

Corona Virus Infection among Healthcare Workers in a COVID Dedicated Tertiary Care Hospital in Dhaka, Bangladesh

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Abstract:

Background: Health care workers (HCWs) are at high risk of acquiring infections during this ongoing COVID-19 outbreak. This study was aimed at determining the prevalence of SARS-CoV-2 infection, the socio demographic and clinical profile and the possible risk factors for infection among the HCWs at Mugda Medical College Hospital (MuMCH).

Method: This retrospective observational study was done among the HCWs of MuMCH from 19 April, 2020 to 15 May, 2020. The SARS-CoV-2 positive 37 HCWs were interviewed over telephone by a structured questionnaire and the obtained data were analyzed by using descriptive statistics.

Result: Out of total 343 HCWs, total 37(10.79%) cases were detected COVID-19 positive. Out of them, 13(35.14%) were male and 24 (64.86%) were female. The median age was 36 years. Among the infected HCWs, 26 (70.27%) did not have any pre-existing comorbidities. Bronchial asthma (13.51%) and HTN (13.51%) were the most prevalent comorbidities. Around 43.24% (16) had no definite symptoms for COVID-19. Among the 21(56.76%) symptomatic cases, 15(40.54%) had mild and 6(16.22%) had moderate symptoms. The most common symptoms were cough (16, 43.24%), fever (11, 29.73%), sore throat (7, 18.92%) and fatigue/malaise (7, 18.92%). All had completely recovered uneventfully although

22(59.46%) got admitted to hospital. Only 12(32.43%) were involved in aerosol generating procedure. Total 26 cases (70.27%) used appropriate PPE during their duty. Although only 4(10.81%) got adequate training on PPE use, 33(89.19%) of them had adequate knowledge on that. About 15(40.54%) were reusing PPEs. Most of them (33, 89.20%) were not taking any chemoprophylaxis; all were following traditional preventive measures. Among the HCWs, 26(70.27%) were not satisfied with the infection prevention and control (IPC) measures taken by the hospital authority. All of them presumed that, their occupational exposure was the possible source of COVID-19 infection.

Conclusion: More than 1 in 10 HCWs at MuMCH was infected with SARS-CoV-2 while working at the hospital. They represented the younger age group, had fewer comorbidities. Nurses were the most affected category. All experienced uneventful recovery and most of them were not satisfied with the IPC measures taken by the hospital authority. Further studies are required to identify the level of risk of infection, possible risk factors and outcomes and to improve the IPC measures of the hospital.

Key words: Health Care Worker, COVID-19 infection.

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Introduction:

Coronavirus disease 2019 (COVID-19), a potentially severe acute respiratory infection caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has been declared pandemic by World Health Organization (WHO) on 11th March 2020 following its outbreak as a cluster of pneumonia cases with unknown cause in

Wuhan City, Hubei Province, China, in December 2019¹⁴. In most cases the clinical presentation is that of a respiratory infection with a symptom severity ranging from a mild influenza like illness, to a severe viral pneumonia leading to acute respiratory distress syndrome that is potentially fatal.

The pandemic Covid-19 has resulted in more than 6.7 million cases and near about 0.4 million deaths worldwide since today. It is now set to gain a foothold in Bangladesh which is the most densely populated country in the world. The first case was declared on 8th Mach in Bangladesh. More than 60,000 people are infected with Covid19 and total about 811 patients have died till 5th June, 2020, according to health bulletin of DGHS, Bangladesh.

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Health Care workers (HCWs) are the essential workers designated as the persons serving in health care settings who have potential for direct & indirect exposure to patients or infected materials⁵. They are presumed to be at increased risk for SARS-CoV-2 infection^{6,7} and reports have described COVID-19 cases in HCWs since early in the outbreak⁸. According to WHO, the HCWs including doctors, nurses & others health stuffs comprised 11% of the total COVID-19 cases in Bangladesh by 1st May, 2020. Still there is no published accurate data, study or risk stratification among the HCWs. Preventing HCW infections is important for reducing morbidity and potential mortality, maintaining health system capacity, and reducing secondary transmission^{9, 10}.

This study was aimed at determining the prevalence of healthcare workers' SARS-CoV-2 infection at MuMCH along with the socio demographic and clinical profile and the possible risk factors for being infected at workplace. Baseline data reported from this study will enable the concerned authority and the future researchers to monitor the spread of infection and examine risk factors for transmission among HCWs. It may be utilized to plan optimal strategies for protecting the HCWs, their families, and their patients as well.

