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# Public Health in Emergency Medicine

## VOLUME AND ACUITY OF EMERGENCY DEPARTMENT VISITS PRIOR TO AND AFTER COVID-19

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**Abstract—Background:** There are scant data regarding the change in volume and acuity of patients presenting to emergency departments (EDs) after Coronavirus Disease 2019 (COVID-19), compared with the pre-COVID-19 era. **Objective:** To determine ED volumes and triage acuity prior to and after COVID-19. **Methods:** We determined the volume of patients presenting to four large EDs affiliated with general, cardiac, cancer, and obstetrics hospitals, and the acuity of presenting illness (using the Canadian Triage Acuity Scale [CTAS]) for March and April 2020 and compared them with the same months in 2019 and January 2020. Together, these facilities see over 80% of the ED visits in Qatar. The first COVID-19 patient in Qatar was diagnosed on February 29, 2020. **Results:** A total of 192,157 ED visits were recorded during the study period. There was a 20–43% overall drop in number of ED visits, with significant variability across hospitals. The Heart Hospital experienced the sharpest decline (33–89%), and the National Center for Cancer Care and Research experienced the least decline in volumes. The decline was observed across all CTAS levels, with the largest decline observed in individuals presenting with CTAS 1 and 2 (26–69% decline month by month). No increase in overall number of deaths or crude mortality rate was observed in the COVID-19 era, according to national statistics. **Conclusions:** Sharp declines in ED visits and the triage acuity seen in both general and specialty hos-

pitals raise the concern that severely ill patients may not be seeking timely care, and a surge may be expected once current restrictions on movement are lifted. © 2020 The Author(s). Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

**Keywords—**COVID-19; emergency department; SARS-CoV-2; Qatar; acute illness

### INTRODUCTION

The Coronavirus Disease 2019 (COVID-19) pandemic has been associated with a decrease in acute care hospitalizations for cardiovascular and other acute care conditions (1,2). There are scant data regarding the change in volumes and triage acuity of patients presenting to emergency departments (EDs) prior to and after COVID-19. A recent single-center report at an urban hospital in the United States reported a 35% decline in ED visits compared with the previous year (3). A reduction in volumes, particularly among those with severe acute conditions, may lead to a higher rate of complications and higher mortality in the general population.

### MATERIALS AND METHODS

The study was conducted at Hamad Medical Corporation, the public health care system that provides approximately

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90% of emergency care and hospital beds in the State of Qatar. Hamad Medical Corporation comprises 14 facilities, which include the largest tertiary care referral center in the country and one of the busiest EDs in the region (Hamad General Hospital), and dedicated national referral centers for cardiac (Heart Hospital), cancer (National Center for Cancer Care and Research), and obstetric/gynecologic (Women’s Wellness and Research Center) care. Smaller secondary care general hospitals are scattered across the country, with more complicated emergency and acute care being referred to Hamad General Hospital. Hamad General Hospital has one of the largest EDs in the region, with annual volumes exceeding 550,000 visits, whereas the Women’s Wellness and Research Center delivers over 18,000 babies annually. Patients suspected of acute coronary syndrome, particularly those who might require primary percutaneous interventions, are diverted to the Heart Hospital. All complex cancer care, including radiation therapy, is provided at the National Center for Cancer Care and Research. The Women’s Wellness and Research Center sees the overwhelming majority of obstetrics cases in the country. All hospitals are accredited by the Joint Commission International and utilize the same electronic health records system (Cerner®, North Kansas City, MO), and patients retain the same unique medical record number across all hospitals.

The first COVID-19 patient in Qatar was diagnosed on February 29, 2020. We determined the number of individuals presenting to four EDs in the State of Qatar during March–April 2020 (COVID era) and compared it with the numbers in January 2020 and the same months (March–April) in 2019 (pre-COVID era). Each patient presenting to any of the EDs was evaluated by a registered nurse who recorded the chief complaint(s), obtained a brief history, recorded vital signs, and assigned a triage category based on the Canadian Triage and Acuity Scale (CTAS), which is a validated scale with values ranging from 1–5, with “1” indicating immediate threat to life or limb requiring resuscitation and “5” indicating nonurgent conditions that do not require immediate attention and may be self-limiting or a part of a chronic problem (4).

