Opportunities and Challenges of COVID-19 Overall Case Handling in Bangladesh: Testing- Isolation- Contact Tracing- Quarantine- Hospitalization

Report

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Abbreviations

BDT	Bangladeshi taka
BUHS	Bangladesh University of Health Sciences
DGHS	Directorate General of Health Services
ERC	Ethical Review Committee
GIS	Geographic Information System
ICU	Intensive Care Unite
IDIs	In-depth interviews
IEDCR	Institute of Epidemiology Disease Control and Research
IPC	Infection Prevention and Control
KIIs	Key Informant Interviews
MOHFW	Ministry of Health and Family Welfare
PPE	Personal Protective Equipment
SSC	Secondary School Certificate
WHO	World Health Organization

EXECUTIVE SUMMARY

Introduction: COVID-19 is a highly infectious disease causing a worldwide pandemic situation declared by World Health Organization (WHO) on 11th March, 2020. This is a severe acute respiratory infection caused by a novel evolving virus causing severe acute respiratory syndrome in other words called (SARS-CoV-2). Bangladesh confirmed the first case of coronavirus on 8th March, 2020. COVID-19 infection numbers are reported from Directorate General of Health Services (DGHS) on a daily basis with confirmed positive cases and deaths having community transmission (dated 28th March, 2020). Though there is no confirm treatment or vaccine for it, still prevention and early detection (test) is the best way. Institutional or home-based quarantine for suspected cases and institutional isolation for confirmed cases can play a great role to face the deadly COVID-19. DGHS has started the COVID-19 case management system through a process of quarantine - testing - isolation - and then admitting the positive patients if there be a need. This process of patient management is very new and its opportunities as well as challenges need to be assessed in order to strengthen the overall COVID-19 case management system of the country.

Objectives: To find out the opportunities and challenges in order to strengthening of the COVID-19 case management system in Bangladesh

Methods: This study was a qualitative study conducted in the different hospitals of the all eight divisions in Bangladesh within a two months period. Using purposive sampling technique, a total of 23 Key Informant Interviews (KIIs) from the direct service providers (both doctors, nurses and other health care providers) from 8 divisions (6 from Dhaka division and 17 from other seven divisions), and total 24 in-depth interviews (IDIs) was conducted among the COVID-19 treated patients and their attendants (8 from Dhaka division and 16 from other seven divisions) who already received the services from the selected hospitals. Besides this, opinions from 4 relevant policy planners (MOHFW appointed Dhaka, Chittagong, Sylhet and Mymensingh divisional advisors) was also collected. Thematic analysis was done to

present the data and the findings were presented under few themes like: *'COVID 19 infection in Bangladesh'; 'Testing'; 'Contact Tracing' 'Isolation'; 'Quarantine'; 'Hospital management'; and 'Capacity Building'*. Ethical approval was taken from the Ethical Review Committee (ERC) of Bangladesh University of Health Sciences (BUHS).

Results: This study uncovered very limited, confined, dissatisfied, and unfavorable opportunities of the system of keeping in home or institutional based quarantine for the people at risk; the system of keeping in home or institutional based isolation for the positive cases; and the system of the referral and admission of confirm COVID-19 patients in the hospitals from all of the different types of participant's point of views. It has also reflected that these scenarios were due to different types of challenges as well as mismanagement from the authority and also reluctant manners of the mass population. Moreover, inability to differentiate between quarantine and isolation along with insufficient and inappropriate relevant healthy measures among the patients and attendants, and also the lack of proper infrastructure, living facilities, and livelihood support greatly increased the burden of challenges. However, the policy planners of the study showed the avenue of opportunities to strengthen the COVID-19 case management system in this country to overcome the situation by the planning or reforming and substantial implementation of national action plans and guidelines with local community engagement and strong enforcement of laws with proper monitoring.

Conclusions: A mixed scenario was explored regarding the COVID-19 case management system in the hospitals reflecting a partially resource deficient as well as unorganized management system in the hospitals throughout the country. Lack of national action plan and implementation, lack of monitoring system and law enforcement, inadequately trained health care provider and lack of local community engagement was highlighted by the key informants behind this scenario. Also delayed and inadequate testing, absence of contact tracing, inadequate and improper quarantine and isolation procedure, inadequacy of medical supplies, facilities and

services, lack of knowledge and awareness among the population etc. increased the barriers and challenges of COVID-19 case management system. Tackling these barriers and challenges may bring the potential future opportunities of strengthening the COVID-19 case management system in Bangladesh more efficiently.