Methodology:

This retrospective observational study was performed among the HCWs of MuMCH from 15 April, 2020 to 5 June, 2020. All HCWs, employed as service provider at MuMCH, now designated as a dedicated COVID-19 care hospital since April, 2020, were enlisted. Initially, the RT-PCR test was offered only to those HCWs who either had a history of close contact with suspected or probable COVID-19 cases or had developed any fever, cough or sore throat in a week following their usual hospital roster duties. Later on, the hospital was transformed into a COVID-19 dedicated hospital on 20 April, 2020. Since then, all the HCWs including doctors, nurses, Office staff, Lab technicians and MLSS working in the same roster group was enlisted to do the RT-PCR test during their quarantine period, usually 5 days after completion of their one week roster duties, or earlier if they had developed any COVID-19 like symptoms. All HCWs used standard PPE including gloves, face mask, gown, shoe cover, head cover and goggles with or without face shield. During donning and doffing, alcohol based hand sanitizer was used as per protocol.

Institutional training for doffing and donning was provided to some of them. HCWs that developed Covid-19 like symptoms were kept in isolation in the hospital. A structured questionnaire was filled up over telephone from those who became SARS-CoV-2 positive on testing. RT PCR test was done in the microbiology lab of Mugda Medical College.

Informed written consent was taken from each personnel. Statistical analysis was done by expert statistician by using descriptive statistics. Continuous variables were presented as mean values \pm standard deviation (SD) and categorical variables were presented as percentages (%). Some data were presented by tables and graphs. CIOMS guidelines were maintained during the research processes. This study was approved by ethical committee of Mugda Medical College.

Results:

Demographic Characteristics

Out of total 343 HCW working at Mugda Medical College Hospital, Dhaka, total 37(10.79%) cases were detected COVID-19 positive from 19 March 2020 to 15 May 2020. According to the Institute of Epidemiology, Disease Control and Research (IEDCR), 20051(12.55%) were tested positive for SARS-CoV-2 infection out of total 159826 suspected cases, throughout the country during that period. But no statistically significant effect was observed in MuMCH in comparison to Bangladesh in the rate of case detection (p value= 0.3256).

Out of the infected HCWs, 13(35.14%) were male with median age of 33 years and 24 (64.86%) were female with median age of 38.5 years. The overall median age was 36 years. Among the infected HCWs, none were less than the age of 20 years, 4 (10.81%) were between the age of 21 to 30, 17(45.95%) were between the age of 31 to 40, 12(32.43%) were between the age of 41 to 50 and 4(10.81%) were more than 50 years old. Other than 15 nurses (40.54%) and 9 doctors (24.32%), 7 office staffs (18.92%), 4 MLSS (10.81%) and 2 Lab technicians (5.41%) were infected.

From Table I it is evident that HCWs whose age is under 20 years are more likely to not be infected by COVID-19 than those above that age group are. Again being a Lab Technician or an Office Staff also made them more susceptible to COVID-19 infection than a Physician or Nurse, keeping in mind that the total number of this population was far less, compared to that of a Physician or Nurse.

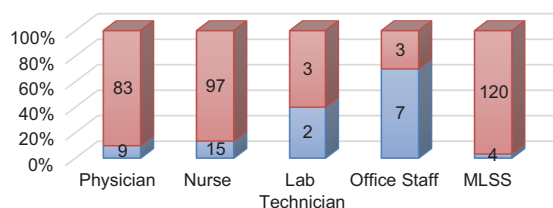


Fig.-1: Rate of infection in different job category.

Data calculated as (n/N)% where N is the total number of HCWs and n is the available HCWs

^a p values indicate the relation and dependency between HCWs with and without COVID-19. Data calculated using χ^2 test for Goodness of Fit. 0.05% significance is used.

