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A comparison study of emergency department visits in Saudi Arabia before and during the COVID-19 pandemic

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Abstract
Background: Healthcare providers had to adapt to a significant drop in patients visiting emergency departments (EDs) in 2020 due to the COVID-19 pandemic, as compared to comparable periods in 2019 or 2018. Aim: In attempt to mitigate the potential effects on community healthcare & healthcare providers, this study compared the demographics & frequency of patients visiting hospital emergency units prior to and following the COVID-19 pandemic.
Methods: This study compared emergency room visits in 2018, 2019, and 2020 and looked for patterns in patient demographics to see if any patterns emerged. The data pertaining to a private hospital in Riyadh city, the capital of Saudi Arabia, was retrieved from an open-source data repository.
Result: The results demonstrated that there was no statistically significant change in the number of patients visiting the emergency department from 2018 to 2019, but there was a discernible decline from 2019 to 2020.
Conclusion: Some patient groups showed a decrease in emergency department visits, but not all. The results show that emergency department attendance varies, which hospital administration should be aware of to prevent unfavorable outcomes.

Keywords: Emergency, COVID-19 pandemic, patients, hospital

Introduction

The global spread of the COVID-19 pandemic has changed the way healthcare systems work, influencing how patients are treated and how resources are used. This research dives into Saudi Arabia's emergency healthcare system by looking at ED visit trends prior to and during the COVID-19 epidemic [1]. A reassessment of public health priorities has been necessitated by the enormous problems brought forth by the epidemic, which have tested the durability of healthcare infrastructures. The complexity of providing emergency healthcare during the epidemic has been a challenge for many countries, including Saudi Arabia. Healthcare professionals, lawmakers, & researchers must comprehend the changes in emergency department use patterns in order to improve response and preparation plans. In order to better understand the many facets of emergency care, this comparative research will look at how the pandemic has affected the number, kind, and results of visits to the emergency department in Saudi Arabia. There is a growing body of knowledge on healthcare resilience & adaptation, and this study adds to it. The world is trying to learn from the current pandemic. Our goal is to determine what factors have influenced people's healthcare-seeking behavior and the use of emergency resources by looking at the trends in ED visits. Not only may this study help with the present epidemic, but it can also help with future public health crises by informing evidence-based policies & initiatives that maximize emergency healthcare delivery.

An observation that has been ascribed to the fact that non-urgent patients make up around half of all ED cases is the growing utilization of EDs in recent years. This trend has been observed in Saudi Arabia and other countries as well [2]. In Among the many reported [3] reasons for non-urgent ED visits in Saudi Arabia, non-urgent patients cited convenience, quick access, & expectation of better care as the most important. Overcrowding in EDs can occur as a result of these causes, which in turn can cause problems with patient-centered care, longer wait times, and interrupted examination and treatment.

The COVID-19 pandemic, which broke out in Wuhan, China, in December 2019, has affected nearly every country on the planet [5].

The COVID-19 pandemic has had the greatest effect on emergency rooms because they are the initial points of contact for individuals experiencing or not experiencing symptoms of the virus. Healthcare systems and state governments have implemented various measures to reduce the impact of the 2019 coronavirus disease pandemic and prepare for the expected surge in cases of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infections. Additionally, health systems have noticed a decline in non-COVID-19 acute care patients in the early days of the epidemic [6]. Patients may be putting themselves at high risk for future preventable morbidity and death if they do not seek and receive treatment for these acute diseases. So far, there hasn't been much research in the medical literature that looks at the features of individuals who are or aren't visiting emergency rooms during the early stages of the SARS-CoV-2 pandemic. Before and after the state-wide notification of a "peacetime emergency" and public health efforts to respond to the pandemic on March 13, 2020, we discuss changes in the characteristics of patients or presentations to the emergency department of an urban level 1 trauma hospital [7].

This article delves into the causes of the decline in emergency room visits during that time and the effects that this decline had on both the community and individual patients. It was in December 2019 in the city of Wuhan, Hubei Province, when the Chinese government notified the WHO China national office about a cluster of 41 people with a novel respiratory infection, marking the first sign of the COVID-19 disease epidemic. The Chinese government notified the World Health Organization (WHO) on January 11, 2020, that a new coronavirus was responsible for this outbreak [8]. As a result of the establishment of isolation areas within their emergency departments, Saudi Arabian hospitals were somewhat ready for the 2003 SARS outbreak. nine to ten Every day, there are three shifts of doctors and nurses working in the emergency department. So, because of the rising number of COVID-19 infections, the private hospital that was utilized for this was ready to receive more patients than usual.

