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# Clinicodemographic profile, intensive care unit utilization and mortality rate among COVID-19 patients admitted during the second wave in Bangladesh

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## ABSTRACT

**Introduction:** The second wave of COVID-19 arrived in Bangladesh in March 2021. This pilot research from a tertiary care COVID-dedicated hospital observed the clinicodemographic profile, intensive care unit (ICU) utilization, and mortality rate among COVID-19 patients admitted during the second wave.

**Methods:** Reverse transcription-polymerase chain reaction or chest high-resolution computed tomography confirmed 972 COVID-19 cases included in this cross-sectional study from 24 March to 23 June 2021, recruited using convenience sampling. Data regarding clinicodemographic profile, ICU utilization and mortality rate were analyzed.

**Results:** The mean study cohort age was  $54.47 \pm 12.73$  years, with most patients (48.3%) aged 41–60; 64.1% were men. Fever (77.9%) and cough (75.9%) were the most common symptoms, and hypertension (43.6%) and diabetes (42.15%) the most common comorbidities. Nearly half of patients had total lung involvement of 26%–50%, and 23.8% required ICU. Overall mortality was 16.5%, whereas the mortality rate among ICU admitted patients was 56.1%. The most important predictors of mortality were older age, chronic renal illness, the proportion of lung involvement and ICU requirement.

**Conclusions:** We found higher mortality and ICU utilization rate and greater total lung involvement during the second wave. The mortality rate among the elderly and ICU patients was also higher than earlier.

## Introduction

The SARS-CoV-2 pandemic began in Wuhan, China, in December 2019 and swiftly spread around the world, culminating in wave after wave of outbreaks (Ridruejo and Soza, 2020, Taboada et al., 2021). The World Health Organization (WHO) designated the new illness as COVID-19 (Lippi et al., 2020). On 30 January 2020, the WHO proclaimed COVID-19 a Public Health Emergency of International Concern, and on 11 April 2020, it was declared a pandemic (Cucinotta and Vanelli, 2020). Based on information from the affected nations, the WHO has reported 185 291 530 laboratory-confirmed cases of COVID-19 with 4 010 834 deaths as of 9 July 2021 (WHO, 2021).

Although more than half of COVID-19 cases are asymptomatic, others develop symptoms ranging from flu-like episodes, including fever, cough and myalgia, to pneumonia. Age, sex and comorbid illness are

associated with the severity of the disease that causes multiorgan involvement and death (Chan et al., 2020, Soriano et al., 2021). The majority of COVID-19 disease (~80%) presents in a mild form and may be managed without hospitalization. Admission is required in 15%–20% of patients, and critical care is required in 3%–5% of cases, with reported fatality rates ranging from 50% to 97% in those requiring ventilatory support (Auld et al., 2020, Wu and McGoogan, 2020).

Since the first case was documented at the beginning of March 2020, 568 706 people in Bangladesh have tested positive for COVID-19, and 8668 people have died, resulting in a fatality rate of 1.52% to 20 March 2021. Overall daily case detection began to drop in early December 2020, and in early January 2021, the detection fell below 1000 per day. However, the number of cases detected and the rate of case referral to hospitals increased again on 16 March 2021, indicating the commencement of the second wave of the pandemic. According to recent studies from other nations, the second wave has much higher infection rates,

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intensive care unit (ICU) utilization and mortality (Graichen, 2021, Jain et al., 2021).

There is currently a paucity of data on the second wave in Bangladesh. To the authors' knowledge, our study is the first to investigate the clinicodemographic profile, ICU utilization and mortality rate among the COVID-19 admitted cases during the second wave. The research will also provide information on the symptomatology and comorbidity associated with the current wave.

## Methods

This cross-sectional study was conducted in a tertiary care COVID-19 specialist hospital during the peak of the second wave (from 24 March to 23 June 2021). The 250-bed hospital is located in the Bangladesh capital and serves 10.9 million people in the city's northern reaches. Using convenience sampling, 972 confirmed COVID-19 cases were included on the basis of diagnostic reverse transcription-polymerase chain reaction (RT-PCR) and/or positive chest high-resolution computed tomography (HRCT). Patients under the age of 18 years were excluded. The study was approved by the institutional review board of the COVID-19 dedicated hospital, who waived the requirement for informed consent in the face of a pandemic scenario.

