)	1757 (41.8%)	<0.001
40–64	2258 (35.5%)	1526 (36.3%)	
>65	1175 (18.5%)	918 (21.9%)	
Length of hospital stay (days)*	5 (2–10)	5 (2–10)	0.721
November			
Total number of patients	6210	3959	
Daily number of patients	207±20.72	131.96±16	<0.001
In-hospital mortality	68 (1.1%)	120 (3%)	<0.001
Hospitalization	744 (12%)	767 (19.4%)	<0.001
Male	3105 (50%)	2101 (53.1%)	0.003
Female	3105 (50%)	1858 (46.9%)	
Age (years)	42 (29–59)	45 (31–61)	<0.001
Age			
18–39	2801 (45.1%)	1637 (41.3%)	<0.001
40–64	2280 (36.7%)	1453 (36.7%)	
>65	1129 (18.2%)	869 (21.9%)	
Length of hospital stay (days)*	5 (2–11)	5 (2–10)	0.559
December			
Total number of patients	7001	3699	
Daily number of patients	225.83±30.1	119.32±12.1	<0.001
In-hospital mortality	90 (1.3%)	112 (3%)	<0.001
Hospitalization	805 (11.5%)	746 (20.2%)	<0.001
Male	3421 (48.9%)	1946 (52.6%)	<0.001
Female	3580 (51.1%)	1753 (47.4%)	
Age (years)	43 (30–60)	44 (30–62)	0.142
Age			
18–39	3051 (43.6%)	1581 (42.7%)	0.006
40–64	2584 (36.9%)	1301 (35.2%)	
>65	1366 (19.5%)	817 (22.1%)	
Length of hospital stay (days)*	5 (2–11)	6 (2–11)	0.542
January			
Total number of patients	7074	3989	
Daily number of patients	228.19±45.19	128.68±13.97	<0.001
In-hospital mortality	79 (1.1%)	81 (2%)	<0.001
Hospitalization	720 (10.2%)	708 (17.7%)	<0.001
Male	3479 (49.2%)	2003 (50.2%)	0.297
Female	3595 (50.8%)	1986 (49.8%)	
Age (years)	43 (29–59)	47 (32–64)	<0.001
Age			
18–39	3156 (44.6%)	1519 (38.1%)	<0.001
40–64	2532 (35.8%)	1522 (38.2%)	
>65	1386 (19.6%)	948 (23.8%)	
Length of hospital stay (days)*	5 (2–11)	5 (2–10)	0.434

Table 1 (cont.) Patient characteristics

	Pre-COVID	Post-COVID	p
February			
Total number of patients	6515	3566	
Daily number of patients	224.66±31.49)	127.36±14.82	<0.001
In-hospital mortality	78 (1.2%)	83 (2.3%)	<0.001
Hospitalization	666 (10.2%)	642 (18%)	<0.001
Male	3233 (49.6%)	1839 (51.6%)	0.062
Female	3282 (50.4%)	1727 (48.4%)	
Age (years)	41 (28–59)	46 (31–62)	<0.001
Age			
18–39	3046 (46.8%)	1416 (39.7%)	<0.001
40–64	2233 (34.3%)	1340 (37.6%)	
>65	1236 (19%)	810 (22.7%)	
Length of hospital stay (days)*	6 (3–11.25)	5 (2–10)	0.014

