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Impact of covid-19 outbreak on emergency visits at King Saud Medical city - A retrospective study

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ABSTRACT

The spread of COVID19 put a lot of extra work on emergency doctors, due to increased visits as a result of respiratory failure and other consequences caused by the infection. our research aims to ascertain the impact of the COVID-19 epidemic on emergency department visits based on triage levels King Saud Medical City, Riyadh, Saudi Arabia, following a retrospective observational design to determine the impact of the COVID-19 epidemic on emergency department visits in King Saud Medical City, Riyadh, Kingdom of Saudi Arabia, from June 1, 2020, to May 31, 2022. The study included all patients presented for emergency department visits at King Saud Medical City in Riyadh, Kingdom of Saudi Arabia during the period of the study. Data was collected and analyzed using SPSS software, version 26. From a total of 92874 patients, 76.2% presented during the post-pandemic. The triage level showed a significant increase from pandemic to post-pandemic. This was mostly observed in level 4 (which changed from 8.5% pandemic to 91.5% post-pandemic) and level 5 (which changed from 17.4% to 82.6%), which was statistically significant with a p value less than 0.001. Referral and OPD showed an increase of 17.5% and 3.0%, respectively. But a decrease in the discharges, deaths, and discharges against medical advice was observed. The presentation rate to cardiology, internal medicine, and orthopedics was significantly reduced.

Keywords: COVID19, emergency, visits.

1. INTRODUCTION

A novel SARS-CoV-2 that emerged in December 2019 after instances of pneumonia with an unexplained etiology started to develop in Wuhan, China.

The World Health Organization (WHO) designated this virus, COVID-19, as a pandemic once it began to spread quickly (Cucinotta & Vanelli, 2020). The principal symptoms, treatments, and preventive strategies of this illness, which severely damages several systems, particularly the respiratory system, have been the subject of numerous studies in the literature (Pascarella et al., 2020). This is an area of extensive ongoing research given that there is not a solid, tested cure yet. With the COVID-19 outbreak, several nations have acted quickly to safeguard their nationals and stop the spread of the illness. The care of COVID-19 patients was given top attention during this procedure, and all necessary preparations were made. There were several issues brought on by this modification. The indirect impact of the COVID-19 epidemic on potentially fatal conditions has been the most important problem (Lange et al., 2020). It was observed that fewer Acute coronary syndrome patients and acute stroke were referred during the pandemic (Mafham et al., 2020; Bres Bullrich et al., 2020). Trauma admissions also decreased similarly (Diegoli et al., 2020; Mitkovic et al., 2020)

Emergency department visits at Hurley Medical Center in Flint, Michigan, decreased by around 13% during the first significant wave of COVID-19. Patients who did visit the emergency room, however, were found to be sicker and more likely to require hospital admission. Contrary to other studies on this subject, COVID-19 restrictions had no effect on the rate of time-sensitive crises (myocardial infarction, stroke, and cardiac arrest) (Chowdhury et al., 2020). In both the pandemic and the pre-pandemic periods, emergency departments (EDs) have seen the initial presentation of emergency patients. Until pandemic outpatient clinics became operational in our nation, all probable COVID-19 patients presented to EDs. Following the implementation of COVID-19 outpatient clinics, EDs continued to treat both critically sick and non-critical patients (both COVID and non-COVID). Both COVID and non-COVID patients received care from EDs during the COVID-19 epidemic. ED visits have changed throughout the epidemic, just like they have in other clinics. There is, however, little research examining the changes in ED visits in the literature. No research exists on the effect of the COVID-19 epidemic on emergency consultations, non-emergency patient visits, or both.

In another study in Turkey, all levels of triage for emergency visits fell during the COVID-19 epidemic. Non-emergency visits fell while there was an increment in the number of critical patients. The overall number of emergency department consultation requests dropped. Within the overall number of emergency consultations, the rates of consultations in anaesthesiology and cardiology rose, those in neurology, orthopaedics, and ophthalmology fell, and those in internal medicine and general surgery were constant. To ensure that all patients, including non-COVID critical patients, can be admitted to hospitals and be examined safely, necessary procedures should be put in place, and the public should be informed (İlhan et al., 2021).

This study's aim is to ascertain the effect of the COVID epidemic on the ED visits based on triage levels at King Saud Medical City, Riyadh, Saudi Arabia.