A pro forma data sheet for demographics, symptoms, comorbidity, HRCT findings, ICU utilization, patient vital status and patient outcome was used to collect data. If necessary, a chest HRCT was performed, and all HRCTs were reported by the same specialist radiologist. Each patient's HRCT severity score was calculated based on lung involvement by calculating the percentage of each lobar involvement separately and allocating a number between 1 and 5, with a score of 1 signifying 5% involvement, score 2: 5%–25% involvement, score 3: 26%–50% involvement, score 4: 51%–75% involvement and Score 5: >75% involvement. The patient's ultimate score was computed out of 25 by adding the individual lobar scores. The total lung involvement was then calculated by multiplying the ultimate score by 4. Finally, the extent of total lung involvement was categorized as follows: Minimal involvement: 1%–25% of total lung volume, mild involvement: 26%–50%, moderate involvement: 51%–75% and >75% lung involvement was considered severe (Al-Mosawe et al., 2021, Francone et al., 2020).

Statistical Package for the Social Sciences software (v.23; IBM Corporation, Armonk, New York) was used for the statistical analysis. Numbers and percentages were used to represent categorical data. The mean and standard deviation were used to present numerical data. The Chi-square test was used to examine qualitative factors, while an unpaired t-test was used to assess quantitative data. The cutoff for statistical significance was determined at  $P < 0.05$ .

## Results

During the research period, 983 patients were admitted to the tertiary care COVID-19 specialized hospital. A total of 972 individuals were included in the research after excluding 11 patients (3 patients were <18 years old; 8 patients had symptoms but were negative for COVID-19 on both chest HRCT and RT-PCR). The average age of study participants was  $54.47 \pm 12.73$  years; 64.1% were men. The majority of the study population (48.3%) were aged 41–60 years. Most patients had one or more of the following comorbid conditions: hypertension (HTN) (43.6%), diabetes mellitus (DM) (42.1%), bronchial asthma (BA) (9.7%), ischemic heart disease (IHD) (7.8%), chronic kidney disease (CKD) (4.7%) and cancer (2.2%). Participants with no comorbidities were 34.1% of participants, whereas 33.1% had at least one. Fever and cough were the most prevalent patient complaints, accounting for 77.9% and 75.9% of all cases, respectively. Shortness of breath affected 38.6% of patients, diarrhea 19.1% of patients, and body aches 15.2% of patients. Only ~12% of the patients had anosmia, lethargy or chest discomfort (Table 1). Chest HRCT was performed in more than 65.5% of the study population, 7.2% of whom were severe cases. Minimal to mild changes were found in 68%

**Table 1**  
Clinicodemographic characteristics of the patients (n = 972)

Characteristics	Group	Mean±SD	n
Age (in years)	<20		12(1.2)
	21-40	54.47±12.73	188(19.3)
	41-60		470(48.3)
	>60		302(31.0)
Sex	Male		624(64.1)
	Female	348(35.8)	
Number of comorbidities	None		332(34.1)
	1		322(33.1)
	2		228(23.4)
	3 or above		90(9.2)
Specific comorbidity	HTN		424(43.6)
	DM		410(42.1)
	BA		95(9.7)
	IHD		76(7.8)
	CKD		46(4.7)
	Carcinoma		22(2.2)
	COPD		14(1.4)
	Liver Disease		14(1.4)
	IBD		11(1.1)
	Others		4(0.4)
Predominant symptoms	Fever		758(77.9)
	Cough		738(75.9)
	SOB		376(38.6)
	Diarrhea		186(19.1)
	Body Ache		148(15.2)
	Anosmia		57(5.8)
	Lethargy		37(3.8)
	Chest pain		23(2.3)

Values are presented as frequency, percentage, and mean±SD; percentage in the parentheses.

Hypertension (HTN), diabetes mellitus (DM), bronchial asthma (BA), ischemic heart disease (IHD), chronic kidney disease (CKD), inflammatory bowel disease (IBD), chronic obstructive pulmonary disease (COPD)

