

Coronavirus Pandemic

COVID-19 Pandemic: How is Bangladesh coping with the rapid spread of coronavirus infection?

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Abstract

The novel coronavirus has become a global risk because of its massive transmission and high rates of mutation. Efficient clinical management remains a challenge in combatting the severe acute respiratory syndrome caused by this virulent strain. This contagious disease is new to the people of Bangladesh. The country is at high risk of spreading the coronavirus infection particularly because of its high population density. Significant morbidity and mortality have been observed for the quick transmission of this virus since March 8, 2020. The basic objective of this article is to analyze the preparedness of Bangladesh, given its constraints and limitations, to cope with the rapid spread of COVID-19 infection. In doing so, it summarizes the origin of coronavirus, epidemiology, mode of transmission, diagnosis, treatment, prevention and control of the disease. Although many steps have been taken by the Government and the private sector of Bangladesh to create awareness about measures needed to prevent the deadly infections, many people are unaware of and reluctant to accept the prescribed rules. Inadequacy of diagnostic facilities and limitations of clinical care and health care services were major constraints faced in treating COVID-19 infected people in Bangladesh. Greater compliance by the people in following the suggested measures may help reduce the rapid spread of the disease and overcome the challenges faced by this pandemic.

Key words: COVID-19; Bangladesh; awareness; pandemic; coronavirus; transmission.

J Infect Dev Ctries 2020; 14(10):1098-1105. doi:10.3855/jidc.13289

(Received 17 June 2020 – Accepted 10 September 2020)

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Introduction

Investigation of a cluster of pneumonia cases of undetermined causes occurring in Wuhan, Hubei province of China, led to the identification of the coronavirus and its reporting to the World Health Organization (WHO) on 31 December 2019 [1]. The WHO declared the outbreak as a Public Health Emergency of International Concern on 30 January 2020, COVID-19 as the name of the disease on 11 February 2020, and consequent on its spread in many other countries declared it a pandemic on 11 March 2020 [2].

As of 27 August, 2020, the WHO reported 23,980,044 global cases and 820,763 deaths [3]. The rapid spread, combined with significant morbidity and high case fatality pose a huge and often unmanageable burden on the health sectors of most affected countries,

particularly in developing low and middle-income countries.

This novel RNA virus has been designated as SARS-CoV-2 [2]. The characteristics of this virus and more importantly its pathogenesis, its clinical features, transmission dynamics and ability for causing airborne infections are evolving. And the uncertainty contributes to the management dilemma of COVID-19 including possible detrimental outcome e.g. the current use of ventilators in seriously manifest patients [4–6].

Bangladesh is a small South Asian country, with a surface area of 147,570 km² (or 56,977 square miles) with a population of about 165 million and a population density of 1161 people/ km², which is tenth in the world. As the disease was spreading from China to the neighboring countries, a similar catastrophic condition was anticipated for Bangladesh, where the first case

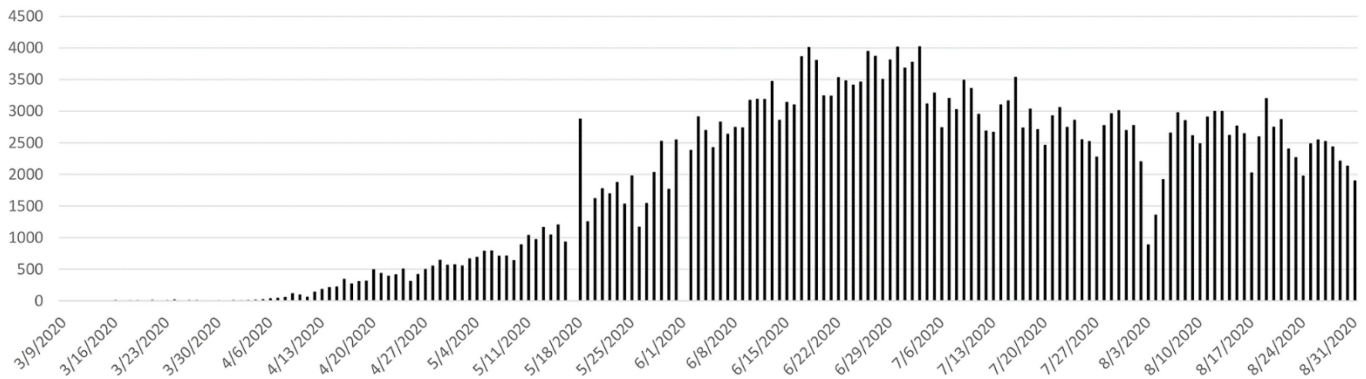
was detected on 08 March 2020 [3]. Bangladesh has reported increasing cases and deaths (Figure 1A and Figure 1B) with a 1.34% infection fatality ratio [3,7]. Healthcare professionals including doctors are facing a massive challenge to fight against this pandemic. A high number of deaths have also been observed among doctors on the COVID-19 front line in Bangladesh. The number of doctors infected by COVID-19 till 16 June 2020 was 1180, where 34 died [8].

