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Original Research Article

Baseline characteristics, level of disease severity and outcomes of patients with COVID-19 admitted to intensive care unit in COVID-19 dedicated Mugda Medical College and Hospital, Dhaka, Bangladesh

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ABSTRACT

Background: Novel coronavirus disease is associated with highly intensive care unit (ICU) mortality. With the dramatic increase of confirmed cases as well as death toll in Bangladesh, timely and effective management of severely and critically ill patients appears to be particularly important. This includes streamlining workflows for rapid diagnosis and isolation, clinical management, and infection prevention. The main objective of this study was identification of the demographic, clinical characteristics, severity and outcome of patients admitted into ICU.
Methods: We aimed to describe the demographic and clinical characteristics, severity of disease, management patterns and outcomes of critically ill patients with coronavirus disease 2019 admitted to ICU in a Bangladeshi setting and for this purpose a retro-prospective study of conveniently selected 63 ICU admitted patients with COVID-19 was conducted from May 1 to June 30, 2020. Data were obtained from patient charts and the hospitals' records using a structured questionnaire.
Results: Most of the ICU patients were older male (30, 65.3%) and most of them were 70 or above years of age group (17, 37.0%). ICU patients more likely suffered from comorbidities like hypertension (938, 60.3%); diabetes (36, 57.1%); chronic kidney disease (21, 33.3%). In most cases treatment in ICU included the administration of antibiotics (100.0%) (Meropenem, 20, 31.7%). Forty-Eight patients died (discharge mortality, 76.2%), and fourteen patients were discharged alive from the ICU with a rate of 22.2%. One patient transferred (Palliative discharge, 1.6%) to other facilities for palliative care purpose.
Conclusions: Our findings also highlight the importance of planning for mass critical care along with central oxygen supply system as the need for ICU care and ventilator support to treat patients with COVID-19 grows rapidly in Bangladesh.

Keywords: Baseline characteristics, Disease severity, Patient's outcome, Intensive care unit, COVID-19 pandemic

INTRODUCTION

COVID-19 was firstly reported in Wuhan, Hubei Province, China at the end of 2019.[1,2] Currently, it is breaking out globally.[3] As of July 17, COVID-19 has cause over 10.12 million infections and over 0.5 million deaths around the world4,5,6. In Bangladesh, more than 0.13 million patients infected with COVID-19 died.[4,5] Novel coronavirus disease 2019 (COVID-19), now characterized as a pandemic by the World Health Organization.[3,7] Infection rates and deaths worldwide increased exponentially. Initial studies from China and Italy showed mortality ranging from 26% to 62% in critically ill patients with COVID-19. Studies from Seattle and New York reported overall mortality ranging from 23% to 50%.[8-11]

Pandemic severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is associated with highly intensive care unit (ICU) mortality.[12] With the dramatic increase of confirmed cases of coronavirus disease (COVID-19) and the increasing death toll in Bangladesh timely and effective management of severely and critically ill patients appears to be particularly important.[3,4] The ICU community needs to prepare for the challenges associated with the coronavirus disease 2019 (COVID-19) pandemic.[13] This includes streamlining workflows for rapid diagnosis and isolation, clinical management, and infection prevention.[14]

It will also require that ICU practitioners, hospital administrators, governments, and policy makers prepare for substantial increases in critical care bed capacity, with a focus on infrastructure and supplies and staff management.[13,14] We aimed to describe the demographic and clinical characteristics, severity of disease, management patterns and outcomes of critically ill patients with coronavirus disease 2019 (COVID-19) admitted to ICU in a Bangladeshi setting. The main objective of this study was identification of the demographic, clinical characteristics, severity and outcome of patients admitted into ICU.

METHODS

Study population, setting, and design

We conducted a retro-prospective study of 63 patients with COVID-19 admitted to the ICU (Intensive Care Unit) of COVID-19 dedicated Mugda Medical College and Hospital, Dhaka, Bangladesh from May 1 to June 30, 20. Admission into the ICU occurred at the discretion of the attending critical care physician, but general criteria included all patients with confirmed COVID-19 infection who were requiring rapidly increasing oxygen therapy. All consecutive patients with laboratory confirmed COVID-19 infection who were admitted to the selected ICU during the study period were enrolled.

Sampling technique

In between the time frame total 63 patients with COVID-19 infection got admitted into ICU of Mugda Medical College and Hospital for treatment purpose. These 63 patients were conveniently selected as study population.

Data collection

Data were obtained from patient charts and the hospitals' admission records using a structured questionnaire which was adopted from Novel Coronavirus (COVID-19 Rapid Version) by Global COVID-19 Clinical Platform which was previously used for same purpose in United Kingdom15 and China16. Demographic data, patient's comorbidities, treatment protocols, sign-symptoms, in-hospital complications and clinical outcomes of ICU patients were collected throughout each patient's hospital admission.

Statistical analysis

The level of significance was set at 0.05. Statistical package for the social sciences (SPSS) 26.0 was used to analyze the data.