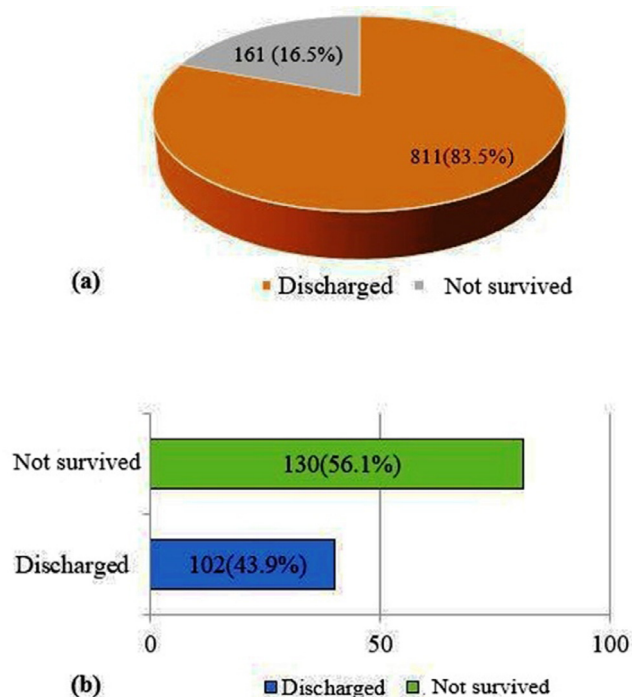
**Table 2**  
CT involvement of lung and severity grade with ICU requirement

CT involvement of lung	Number of Patients n (%)		
Yes	637(65.5)		
No	335(34.4)		
Grade of CT involvement	Extent of involvement (%)		Mean±SD
	Minimal	1-25	125(19.6)
	Mild	26-50	310(48.6)
	Moderate	51-75	156(24.4)
	Severe	>75	46(7.2)
ICU Required	Yes	232(23.8)	
	No	740(76.1)	

Values are presented as frequency, percentage, and mean±SD; percentage in the parentheses.

Computed tomography (CT), intensive care unit (ICU)

of cases. Out of 972 patients, 232 (23.8%) needed critical care support (Table 2). The overall mortality rate was 16.5% among all study participants (Figure 1(a)), while the mortality rate among patients admitted to ICU was 56.1% (Figure 1(b)). A comparison between patients who died and those who were discharged revealed that older age, male gender, presence of HTN and DM, along with CKD, carcinoma and inflammatory bowel disease, were significantly associated with mortality. Those who died had higher lung involvement percentages and ICU utilization rates (Table 3). There were no significant differences in gender or associated comorbidities between patients admitted to ICU and those not admitted to ICU. On the other hand, compared to non-ICU patients, ICU patients were significantly older, with a higher mortality rate and a greater percentage of lung involvement in chest HRCT (Table 4).



**Figure 1.** Mortality rate of COVID-19 admitted patients during the second wave. Overall mortality[1(a)]. Mortality of intensive care unit admitted cases[1(b)].

**Table 3**

Comparison of clinicodemographic profile between discharged and not survived patients (n=972)

Outcome	Not survived (n = 161)		Discharged (n = 811)		P value
	n	%	n	%	
Age (Mean±SD)	61.39±11.64		50.44±14.17		<sup>a</sup> 0.001 <sup>s</sup>
Sex					
Male	127	78.8	497	61.2	<sup>b</sup> 0.001 <sup>s</sup>
Female	34	21.1	314	38.7	
Comorbidity					
DM	89	55.2	321	39.5	<sup>b</sup> 0.001 <sup>s</sup>
HTN	109	67.7	315	38.8	<sup>b</sup> 0.001 <sup>s</sup>
IHD	18	11.1	58	7.1	<sup>b</sup> 0.082 <sup>ns</sup>
CKD	26	16.1	20	2.4	<sup>b</sup> 0.001 <sup>s</sup>
BA	15	9.3	80	9.8	<sup>b</sup> 0.830 <sup>ns</sup>
COPD	5	3.1	9	1.1	<sup>b</sup> 0.052 <sup>ns</sup>
Carcinoma	9	5.5	13	1.6	<sup>b</sup> 0.001 <sup>s</sup>
Liver disease	5	3.1	9	1.1	<sup>b</sup> 0.052 <sup>ns</sup>
IBD	4	2.4	7	0.8	<sup>b</sup> 0.075 <sup>s</sup>
Others	2	1.2	2	0.2	<sup>b</sup> 0.071 <sup>ns</sup>
Major symptoms					
Fever	135	83.8	623	76.8	<sup>b</sup> 0.049 <sup>s</sup>
Cough	123	76.3	615	75.8	<sup>b</sup> 0.878 <sup>s</sup>
Body ache	11	6.8	137	16.8	<sup>b</sup> 0.001 <sup>s</sup>
Anosmia	4	2.4	53	6.5	<sup>b</sup> 0.045 <sup>s</sup>
Diarrhea	26	16.1	160	19.7	<sup>b</sup> 0.291 <sup>ns</sup>
SOB	72	44.7	304	37.4	<sup>b</sup> 0.085 <sup>ns</sup>
Lethargy	12	7.4	25	3.0	<sup>b</sup> 0.008 <sup>s</sup>
Chest pain	6	3.7	17	2.0	<sup>b</sup> 0.213 <sup>ns</sup>
ICU Required	130	80.7	102	12.5	<sup>b</sup> 0.001 <sup>s</sup>