BACKGROUND:

Health systems in both developed and developing countries are now struggling to respond to the challenges posed by Coronavirus Disease-2019 (COVID-19) pandemic. As of September 29, 210 countries and territories have been affected by the pandemic with more than 33,249,563 cases and 1,000,040 deaths globally (WHO, 2020). With the outbreak of COVID-19 the entire world is working to address it as an international public health emergency. As the outbreak quickly surges worldwide, many countries are adopting non-therapeutic preventive measures, which include travel bans, remote office activities, country lockdown, and most importantly, social distancing. However, these measures face challenges in Bangladesh, a lower-middle-income economy with one of the world's densest populations, where a significant proportion of the total population lives hand to mouth, lockdown is not a feasible idea. Social distancing is also difficult in many areas of the country, and with the minimal resources the country has, it would be extremely challenging to implement the mitigation measures. Mobile sanitization facilities, temporary quarantine sites and healthcare facilities could help mitigate the impact of the pandemic at a local level. **(National Guidelines on Clinical Management of COVID-19, 2020)**.

The first case of coronavirus in Bangladesh was confirmed on 8th March, 2020 and first death on 18th Match, 2020. In the first 3 weeks after the detection of the first COVID-19 case in Bangladesh, the IEDCR was the sole diagnostic facility in the country of 180 million people, and the daily testing rate remained below 100 per day (Dhaka Tribune, 2020). Five weeks after the detection of the first COVID-19 case in Bangladesh, the IEDCR had only tested 11,223 people, constituting approximately 68 tests per million population **(DGHS press release, 2020; Worldometer, 2020)**. The centralization of COVID-19 diagnosis facilities is somewhat plausible, as most hospitals do not have enough personal protective equipment (PPE). However, this left the mass of people and healthcare workers in an awfully susceptible condition. Bangladesh had a severe shortage of testing kits, PPE, masks which only covered a small portion of the country's actual needs **(Chowdhury SI, 2020)**. As a result of the

combined lack of PPE and diagnostic testing capacity, fear, and anxiety geared up among the mass population, and many healthcare workers refused to provide any service **(Anwar S. et al., April 2020)**.

Following detection of the first few COVID-19 cases in early March, Bangladesh has stepped up its efforts to strengthen capacity of the healthcare system to avert a crisis in the event of a surge in the number of cases **(Khan MHR et al. May 2020)**. Bangladesh have started the preparation to control and contain the pandemic in the country based on National Preparation and Response Plan. As a part of the preparation process, a guideline on clinical management was developed by Bangladesh Society of Medicine in late January, 2020. But the number of cases per million exceeds the number of available isolation beds per million in the major hotspots indicating that there is a risk of the healthcare system becoming overwhelmed. This is especially true for Dhaka Division, where the ratio of COVID-19 patients to doctors appears to be alarmingly high. Among the eight divisions, prevalence is highest in Dhaka Division followed by Mymensingh and Barishal. With limited resources, expanding healthcare capacity remains a challenge for Bangladesh. There are about one hundred hospitals with ICU facilities in Bangladesh and 80% of them are located in Dhaka **("Message from president. Criticon Bangladesh 2018", 2018)**. Hospitals in Bangladesh currently have a total of 1,169 ICU beds. Out of these, 432 are in government hospitals and only 110 are outside the capital Dhaka, and 737 are in the private hospitals **(Khan & Hossain, 2020)**. According to "The Daily Dhaka Tribune", March 21, 2020, Bangladesh currently has a total 141,903 hospital beds or 0.84 beds per 1000 people. Whether these resources are sufficient to tackle the COVID-19 pandemic requires a more in-depth analysis. This paper tries to find out the opportunities and challenges needed to strengthen the COVID-19 case management in Bangladesh through a qualitative approach.