Like all other nations, Bangladesh is facing the challenge of preventive and clinical health care as well as economic challenges that have arisen out of the measures adopted to slow down the spread of the virus. The main objective of this article is to discuss the constraints and limitations in establishing appropriate measures for stopping the COVID-19 epidemic in the under-resourced health care system of Bangladesh.

Facts on SARS-CoV-2 at a glance

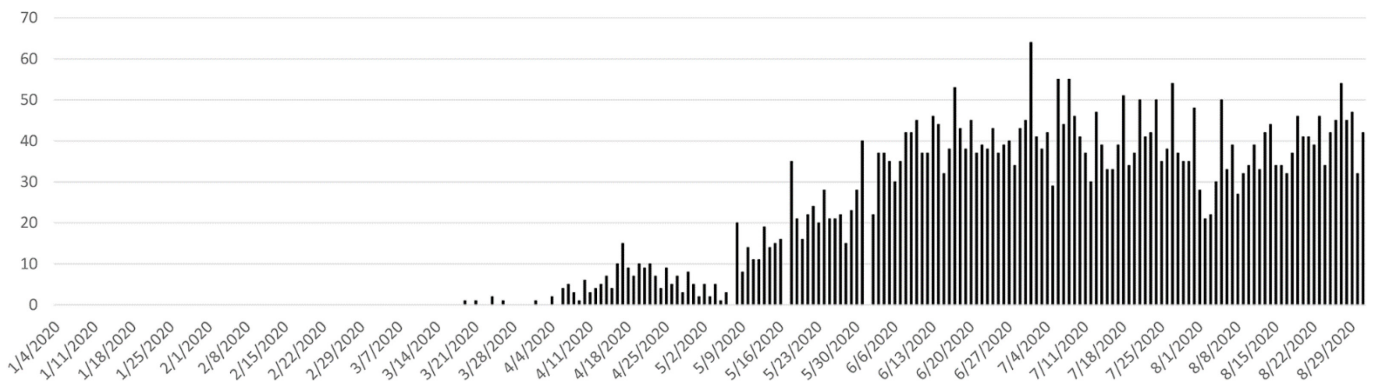
The outbreak of the coronavirus was initially believed to have some link to wet animal markets, suggesting animal-to-human transmission of the virus. The disease later spread to other provinces of China, and then to countries outside of China indicating human-to-human transmission of the virus [1]. The incubation period of the virus is usually 3 to 7 days but it may take up to 2 weeks for the symptoms to appear after being exposed to the virus. Available data indicates the doubling of the number infected in a week [5]. People of all ages and races are susceptible to coronavirus. In China, 71.45% of the confirmed COVID-19 patients were in the age range of 35-60 years; children younger than ten years constituted only 0.35% of the infected population [9].

Figure 1A. COVID-19 New Cases per Day in Bangladesh.



New COVID-19 cases per day in Bangladesh from 8 March till 31 August 2020. It showed that the number of new cases started to increase per day from 5 April 2020.

Figure 1B. COVID-19 New Death Cases per Day in Bangladesh.



COVID-19 death cases per day in Bangladesh from 8 March till 29 August 2020. It showed that the number of death cases started to increase per day from 7 April 2020.

Mode of Transmission of Coronavirus

Transmission of infections from an infected person to others can occur in various ways such as (a) by inhalation of the expelled droplets during sneezing and coughing, and even speaking from a short distance emerging from an infected person, (b) by touching virus-contaminated surface and then touching the mouth, eyes, and even (c) staying in close contact with the host during the pre-symptomatic period [10–13]. The WHO has recently alerted on possible aerosol transmission in association with prolonged exposure to elevated aerosol concentrations in closed spaces [5].

People at high risk of COVID-19 infection

In people with no associated risk factor(s), acute respiratory failure develops in a small proportion of patients with case fatality of 1%-3% [14]. People with underlying medical conditions such as diabetes, chronic lung conditions such as asthma and COPD, hypertension and other cardiovascular diseases, and cancer are at a much higher risk of developing severe illness and deaths from COVID-19 [13]. Elderly and other immuno-compromised individuals and smokers are also at high-risk [15,16]. Provision of care and treatment to severely ill COVID-19 patients at ICU setup is challenging where the health care providers remain at a high risk of acquiring nosocomial infections, and the risk of nosocomial infection is also higher among people attending hospital more than once [17].