s= significant, ns= not significant

<sup>a</sup> P-value reached from Unpaired t-test,

<sup>b</sup> p-value according to Chi-square test. Hypertension (HTN), diabetes mellitus (DM), bronchial asthma (BA), ischemic heart disease (IHD), intensive care unit (ICU), chronic kidney disease (CKD), inflammatory bowel disease (IBD), chronic obstructive pulmonary disease (COPD)

**Table 4**

Comparison between ICU and non-ICU patients (n=972)

ICU required	ICU (n = 232)		Non-ICU (n = 740)		P value
	n	%	n	%	
Age (Mean±SD)	61.56±12.39		50.05±13.14		<sup>a</sup> 0.0001 <sup>s</sup>
Sex					
Male	168	72.4	456	61.6	<sup>b</sup> 0.002 <sup>s</sup>
Female	64	27.5	284	38.3	
Comorbidity					
DM	103	44.3	307	41.4	<sup>b</sup> 0.433 <sup>ns</sup>
HTN	115	49.5	309	41.7	<sup>b</sup> 0.036 <sup>s</sup>
IHD	23	9.9	53	7.1	<sup>b</sup> 0.173 <sup>ns</sup>
CKD	19	8.1	27	3.6	<sup>b</sup> 0.004 <sup>s</sup>
BA	17	7.3	78	10.5	<sup>b</sup> 0.150 <sup>ns</sup>
COPD	4	1.7	10	1.3	<sup>b</sup> 0.677 <sup>ns</sup>
Carcinoma	7	3.0	15	2.0	<sup>b</sup> 0.376 <sup>ns</sup>
Liver disease	8	3.4	6	0.8	<sup>b</sup> 0.003 <sup>ns</sup>
IBD	5	2.1	6	0.8	<sup>b</sup> 0.091 <sup>ns</sup>
Others	3	1.2	1	0.1	<sup>b</sup> 0.082 <sup>ns</sup>
Major symptoms					
Fever	193	83.1	565	76.3	<sup>b</sup> 0.028 <sup>s</sup>
Cough	160	68.9	578	78.1	<sup>b</sup> 0.004 <sup>s</sup>
SOB	110	47.4	266	35.9	<sup>b</sup> 0.001 <sup>s</sup>
Diarrhea	46	19.8	140	18.9	<sup>b</sup> 0.758 <sup>ns</sup>
Body ache	15	6.4	133	17.9	<sup>b</sup> 0.001 <sup>s</sup>
Lethargy	13	5.6	24	3.2	<sup>b</sup> 0.101 <sup>ns</sup>
Chest pain	9	3.8	14	1.8	<sup>b</sup> 0.082 <sup>ns</sup>
Anosmia	15	2.1	42	7.0	<sup>b</sup> 0.655 <sup>ns</sup>
CT involvement					
Minimal	3	1.2	122	16.4	
Mild	61	26.2	249	33.6	<sup>b</sup> 0.001 <sup>s</sup>
Moderate	93	40.0	63	8.5	
Severe	46	19.8	00	00	
CT involvement (Mean±SD)	61.10±15.76		36.27±17.9		<sup>a</sup> 0.001 <sup>s</sup>
Outcome of ICU patients					
Discharged	102	43.9	709	95.8	<sup>b</sup> 0.001 <sup>s</sup>
Not survived	130	56.1	31	4.1	

s= significant, ns= not significant

<sup>a</sup> P-value reached from Unpaired t-test,

<sup>b</sup> P-value according to Chi-square test. Hypertension (HTN), diabetes mellitus (DM), bronchial asthma (BA), ischemic heart disease (IHD), intensive care unit (ICU), chronic kidney disease (CKD), inflammatory bowel disease (IBD), chronic obstructive pulmonary disease (COPD)

**Discussion**

The second wave of COVID-19 has had a catastrophic impact on the Indian subcontinent, resulting in much greater infection rates, ICU utilization and death compared with the first wave (Graichen, 2021, Jain et al., 2021). According to current data, critical care units and mechanical ventilators are only accessible at a rate of 0.1 to 2.5 per 1 000 000 persons in low- and middle-income nations like Bangladesh (Lombardi et al., 2020). Furthermore, a recent study found that critically ill patients had a longer hospital stay with a death rate of up to 60%, resulting in a scarcity of critical care resources (Sang et al., 2021). The objective of this pioneer study was to evaluate the clinicodemographic profile, ICU utilization and death rate of COVID-19 admitted patients during the second wave in our country.