^b p values > 0.05 indicates no dependency between HCWs with or without COVID-19

Table-I

Socio-demographic data of the study population				
Characteristics	HCWs (Total = 343)	HCWs with COVID-19 (Total = 37)	HCWs without COVID-19 (Total = 306)	p Value ^a
Age (years)		Median = 36		
Less than 20	3 (0.87%)	0 (0%)	3 (0.98%)	0.08326 ^b
21 to 30	60 (17.49%)	4 (10.81%)	56 (18.30%)	<0.00001
31 to 40	177 (51.60%)	17 (45.95%)	160 (52.29%)	<0.00001
41 to 50	80 (23.32%)	12 (32.43%)	68 (22.22%)	<0.00001
More than 50	23 (6.71%)	4 (10.81%)	19 (6.21%)	0.00176
Sex				
Male	148 (43.15%)	13 (35.14%)	135 (44.12%)	<0.00001
Female	195 (56.85%)	24 (64.86%)	171 (55.88%)	<0.00001
Job Category				
Physician	92 (26.82%)	9 (24.32%)	83 (27.12%)	<0.00001
Nurse	112 (32.65%)	15 (40.54%)	97 (31.70%)	<0.00001
Lab Technician	5 (1.46%)	2 (5.41%)	3 (0.87%)	0.65472 ^b
Office Staff	10 (2.92%)	7 (18.92%)	3 (0.87%)	0.2059 ^b
MLSS	124 (36.15%)	4 (10.81%)	120 (39.22%)	<0.00001

Clinical & Symptomatic Characteristics

Among the infected people, 26 (70.27%) did not have any pre-existing comorbidities. Bronchial asthma 5 (13.51%) and HTN 5 (13.51%) (Shown in Figure 3), were the most prevalent comorbidities. Around 43.24% (16) had no definite symptoms for COVID 19. From Table 3, it can be said that of the 21 (56.76%) symptomatic cases, 15(40.54%) had mild symptoms and 6 (16.22%) had

moderate symptoms. In Figure 2, only the most common symptoms like cough (16, 43.24%), fever (11, 29.73%), sore throat (7, 18.92%) and fatigue/malaise (7, 18.92%) are shown.

Table II & III shows the clinical characteristics and detailed symptoms of the HCWs with COVID-19. Whereas Figure 2 & 3 only highlights the most common characteristics from Table II & III.

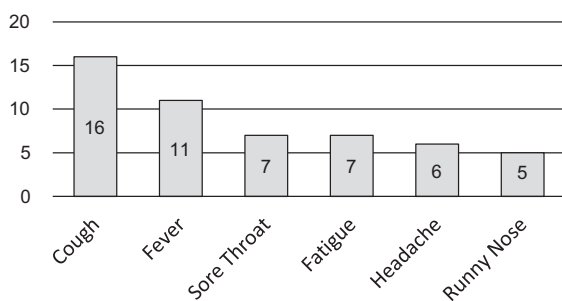


Fig.-2-: Most common symptoms in HCWs with COVID-19

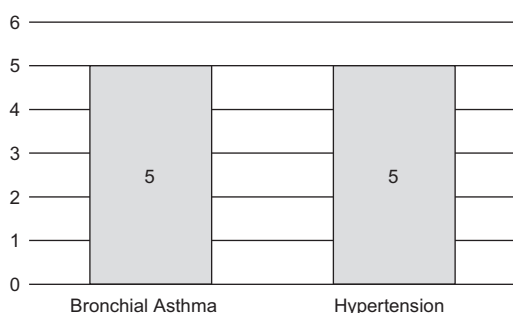


Fig.-3: Most common co-morbidity in HCWs with COVID-19

From Table II it is seen that in COVID-19 positive patients, some of the less popular co-morbidities were DM (5.41%), Obesity (5.41%) and hypothyroidism (2.70%). Similarly, some of the less presented symptoms were body ache (10.81%), shortness of breath (10.81%), chest pain (8.11%), loose motion (8.11%), insomnia (5.41%) and anosmia (2.70%).

Table-II

<i>Co-morbidities of HCWs with COVID-19</i>	
Characteristics	Number of HCWs (Total = 37)
Co-morbidity's Presence	
Present	11 (29.73%)
Absent	26 (70.27%)
Co-morbidities	
Hypertension	5 (13.51%)
Bronchial Asthma	5 (13.51%)
Diabetes	2 (5.41%)
Obesity	2 (5.41%)
Hypothyroidism	1 (2.70%)

Henceforth, from Table II, it can be concluded that people who had co-morbidities hypertension and bronchial asthma, were more likely to be infected by COVID-19. Moreover, from Table III, it can be assumed that most of the infected HCWs showed only mild symptoms, then again it can be said that severity and complexity of the symptoms increased with age. Since the overall median age of HCWs with COVID-19 was, only 36 years (Table 1), there were lesser severity and complexity in symptoms.