*: Patients who required hospitalization

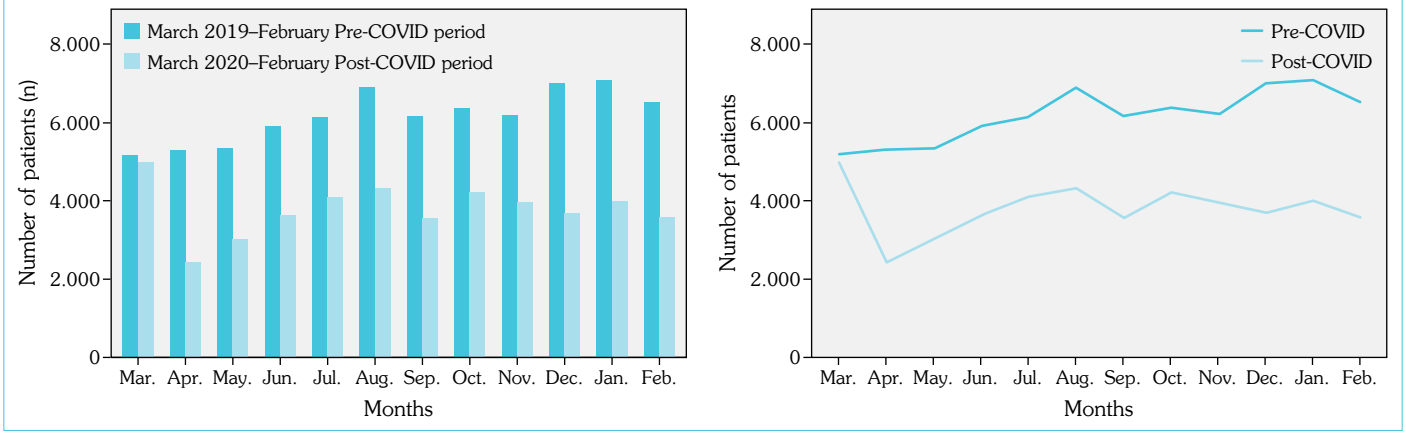

Figure 1. Number of patients by month

Our results revealed an increase in the rates of male gender and patients over 65 with the pandemic. Hartnett et al. (7) found a more prominent decrease in the number of female younger patients. High mortality and comorbidity rates are more common in geriatric patients than in the younger patients (12). In this study, the decrease in patients discharged from the ED during the post-COVID period, and the fact that older patients are hospitalized more than younger patients, may have increased the rate of patients over the age of 65. In addition, old age is a high-risk factor for hospitalization in cases of COVID-19. The disease may be the primary reason for the increase in patients over the age of 65. The imposition of movement restrictions in our country, particularly for individuals over the age of 65, may have contributed to the decrease in the number of patients of this age group. The rate of visits of patients over the age of 65 in the summer months was similar between the 2 groups (Fig. 5). The high rate of male patients in the post-COVID group may be related to the higher incidence of COVID-19 in the males (13). The higher prevalence of COVID-19-related anxiety in females may also have been a contributing factor (14).

Limitations

Limitations of this study include the single-center design and the lack of diagnostic subgroup analysis that could have offered more precise understanding of the differences between the groups.

CONCLUSION

The results of this study revealed that although the number of ED visits decreased in the period following the COVID-19 outbreak, the number of patients who died increased. In addition, while the number of hospitalized patients was similar between the 2 time-period groups, the rate of hospitalization increased in the post-COVID period. Finally, the rate of patients who were over the age of 65 and the rate of male patient presentation increased after the pandemic. Diagnostic subgroup studies are needed to more clearly understand the reasons for these differences and plan accordingly.

Ethics Committee Approval: The Necmettin Erbakan University Meram Faculty of Medicine Pharmaceutical and Non-Medical Device Studies Ethical Committee granted approval for this study (date: 19.03.2021, number: 2021/3158).