2. METHODS

This was observational retrospective study in Riyadh, Saudi Arabia, King Saud Medical City (KSMC). One of Saudi Arabia's major tertiary care facilities, it was established in 1956 and has a total bed capacity of 1,500, including 200 ICU beds. The study examines the effect of the corona virus disease epidemic on emergency department visits in King Saud Medical City, Riyadh from June 1, 2020, to May 31, 2022. The period reflects the impact of the pandemic at various times of viral impact in the community. The study included all patients who presented to the emergency department at King Saud Medical City in Riyadh, Kingdom of Saudi Arabia, between June 1, 2020, and May 1, 2022. Referred cases from other hospitals were excluded. Adult's 18-and-up made up the study population. We used the health information office's summary of patient medical records from emergency visits during the study period.

Data was collected in a dedicated Google form and spread sheet. The study variables were (a) Demographic information (age, gender, and comorbidities) b) Duration of stay c) Status (discharged, admitted, referred, or died). d) Diagnosis (infectious disease, respiratory failure/insufficiency/arrest, abdominal pain, personal/family disease history, lipid metabolism disorders, and so on). Data on comorbidities, age, gender, and length of hospital stay were compared between June 1, 2021 and May 31, 2022, and June 1, 2020 and May 31, 2021, respectively. Data was collected from the King Saud Medical City and King Saud Medical City Medical Records and entered into a purpose-built (Stata/Excel) spread sheet and statistical analysis was done by SPSS Analyses.

All data was collected and analyzed by using the Statistical Package for Social Sciences (SPSS) to generate statistics and to generalize the results to a wider population. Categorical variables were summarized as frequency and proportion (%). Continuous variables were presented as the mean and standard deviation. Between comparisons, the Fischer exact test (categorical variables) and the independent sample t-test (continuous variables) were applied. Normality tests were performed using the Shapiro-Wilk test. A p-value cut-off point of 0.05 at 95% CI was used to indicate statistical significance. Research board approval was obtained from the directorate of King Saud Medical City, Ministry of Health Riyadh, Kingdom of Saudi Arabia. All the forms were kept

confidential and managed according to the requirements of the research centre. No patients' names or private information will be mentioned in this study. All the data will be stored, but only the investigators, statisticians, and data collectors will have access to it.

In a protocol-based number (H1RI-27-Jul22-01), the KSMC review board granted permission and waived consent for this study. The forms were handled in a secure and private manner according to the needs of the research facility.

3. RESULTS

According to Table 1, there were 92,874 patients presented to the hospital during the period from June 1, 2020, to May 31, 2022. The majority of the patients (70,728 or 76.2%) presented during the post-pandemic period from June 1, 2021, to May 31, 2022.

Table 1 Clinical attributes and demographic of the patients (n=92,874)

Period	N (%)
Pandemic	22146 (23.8%)
Post-Pandemic	70728 (76.2%)
Total	92874 (100%)

Patients' gender varied significantly between pandemic and post-pandemic, with a considerable reduction in the male to female ratio presentation to ER from 70.6% of males presented in the pandemic period to 66.2%. This change was a statistically significant variation with a p-value of 0.001 (Table 2). Additionally, the triage level showed a significant change from pandemic to post-pandemic. This was most prominent in levels IV and V as the change was from 8.5% and 17.4% to 91.5% and 82.6%, respectively. This was statistically significant with a p-value of 0.001.

Table 2 Association between presentation period and the patient's characteristics (n=92,874)

	Period		P-value §
	Pandemic N (%) (n=22146)	Post-Pandemic N (%) (n=70728)	
Age group in years (mean ± SD)	43.76 ± 20.242	38.87 ± 18.804	0.001 **
Gender			
Male	15638 (70.6%)	46846 (66.2%)	0.001***
Female	6508 (29.4%)	23882 (33.8%)	
Triage Level			
Level I	113 (32.2%)	238 (67.8%)	0.001***
Level II	7675 (31.5%)	16717 (68.5%)	
Level III	13629 (23.9%)	43376 (76.1%)	
Level IV	680 (8.5)	7359 (91.5%)	
Level V	45 (17.4%)	213 (82.6%)	

§ P-value has been calculated using the Chi-Square test.