Table-III

Symptomatic characteristics of HCWs with COVID-19

Characteristics	Number of HCWs (Total = 37)
Symptoms	
Asymptomatic	16 (43.24%)
Symptomatic	21 (56.76%)
Symptoms' Severity	
Mild	15 (40.54%)
Moderate	6 (16.22%)
Severe	0 (0%)
Symptoms	
Cough	16 (43.24%)
Fever	11 (29.73%)
Sore Throat	7 (18.92%)
Fatigue/ Malaise	7 (18.92%)
Headache	6 (16.22%)
Runny Nose	5 (13.51%)
Body Ache	4 (10.81%)
Shortness of Breath	4 (10.81%)
Chest Pain	3 (8.11%)
Loose Motion	3 (8.11%)
Insomnia	2 (5.41%)
Anosmia	1 (2.70%)

Data calculated as (n/N)% where N is the total number of HCWs and n is the available HCWs

Risk Factors

From Table IV, it can be seen that, 22 cases (59.46%) got admitted to hospital. All had completely recovered uneventfully. Out of them, 12 (32.43%) were involved in aerosol generating procedure. Total 26 cases (70.27%) used appropriate PPE during their duty. Although only 4 (10.81%) got adequate training on PPE use, 33 (89.19%) of them had adequate knowledge on that. About 15

(40.54%) were reusing PPEs. Most of them (33, 89.20%) were not taking any chemoprophylaxis; all were following traditional preventive measures. Among the HCWs, 26 (70.27%) were not satisfied with the infection prevention and control measures taken by the hospital authority. All of them presumed that their occupational exposure was the possible source of COVID 19 infection.

Table-IV*Risk Factors of HCWs with COVID-19*

Characteristics	Number of HCWS (Total = 37)
Aerosol Generated Procedure	
Performed	12 (32.43%)
Didn't Perform	25 (67.57%)
PPE Usage	
Used	26 (70.27%)
Did Not Use	11 (29.73%)
Adequate Knowledge of PPE	
Present	33 (89.19%)
Absent	4 (10.81%)
Adequate Training on PPE	
Received	6 (16.22%)
Did Not Receive	31 (83.78%)
Reuse of Disposable PPE	
Reused	15 (40.54%)
Did Not Reuse	22 (59.50%)
Chemoprophylaxis	
Taken	4 (10.81%)
Not Taken	33 (89.20%)
Traditional Measures	
Used	37 (100%)
Not Used	0 (0%)

Data calculated as (n/N)% where N is the total number of HCWs and n is the available HCWs

Statistical Analysis

Continuous variable like age, is expressed as median (IQR). Categorical variable is expressed as number (%). p value is calculated using χ^2 test or Goodness of Fit test between HCWs with and without COVID-19. A two-sided α of less than 0.05 was considered statistically significant, while calculating p value.

Discussion:

Since the recognition of the first ever COVID-19 case in Bangladesh on 8 March, 2020, a couple of thousands

Health care workers (HCWs) along with more than 900 doctors have been diagnosed with positive RT PCR test for SARS-CoV-2 till 5 June, 2020. MuMCH has started its journey as dedicated COVID care hospital from 20 April, 2020. But it is experiencing to have SARS-CoV-2 positive HCWs long before that. The first SARS-CoV-2 RT PCR positive HCW at MuMCH was identified on, 19 March, 2020. Since then, out of total 343 HCWs working at MuMCH, 39 HCW had become COVID positive while working on hospital from March 2020 to May 2020. Out of them 37 were interviewed for this study retrospectively.

HCWs account for a significant proportion of infections in these COVID outbreaks throughout the world. But there is lack of evidence and methodological limitations on SARS-CoV-2 infections in HCWs. Many studies are case series and epidemiologic evaluations; evaluations of clinical cohorts of exposed HCWs are lacking. Almost all studies were performed at Wuhan, in China¹¹.

The overall rate of infection among HCWs at MuMCH was 10.79%. Whereas, the infection rate was 1.1% in one study at Wuhan¹², while 3.8% in another study¹³ in China among HCWs. Although the rate was much higher than the Chinese studies, it was found to be comparable with the overall infection rate of the general population of the Bangladesh during that time period¹⁴.

The overall median age of the affected HCW was 36 years. Likewise, it was found that, the most of the affected HCW were of younger age group in several studies done in China^{15, 16, 17} and one study done at Washington¹⁸. The median age of United States' health care personnel infected with COVID-19 was found to be 42 in another study¹⁹.

