

Outcomes of Discharged Coronavirus Disease of 2019 Patients from an Emergency Department at a Tertiary Care Hospital: A Pilot Study

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Abstract Background: Patients with Coronavirus Disease of 2019 (COVID-19) infection can develop varying degrees of illness severity. A critical decision point for all frontline providers affects to whether a given patient is at high risk for severe illness and thus needs inpatient care as opposed to recovery at home. **Aim of the study:** The aim of the current study is to assess the outcomes of the suspected Covid-19 patients who were swabbed after presenting to the Emergency Department at King Abdullah Medical City and their result came positive for Covid-19. **Subjects and Methods:** A retrospective pilot study was conducted at KAMC, Holy Makkah-Saudi Arabia. Fifty-one positive covid-19 patients were included at this study. The demographic data, presenting complaint, The Canadian Triage and Acuity Scale (CTAS), comorbidities, discharging vital signs, and hospital revisits were extracted from the electronic medical records (EMR) using Trakcare system. Patients were followed up by phone calls after discharge from the ER for 14 days. Information regarding KAMC hospital revisit or other hospital revisit, quarantine location and length, seeking medical advice, and non-hospital revisit were obtained from the patients or their relatives. Data was collected from 15th of March 2020 till 15th of June 2020. Then the outcomes were assessed. Chi-square test and independent sample t-test were used to compare proportions and continuous variables, respectively. The binary logistic regression calculated odds ratios (OR) and 95% confidence intervals (95% CI for the interested predictors. $P < 0.05$ was considered statistically significant. **Results:** oxygen saturation was found to be the only independent predictor of revisiting COVID 19 patients (OR=0.46; $P=0.009$). **Conclusion:** oxygen saturation was found to be the only independent predictor of revisiting COVID 19 patients.

Keywords: COVID-19, outcomes, emergency department

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1. Introduction

Coronavirus Disease of 2019 (COVID-19) created many challenges for all health care system; the most important was to prevent hospitals from being overwhelmed by admissions. Strategies were practiced balancing adequate care with the need to maintain bed capacity. This required an active approach to emergency department (ED) discharges. Covid-19 is an overwhelming pandemic. Because of the limited resources and hospital capacity, patients are triaged in terms of clinical severity, in addition to testing for SARS-CoV-2 by means of reverse transcriptase PCR

(RT-PCR), and they are managed accordingly. In other words, not all Covid-19 suspects are admitted [1,2].

Patients with COVID-19 infection can get variable degrees of illness severity. A critical decision point for all frontline providers pertains to whether a given patient is at high risk for severe illness and thus needs inpatient care as opposed to convalescence at home [3]. Early reports have indicated that some patients with COVID-19 have paradoxically mild presentations at first encounter but are prone to following rapid deterioration. Existing guidelines have few specific criteria for facilitating identify which patients may be most at risk for subsequent decompensation and should be monitored more closely or admitted to the hospital [4].

In Saudi Arabia, the recommendations continuously change. On the 10th of February 2021, a protocol from Ministry of Health (MOH) for managing Covid-19 patients released its last update. The protocol classifies patients to suspected and PCR-confirmed cases. Each one is categorized based on the severity of symptoms; furthermore, it explained the recommended approach for dealing with each category [5,6]. A study done by Sulaiman et al reported that return to hospital after admission for COVID-19 was infrequent within 14 days of discharge. The most common cause for return was respiratory distress. Patients who returned more likely had COPD and hypertension, shorter LOS on index-hospitalization, and lower rates of in-hospital treatment-dose anticoagulation [7].

Early detection of patients who are likely to develop critical illness is of great importance and may aid in delivering proper care and optimizing use of limited resources. It is not known how often and which patients with COVID-19 return to the hospital following initial evaluation in the ED. To date, prediction models have focused on the risk of critical illness among hospitalized patients [8].

The originality of this virus has spurred record-breaking efforts by the scientific community to describe its epidemiology, explain its clinical features, develop therapeutics, and build illness severity prediction tools to aid clinicians in its triage and management. Emergency departments are often the first line of contact with people infected with COVID-19 and play a crucial role in triage. However, there is now little specific guidance for determining when patients with COVID-19 need hospitalization and when they may be carefully monitored as an outpatient. so, urgent clinical guidance based on outcomes data is needed to inform shared decision-making about patient discharge. In this paper, we focus on ED disposition decision-making in King Abdullah Medical City in Makkah (KAMC) during the COVID-19 pandemic, by identifying patients suspected of COVID-19 who are discharged yet finally require hospital return and admission. This study seeks to describe the clinical, and demographic characteristics that are associated with an unscheduled return to the ED for admission.