** Significant at $p<0.05$ level. *** Significant at $p<0.001$ level.

There was an increase in patient referral (17.5%), and OPD cases (3.0%) but a drop in discharge (74.8%), death (2.3%), and Discharge against Medical Advice (DAMA) (2.8%). These changes were statistically significant with a P-value of less than 0.001 (Table 3). When the admission departments' rates were evaluated, according to table 4, a significant reduction was found in the presentation rates of cardiology, internal medicine, and orthopaedics. This change was significant. The changes between the rates of the different periods are shown in Figure 1.

Table 3 Association between presentation period and the final status of patients (n=92,874)

	Period		P-value §
	Pandemic N (%), (n=22146)	Post-Pandemic N (%), (n=70728)	
Discharged	17161 (77.5%)	52909 (74.8%)	0.001***
Referred	2097 (9.5%)	12091 (17.5%)	
Death	1738 (7.8%)	1662 (2.3%)	
DAMA	952 (4.3%)	1951 (2.8%)	
OPD case	198 (0.9%)	2115 (3.0%)	

§ P-value has been calculated using the Chi-Square test.

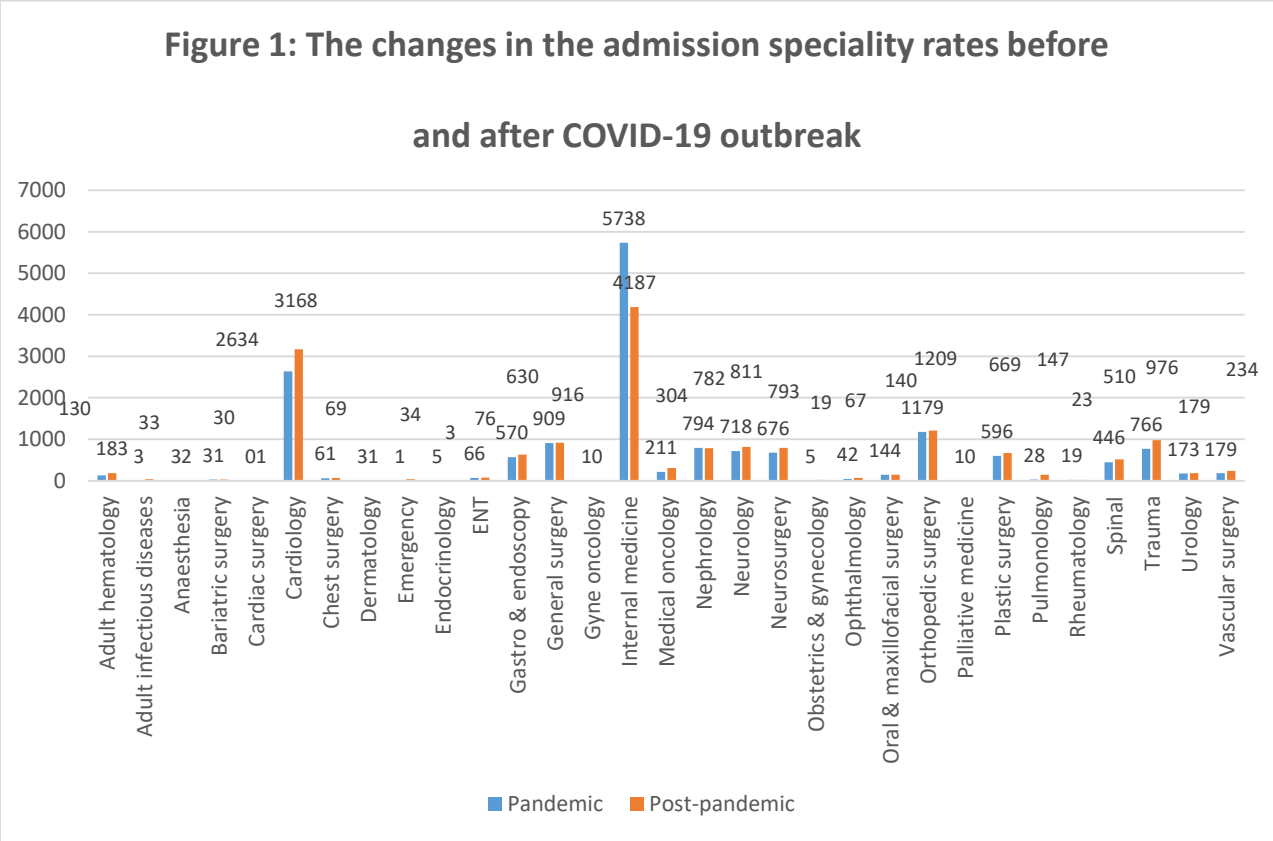
** Significant at p<0.05 level. *** Significant at p<0.001 level.