Around two third of the affected HCWs were female (64.86%). This was very similar to the studies done by Xiaoquan Lai et al¹², Liu J et al¹⁵, Liu M et al¹⁶ and the morbidity mortality weekly report (MMWR) from United States¹⁸ who also observed female predominance on affected HCWs ranging from 65% to 73%

Nurses and doctors were the most affected health personnel. Nurses (40.54%) were affected more than the physicians (24.32%). In one study in China¹⁵, one third of cases were physicians and two thirds were nurses; this was reversed in the other study¹⁶. In a prospective cohort study at a large U.S. university and two affiliated university hospitals also found that nurses

were the most affected health care personnel (62.5%) with COVID-19²⁰.

Most of the affected persons (70.274%) did not have any pre-existing comorbidities. Bronchial asthma (13.51%) and HTN (13.51%) were the most prevalent comorbidities. Similar observation was found in a recent living rapid review on corona virus infection on HCWs¹¹.

A large proportion of the affected HCW (43.24%) had no definite symptoms for COVID 19. Out of the 19 (56.76%) symptomatic cases, most (40.54%) had mild symptoms and only 6 people had (16.22%) moderate symptoms. This may be attributed to their younger age and fewer preexisting co morbid condition, which was again an identical observation to the recent living rapid review on corona virus infection on HCWs¹¹.

Cough (43.24%), fever (29.73%), sore throat or throat pain (18.92%), fatigue/malaise (18.92%), runny nose (13.51%) and headache (16.22%) were the most prevalent symptoms among the HCWs. Whereas the 5 most common symptoms were fever (60.9%), myalgia or fatigue (60.0%), cough (56.4%), sore throat (50.0%), and muscle ache (45.5%) in one study done on a large cohort in Wuhan, China¹². This study also found 84.5% non-severe disease, but 1 (0.9%) death among the affected HCWs. On the contrary all the SARS-CoV-2 positive HCWs at MuMCH had uneventful complete recovery later on, although there were already few deaths of HCWs reported till date of writing this paper throughout the country. This may be attributable to the early detection, younger age, few comorbidities and less severity of the cases.

On evaluation of possible risk factors, involving in aerosol generating procedures (32.43%), not using appropriate PPE (29.73%), inadequate training on PPE use (83.78%) and reusing PPEs (40.54%) had been found to be possible contributors.

In a cohort study done at a designated hospital in Wuhan, possible risk factors were working in a high risk versus general department, suboptimal hand washing before or after patient contact, longer work hours and improper PPE use. Possible aerosol generating procedures as endotracheal tube removal, cardiopulmonary resuscitation, fiber optic bronchoscopy, and sputum suction were not associated with increased risk in this study¹⁷.

Most of HCW at MuMCH (33, 89.20%) were not taking any chemoprophylaxis; all were following traditional preventive measures. None of the studies done in China, Netherlands or United States had addressed this issue.

More than two third of the employees (70.27%) were not satisfied with the infection prevention and control (IPC) measures taken by the hospital authority at MuMCH. All of them presumed that, their occupational exposure was the possible source of COVID 19 infection. This indicates that, there is still a lot to do to improve the IPC measures of the hospitals. That includes supplying appropriate and adequate PPEs, providing appropriate and adequate donning-doffing facilities, arranging effective training on PPE use, reducing the duration of exposure to COVID-19 patients and safe waste disposal. Last but not the least, providing psychosocial supports to all the HCWs to boost up their confidence and mental strength is also very necessary, as there is evidence that depression, anxiety, and psychological distress are common in HCWs in the COVID-19 outbreak¹¹.

More studies are needed for better understanding of the exposed HCWs who are infected with SARS-CoV-2, their associated outcomes, including economic effects; ability to work; social effects (eg, need for child care); impacts on family members and other close contacts and possible spread.

Conclusion:

More than 1 in 10 HCWs at MuMCH was infected with SARS-CoV-2 while working at the hospital in the first two months of COVID-19 pandemic in Bangladesh. The affected personnel were mostly of younger age group and with less comorbidity. Nurses were the most affected HCW. All experienced uneventful recovery and most of them were not satisfied with the IPC measures taken by the hospital authority. Further studies are required to identify the level of risk of infection, possible risk factors and outcomes and last but not the least, the effective IPC measures to be taken by the hospital authority under the guidance of the ministry of health.

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