



The Effect of Curfew Enforcement on Health Care Provision in COVID-19 Pandemic

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Abstract

The COVID-19 disease occurred in the final weeks of 2019. As part of the fight against COVID-19, countries have taken actions such as travel restrictions, suspension of border crossings and international flights, voluntary home isolation, public activities restriction, and curfews. The objective of this study is to identify the effect of curfew enforcement during the COVID-19 pandemic to determine and identify whether curfew has a positive effect on the health care workload. The number of patients admitted to Sakarya University Training and Research Hospital, their means of arrival, hospitalization-discharge, demographic characteristics were examined retrospectively for the period of curfew in April and May 2020 and the corresponding days in 2019. The significant statistical differences between the two periods were analyzed. The results of this research reveal that 24,488 patients were admitted to our emergency department. Of these patients, 12,813 (52.3%) were male, 11,675 (47.7%) were female. The number of emergency department admissions of the pediatric age group decreased from 1,822 (8.9%) to 33 patients (0.8%). Moreover, the number of patients admitted to the emergency service in the related period of 2019 was 20,548 (83.9%), while this figure decreased to 3,940 individuals (16.1%) during the curfew period. It was implied that curfew could reduce the unnecessary admissions to hospitals, the number of ambulance usage, and provide a positive contribution to the reduction in traumas, car accidents, work accidents, and forensic cases during pandemic.

Keywords: COVID-19, Curfew, Pandemic

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1. INTRODUCTION

The SARS-CoV-2 virus was discovered to transmit from person to person, and the disease was caused by the virus named COVID-19 (World Health Organization, 2020; Huang, et al., 2020). The COVID-19 disease emerged in the final weeks of 2019 in Wuhan city, Hubei Province, China, and soon spread all over the world (European Centre for Disease Prevention and Control., 2020; World Health Organization, 2020). This virus has affected 213 nations and territories across the world (World Health Organization, 2020). Following this rapid spread, the pandemic was declared by the World Health Organization on March 11th, 2020 (World Health Organization, 2020). As part of the fight against COVID-19, countries have performed their own actions. Measures such as travel and public activities restrictions, suspension of border crossings and international flights, voluntary home isolation, curfews, and obligation in wearing masks were regulated by the countries (Usher, et al, 2020). There are several studies which present that travel restrictions could have a positive effect to encounter the outbreak (Camitz, & Liljeros 2006). On the other hand, there were claims that the outbreak was spreading more rapidly in countries which were reluctant about taking the necessary measures from the start (Khosrawipour, et al., 2020).

Turkey is including one of countries to take the initial measures in this regard. The process began with the closure of the Turkey-Iran border crossing on February 23rd, 2020, and the suspension of all international flights on March 28th, 2020. Recently, a total of 23-day curfew has been authorized in the 31 provinces with the highest number of cases and the largest population in Turkey, consisting of weekends and holidays in April and May which have started from April 11th, 2020. Thus, this study identified the effect of the curfew imposed in Sakarya City during the COVID-19 epidemic, straining the capacity of the hospitals, on the Sakarya University Training and Research Hospital. Hence, the aim is to discuss whether the curfew could be used in reducing the hospital workload, and limiting the spread of the pandemic. In this way, by looking at the curfew from a different window, there may be possibility to contribute to the current medical literature.

2. RESEARCH METHOD

The patients admitted to Sakarya University Training and Research Hospital in April and May 2020, during the 23-days curfew including weekends and holidays from April 11th, 2020, were involved in the study. Patients admitted to the pediatric emergency and obstetrics and gynecology emergency department were in contrary, excluded. Meanwhile, the pediatric traumas were included in the study since pediatric trauma patients were also administered to the adult emergency department. Since the curfew was enforced only on weekends and holidays, the data were compared with the corresponding non-curfew weekends and holidays on April and May 2019. The SPSS Version 21 program was employed for the statistical analysis of the data. The Chi-square test was administered to compare the categorical values. For the results, $p < 0.05$ was considered statistically significant. In the study, number of patients, genders, age groups, means of arrival to the emergency service, and admission and discharge statuses of the patients were also compared.

During the pandemic, all new cases were received in the emergency service, and the patients considered suitable were hospitalized in the service or intensive care units designed for COVID-19. During this process, elective operations were postponed, and only the emergency operations were applied. Outpatient clinic services were performed only to administer checks of COVID-19 patients followed-up or discharged from COVID-19 services, while all other outpatient clinics were closed during the process. As of 2019

and 2020, the emergency service owns three patient admission areas divided according to the patients' triage as follows.