OBJECTIVES:

- To identify the opportunities and challenges of the system of keeping the people at risk in home or institutional based quarantine.
- To identify the opportunities and challenges of the system of keeping the positive patients in home or institutional based isolation.
- To identify the opportunities and challenges of the referral and admission process of confirm COVID-19 patients in the hospitals.

METHODS:

Study Settings:

A qualitative study was conducted to identify the opportunities and challenges of the health system of Bangladesh during this COVID-19 pandemic situation involving the service providers, service users and policy planners. The study involved the few COVID dedicated hospitals in eight divisions (Barisal, Chottogram, Dhaka, Khulna, Mymensingh, Rajshahi, Rangpur, and Sylhet) of Bangladesh. It was completed within two-months period from 15 June to 15 August 2020.

Table 1: Distribution of the data collection sites

Division Name	Data collection area
Barisal	• Barisal Sher E Bangla Medical College & Hospital • Barguna General Hospital
Chottogram	• Cox's Bazar Sadar Hospital • Chottogram Medical College • Cumilla Medical College & Hospital
Dhaka	• Dhaka Medical College Hospital • Bangabandhu Sheikh Mujib Medical University • Shaheed Syed Nazrul Islam Medical College • Mirpur Maternity Hospital • National Chest Infectious Diseases Hospital • Reagent Hospital, Mirpur • Kuwait Bangladesh Friendship Government Hospital • Bashundhara Isolation Centre • Faridpur Medical College & Hospital • Sorkari Kormochari Hospital • National Institute of Laboratory Medicine and Referral Center
Khulna	• Khulna Diabetic Hospital • Khulna Medical College
Mymensingh Rajshahi	• Mymensingh Medical College Hospital • TMSS Medical College • Rafatullah Community Hospital, Bogra
Rangpur	• Upazilla Health Complex, Ranisankail, Thakurgaon
Sylhet	• Shahid Shamsuddin Ahmed Hospital

Study population:

All the stakeholders related to the COVID-19 management directly or indirectly were involved in the study. They are service providers (physicians, nurses), service receivers including patients who had been treated as COVID positive, their attendants, and MOHFW appointed divisional policy planners. Both the hospitals and the participants were selected purposively.

Data collection procedure:

Considering the COVID-19 pandemic, data were collected from the service providers and users through telephone interview from outside of the Dhaka division, and in case of Dhaka division (Epicenter for COVID-19) both telephone and face-to-face interview was conducted using a guided questionnaire and prefixed interview schedule (Annex: 3a to 3c). The interviews were recorded with the permission of the respondents.

Total 23 Key Informant Interviews (KIIs) with the direct service providers (both doctors and nurses) from 8 divisions (6 from Dhaka division and 17 from other seven divisions), and total 24 in-depth interviews (IDIs) were conducted among the COVID-19 treated patients and their attendants (8 from Dhaka division and 16 from other seven divisions) who already received the services from the selected hospitals. Besides this, opinions from 4 relevant policy planners (MOHFW appointed Dhaka, Chottogram, Sylhet and Mymensingh divisional Policy planners) was also collected. Data collectors were recruited to conduct the interviews and for its transcription who worked along with the investigators. Though we approached almost all of the participants of Dhaka city for face-to-face KIIs and IDIs but we succeed only for seven. Due to COVID situation, rest of them denied for face-to-face interview but agreed to telephone interview. In case of face-to-face KIIs and IDIs, both data collectors and participants used maximum PPE protection.

Though we had an intention, we could not visit a quarantine center (Dhaka Hajj Camp) to see the arrangement and services they are providing as we failed to manage the permission from the concerned authorities.

Thematic analysis was done for data presentation. After transcription of the interviews from the record, it was organized under different themes including 'COVID 19 infection in Bangladesh'; 'Testing'; 'Contact Tracing' 'Isolation'; 'Quarantine'; 'Hospital management'; and 'Capacity Building'.