Clinical features of COVID-19

The common symptoms include sore throat, cough, fever, malaise to severe body ache, shortness of breath and increasingly difficult breathing. Loss of smell and taste has also been reported. Moreover, certain less common symptoms were also identified such as fatigue, pain in muscle joint, vomiting, headache, diarrhoea, hemoptysis [18]. Patients exhibiting mild symptoms usually recover within 1–2 weeks [9]. During the early period, COVID-19 was believed to cause serious Acute Respiratory Distress Syndrome (ARDS) [10], leading to ventilator use guidelines; however, the outcome of patients was disastrous as around 80% of the patients on ventilator had fatal outcomes [19].

Pathophysiology of COVID-19

The pathophysiology of COVID-19, caused by the novel coronavirus, is not fully understood. There is evidence that coagulopathy is involved, at least in part, which is indicated by the elevation of fibrinogen and D-dimer levels in severely ill hospitalized patients with

COVID-19 [20]. A rise in traditional inflammatory marker, such as CRP is correlated with the elevated fibrinogen and D-dimer levels. Higher deaths occurred in patients when the D-dimer levels was ≥ 2.0 $\mu\text{g/mL}$ compared to those with a D-dimer level of < 2.0 $\mu\text{g/mL}$. The finding suggests the need for determining the concentration of D-dimer in severe cases of COVID-19 and possible benefit from the administration of an appropriate anticoagulant in their management. The use of low molecular weight heparin (LMWH) has been suggested for patients hospitalized with COVID-19 pneumonia [20,21].

Overproduction of pro-inflammatory cytokines (cytokine storm), such as TNF- α , IL-6 and IL-1 β has also been reported in COVID-19 patients with severe acute respiratory syndrome (SARS). Persistent high concentrations of the cytokines cause hyperpermeability in blood vessels causing thrombosis in the pulmonary vessels and perhaps also in the kidneys and other organs leading to multi-organ failure and even deaths. Anticytokine and immunomodulatory therapies are under investigation for treating patients with the overactive response of cytokines [22]. Impaired pro-and anticoagulant balance in COVID-19 patient may lead to disseminated intravascular coagulation (DIC), micro thrombosis and multi-organ failure. It has been reported that acute pulmonary embolism is a risk factor for COVID-19 patients [23].

Prevention of COVID-19

Recommended preventive measures include hand washing, maintaining respiratory etiquette, i.e., covering of mouth when coughing, maintaining a safe distance from other people, and wearing a face mask in public settings [13].

It has become a public concern to stop the spread of coronavirus infection. The social distancing of 6 feet is a common measure taken. However, community-based transmission highlights the limitation of maintaining social distancing. Taking the above into consideration, the Centers for Disease Control and Prevention (CDC) recommends wearing face-covering of cloths that may help slow the transmission of infection. These masks can be prepared with simple items at a low cost, thus reducing the market demand for the surgical masks or N-95 masks which should be reserved for healthcare professionals only [24].

CDC and Public Health England guidelines suggest some measures for the patients who have possible symptoms like COVID-19 infection. The person should isolate himself/herself from others and stay at home. Initially, it should be for 7 days, but 14 days is highly

recommended as the chance of transmission goes down to a very low level. If elderly or vulnerable persons are present (who have the chance to get infected easily), they should be moved to another place. If that is not possible, the infected person should strictly maintain distance from them. The symptoms of the infected individual should be regularly monitored. Maintenance of proper hygiene practice is also important. Social contact and public gathering must be avoided. If the condition worsens, immediate medical attention should be given [25].

Control of an infectious disease outbreak

According to the WHO guidelines, transmission can occur from all types of infected individuals - pre-symptomatic, symptomatic and asymptomatic. Virus shedding from symptomatic patients occurs mostly within the first 3 days of the onset of symptoms [26] making it the most contagious stage. In the case of asymptomatic infections, the carrier never develops any symptoms. A recent study has shown that 15.8% of those infected under 10-years old children were asymptomatic [9]. Both asymptomatic and pre-symptomatic transmissions of the virus infection have been reported [27].

Spread of coronavirus in Bangladesh: implemented guidelines and healthcare services

Lack of awareness among people and socio-economic challenges

Being a densely populated, lower-middle-income country, the risk of rapid spread of infection is high in Bangladesh. The country had limited experience from two earlier outbreaks of SARS and MERS [28,29]. The events of rapid spread and high case fatality of COVID-19 in European countries alerted Bangladesh. The Government of the Peoples' Republic of Bangladesh (GoB) initiated a media campaign to make people aware of this fatal disease.