Green Area: This room is for cases which patients' condition do not require an urgent intervention, and do not get jeopardized by waiting for 24 hours. Only the patients aged 18 and above can be hospitalized in this area.

Yellow Area: It is the room for the patients whose condition requires emergency intervention, needs to be monitored, needs laboratory analysis and imaging to diagnose or rule out. Furthermore, all trauma patients are examined in this area. Patients aged 18 and above, excluding patients with trauma, are treated in this area. Trauma patients, however, are accepted in all age groups.

Critical Area: This area is for the admission of the cases which patients need immediate intervention or need intensive care follow-up, until obtaining the expected outcome. Patients from all age groups are accepted in this area.

3. RESULTS AND DISCUSSION

In 2019 and 2020, 24488 patients were admitted to the adult emergency service of the Sakarya University Training and Research Hospital during the 46 non-business days in April and May. Of these patients, 12813 (52.3%) were male and 11675 (47.7%) were female. The mean age of the patients included in the study was 41.17 years (± 20.16), the age range was 0-108 years, and the median value was 38 years. In the comparison of the patients' admission to the hospital, regarding the age groups, a significant statistical difference was discovered between the curfew and the non-curfew period as shown in Table 1 ($p=0.000$).

Table 1. The comparison of the patients' admission to the hospital

Year		0-17 Age	18-64 Age	65 Age and Above	Total
2019	Count	1822	15910	2816	20548
	Percent	8,90%	77,40%	13,70%	100%
2020	Count	33	2980	927	3940
	Percent	0,80%	75,60%	23,50%	100%
Total	Count	1855	18890	3743	24488

Based on Table 1, the number of emergency department admissions in the pediatric age group declined from 1822 (8.9%) to 33 patients (0.8%). In contrast, although the number of patients' admissions aged 65 and above decreased, the admission rate was discovered to increase from 13.7% to 23.5%.

A significant statistical difference was found in the annual numbers and in rates of admissions to emergency rooms ($p=0.000$). Of all the patients involved in the study, 20548 (83.9%) patients were admitted to the emergency service in the same period in 2019 which decreased to 3940 individuals (16.1%) during the curfew period. In the distribution of patients admitted during the period, according to outpatient clinics, it is identified that 1.7% of patients admitted during the non-curfew period were critical area patients. This rate increased to 4.1% during the curfew period, and the rate of critical patients increased accordingly, despite the decreasing number of the critical patients.

Table 2. The distribution of patients to emergency areas after triage by year

Year		Green room	Yellow room	Critical room	Total
2019	Count	10990	9204	354	20548
	Percent	53,50%	44,80%	1,70%	100%

2020	Count	1949	1830	161	3940
	Percent	49,50%	46,40%	4,10%	100%
Total	Count	12939	11034	515	24488

In the comparison of the periods with and without the curfew restrictions, the number of normal emergency patients, judicial cases, work accidents and traffic accidents decreased.

Table 3. The results of the comparison patients to emergency areas after triage by year

Year		Emergency Case	Forensic Case	Industrial Injury	Traffic Accident	Total
2019	Count	19663	643	93	149	20548
	Percent	95,70%	3,10%	0,50%	0,70%	100%
2020	Count	3889	46	3	2	3940
	Percent	98,70%	1,20%	0,10%	0,10%	100%
Total	Count	23552	689	96	151	24488

According to Table 3, while there is a significant statistical decrease in all types of cases ($p=0.000$), the decrease in the number and rates of traffic accidents and work accidents is quite remarkable.

A significant statistical difference was discovered in the outpatient follow-up and hospitalization rates in accordance with the periods ($p=0.000$). During the same period of 2019 with no curfew, 792 (3.9%) of 19756 patients were hospitalized. Meanwhile, during the curfew period, 776 (19.7%) out of 3164 patients were hospitalized. A significant difference was also identified in the service and intensive care hospitalizations, according to the curfew status ($p=0.027$). In 2019, 205 (25.9%) out of 792 patients were hospitalized in the intensive care, 587 (74.1%) in the service. However, during the curfew period, 164 (21.1%) of the 776 patients were hospitalized in the intensive care, and 612 (78.9%) in the service.