Table 2: Distribution of the participants according to the divisions

Divisions	Key Informant Interview (KII)		In-depth interview (IDI)	Total
	Service providers *(Participants: Physician and Nurse)*	**Policy planner's opinion** *(Participants: MOHFW appointed divisional Advisor)*	**Service users** *(Participants: patients and their attendants)*	
Barisal	2	0	1	3
Chottogram	3	1	3	7
Dhaka	7	1	8	16
Khulna	2	0	1	3
Mymensingh	2	1	2	5
Rajshahi	3	0	3	6
Rangpur	2	0	3	5
Sylhet	2	1	3	6
Total	**23**	**4**	**24**	**51**

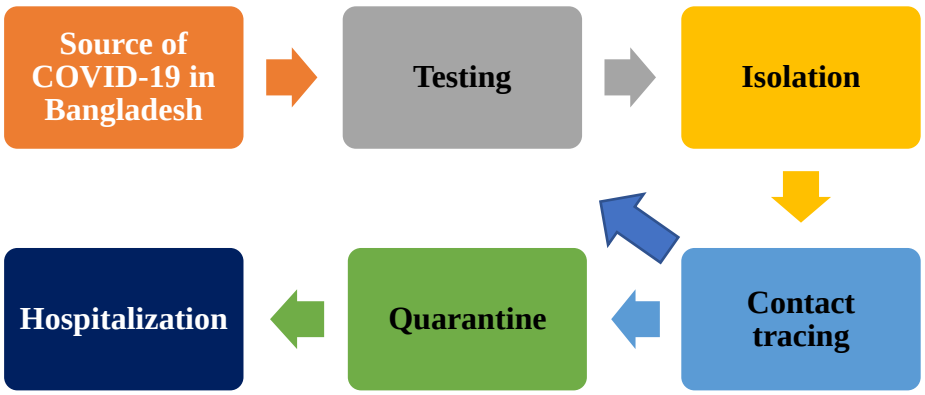

Figure 1: COVID-19 case handling flowchart in Bangladesh

Ethical approval:

Ethical approval (Registration Number: **BUHS/ERC/20/15**) was taken from the Ethical Review Committee (ERC) of Bangladesh University of Health Sciences (BUHS) (Annex: 2). All the ethical guidelines as per Helsinki Declaration related to biomedical research were followed strictly. Verbal informed consent was taken from each participant.

RESULTS:

Socio-demographic information of the participants

The overall participants of the study were categorized as healthcare providers (physicians and nurses), healthcare receivers (patients and patient's attendants), and policy planners (MOHFW appointed divisional advisors). All the physicians were men, nurses were mostly women, patients and their attendants were mostly men, and all the policy planners were men. Age of the physicians and nurses were ranged from 26 to 48 years reflecting young to middle adult age group, it was 23 to 64 for patients and their attendants reflecting the same age group as physicians and nurses, and it was 57 to 62 years for the Divisional Policy Planners reflecting middle adult age group. Most of the patients and their attendants completed Secondary School Certificate (SSC) or more, were employed.

Findings of thematic Analysis:

The participants (service providers, service users and the policy planners) expressed their views regarding the management system and prevention of COVID-19 infection in the country which was organized under different themes and presented descriptively using direct speech quoting and case story. Except one all of the service users were treated in the hospitals.

COVID-19 infection in Bangladesh

KIIs:

Reasons of spreading COVID-19 infection:

Regarding the reasons of spreading COVID-19 infection among the general people, the policy planners highlighted on the lack of monitoring from the administration and lack of enforcement of the law enforcement agencies. They also underlined over the behavior of general people like not maintaining the social distance, doesn't not wear mask, doesn't follow the hand washing procedure, doesn't follow the quarantine instruction properly, breakdown of the lockdown instruction.

About the spreading of infection among the health care providers, the policy planners identified inadequate supply of PPE, poor quality of PPE, lack of knowledge on COVID-19 infection prevention and control (IPC) law, lack of training on IPC and PPE use, no negative pressure room for PPE change (donning & doffing), inappropriate disposal of PPE as the main reasons. They told, doctors didn't follow the appropriate steps of prevention of COVID-19 spread, the donning and doffing of PPE by them weren't appropriate. Poor hospital waste management system is another cause as nobody is monitoring about spreading of COVID-19 from the hospital waste.

In this aspect one mentioned!