Current situation of the COVID-19 pandemic & worldwide statistical data

A cluster of individuals exhibiting symptoms similar to pneumonia with an unknown cause was reported from Wuhan, Hubei Province, China, on December 8, 2019. Upon reviewing the background of these admitted individuals, a striking similarity was noted. The local Huanan seafood wholesale wet market was the site of employment or residence for the majority of the patients. Patients in this group experienced SARS during the early stages of pneumonia, & small number of them went on to develop ARDS and severe acute respiratory failure as sequelae. The new coronavirus was later identified from a throat swab sample of a hospitalized person on January 7, 2020, by the Chinese Center for Disease Control & Prevention [11]. The World Health Organization (WHO) verified on January 9, 2020, that the strain of coronavirus identified from the hospitalized patient is a new strain, and it was later called 2019-nCoV. It was also on January 9th that the first COVID-19 fatalities were reported. On January 13, 2020, the Ministry of Public Health in Thailand disclosed the country's first laboratory-confirmed case of COVID-19, joining China as a witness to the outbreak. Both the Japanese Ministry of Health, Labor and Welfare and the Korean National IHR Focal Point (NFP) announced the first cases of COVID-19 on the same day. It is worth noting that the cases detected in Japan and Thailand were really imported cases from Wuhan, China [12].

Sustained outbreaks of coronavirus (SARS-CoV-2) were later documented in Taipei Municipality, Macau Special Administrative Region, Hong Kong Special Administrative Region, & United States of America [13]. According to the 6th Situation report on the COVID-19 pandemic, which was released by the WHO on January 26, 2020, 29 confirmed cases were recorded globally in 10 countries (excluding China). Of the 29 confirmed cases, 26 had visited the Chinese city of Wuhan before, while the remaining 3 had never been there. Further examination of these three patients, however, uncovered that one of the Australian patients had close contact with a COVID-19 positive individual from Wuhan. Additionally, there is a Vietnamese individual who has personal knowledge of a COVID-19 positive father who has recently visited Wuhan. This SARS-CoV-2 transmission from an infected individual to a healthy, non-infected person, leading to human-to-human transmission, was demonstrated by the transmission of the virus to individuals who did not have a direct travel history to Wuhan through their close contacts and relatives who were in the area of the city [14]. Figure 1 depicts a chronology of the COVID-19 pandemic that highlights the important events.

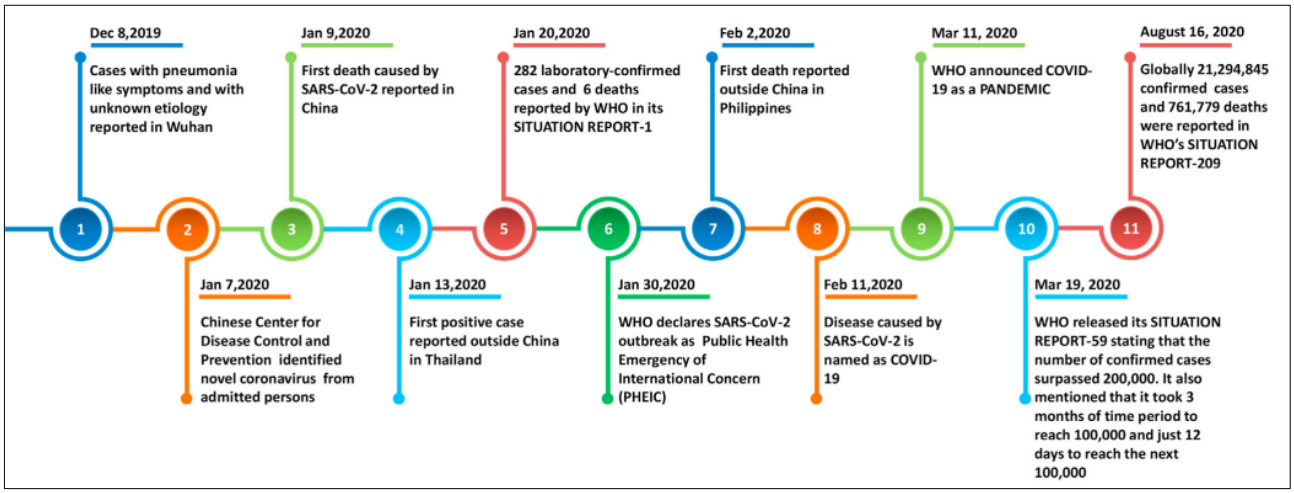

Fig 1: Timeline with significant events of COVID-19 pandemic.