RESULTS

Demographic details of the included 63 patients are shown in the Table 1.

Health care workers were less likely admitted to the ICU (6, 9.5%). ICU patients more likely suffered from comorbidities; hypertension (38, 60.3%); diabetes (36, 57.1%); chronic kidney disease (21, 33.3%) (Table 1).

The treatment in ICU included the administration of antibiotics (100.0%) (meropenem, 20, 31.7%), experi mental drug (enoxaparin sodium, [37, 58.7%]), glucocorticoid therapy (35, 55.6%), antimalarial agent (hydroxychloroquine sulphate, [11, 17.5%]), CRRT (continuous renal replacement therapies) (14, 22.2%), antiviral therapy (10, 15.9%), oxygen inhalation (100%), invasive mechanical ventilation (15, 23.8%), non-invasive ventilation (10, 15.9%), extracorporeal membrane oxygenation (1, 1.6%) and they also more likely suffered from in-hospital complications (ARDS 47, 74.6%); pneumonia (28, 44.4%); acute cardiac injury (17, 26.9%); acute kidney injury (10, 15.9%); and arrhythmia (4, 6.3%) (Table 1).

Out of 144 study participants, 111 (77%) were aware that dog bite causes disease while 33 (23%) were not aware that dog bite causes disease.

On the basis of appearance of symptoms about 96.8% (61) were symptomatic and only 3.2% (2) were asymptomatic. Distribution of patient according to appearance of sign symptoms were enlisted in Table 1.

Table 1: Baseline characteristics, complications and outcome of COVID-19 patients admitted to ICU (n=63).

Traits	N (%)
Infection	
Health care workers	6 (9.5)
Signs and symptoms	
Fever	37 (58.7)
Fatigue	33 (52.4)
Shortness of breath	58 (92.1)
Lower chest in drawing	36 (57.1)
Dry cough	35 (55.6)
Cough with sputum	7 (11.1)
Cough with hemoptysis	2 (3.2)
Runny nose	3 (4.8)
Wheezing	5 (7.9)
Chest pain	16 (25.4)
Muscle ache	16 (25.4)
Diarrhoea	15 (23.8)
Sore throat	28 (44.4)
Comorbidities	
Hypertension	38 (60.3)
Diabetes	36 (57.1)
Cardiovascular disease	13 (20.6)
Chronic pulmonary disease	1 (1.6)
Asthma	12 (19.0)
Malignancy	1 (1.6)
Chronic kidney disease	21 (33.3)
Chronic liver disease	0 (0.00)
Treatments	
Antiviral therapy	10 (15.9)
Antibiotic treatment	63 (100.0)
Glucocorticoid therapy	35 (55.6)
Antimalarial therapy	11 (17.5)
Experimental therapy (Enoxaparin Sulphate)	37 (58.7)
Angiotensin II receptor blocker	26 (41.3)
Oxygen inhalation	63 (100.0)
Noninvasive ventilation	10 (15.9)
Invasive mechanical ventilation	15 (23.8)
Isotropes/Vasotropes	15 (23.8)
Extracorporeal membrane oxygenation	1 (1.6)
CRRT	14(22.2)
Prone Position	16(25.4)
Complications	
Shock	19 (30.2)
ARDS	47 (74.6)
Pneumonia	28 (44.4)
Cardiac arrest	13 (20.6)
Arrhythmia	7 (38.9)
Acute kidney injury	10 (15.9)
Anemia	5 (7.9)
Electrolyte imbalance	3 (4.8)

All patients were isolated. The reasons for admission included increase breathing rate >20 breaths/min (62, 98.4%) which is considered as abnormal breathing rate and indicated for emergency by World Health Organization (WHO), oxygen saturation <90% (46, 76.19%) which is considered as clinical emergency by WHO and combined shock (19, 30.2%) and/or acute renal failure (10, 15.9%). Most of the ICU patients were older male (30, 65.3%) and most of them were 70 or above years of age group (17, 37.0%) followed by 60-69 years of age group (13, 28.3%) (Table 2).

Table 2: Distribution of gender/sex according to age of patient.

Age category in years	Gender/sex of the patient		Total N (%)
	Male	Female	
	N (%)	N (%)	
<18	2 (4.3)	0 (0.0)	2 (3.2)
18-39	1 (2.2)	6 (35.3)	7 (11.1)
40-50	4 (8.7)	2 (11.8)	6 (9.5)
50-59	9 (19.6)	3 (17.6)	12 (19.0)
60-69	13 (28.3)	5 (29.4)	18 (28.6)
≥70	17 (37.0)	1 (5.9)	18 (28.6)
Total	46	17	63

Majority time lapse (in days) between appearance of symptoms and hospital admission were both 4 and 6 days (12, 19.0%) (Table 3).

Table 3: Time lapse (days) between appearance of symptoms and hospital admission.