The overall volume of patients presenting to each ED was determined and compared across the study months. Triage acuity was also compared across all months, across all hospitals. Changes were recorded as percentage changes across months.

**RESULTS**

A total of 192,157 ED visits were recorded during the study period. The breakdown by hospital and study month is presented in Table 1. There was a 20–43% overall drop in ED visits, with significant variability across hospitals. The Heart Hospital, which receives the most

**Table 1. Number of Emergency Department Visits Per Hospital and Change in Volumes During the Study Period**

	Hamad General Hospital, n	Heart Hospital, n	National Center for Cancer Care and Research, n	Women’s Wellness and Research Center, n	Grand Totals, N
March 2019	34,612	1289	506	7532	43,939
April 2019	33,469	1204	448	7660	42,781
January 2020	35,839	1279	510	7205	44,833
March 2020	27,993	854	457	5815	35,119
April 2020	20,818	132	408	4127	25,485
Δ (Apr 2020 - Apr 2019)	-37.80%	-89.04%	-8.93%	-46.12%	-40.43%
Δ (Mar 2020 - Mar 2019)	-19.12%	-33.75%	-9.68%	-22.80%	-20.07%
Δ (Apr 2020 - Jan 2010)	-41.91%	-89.68%	-20.00%	-42.72%	-43.16%
Δ (Mar 2020 - Jan 2020)	-21.89%	-33.23%	-10.39%	-19.29%	-21.67%

CTAS = Canadian Triage and Acuity Scale.

**Table 2. Number of Emergency Department Visits Per Month by Severity Level At All Hospitals**

	CTAS 1 + 2		CTAS 3		CTAS 4		CTAS 5		Missing*	
	n	%	n	%	n	%	n	%	n	%
March 2019	2644	6.00%	15,135	34.40%	16,057	36.50%	9051	20.60%	1052	2.40%
April 2019	2227	5.20%	14,824	34.70%	15,891	37.10%	9100	21.30%	739	1.70%
January 2020	1345	3.00%	14,249	31.80%	18,446	41.10%	10,008	22.30%	785	1.80%
March 2020	824	2.30%	11,296	32.20%	14,291	40.70%	7647	21.80%	1061	3.00%
April 2020	994	3.90%	8175	32.10%	9188	36.10%	5341	21.00%	1787	7.00%
Δ (Apr 2020 - Apr 2019)	-1233	-55.37%	-6649	-44.85%	-6703	-42.18%	-3759	-41.31%	1048	58.65%
Δ (Mar 2020 - Mar 2019)	-1820	-68.84%	-3839	-25.37%	-1766	-11.00%	-1404	-15.51%	9	0.85%
Δ (Apr 2020 - Jan 2020)	-351	-26.10%	-6074	-42.63%	-9258	-50.19%	-4667	-46.63%	1002	56.07%
Δ (Mar 2020 - Jan 2020)	-521	-38.74%	-2953	-20.72%	-4155	-22.53%	-2361	-23.59%	276	26.01%

CTAS = Canadian Triage and Acuity Scale.

\* Missing triage category represents those individuals who registered to be seen but were not evaluated, having left the Emergency Department prior to triage evaluation.

patients with acute coronary syndrome, experienced the sharpest decline (33% in March 2020; 89% in April 2020), whereas the National Center for Cancer Care and Research, which manages cancer patients, experienced the least decline in volumes (Table 1). The steepest decline in volumes at the Heart Hospital in April 2020 likely reflects an administrative decision to shift all walk-in patients to the main tertiary care hospital ED across the street. The decline was observed across all CTAS levels, with the largest decline observed in individuals presenting with CTAS 1 and 2 (26–69% decline month by month) (Table 2; Supplementary Figure 1, available online). An increase in number and proportion of persons with missing CTAS values was observed in the COVID era, which reflects individuals who did not wait to be screened after initial registration.