Over 761,779 people have died as a result of this very contagious virus in just 210 days (30 weeks), and the death toll is rising every day. Therefore, the most pressing requirement at this time is for comprehensive public health measures and strategic preparation to contain this worldwide epidemic. Visual representations of confirmed and emerging COVID-19 cases and deaths worldwide up until August 16, 2020, are shown in Figure 2A and Figure 2B, respectively.

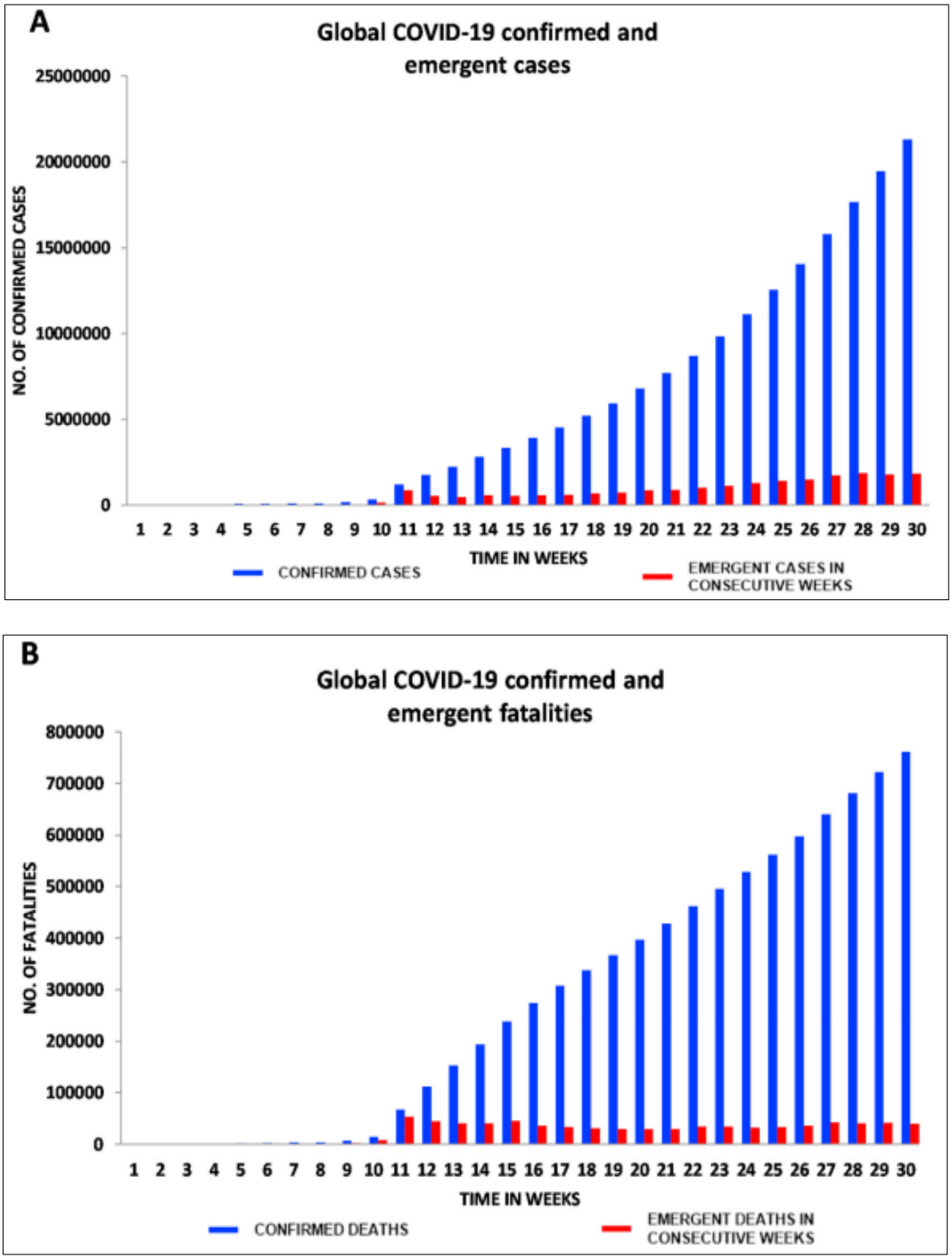

Fig 2: (A) COVID-19 confirmed & emerging cases worldwide, (B) deaths recorded up to August 16, 2020.