Appearance of symptoms	Days	Frequency	Percentage
Symptomatic	0	1	1.6
	1	3	4.8
	2	4	6.3
	3	8	12.7
	4	12	19.0
	5	8	12.7
	6	12	19.0
	7	6	9.5
	9	3	4.8
	10	2	3.2
	11	1	1.6
	12	1	1.6
Total		61	96.8
Asymptomatic		2	3.2
Total		63	100

In majority cases (38, 60.3%) patients were directly admitted into ICU (Table 4).

Forty-Eight patients died (discharge mortality, 76.2%), and fourteen patients were discharged alive from the ICU with a rate of 22.2%. One patient transferred (Palliative

discharge, 1.6%) to other facilities for palliative care purpose (Table 1).

Majority patients were passed away before performing the second (42, 66.67%) and third (48, 76.19%) COVID-19 test respectively (Table 5).

Table 4: Time gap (days) between hospital admission and ICU admission.

Days	Frequency	Percentage
0	38	60.3
1	7	11.1
2	3	4.8
4	2	3.2
5	2	3.2
7	2	3.2
8	3	4.8
9	3	4.8
10	1	1.6
12	1	1.6
19	1	1.6
Total	63	100

Table 5: Relationship between COVID-19 second and third test result with health outcome.

COVID-19 test result	Health related outcome of respondents		
	Discharge alive	Death	Palliative discharge
	N (%)	N (%)	N (%)
Second test result			
Positive	1(1.59)	3 (4.76)	0 (0.0)
Negative	13 (20.63)	3 (4.76)	1(1.59)
Not done	0 (0.0)	42 (66.67)	0 (0.0)
Third test result			
Negative	9 (14.29)	0 (0.0)	0 (0.0)
Not done	5 (7.94)	48 (76.19)	1 (1.59)

DISCUSSION

The SARS-CoV-2 pandemic is perhaps the most devastating global event in modern medicine. Physicians and scientists are struggling for therapies to mitigate this disease. Our results suggest that ICU patients suffer at admission from more comorbidities and develop many complications due to hospitalization. We found that among 63 ICU admitted patients 76.2% died. A previous study including 138 patients with COVID-19 showed that 4.3% died during treatment in ICU.[19] Another study reported about 11.0% mortality rate of COVID-19 patient during treatment under ICU.[20] Another study in New York showed that, among 373 patients who were treated in the intensive care unit (ICU), 12.2% receiving invasive mechanical ventilation, and 21% had died21. In United Kingdom as of 3rd April, based on a sample of 690 patients with confirmed COVID-19 for which intensive care support required found 50.1% have been died during treatment in ICU.[22] In Bangladesh, Mugda Medical College and Hospital is one of the major tertiary teaching hospitals and is responsible for the treatment of critically ill patients with COVID-19. Thus, this study might represent the more severe COVID-19 patients and the rates of death and ICU admission may be overestimated. A recent study showed that only 5% of the included COVID-19 patients were admitted to ICU and 1.36% succumbed1. In our study majority of the patient were directly admitted into ICU. The physicians at the study hospital have administered targeted therapies for COVID-19. SARS-CoV-19 is a beta coronavirus, as are SARS and Middle East respiratory syndrome (MERS) coronoviridae.[23] Drugs such as antibiotics, antiviral, antimalarial, and corticosteroids, have been used in patients with SARS or MERS, with controversial efficacy.[24] Chloroquine and hydroxyl chloroquine are anti-malarial drugs that have demonstrated in-vitro efficacy against COVID-19 by an as yet not fully understood mechanism.[23,24] Hydroxy-chloroquine might be preferred as it has fewer side effects than chloroquine, but have neither have yet demonstrated efficacy in infected patients.[24] The patients in our study presented with respiratory symptoms similar to those of patients described in reports from China, which indicates a common host response to SARS-CoV-2. Shortness of breath was the most common presenting symptom, as it was in reports from China, and the mean duration of symptoms before ICU admission was 1 week1.

Only half the patients had fever at the time of hospital admission, which suggests that fever may not be a useful criterion to determine the severity of illness and that diagnostic algorithms that require fever for COVID-19 testing may delay diagnosis. The majority of patients had chronic illnesses before their admission to the ICU, most commonly diabetes mellitus and chronic kidney disease. Hypertension was common on hospital admission, as it was in reports from China.[24,25]

CONCLUSION

We describe the early ICU experience of patients with COVID-19 in the Dhaka region in Bangladesh. Patients often received non-invasive ventilation as well as invasive, with several adjunctive therapies such as prone position ventilation. This early experience of the COVID-19 pandemic in Bangladesh resembles the experience in other countries, with high mortality for patients requiring care in the ICU. Patients with coexisting conditions and older age are at risk for severe disease and poor outcomes after ICU admission. Better information is needed to inform care for these challenging patients. Our findings also highlight the importance of planning for mass critical care along with central oxygen supply system as the need for ICU care and ventilator support to treat patients with COVID-19 grows rapidly in Bangladesh. We did not approach patients to obtain additional history or biologic samples for laboratory measurement.

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