Considering the transportation means to the hospital, there was a significant difference between the two periods ($p=0.000$). In the same period of 2019, when there was no curfew, 1344 (6.5%) out of 20548 patients used ambulance to the emergency department, while 19204 (93.5%) patients used their own vehicles. During the curfew period, 732 out of 3940 patients (18.6%) went to the hospital by ambulance. It is astonishing that the number of patients using ambulance to the hospital decreased.

Since studies on COVID-19 disease are still in their infancy, there has not been a study in the literature regarding the effect of curfew enforcement on admissions to hospitals during the COVID-19 pandemic. Hence, in our study, when we retrospectively compared the weekends and holidays in the curfew period, we discovered a significant and dramatic decline in admissions to our hospital. Under the curfew, people were prohibited from leaving their homes, driving, and traveling elsewhere. Only in the incidence of an emergency illness, people were allowed to go to the hospital by their own vehicle or by ambulance. It can be implied that the accompanying decrease in traffic accidents, forensic cases, and work accidents had a positive impact on the workload of health care professionals who provided health services during the pandemic.

A study conducted in China revealed that people were psychologically affected by the outbreak at moderate to severe levels during the pandemic (Wang, et al., 2020). It is also understood that a large number of patients with anxiety suffering from emergency immediate symptoms, admit to emergency departments (Musey, et al., 2018). As suggested by the present study, 52.8% of all the patients admitted to out emergency service

were green room patients, who did not have an emergency symptom. In such a pandemic process with the increasing anxiety, an admissions increase to hospitals is not surprising due to the concerns for the COVID-19. At the time of the curfew, the decline in the number of green room admissions from 10990 to 1949 suggested that such an increase did not occur, and that the rate of non-emergency cases using the emergency service declined either. Hence, the curfew helped prevent emergency services from drowning under the unnecessary workload.

Elyse et al. and Shatz et al. stated that curfew restriction had a positive effect on juvenile traumas (Grossman, & Miller., 2015; Shatz, et al, 1999). From the pediatric age group, only the trauma patients admitted to the emergency department at Sakarya University Training and Research Hospital. The dramatic decrease in pediatric age group admissions to the emergency service during the curfew period implies that state pediatric traumas decreased with curfew restrictions. Moreover, it is reported that the use of computed tomography in pediatric traumas has increased in recent years (Melnick, et al., 2012). Pediatric trauma patients also required the use of computed tomography. On the other hand, Yan Li et al. argued that thorax CT was an effective method with the high sensitivity rate in COVID-19 diagnosis (Li, & Xia, 2020). The use of computed tomography in the diagnosis of both the trauma patients and the COVID-19 patients can be a severe case, especially for places with limited tomography capacity. This curfew aspect may have an indirect positive effect on the tomography usage rates.

In a meta-analysis, Rodriguez-Morales et al. explained that 20.3% of patients needed intensive care during the pandemic (Rodriguez-Morales, et al., 2020). In the present study, the number of patients admitted to intensive care during the curfew period in the COVID-19 pandemic underwent a decrease. However, the number of patients hospitalized in the service was deemed increasing. The decrease in trauma patients and traffic accidents in curfew might contribute to the hospitalization decrease in intensive care.

Since the number of patients arriving at the hospital by ambulance falling from 1344 to 732 compared to non-curfew period, the curfew had a positive impact in providing the emergency ambulance services to the emergencies in a timely manner, and in serving adequate care to the emergency patients.

One of the limitations of the study is that it is a single center study. In order to see the full effect of the curfew enforcement, it could be useful to examine the patients' applications made to all hospitals in the area where the curfew is imposed.

4. CONCLUSION

The curfew is one of the measures performed to prevent the outbreak spread implemented by different countries in various methods during the COVID-19 pandemic. It can be concluded that curfew, applied only on weekends and holidays in Turkey, reduced unnecessary admissions to hospital, the number of ambulance usage, produced a positive contribution to the reduction of traumas, car accidents, work accidents, and forensic cases, and also decreased the workload of health care professionals who might be overstretched during the pandemic.