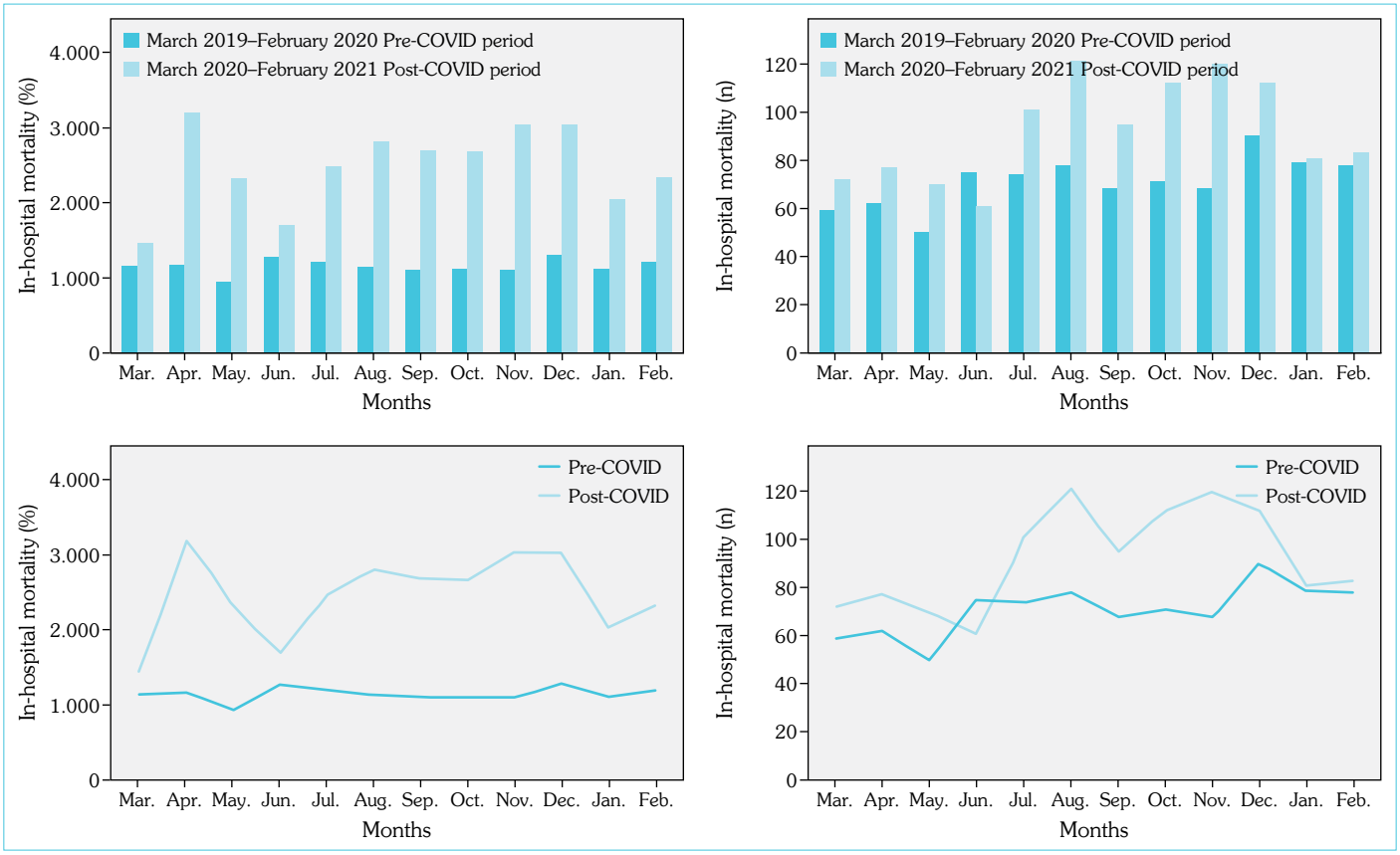

Figure 2. **In-hospital mortality by month**

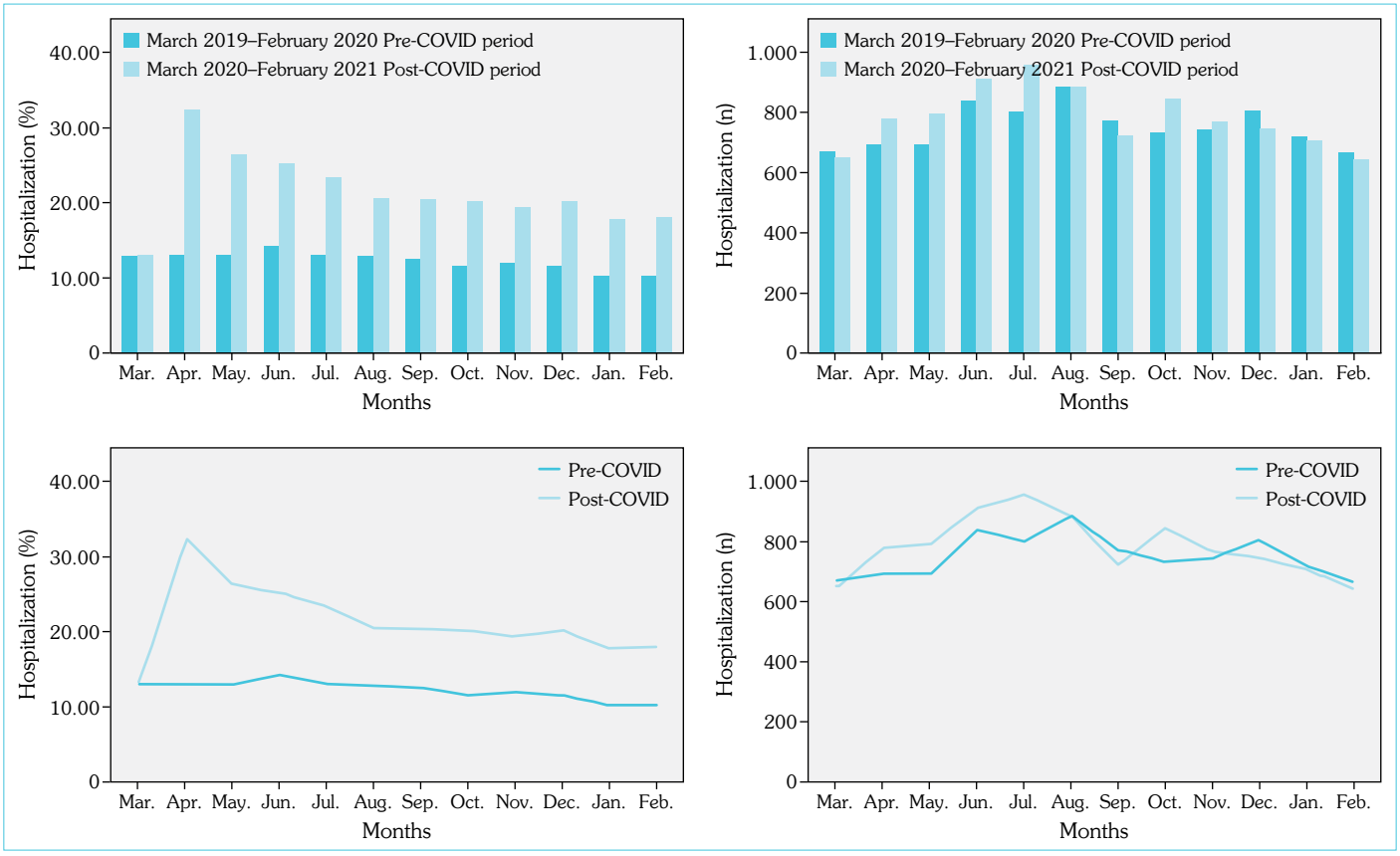

Figure 3. **Hospitalization by month**

