


# The Effects on the Number of Patients Visiting the Emergency Units: Comparison Study Before and During COVID-19 Pandemic in Saudi Arabia

Abdelhakim Abdelhadi 

Engineering Management Department,  
Prince Sultan University, Riyadh, Saudi  
Arabia

**Background:** The number of patients attending emergency departments (EDs) fell dramatically in 2020, during the COVID-19 pandemic, compared with similar periods in 2019 or 2018, and healthcare providers have had to adjust to this change. The aim of this study was to compare the number and type of patients attending a hospital emergency unit before and during the COVID-19 pandemic in order to avoid the impact of any difference on the community's healthcare and on healthcare providers.

**Methods:** This study assessed differences in the numbers of patients attending the emergency department in 2018, 2019 and 2020, and then determined whether a particular patient type accounted for any such difference. An open-source data repository was accessed to collect the data targeting a private hospital in Riyadh city, the capital of Saudi Arabia. Descriptive statistics and a paired *t*-test were used to verify the level of variations in the number of patients attending the emergency rooms.

**Results:** Results showed no statistically significant difference in the number of patients attending the emergency department between 2018 and 2019, while a noticeable drop was found in the number of patients attending the department between 2019 and 2020.

**Conclusion:** The reduction in the number of patients attending the emergency department was found in some but not all patient types. These conclusion highlight variations in ED attendance of which hospital management should be aware so that action can be taken to avoid negative consequences.

**Keywords:** emergency room, COVID-19, World Health Organization

## Introduction

In Saudi Arabia and elsewhere, the utilization of emergency departments (EDs) has increased in recent years<sup>1,2</sup> an observation which has been attributed to non-urgent patients comprising approximately 50% of all ED cases.<sup>3,4</sup> In Saudi Arabia, non-urgent patients reported multiple reasons for attending the ED such as convenience and rapid access, and the perception that they will receive better care.<sup>5</sup> These factors can lead to ED overcrowding with consequences such as increased waiting time, impaired patient-centered care, and disrupted evaluation and treatment.<sup>6,7</sup> The COVID-19 disease outbreak that first surfaced in Wuhan, China, in December 2019, has had a major impact globally, affecting almost every country.<sup>8</sup> Emergency departments have provided a first point of contact for patients with or without the COVID virus symptoms and have been most heavily impacted by this outbreak. They have played an important role in identifying patients infected with the virus and isolating them for further treatments, highlighting

Correspondence: Abdelhakim Abdelhadi  
Email [abdelhadi@psu.edu.sa](mailto:abdelhadi@psu.edu.sa)

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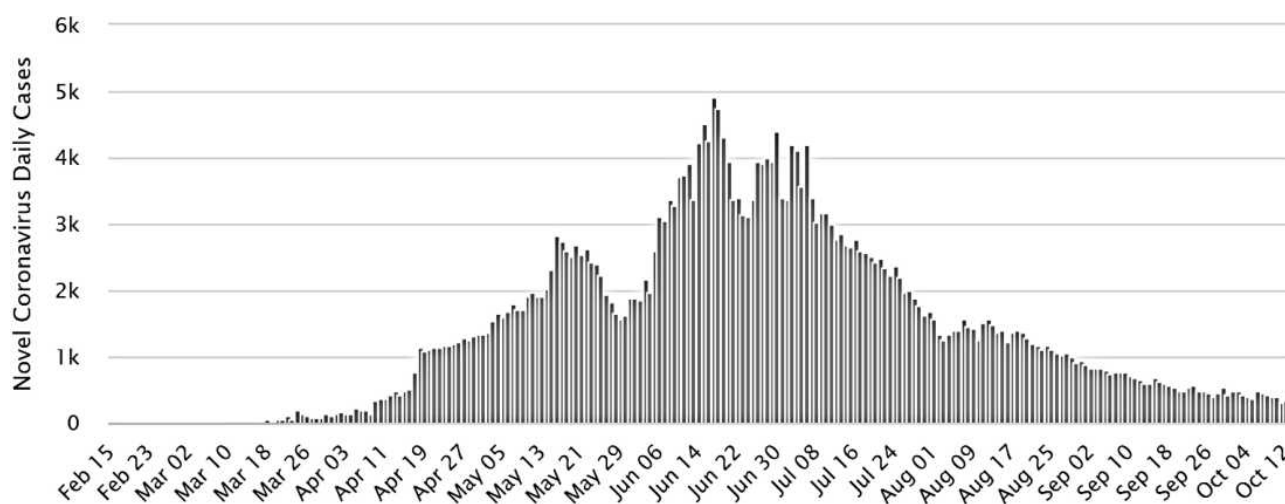


the critical nature of emergency medicine in public health. We studied the volume of patients arriving at an ED in a private hospital in the Kingdom of Saudi Arabia. We found that the number of patients attending the emergency room fell compared to previous years, perhaps due to factors such as the government-imposed curfew, or personal decisions by the public to minimize the chance of infection, based on a perception of any medical facility being a source of such infection. In this paper, we discuss the types of patient that contributed to decreased emergency department attendance during this period and the consequences of this decrease on the community or the patients themselves.