To understand the impact of lower volumes and lesser numbers of patients with high triage acuity upon overall mortality in the country, we retrieved publicly available national data from the Planning and Statistics Authority (5). No significant spike in number of deaths or crude death rate was observed in March/April 2020, compared with previous months and with same months in 2019 (Supplementary Table 1, available online). However, a dramatic decline in number of live births was noted in March and April 2020 compared with previous months and year by year, with a rebound observed in May 2020.

## DISCUSSION

We observed a sharp decline in patients presenting to EDs at both general and specialty care hospitals in Qatar in the COVID era compared with earlier comparison periods. The drop in the number of persons with highest acuity of illness is concerning because these conditions require immediate medical attention and care. With the overall decrease in the number of patients presenting to EDs due to the pandemic and travel restrictions, one would

expect the proportion of persons with more severe disease to be higher, because the sickest patients would be expected to present for care. According to national statistics, the number of deaths and crude mortality rate did not increase in March and April 2020, compared with previous months (Supplementary Table 1) (5). Although it may still be too early to gauge the impact of change in ED volumes upon outcomes and mortality, it is reassuring that the short-term mortality did not show an increase.

The sharp decline in persons presenting to the Heart Hospital is concerning. Because this hospital predominantly serves those with cardiovascular diseases, and is the sole center for primary percutaneous interventions for acute coronary syndrome, it is unclear whether there is an actual decline in number of hard cardiovascular disease events (e.g., acute myocardial infarction), or whether this represents a decline in patients with nonacute cardiac problems or symptoms of noncardiac origin. The steeper decline in April reflects an administrative decision to shift all walk-in patients to the nearby tertiary care hospital. However, the decline in March 2020, compared with the pre-COVID era, represents a true decline. The observation that the triage acuity in the COVID-19 months was sharply lower could indicate both patients with acute severe conditions opting not to come to the ED, and the possibility that fewer patients actually have acute conditions requiring immediate intervention.

A dramatic drop in reported births was observed in March and April 2020. These months coincide with the governmental decision to restrict travel within the country and the mandatory requirement for 80% of staff to work from home. We postulate that this resulted in delayed reporting and registration of births to the Planning and Statistics Authority. This assumption is supported by a sharp rebound in reported births in May 2020, though not to the prepandemic numbers. We expect this to further increase in the coming months as government offices catch up with all reports. Qatar's epidemiologic curve

for the early months, with key government decisions, is presented in [Supplementary Figure 2](#) (available online).

### Limitations

We did not study the impact of specific movement and travel restrictions implemented by the State of Qatar upon the number of patients presenting to the EDs. The study period was limited to the first 2 months after the first COVID-19 patient was diagnosed in Qatar. The results may change after a longer-term follow-up, and we intend to update our results in the future.

### CONCLUSIONS

The number of patients presenting to the all EDs and the triage acuity dropped sharply in the COVID-19 era. These declines were observed in both general and specialty hospitals, and raise the concern that severely ill patients may not be seeking timely care, and a surge may be expected once current restrictions on movement are lifted. It is imperative to determine whether these declines are associated with an increase in long-term overall mortality and rate of complications in the general population. If confirmed, this requires interventions to identify and provide appropriate care to these individuals.

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### SUPPLEMENTARY DATA

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.jemermed.2020.08.013>.

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## ARTICLE SUMMARY

### **1. Why is this topic important?**

Understanding the impact of Coronavirus disease 2019 (COVID-19) upon emergency department (ED) care is critical in planning and ensuring appropriate and timely care of patients with medical emergencies.

### **2. What does this study attempt to show?**

This study demonstrates the changes in volumes and severity of presenting complaints in the COVID-19 era compared with the pre-COVID-19 era.

### **3. What are the key findings?**

A 20–40% drop in ED visits was observed in the COVID era compared with the pre-COVID era.

The decline was observed in EDs affiliated with all hospitals.

Proportion of persons presenting with Canadian Triage Acuity Scale (CTAS) 1 & 2 also dropped sharply.

### **4. How is patient care impacted?**

Drops in CTAS 1 & 2 suggests that severely ill patients are not seeking timely care.

A surge in patients with more severe presenting complaints may be expected after the movement restrictions are lifted.