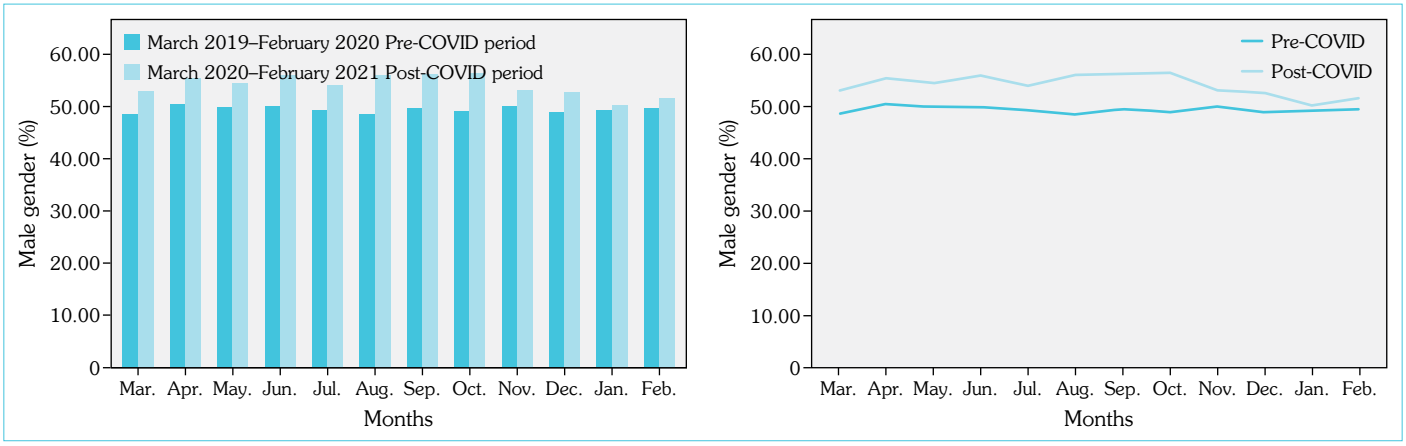

Figure 4. **Rate of male patients by month**

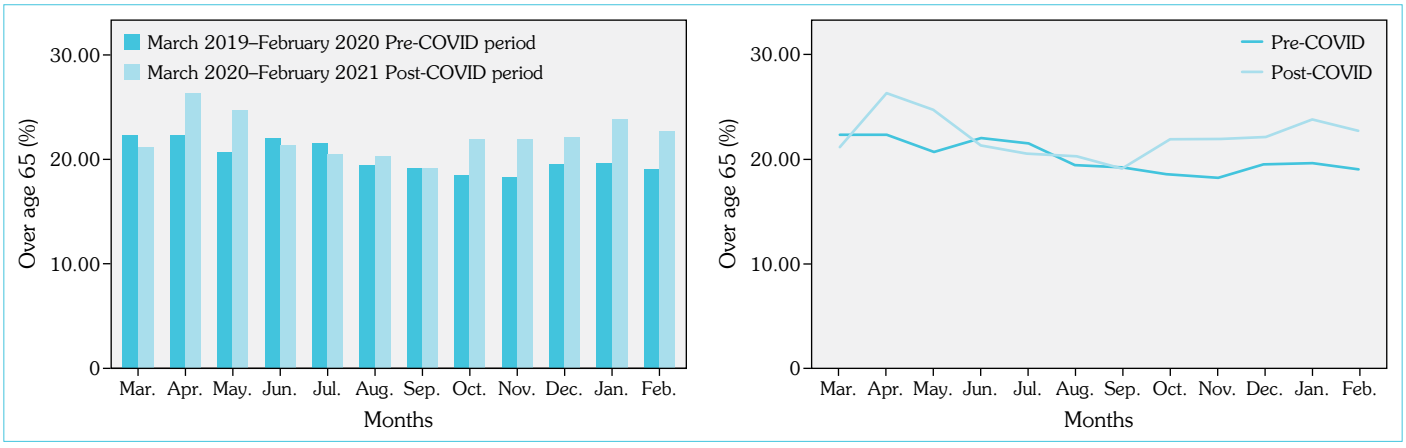

Figure 5. **Rate of patients over the age of 65 by month**

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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