> ***"You will find a hanged towel besides every basin in the hospital rooms. Even after disinfecting their hands using sanitizer or soap water, doctors/nurses may get infected if they use the infected towel".***

COVID-19 Testing

Availability of COVID-19 testing facilities:

Whether COVID-19 testing is adequate or not in Bangladesh, the respondents gave their views in this regard. Almost all (100%) of them were agreed that the testing of COVID-19 in Bangladesh was inadequate from the very beginning to till the date. Regarding the possible reasons for inadequate testing of COVID-19, they mentioned that lack of testing facilities (laboratories) and kits, deficiency of technologists or technicians, lack of COVID-19 testing skill and lack of monitoring for quality of Corona testing, reporting delay, public gathering in testing sites, fear of getting infected from the testing sites.

KIIs:

> ***"We failed to do sufficient number of testing that WHO emphasized on and also failed to keep them in isolation after testing".***

> ***"Initially, the COVID-19 test was free of cost. But now it requires 100 BDT (in the Govt. hospitals). So now, people are not complying with this. Also, gradually a phobia was developed within the people regarding being infected by Corona virus while going for testing".***

IDIs:

Most (80%) of the service users had little knowledge on COVID testing like, where the testing can be done? what is the procedure of testing? whether any chance of getting infected from the testing site? what is the benefit of testing?

Sometimes the service users (60%) are not interested for testing due to the social stigma and fears of isolation from the community people and family members.

Few of the service users had very bad experiences on false negative testing results like they did testing for three times and in the last time they confirmed as COVID positive. Sometimes, they complained about the delay of testing results. One of them told that he received positive test result after 12 days when the symptoms disappear and treatment course almost finished.

CASE REPORT-1

A 50 YEARS OLD JOB HOLDERS FROM BORGUNA TOLD LIKE THIS THAT WHEN HE CONFIRMED AS COVID POSITIVE, HE DID NOT TESTED OTHER FAMILY MEMBERS IN SPITE OF HAVING THE COVID LIKE SYMPTOMS. HIS PERCEPTION IS ALL ARE COVID POSITIVE AND THEY ALSO NEED THE SAME TREATMENT LIKE HIM.

Most (85%) of the attendants reported that they did not tested themselves as they had not any COVID like symptoms. Even no one suggested them that they have to do COVID test in spite of having COVID like symptoms.

Majority (60%) of the service users thought that the testing facilities should be at their doorstep or mobile. Some of them told that they had to go other districts through public transports with their ill condition for the testing as it was absent in their district. Which may have the chance of COVID spreading.

However, all the respondents who were admitted and received treatment from the hospitals, they were satisfied on the testing facilities. As one or two technologists collected their samples from their beds and received their report on time.

Contact Tracing

KIIs:

All (100%) the respondents reported that proper contact tracing can reduce the health care burden due to COVID-19. Without contact tracing COVID prevention and control is impossible. For contact tracing they advised, a team should be built in every Upazila level for contact tracing and they need to have knowledge on it. One policy planner mentioned,

> ***"We need 100 times more testing compare to current number of testing as a lot of asymptomatic cases persists."*** and
> ***"At the beginning of the infection we successfully did contract tracing, and after that we failed due to a lot of people came from Europe especially from Italy".***

We don't have a complete local patient information system regarding total number of patients, total number of isolated cases or total number of quarantined people. There is no emergency patient transport management system. For the emergency patient management, it requires time-bound action, but there is no system in terms of time-bound action.

IDIs:

One service user informed that when he was confirmed as COVID-19 positive, then his family members were not tested. Another service user said,

> ***"As my result was positive all of my family members performed tests"***

All (100%) the service users reported that when they became COVID positive no one came to them to know about the persons who came contact with them.

Isolation

KIIs

Institutional isolation:

When asked about the institutional isolation procedure, all the respondents (100%) told that it was not followed appropriately in our country. Evaluating the possible reasons of inappropriate institutional isolation procedure in Bangladesh, several potential reasons were explored as follows -

- The main reason is inability to differentiate between the quarantine and isolation. If they could differentiate, the spread would be less. Like one of the policy planners mentioned:

> ***"In our country, people couldn't differentiate between quarantine and isolation".***

  If they could find out the positive cases from quarantine, the quarantined population would be less as the positive cases would go for isolation, and they would stay separated. We couldn't be able to make proper coordination regarding these two different processes. There was also no coordination regarding the matter of isolated corona ward in hospitals and also the dedicated hospitals for corona treatment.
- Lack of infrastructure, lack of monitoring by the administration and law enforcement agencies were other reasons behind it.
- They also mentioned about lack of proper contact tracing in our country.