Materials and Methods

The private hospital in Saudi Arabia's capital city provided the data, which were retrieved from an open access source [10]. Compared to the same periods in 2018 and 2019, the number of patients visiting the emergency department in 2020 was significantly lower, as shown in Figure 2. Table 1 shows that the patient numbers tend to follow the same patterns year after year, reaching a peak in either February (2020) or March (2018 - 2019). Statistical significance was determined using paired t-tests with a p-value less than 55. You can find the 2018 or 2019 descriptive statistics in Table 2, & estimation for the paired difference of the population mean in Table 3. Table 5 displays the estimated paired difference of the population mean for 2019 and 2020, whereas Table 4 offers descriptive information for both years. According to paired t-tests, there is no significant variation (p=0.246) in the number of patients seen in the emergency department from 2018 to 2019, but there is a significant change (p<0.001) between 2019 and 2020.

Table 1: Patient Attendance in Emergency Departments from January to September in 2018, 2019, and 2020

Year	2018	2019	2020
January	19,257	19,536	15,907
February	18,881	19,593	17,078
March	20,615	23,256	13,078
April	18,877	18,718	5706
May	16,194	16,183	8686
June	14,539	15,886	7467
July	14,907	15,473	8703
August	15,842	15,862	9907
September	19,047	17,752	10,968

Table 2: Overview of 2018 - 2019 with Statistical Details

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

Table 3: An Approximation of the Population Mean's Paired Difference between 2018-2019

Mean	Standard Deviation	Standard Error Mean	95% Confidence Level of the Mean Differences μ_
−455	1091	364	(−1294,384)

Table 4: Overview of 2019 - 2020 with Statistical Details

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

Table 5: An Approximation of the Population Mean's Paired Difference between 2019 - 2020

Mean	Standard Deviation	Standard Error Mean	95% Confidence Level of the Mean Differences μ_
7196	3179	1060	(4752,9639)

Results and Discussion: According to Table 6, the private hospital that is being studied divides its emergency department patients into three categories: adults, pediatrics, or obstetrics & gynecology, and investigations or treatments. This condition has multiple ramifications, including an economic impact on the hospital or health impacts on the community, due to the fact that the number of patients visiting the emergency department during the pandemic is statistically lower than the number of patients visiting the same period before the pandemic. 6 The purpose of this study is to identify the patient demographics that saw the biggest decline in hospital visits & to assess the potential effects on public health. The purpose of the study is to examine the differences and similarities between the epidemic & hospital emergency department in terms of patient demographics.

Table 6: Classification of Patients & Their Treatments

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

For both 2019-2020, Table 7 displays the total number of adult hospital patients who visited the emergency department between January and September. According to a paired t test, there is a statistically significant difference between these attendance figures (p=0.011). Table 8 shows the amount of new adult files accessed in 2020 and 2019 within the same time periods. All things considered, the difference between these attendance figures was not statistically significant (p=0.799). On the other hand, May 2020 shows an uptick, which could be due to COVID-19 viral testing that month, according to the table. Table 9 displays the numbers of pediatric patients who visited the emergency department in 2019- 2020, during the pandemic. In comparison to 2019, the figures were discovered to be noticeably lower in 2020 (p<0.001).

Table 7: Displays the total number of adult patients who visited the emergency department and had a record.

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: Displays the Amount of New Adult Patients Visits to the Emergency Department

	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: Displays the Attendance of Current Pediatric Patients at the Emergency Department

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: Displays the Amount of New Pediatric Patients Visits to the Emergency Department

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 study compared the emergency department traffic at a private hospital in Saudi Arabia, a country in the Middle East, using data from both the pre- and post-COVID-19 eras. The findings show that during the pandemic, fewer patients visited the emergency department. According to the results, the number of patients visiting the emergency room before and during the pandemic was different. Nevertheless, the size variations are restricted to an existing patient population and do not manifest in newly-diagnosed individuals. Current patients' familiarity with the emergency department or their perception that going there poses less of a danger than staying home could account for these results. If there was no discernible drop in new adult patients, it may be because these individuals were experiencing genuine situations that required them to visit the emergency department. This study's findings should make it crystal evident that hospitals should assess the demographics of large-disease patients presenting to their emergency rooms according to their specific locations. It would be beneficial for healthcare facilities to track the number of patients seen in emergency departments by demographic in order to identify problem areas and develop strategies to address them.

Ethical Approval

This project does not need ethical approval because it has been excused by the Engineering Management Department's ethics committee at Prince Sultan University.

Declaration of competing interest

The authors have declared that they have no conflicts of interest.

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