As a highly-infectious disease, effective strategies to prevent the outbreak of COVID-19 include containment and mitigation. Containment aims at tracing and isolating the infected individuals along with introducing other infection control measures to stop/limit the spread of the disease into the larger population. Mitigation measures aim at slowing the spread of the disease and mitigating its effects on the healthcare system and society. A combination of both containment and mitigation measures may be undertaken at the same time [30].

For limiting the import of infections from outside of the country, the GoB initiated measures at its international airports to screen arriving passengers from different countries and organizing their home or institutional isolation according to its 'Novel Coronavirus (COVID-19) Guidelines'. However, some passengers were not compliant to the home quarantine measures which is one of the major factors behind the initial transmission of the disease [31].

In an effort at slowing down the spread as well as localizing the infections, the Ministry of Public Administration of Bangladesh announced general holidays from 26 March 2020 and urged people to stay at homes, and come out only when essential, such as for medical reasons, or for purchase of food items and for banking. The duration of the shutdown was extended several times after that. Failing to understand the problem of COVID-19 as well as the concept and the need for physical distancing for its control, people in cities as well as in small townships regularly violated it, necessitating the establishment of effective programmes to address the issues. According to the World Bank data, over 55 percent of the urban population live in the slums [32]. The poor people in the major city slums typically have a small single room for the entire family of four on average but in many cases higher than that. In slums, the access to individual living quarters is usually very narrow and barely passable for two individuals, where social distancing is practically impossible. And the poorest members of society like daily laborers, vendors, rickshaw pullers, etc. find themselves breaking social distancing for sheer survival [33,34].

Establishment of healthcare platforms and testing facilities

At the beginning of the epidemic, the GoB identified initially only three public hospitals. Later, a good number of both government and private hospital facilities at the administrative district levels were earmarked. The Directorate General of Health Services (DGHS) of the GoB trains doctors and nurses in each division and their district level health facilities, covering topics such as hospital management, clinical care, and hospital infection prevention and control of COVID-19. A new volunteer organization has emerged that brought together specialist doctors from various GoB and non-governmental institutions to provide care and treatment to the COVID-19 patients [35].

COVID-19 is diagnosed by detecting the presence of virus RNA in the respiratory secretion or nasopharyngeal/ pharyngeal swab of the patient by RT-

PCR [36]. Initially, the Institute of Epidemiology, Disease Control and Research (IEDCR) of Bangladesh was the only institute performing RT-PCR tests. Later, 60 laboratories were set up with ability to perform tests to detect the presence of the virus by using RT-PCR till June 2020. Starting on 08 March 2020, a total of 918,272 tests were performed till 10 July 2020, of which, 4082 died and 193458 recovered [37]. The test for the virus was only conducted for suspected COVID-19 cases and people dying from similar features, as those exposed to a COVID-19 positive case [38].

Implications of the measures undertaken by the GoB

The GoB receives technical advice and guidance from the WHO, and has urged general people to maintain personal hygiene, particularly handwashing, to maintain respiratory etiquette, and to wear face masks while going out of home or at work. It prioritized the use of personal protective equipment (PPE) only for health workers [35]. Bangladesh has implemented National Covid-19 Medical Management Guidelines to ensure proper health care for infected people, patients with specific health conditions (e.g. heart disease, diabetes etc.) as well as critically ill patients [39].

The GoB restricted people's movement, encouraged physical distancing and restricted social and religious gatherings including prayers at masjids, temples and churches. Shutting down of public life resulted in an economic crisis because about a fifth of the country's population lives below the poverty line and a large proportion of the working people are day laborers, factory workers, rickshaw pullers, and petty businessmen, who were seriously affected by the above measures. Health messages were provided through electronic media, but were not accessible to all. More importantly, there was a serious lack of behavioural change communications. Thus, there is a need to examine the effectiveness of communications and undertake necessary measures for improvement.

Mild to moderate cases of COVID-19 require adequate rest, fluid intake, and acetaminophen for control of fever and/or body ache as treatment. Critically ill COVID-19 patients, or patients with underlying health conditions might require intravenous fluid, oxygen inhalation, and breathing support including the use of ventilators [25,40]. During the initial days of the spread of the virus, there was a chaotic situation in the provision of health services in Bangladesh. Despite the establishment of designated hospitals for treatment and care of possible COVID-19 patients, people found it very difficult to receive treatment - some were reported [41] or have been forced

to move from one health facility to another and succumb to death without receiving any care or treatment. This also affected patients with other conditions, both at the health facility as well as at the general practitioner level. There were tremendous shortages of ICU beds in the government and private hospitals for treating critically infected COVID-19 patients. The demand of high flow oxygen to the critically ill patients to meet the adequate oxygen saturation was severely impaired in the health care setting in Bangladesh. There was also a serious shortage of protective tools such as PPE that meet the WHO criteria, gloves, and hand sanitizers. As a result, doctors, nurses and health assistants were reportedly at a greater risk of acquiring COVID-19 infections at the designated health centres.