The aim of this study is to assess the outcomes of the suspected COVID-19 patients who were swabbed after presenting to the Emergency Department at KAMC and their result came positive for COVID-19.

2. Research Methods

A retrospective pilot study was conducted at KAMC, Holy Makkah-Saudi Arabia. Patients with positive SARS-CoV-2 Polymerase Chain Reaction (PCR) testing were included at this study. All these patients were stable and discharge directly from Emergency Department after taking the swab and symptomatic treatment. We excluded all patients who discharged against medical advice in the Emergency Department, all absconded patients (left without completing treatment), and patients younger than 14 years as KAMC scope of service is limited to treating adult patients.

An official approval and permission from KAMC IRB were obtained before conducting the research. The aim of the study was explained to the participants and verbal consent was obtained. The anonymity, privacy of the participants, confidentiality of the data, and the right to refuse to participate or refuse to participate and withdraw from the study were assured.

3. Data Collection

The demographic data, presenting complaint, The Canadian Triage and Acuity Scale (CTAS), comorbidities, discharging vital signs, and hospital revisits were extracted from the electronic medical records (EMR) using Trakcare system. Patients were followed up by phone calls after discharge for 14 days. Information regarding KAMC hospital revisit or other hospital revisit, quarantine location and length, seeking medical advice, and non-hospital revisit were obtained from the patients or emergency contact person according to patient's medical record. Then the outcomes were assessed. The primary outcome which is the health status (clinical features of the first ER visit, documented the revisited cases and compared them with the non-revisits) by phone call follow ups. The Secondary outcome was the associated risk factors with re-visited the ED after being discharged. Data were collected from 15 March 2020 to 15 June 2020.

4. Statistical Analysis

Data were analyzed through SPSS V 25. Categorical variables were presented in frequencies and percentages and continuous variables were presented in means and standard deviation. Chi-square test and independent sample t-test were used to compare proportions and continuous variables, respectively. The binary logistic regression calculated odds ratios (OR) and 95% confidence intervals (95% CI for the interested predictors. $P < 0.05$ was considered statistically significant.

5. Results

Our study illustrates the mean aged of the participants was 46.49 ± 16.05 , 52.9% was female, 51.0% was non-Saudi, not smoking (78.4%), obese (66.7%). There was no statistically significant difference between revisited and non-revisited patient related to their age, gender, nationality, smoking status, and BMI. (Table 1)

Our study illustrates the studied patients had different signs and symptoms of COVID 19; fever (68.6%), had difficulty of breathing (39.2%), muscle / or body aches, and sore throat (19.6%), loss smelling or tasting, runny nose / congestion, nausea / or vomiting (5.9%), diarrhea (13.7%), cough (56.9%), fatigue (2.0%), and headache (9.8%). The majority of the studied patients (96.1%) were alert, 66.7% sorted as CTAS3. The means of patients' oxygen saturation, heart rate, respiratory rate, temperature, systolic, and diastolic blood pressure were 96.63 ± 1.69 , 89.45 ± 14.35 , 17.96 ± 1.73 , 37.44 ± 0.45 , 132.31 ± 17.41 , and 77.31 ± 10.82 respectively. The studied patients had

medical history including diabetes mellitus (43.1%), hypertension (35.3%), chronic vascular disease (37.3%), bronchial asthma (2.0%), and chronic kidney and lung diseases (2.0%). There was no statistically significant

difference between revisited and non-revisited patient related to signs and symptoms of COVID 19, levels of triage, medical history and vital signs except oxygen saturation, in addition to conscious levels. (Table 2)