Table 4 Association between presentation period and the admission department (n= 92,874)

	Pandemic (n=22,146)		Post pandemic (n=70,728)		P - value
	Count	Percentage	Count	Percentage	
Not Defined	6014	27.16%	54532	77.1%	0.001***
Adult Hematology	130	0.59%	183	0.3%	
Adult Infectious Diseases	3	0.01%	33	0.05%	
Anaesthesia	3	0.01%	2	0.003%	
Bariatric Surgery	31	0.14%	30	0.04%	
Cardiac Surgery	0	0.0%	1	0.001%	
Cardiology	2634	11.9%	3168	4.5%	
Chest Surgery	61	0.3%	69	0.1%	
Dermatology	3	0.01%	1	0.001%	
Emergency	1	0.004%	34	0.05%	
Endocrinology	5	0.02%	3	0.004%	
Ent	66	0.3%	76	0.1%	
Gastro And Endoscopy	570	2.6%	630	0.9%	
General Surgery	909	4.1%	916	1.3%	
Gynae Oncology	1	0.004%	0	0.0%	
Internal Medicine	5738	25.9%	4187	5.9%	
Medical Oncology	211	1.0%	304	0.4%	
Nephrology	794	3.6%	782	1.1%	
Neurology	718	3.2%	811	1.1%	
Neurosurgery	676	3.1%	793	1.1%	
Obstetrics And Gynecology	5	0.02%	19	0.03%	
Ophthalmology	42	0.2%	67	0.1%	
Oral And Maxillofacial Surgery Dept.	144	0.7%	140	0.2%	
Orthopaedic	1179	5.3%	1209	1.7%	
Palliative Medicine	1	0.004%	0	0.0%	
Plastic Surgery	596	2.7%	669	0.9%	
Pulmonology	28	0.1%	147	0.2%	
Rheumatology	19	0.09%	23	0.03%	
Spinal	446	2.0%	510	0.7%	
Trauma	766	3.5%	976	1.4%	
Urology	173	0.8%	179	0.3%	
Vascular Surgery	179	0.8%	234	0.3%	

§ P-value has been calculated using Fischer exact test.

** Significant at p<0.05 level; *** Significant at p<0.001 level.



4. DISCUSSION

In this study, a substantial increase in emergency visits at all levels of triage was seen. In our analysis, we saw a considerable rise in the frequency of exams for patients' levels III, IV, and V. In this case, we may state that throughout the COVID-19 outbreak, critical patients visited the emergency department (ED) more frequently than non-critical patients. Conversely, Hoyer et al., (2020) found a decrease in stroke and TIA cases in some sites in their multicenter trial. All kinds of acute coronary syndrome were observed to be declining over the COVID-19 era (Mafham et al., 2020). Data from hospital admissions for life-threatening conditions showed a drop during the COVID-19 period (Lange et al., 2020). The visits of severely sick patients to the red triage level and the consultations from the red area both showed a considerable increase in our research. The number of grades III, IV, and V has significantly increased, and their prevalence has grown among all emergency visits in our research, notwithstanding this (Chowdhury et al., 2022). Additionally, among all emergency consultations, the incidence of seriously sick individuals seeking emergency care has risen. The public needs nationwide education and explanation. The fact that care is also given to COVID-free patients should be stressed. During epidemics, proper medical treatment was provided. Additionally, the right triage results are used to identify individuals that require additional resources and medical attention.

When the admission departments' rates were evaluated, A significant reduction was found in the presentation rates of cardiology, internal medicine, and orthopaedics. This change was significant. The proportionate rise of COVID-19 critical patients in the red triage category within all ED visits might be the cause of this decrease. A study found that there were fewer serious cardiac cases during the pandemic. The number of patients consulted by the cardiology department in our analysis also showed a considerable decline. However, a notable rise in the rates of cardiology consultations was found (Toniolo et al., 2020). Due to the rising percentage of patients with a red triage level and the increased need for a cardiac examination of critically ill patients, this increase can be tolerated. Additionally, there may have been an increase in cardiology presentations number during the pandemic period due to the cardiac effects of both the COVID-19 virus and the medications used to treat it (Ilhan et al., 2021).