REFERENCES

- Camitz, M., & Liljeros, F. (2006). The effect of travel restrictions on the spread of a moderately contagious disease. *BMC medicine*, 4(32). doi: <https://doi.org/10.1186/1741-7015-4-32>
- European Centre for Disease Prevention and Control. (2020). Cluster of pneumonia cases caused by a novel coronavirus, Wuhan, China. ECDC: Stockholm. Retrieved from:

- <https://www.ecdc.europa.eu/sites/default/files/documents/Risk%20assessment%20-%20pneumonia%20Wuhan%20China%2017%20Jan%202020.pdf>
- Grossman, E. R., & Miller, N. A. (2015). A systematic review of the impact of juvenile curfew laws on public health and justice outcomes. *American journal of preventive medicine*, 49(6), 945-951. doi:<https://doi.org/10.1016/j.amepre.2015.07.021>
- Huang, C., Wang, Y., Li, X., Ren, L., Zhao, J., Hu, Y., ... & Cheng, Z. (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The lancet*, 395(10223), 497-506. doi:[https://doi.org/10.1016/S0140-6736\(20\)30183-5](https://doi.org/10.1016/S0140-6736(20)30183-5)
- Khosrawipour, V., Lau, H., Khosrawipour, T., Kocbach, P., Ichii, H., Bania, J., & Mikolajczyk, A. (2020). Failure in initial stage containment of global COVID-19 epicenters. *Journal of Medical Virology*, 92, 863-867. doi:<https://doi.org/10.1002/jmv.25883>
- Li, Y., & Xia, L. (2020). Coronavirus disease 2019 (COVID-19): role of chest CT in diagnosis and management. *American Journal of Roentgenology*, 214(6), 1280-1286. doi:<https://doi.org/10.2214/AJR.20.22954>
- Melnick, E. R., Slezak, C. M., Bentley, S. K., Dziura, J. D., Kotlyar, S., & Post, L. A. (2012). CT overuse for mild traumatic brain injury. *The Joint Commission Journal on Quality and Patient Safety*, 38(11), 483-489. doi:[https://doi.org/10.1016/S1553-7250\(12\)38064-1](https://doi.org/10.1016/S1553-7250(12)38064-1)
- Musey, P. I., Lee, J. A., Hall, C. A., & Kline, J. A. (2018). Anxiety about anxiety: a survey of emergency department provider beliefs and practices regarding anxiety-associated low risk chest pain. *BMC emergency medicine*, 18(10). doi:<https://doi.org/10.1186/s12873-018-0161-x>
- Rodriguez-Morales, A. J., Cardona-Ospina, J. A., Gutiérrez-Ocampo, E., Villamizar-Peña, R., Holguin-Rivera, Y., Escalera-Antezana, J. P., ... & Paniz-Mondolfi, A. (2020). Clinical, laboratory and imaging features of COVID-19: A systematic review and meta-analysis. *Travel medicine and infectious disease*, 34 (101623). doi:<https://doi.org/10.1016/j.tmaid.2020.101623>
- Shatz, D. V., Zhang, C., & McGrath, M. (1999). Effect of a curfew law on juvenile trauma. *Journal of Trauma and Acute Care Surgery*, 47(6), 1013.
- Usher, K., Bhullar, N., & Jackson, D. (2020). Life in the pandemic: Social isolation and mental health. *Journal of Clinical Nursing*. 29, 2756-2757. doi:<https://doi.org/10.1111/jocn.15290>
- Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C. S., & Ho, R. C. (2020). Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *International Journal of Environmental Research and Public Health*, 17(5), 1729. doi:<https://doi.org/10.3390/ijerph17051729>
- World Health Organization. (2020). *WHO Announces COVID-19 Outbreak a Pandemic*. Geneva: World Health Organization. Retrieved from: <https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/news/news/2020/3/who-announces-covid-19-outbreak-a-pandemic>

- World Health Organization. (2020). *A Guide to WHO'S Guidance on COVID-19*. Geneva: World Health Organization. Retrieved from: <https://www.who.int/news-room/feature-stories/detail/a-guide-to-who-s-guidance>
- World Health Organization. (2020). *Mental Health and Psychosocial Considerations During The COVID-19 Outbreak*. Geneva: World Health Organization. Retrieved from: <https://www.who.int/publications/i/item/WHO-2019-nCoV-MentalHealth-2020.1>
- World Health Organization. (2020). *Pneumonia of unknown cause – China*. Geneva: World Health Organization. Retrieved from: <https://www.who.int/csr/don/05-january-2020-pneumonia-of-unkown-cause-china/en/>