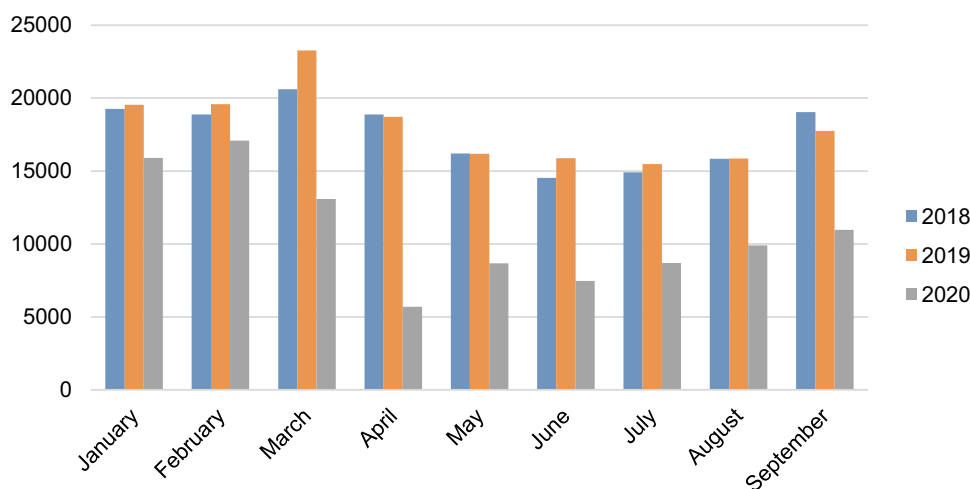
The first indication of the COVID-19 disease outbreak was in the city of Wuhan, Hubei Province, on December 2019 when the Chinese government informed the World Health Organization (WHO) China country office about a cluster of

41 patients with a new respiratory infection. On 11 January 2020, the Chinese authority informed the WHO that this infection was due to a novel coronavirus.<sup>9</sup> In Saudi Arabia, hospital EDs were prepared to some extent since isolation areas had been created within those departments when the SARS virus outbreak occurred in 2003.<sup>10,11</sup> On a normal day, the ED is manned by three shifts of doctors and nurses over a 24-hr period. The private hospital used in this was therefore prepared to receive a higher number of patients than usual due to the increasing number of COVID-19 infections. Figure 1 shows the number of confirmed cases in the Kingdom of Saudi Arabia since January 2020 (<https://www.worldometers.info/coronavirus/>).

Figure 2 indicates a decline in the number of patients attending the ED between January 2020 and September 2020 compared to the same period in 2018 and 2019.



**Figure 1** Daily new cases in Saudi Arabia.



**Figure 2** Number of patients visited the emergency room between 2018 to 2020.

## Materials and Methods

Data were collected from an open access source at the private hospital in the capital of Saudi Arabia.<sup>11</sup> The data are presented in Figure 2 which shows a significant reduction in the number of patients attending the ED in 2020 compared to the corresponding periods in 2018 and 2019. However, as shown in Table 1, the patient numbers follow similar trends each year, with a peak in the month of February (2020) or March (2018 and 2019). Paired t-tests with a <5% p value were used to define statistical significance.

Table 2 presents descriptive statistics for 2018 and 2019 and Table 3 shows estimation for paired difference of the population mean for 2018 and 2019. While Table 4 presents descriptive statistics for 2019 and 2020 and Table 5 shows estimation for paired difference of the population mean for 2019 and 2020. Paired t-tests show no significant difference ( $p=0.246$ ) between the numbers of patients attending the ED

**Table 1** Number of Patients Attending ED in 2018, 2019 and 2020 from January to September

Year	2018	2019	2020
January	19,254	19,537	15,908
February	18,882	19,591	17,079
March	20,616	23,257	13,079
April	18,878	18,719	5707
May	16,195	16,182	8687
June	14,540	15,887	7466
July	14,908	15,474	8704
August	15,844	15,863	9906
September	19,048	17,753	10,967

**Table 2** Descriptive Statistics for 2018 and 2019

Sample	N	Mean	Standard Deviation	Standard Error Mean
2018	9	17,574	2204	735
2019	9	18,029	2545	848

**Table 3** Estimation for Paired Difference of the Population Mean for 2018 and 2019

Mean	Standard Deviation	Standard Error Mean	95% Confidence Level of the Mean Differences $\mu_{-}$
-455	1091	364	(-1294, 384)

**Table 4** Descriptive Statistics for 2019 and 2020

Sample	N	Mean	Standard Deviation	Standard Error Mean
2019	9	18,029	2545	848
2020	9	10,834	3831	1277

**Table 5** Estimation for Paired Difference of the Population Mean for 2019 and 2020

Mean	Standard Deviation	Standard Error Mean	95% Confidence Level of the Mean Differences $\mu_{-}$
7196	3179	1060	(4752, 9639)

in 2018 and 2019, but a significant difference between attendance in 2019 and 2020 ( $p<0.001$ ).