Table 1. Personal characteristics of the studied patients

Characteristics	Overall (n=51)		Not revisit (n=40)		Revisit (n=11)		p
	No	%	No	%	No	%	
Age (years)							
20 - 30 years	9	17.6	7	17.5	2	18.2	1.0
31 - 40 years	11	21.6	9	22.5	2	18.2	
41 - 50 years	10	19.6	8	20.0	2	18.2	
> 50 years	21	41.2	16	40.0	5	45.5	
Mean±SD	46.49±16.05		45.55±15.57		49.91±18.02		
Gender							
Male	24	47.1	18	45.0	6	54.5	0.57
Female	27	52.9	22	55.0	5	45.5	
Nationality							
Saudi	25	49.0	19	47.5	6	54.5	0.67
Non- Saudi	26	51.0	21	52.5	5	45.5	
Smoking							
No	40	78.4	31	77.5	9	81.8	1.0
Yes	11	21.6	9	22.5	2	18.2	
Body mass index							
<18.5 (underweight)	1	2.0	0	100.0	1	9.1	0.22
18.5-24.9(Normal weight)	11	21.6	9	22.5	2	18.2	
25.0-29.9 (Overweight)	5	9.8	3	7.5	2	18.2	
> 30 (obese)	34	66.7	28	70.0	6	54.2	
Mean±SD	31.61±7.78		31.27±7.12		32.85±10.12		0.55

Table 2. Health profile of the studied patients

Signs and symptoms of COVID 19	Overall (n=51)		Not revisit (n=40)		Revisit (n=11)		p
	No	%	No	%	No	%	
Fever	35	68.6	28	70.0	7	63.6	0.72
Difficulty of breathing	20	39.2	14	35.0	6	54.5	0.30
Muscle or / Body aches	10	19.6	9	22.5	1	9.1	0.43
Loss smelling or tasting	3	5.9	3	7.5	0	100.0	1.0
Runny nose/ or congestion	3	5.9	1	2.5	2	18.2	0.11
Diarrhea	7	13.7	7	17.5	0	100.0	0.32
Cough	29	56.9	21	52.5	8	72.7	0.31
Fatigue	1	2.0	0	100.0	1	9.1	0.22
Headache	5	9.8	4	10.0	1	9.1	1.0
Sore throat	10	19.6	8	20.0	2	18.2	1.0
Nausea/ or vomiting	3	5.9	3	7.5	0	100.0	1.0
Triage levels							
CTAS2	1	2.0	0	100.0	1	9.1	0.33
CTAS3	34	66.7	27	67.5	7	63.6	
CTAS4	16	31.4	13	32.5	3	27.3	
Level of consciousness							
Alert	49	96.1	40	100.0	9	81.8	0.04*
New onset confusion	1	2.0	0	0.0	1	9.1	
Unresponsive	1	2.0	0	0.0	1	9.1	
Vital signs (mean / SD)							
Oxygen saturation	96.63	1.69	97.03	1.42	95.18	1.89	0.001**
Hear rate	89.45	14.35	89.60	13.18	88.91	18.76	0.88
Respiratory rate	17.96	1.73	17.90	1.83	18.18	1.33	0.63
Temperature	37.44	0.45	37.41	0.66	37.59	1.03	0.48
Systolic blood Pressure	132.31	17.41	130.98	15.92	137.18	22.23	0.30
Diastolic blood Pressure	77.31	10.82	77.33	10.23	77.27	13.33	0.98
Medical history							
Diabetes mellitus	22	43.1	15	37.5	7	36.4	0.17
Hypertension	18	35.3	13	32.5	5	45.5	0.49
Chronic vascular disease	19	37.3	13	32.5	6	54.5	0.29
Bronchial asthma	1	2.0	0	100.0	1	9.1	0.22
Chronic Kidney disease	1	2.0	0	100.0	1	9.1	0.22
Chronic lung disease	1	2.0	1	2.5	0	100.0	1.0

** p<0.001.

Our study shows that the revisited patient (54.6%) had fever, (63.6%) difficulty of breathing, (45.5%) cough, (9.1%) headache and sore throat. The majority (90.9%) was conscious with mean 96.09, 94.0, 20.0, 37.37, 141.45 and 83.0 for oxygen saturation, heart rate, respiratory rate, temperature, systolic and diastolic blood pressure respectively. (Table 3)

Our study showed the oxygen saturation was found to be the only independent predictor of revisiting COVID 19 patients (OR=0.46; P=0.009). (Table 4)

Table 3. Health profile of the revisited COVID 19 patients

Signs and symptoms of COVID 19	During revisit in ED (n=11)	
	No	%
Fever	6	54.6
Difficulty of breathing	7	63.6
Cough	5	45.5
Headache	1	9.1
Sore throat	1	9.1
Triage levels		
CTAS3	11	100.0
Level of consciousness		
Alert	10	90.9
New onset confusion	1	9.1
Vital signs (mean/SD)		
Oxygen Saturation	96.09	3.08
Hear rate	94.00	12.77
Respiratory rate	20.00	2.00
Temperature	37.37	0.91
Systolic blood pressure	141.45	24.45
Diastolic blood pressure	83.0	14.04