The triage level showed a significant change from pandemic to post-pandemic. This was most prominent in levels III, IV, and V. The fear of hospital incompetence and anxiety during the pandemic period that patients in many nations, including our own, are suffering may be the causes of this development. Despite limitations around the nation, our emergency medical service has been treating patients. As a result, anxiety rather than fear contributes more to the decrease in patient presentations. Additionally, an increase in COVID-19 daily mortality may have an effect on ED admissions (Mantica et al., 2020).

It is challenging to understand significant changes in patient presentations using percentages alone due to the study's enormous sample size. It's been figured out that minor percentage changes in huge numerical populations correspond to hundreds of cases. The COVID-19-related drop in patient presentations in 2020 might potentially be ascribed to varying percentages. The data in our investigation were compared from June 1, 2020, to May 31, 2021, and from June 1, 2021, to May 31, 2022. Therefore, the data and comments reflect only a subset of the COVID-19 epidemic. This research also assessed emergency department hospital visits at a single Riyadh, Saudi Arabia hospital. As a result, this information is particular to the area's residents and might not reflect the experiences of other hospitals or regions in Riyadh or the rest of the country. Finally, because there are additional indicators to evaluate for severity other than triage level, one investigative metric, severity, may not be directly comparable to other research looking at the severity of ED visits.

5. CONCLUSION

In this research, emergency visits at all levels of triage increased significantly. We observed a significant increase in the frequency of assessments for levels III, IV, and V patients. During the COVID-19 epidemic, we may claim that critical patients attended the emergency department (ED) more often than non-critical patients. Since there are multiple markers to measure severity outside triage level, one investigative statistic, severity, may not be directly comparable to previous study examining the extent of emergency visits.

Abbreviations

EM: emergency department, TIA: transient ischemic attack.

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Authors' contributions

Principal investigator: Faheem Mohammed Alanazi: From the inception of the research proposal through its conclusion, I organized and supervised the whole project and participated in all aspects of the study.

Co authors: Eradah A Almarhoon: I was involved in every stage of the study, from proposal preparation to the end.

Ahmed D Alhejaili: was responsible for proposal writing and data gathering and participated in the majority of research phases, from proposal writing through conclusion.

Hassan H Al Jalooud: was responsible for the final introduction and data gathering and participated to the majority of the study phases from proposal preparation to conclusion.

Maram M Alawwad: Was responsible for questionnaire design, data collecting and analysis, and data gathering, and participated in the majority of research phases, from proposal writing through conclusion writing.

Moshabob S Alqahtani: was responsible for discussion and conclusion writing and participated largely during research phases, from proposal writing through conclusion writing.

Manar A Hamdoon: Took part in developing the questionnaire, collecting data, and analyzing results; also helped with other stages of the study process, from proposal preparation through report writing.

Malak A Hamdoon: Actively participated to the study process, from proposal writing through conclusion writing, by helping to develop the questionnaire, gather data, and analyze results.

Reem C Alanazi: contributed to the study in many ways, including the idea, analysis, debate, and conclusion.

Khalid M Alghamdi: Took part in developing the questionnaire, collecting data, and analyzing results; also helped with other stages of the study process, from proposal preparation through report writing.

Ibrahim F Alanazi: aided in many aspects of the research, including conception, data collection, analysis, discussion, and interpretation.

Ibrahim M Alghamdi: Actively participated to the study process, from proposal writing through conclusion writing, by helping to develop the questionnaire, gather data, and analyze results.

Ali M Aldhufairi: Helped with the development of the questionnaire, the gathering and analysis of data, and many other aspects of the study process from proposal writing through report writing.

Rayan M Alqahtani: had primary responsibility for the research's discussion and conclusion and participated in its development through its many stages.
Sameh Ahmed: was responsible for developing the questionnaire, gathering and analyzing data, and participating in most stages of the study process from proposal to report.

Further information

All authors have confirmed that they have no current or historical financial relationships to any organizations that would have an interest in the submitted work, and that they have no other affiliations or activities that might be construed to have influenced the work.

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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