## Results and Discussion

The private hospital under study classifies ED patients as adults, pediatric or obstetrics and gynecology, and investigations or treatments as shown in Table 6.

Since the number of patients attending the hospital's ED during the pandemic is statistically lower than the number visited the hospital's ED in the same period before the pandemic, this situation has several consequences such as an economic impact on the hospital and health impact on the community.<sup>6</sup> As mentioned, this study will determine the type of patient categories with the greatest reduction in hospital attendance, and the impact, if any, of this reduction on community health. The study therefore aims to compare the characteristics of patients attending the hospital ED before and after the pandemic.

**Table 6** Patient and Treatment Classifications

Category	Classification
1	New File (new ED patient)
2	Old File (existing ED patient)
3	Referrals
4	Injection
5	Nebulizer
6	Follow Up
7	Electrocardiogram
8	Minor Surgery
9	Plaster Cast
10	Special Procedure
11	Road Traffic Accidents (RTS)
12	Other

Table 7 shows the number of existing adult hospital patients attending the hospital ED from January to September inclusive in 2019 and 2020. The difference between these attendance numbers was found to be significant based on a paired  $t$  test ( $p=0.011$ ).

The number of new adult files opened in the same periods in 2020 and 2019 are shown in Table 8. Overall, no significant difference was found between these attendance numbers ( $p=0.799$ ). However, the table indicates an increase in May 2020 which may reflect COVID-19 virus testing during that month.

The numbers of existing pediatric patients attending the ED during 2019 and 2020, during the pandemic, are shown in Table 9. Overall, the numbers were found to be significantly lower in 2020 than in 2019 ( $p<0.001$ ).

The number of new pediatric new patients attending the ED during these periods are shown in Table 10. A statistically significant difference was found between the attendance numbers in these two years ( $p<0.001$ ).

**Table 7** Shows the Number of Adult Patients with an Existing File Attending the ED

Month	Old File in 2020	Old File in 2019
Jan	5536	5942
Feb	5900	14,330
Mar	5298	6949
Apr	2156	13,065
May	2824	5584
Jun	2415	5405
Jul	2714	5422
Aug	3408	5552
Sep	3765	5570

**Table 8** Shows the Number of New Adult Patients Attending the ED

	New File in 2020	New Files in 2019
Jan	583	692
Feb	574	593
Mar	705	754
Apr	598	660
May	1895	639
Jun	472	721
Jul	623	732
Aug	588	628
Sep	540	637

**Table 9** Shows the Number of Existing Pediatric Patients Attending the ED

Month	Old File in 2020	Old File in 2019
Jan	4340	6706
Feb	5192	7382
Mar	2868	9028
Apr	543	6078
May	861	4335
Jun	948	4199
Jul	1126	3464
Aug	1636	4046
Sep	2174	5383

**Table 10** Shows the Number of New Pediatric Patients Attending the ED

Month	New File 2020	New File 2019
Jan	347	361
Feb	264	374
Mar	202	447
Apr	57	309
May	94	257
Jun	104	310
Jul	116	258
Aug	126	258
Sep	150	341

## Conclusion

This research has used data reflecting the periods before and during the COVID-19 pandemic to make a comparison of the number of patients attending an ED at a private hospital in the middle eastern region of Saudi Arabia. The data reveal reduced patient attendance at ED during the pandemic. Analysis of the results indicated that there was a difference in the volume of patients' attendance at the emergency room between the pre- and during-pandemic period. However, the differences in size are limited to a specific type of patient, being apparent in existing patients but not in new patients.

These findings may be explained by existing patients being accustomed to visiting the ED or believing that the risk of visiting the ED is less than that of non-attendance. The lack of significant reduction in new adult patients may indicate that true emergencies necessitated ED attendance for this group of patients.

As a result of this research, it should be clear that each healthcare facility based on its geographical location should evaluate the type of patients who have a difference in size reaching the emergency room.

Healthcare facilities should establish measures to monitor ED attendance by different patient groups in order to determine whether interventions should be introduced to improve access to care. For example, a decrease in the number of children in the category of “injection” or “nebulizer” should trigger contact with their parents to discuss the non-attendance.

In summary, this study indicates that there is a difference between the number of cases attending health facility emergency departments before and after the COVID-19 pandemic, but this difference does not apply to all patient groups. Reasons for non-attendance may include fear of disease transmission within the ED or a tendency not to make non-essential visits to ED. Further research is needed to explore the reasons for ED non-attendance using questionnaire methods to collect data that may lead to changes in state or health facility policy and thus may prevent negative consequences of ED non-attendance.

## Ethical Approval

The ethics committee in the Engineering Management Department at Prince Sultan University have exempted this study from requiring ethical approval. The committee confirm that there is no need for any approval since the data is in form of retrospective, available in public domain and it is in the form of numbers which does not reveal any personal information.

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## Disclosure

The author declares no known competing financial interests or personal relationships with the potential to influence the work reported in this paper.

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