While COVID-19 outbreaks are posing serious health risks to people in general, nature always provides some lessons. Some such positive outcomes of the pandemic are discussed below.

Possible positive outcomes of the COVID-19 pandemic in Bangladesh

It is hoped that post-COVID-19 Bangladesh might manifest some positive behavioral, and attitudinal changes, especially in the areas of personal hygiene and sanitation. Learning from this epidemic, essential health sector reforms, including the development of trained manpower, establishment of modern laboratory facilities, emergency health response capacity development, screening of potential sources of infections, and development of appropriate ways of isolation, care and treatment could be positive outcomes. Together, there might be an impact on the capacity to manage possible future outbreaks/epidemics. It would also be important to develop and improve the capacity for epidemiological and clinical studies, laboratory capacity for diagnosis and development of new tests, and development/production of drugs and vaccines.

Emergencies and disasters, such as COVID-19 pandemic, help bring people together for achieving a common goal, creating empathy, and motivating people toward philanthropic works and charities. While people are already demonstrating that, the establishment of an efficient system for the collection of donations and their distribution to the needy people deserves consideration.

Discussion

Bangladesh is facing similar healthcare and economic issues as other COVID-19 inflicted countries, but the challenges are greater in this densely populated

lower-middle-income country. This is the first time the people are experiencing and learning from a lockdown situation, and consequently, its full potential could not be realized. Thus, there is a need to review behavioral communication strategies and to improve them for preparing people in facing similar challenges in future and in acting harmoniously.

As of 14 June 2020, the highest affected region in the world with COVID-19 is the United States of America with 3,770,018 confirmed cases and 114,466 deaths. In Southeast Asia the number of confirmed cases is 459,867 with 12,602 deaths. Among the 61 countries in the European region, most were affected by community transmission, some had clusters of cases and very few numbers of sporadic cases. In Southeast Asia, only Indonesia has been affected through community transmission whereas, Bangladesh, India, and the other 7 countries are affected through clusters of cases. The rapid transmission of COVID-19 cases in Bangladesh since March may be due to the delay in imposing lockdown and in restricting air travel to the country [42].

According to the information we have provided in this article, it is clear that Bangladesh is experiencing a serious outbreak of COVID-19 that has gained in pace after the initial case was detected in March. In Bangladesh, the first COVID-19 case was detected on March 8, which jumped to 65,769 cases in 120 days (till June 8) due to clusters of cases. As of 14 June 2020, Bangladesh stands to have 87,520 COVID-19 cases as the result of cluster cases [43]. According to the published report, the death rate of the doctors on the COVID-19 front line is about 3% [8]. The increase in the number of cases and deaths observed in the country demonstrates the unpreparedness of its healthcare system in the face of such a pandemic. The death rate among doctors treating COVID-19 patients is alarmingly high in Bangladesh. This is likely to have an adverse impact on the quality of treatment of patients and the outcomes. Stricter adherence to the WHO guidelines for infection control right from the start could have helped better management of this deadly disease thereby saving lives of patients including the front liner doctors.

Conclusions

A number of conclusions may be drawn from the experience regarding the spread of COVID-19, the efforts made to slow down the rate of infections, and the challenges faced in implementing regulations and in providing health care to the affected. First, the government's preparedness and ability to face such a

public health emergency have been severely tested and found to be inadequate. Urgent attention needs to be devoted to this area and steps are needed both to strengthen health services and the degree of preparedness to face such situations in future. Second, common people also seem to be lacking in awareness about the seriousness of such infectious diseases and strategies needed to tackle them. Even within the limitations of low levels of incomes, education and precarious living, greater awareness and knowledge of personal hygiene and of the importance of practising social distancing could contribute to the slowing down of the spread of the virus. Stricter enforcement of regulations and greater efforts at raising public awareness could have prevented the situation from deteriorating so much and limited the rate of mortality from the infection.

Acknowledgements

Our deepest gratitude to Dr. MA Salam, Former Director, Research Administration of International Centre for Diarrhoeal Disease Research, Bangladesh for editing and reviewing this manuscript.

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Conflict of interests: No conflict of interests is declared.