Table 4. Factors associated with revisiting the COVID 19 patients

Varia Variables	OR (95% CI)	p
Age (years)		
20 - 30 years	0.33 (0.02-4.49)	0.41
31 - 40 years	0.64 (0.08-4.93)	0.67
41 - 50 years	0.86 (0.12-5.94)	0.88
> 50 years	Reference	
Gender		
Male	1.86 (0.26-13.39)	0.53
Female	Reference	
Nationality		
Saudi	1.95 (0.33-11.44)	0.45
Non- Saudi	Reference	
Smoking		
No	4.75 (0.33-67.85)	0.25
Yes	Reference	
Body mass index	1.02 (0.94-1.11)	0.54
Triage levels		
CTAS3	1.12 (0.24-5.06)	0.88
CTAS4	Reference	
Medical history		
Diabetes mellitus (yes VS no)	0.28 (0.03-2.82)	0.28
Hypertension (yes VS no)	1.99 (0.26-15.21)	0.50
Chronic vascular disease (yes VS no)	2.03 (0.24-17.10)	0.51
Vital signs (mean / SD)		
Oxygen saturation	0.46 (0.25-0.82)	0.009**
Hear rate	1.00 (0.94-1.07)	0.93
Respiratory rate	1.16 (0.64-2.12)	0.63
Temperature	0.75 (0.25-2.25)	0.61
Systolic blood Pressure	1.01 (0.96-1.07)	0.57
Diastolic blood Pressure	0.97 (0.87-1.01)	0.65

** p<0.001.

6. Discussion

In response to this urgent need to maximize hospital capacity through rapid discharges, a multidisciplinary team of clinicians and hospital leaders established a COVID-19 Discharge Care Program consisting of provisional discharge criteria and remote monitoring. At the time, there were few published guidelines for safe discharge parameters for patients hospitalized with COVID-19 illness and few known risk factors for readmission [9,10]. To our knowledge, no prior study has evaluated the outcomes of return hospital admission in patients with COVID-19 following ED discharge at Saudi Arabia.

The result of this study revealed that the oxygen saturation was found to be the only independent predictor of revisiting COVID 19 patients. Somani et al reported that the most common cause for return was respiratory distress. Patients who returned more likely had COPD and hypertension, shorter LOS on index-hospitalization, and lower rates of in-hospital treatment-dose anticoagulation [7]. Kilaru et al also concluded that Age, abnormal chest x-ray findings, and fever or hypoxia on presentation were independently associated with increased rate of return admission [11].

Findings of the current study indicated that there was no statistically significant difference between revisited and non-revisited patient related to their age, gender, nationality, smoking status, and BMI. A study done by lanham et al revealed that there were no differences in age or gender between reattenders and non-reattenders [12].

The present study showed that revisited patients symptoms were fever, difficulty of breathing, cough, headache, and sore throat. Yuan et al noted that returning patients were more likely to be older, obese, hypertensive, diabetic, have prior heart failure or myocardial infarction, prior COPD or asthma and chronic kidney disease; they were also more likely to be febrile and more hypotensive during their initial visit [13].

7. Limitation

Several limitations of this study warrant mention. First, small sample size and missing data restricted statistical power and prevented multivariable analysis to adequately control for non-normal distributions and feature collinearities. Larger sample sizes may allow the development of such multivariable models to address potentially confounding factors and are actively being pursued. Second, the follow-up period was limited to 14 days after discharge. Third some ED visits and return hospital admissions were unrelated to COVID19 but rather occurred incidentally in patients infected with the novel coronavirus. Finally, the false negative rate of COVID-19 PCR testing led to exclusion of these patients based on the inclusion criteria

8. Conclusion and Recommendations

Oxygen saturation was found to be the only independent predictor of revisiting COVID 19 patients. As

the pandemic evolves, further investigation may be needed to develop risk stratification tools that guide disposition for patients with COVID-19 in the ED. Additional work such as the development of more specific clinical protocols for these settings is needed to guide decision-making and optimal utilization of healthcare resources during the current COVID-19 pandemic. Further research with additional patients from multiple centers would be helpful for generalization.

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