The average age of participants in this research was 54.47±12.73 years, with the majority of patients (48.3%) aged 41–60. Rahim et al. (2021) and another retrospective study from Germany found a comparable average age and majority age group (Brehm et al., 2021, Rahim et al., 2020). The present study demonstrated older age and male predominance (64.1%) among COVID-19 patients. Several studies performed in the Indian subcontinent and Europe have found a similar age and gender predominance (Ali et al., 2021, Brehm et al., 2021, Rahim et al., 2020). It has been proposed that females are more resistant to infections than men and that women have a more responsible attitude toward the COVID-19 pandemic than men (Bwire, 2020, Kopel et al., 2020). On the other hand, due to unavoidable physiological changes and possibly un-

derlying comorbid conditions that occur with ageing, older people are more susceptible to infection (Divo et al., 2014). Our observations revealed that 65.7% of patients had one or more comorbidities, similar to findings reported from studies in Italy and China (Grasselli et al., 2020, Yu et al., 2020). The most frequent comorbidities in this study were HTN (43.6%) and DM (42.1%). In previous studies in Bangladesh and other countries, DM and HTN were the two most prevalent comorbidities (Mowla et al., 2020, Nelson et al., 2020, Singh et al., 2020). Fever (77.9%) and cough (75.9%), followed by shortness of breath (38.6%), diarrhea (19.1%) and body aches (15.2%), were the dominant clinical manifestations. Previous research also found that fever and cough were the most prevalent symptoms of COVID-19 patients (Di Gennaro et al., 2021, Mowla et al., 2020).

In this study, the overall mortality rate was 16.5%. Earlier statistics from the Indian subcontinent reported a somewhat lower overall mortality rate of 13.72% (Malhotra et al., 2021). Patients who died were older and had a higher percentage of DM, HTN and CKD. In their study, Oliveira et al. (2021) observed that mortality is influenced by older age, CKD and ICU admission (Oliveira et al., 2021). The average total lung involvement in chest HRCT among all hospitalized patients was  $44.83 \pm 19.87$ , with nearly half of patients having total lung involvement of 26%–50%, indicating a larger involvement than an earlier study (Alam et al., 2020). In the present study, out of 972 patients, 232 (23.8%) required intensive care support, and the mortality rate among the ICU patients was 56.1%. Previous studies from United Kingdom and United States of America reported an ICU utilization rate of 19.6% with a case fatality rate of 35% (Armstrong et al., 2021, Karaca-Mandic et al., 2020). However, earlier research in Bangladesh reported ICU utilization of <10% (Hossain et al., 2020). The higher overall mortality and ICU mortality and increased ICU utilization with greater total lung involvement in the present study indicate that the disease variant is more severe. In their study, Pijls et al. (2021) found that being older is strongly linked with intensive care support and Ahlstrand et al. reported that CT severity score for COVID-19 patients is a strong predictor of ICU admission (Ahlstrand et al., 2021, Pijls et al., 2021).

Our study had some limitations. It was carried out at a single tertiary care COVID-19 specialized referral facility; therefore, the proportion of critically ill patients may be higher than in other centers or in population-based research. Furthermore, the case series assessed the clinical history while in the hospital without any follow-up data. Therefore, information on recurrences was not documented. Nevertheless, this was a pioneer study on the second wave in Bangladesh. Our findings will serve as a baseline for upcoming multicentered studies and comparing with past or future waves.

## Conclusions

Our findings are comparable to studies performed elsewhere; nevertheless, our investigation identified higher overall mortality and ICU death rates, increased ICU utilization and larger total lung involvement during the current wave. The mortality rate of elderly patients was also higher. The most frequent symptoms were cough and fever, and the most prevalent comorbidities were DM and HTN. Age, presence of chronic renal disease, and the need for ICU care were all significant predictors of mortality. The percentage of lung involvement was also higher in those who died.

## Ethical approval

The Ethical and Scientific Committee of the tertiary care COVID-19 specialized hospital approved the protocol.

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## Competing interests

None

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