Home isolation:

Similar to the context of institutional isolation, the Policy planners also thought that the home-based isolation procedure was not followed appropriately in our community. As possible reasons, a Policy planner emphasized on lack of community engagement besides lack of monitoring by the administration and law enforcement

agencies. The remaining Policy planners also reported as similar to the institutional isolation.

IDIs:

Most (90%) of the service users who were treated at home-maintained isolation strictly they thought. They were in a separate room with attached bathroom. They used different amenities than others. For their entertainment and communication, they used their mobile phones with internet. They received services from the younger persons of their home.

Few of them reported that they stayed in the same room but maintained distance as they had space limitation. But they tried to use mask always. During the home isolation all of them received treatment over mobile phone from the doctors. Some of them received advices from their relatives who were from medical background.

CASE REPORT-2

A 32 YEARS GOVERNMENT OFFICERS REPORTED THAT HE HAS TO STAY IN THE GOVT. STAFF QUARTER AND HIS FAMILY STAY IN DHAKA. WHEN HE CAME TO KNOW ABOUT COVID POSITIVE. HE STAYED IN THE QUARTER UNTIL HE BECAME NEGATIVE. DURING HIS ISOLATION PERIOD HE PASSED HIS TIME WITH READING, LISTING MUSIC, GOSSIPING WITH FAMILY MEMBERS OVER MOBILE PHONE, AND PRAYING. HE THOUGHT THAT INITIALLY FIRST 2 TO 3 DAYS HE WAS TRAUMATIZED AS HE WAS ALONE WHEN HE CAME TO KNOW HIS REPORT. AFTER THAT IT WAS OK TO HIM AND HE WAS NORMAL AND RECEIVED TREATMENT FROM THE DOCTOR OVER PHONE. HE DID THE PHYSICAL EXERCISE REGULARLY AND HE THOUGHT IT HELPS HIM TO RECOVER QUICKLY.

Community engagement:

KIIs:

All (100%) the policy planners strongly emphasized on the community engagement for successful home isolation and quarantine as they mentioned….

> ***"There was no monitoring of the quarantine and isolation system by the local community. Therefore, home quarantine & isolation were not done properly and we also failed to do so in the urban area"***

Community engagement could play a vital role for the prevention and control of COVID-19 in Bangladesh. All the Policy planners emphasized on the community participation and believed that community participation, cohesion and compliance, and promoting the individual's health awareness can bear a high impact on strengthening the COVID-19 case management system: Community people can ensure the proper home quarantine and isolation by monitoring, by ensuring all necessary supplies, by ensuring treatment in the critical moment. Even they can build a community isolation or quarantine centers with minimal facilities. They can ensure the food of the affected people through community kitchen like Kerala, India. Even in Tolarbagh, Mirpur, Dhaka is the best

CASE REPORT-3

AN ORGANIZATION NAME POCAA (PLATFORM OF COMMUNITY ACTION AND ARCHITECTURE) TAKEN AN INITIATIVES NAME "ALADA GHAR" FOR COVID-19. THEY DESIGNED EVERYTHING VERY NICELY SO THAT NO ONE NEED TO CONTACT WITH OTHER. THEY IMPLEMENTED THE SCHOOLS AND COLLEGES BASED QUARANTINING AND ISOLATION PROCEDURES. THERE, THEY DEMONSTRATED HOW TO USE ROOM, TOILET AND OTHERS, AND THEY MONITORED THE PERSONS SUCH AS WHEN BREATHING DIFFICULTY APPEARS, WHEN NEEDS TO TAKE TO THE HOSPITAL ETC.

THEY DID THIS INITIATIVES FOR THE POOR PEOPLE WHO HAVE LIMITED RESOURCES.

example of community engagement. Community people did everything for the affected people so that they can stay in their home.

Example of local engagement and arrangement

"the Anti-Corruption Commission Chairman asked the consultant physician of Borguna (his hometown) District Hospital about their requirements. The physician asked for few pulse oximetry. Then the Chairman provided total 16 pulse oximetry, and the physician managed the patients with these 16-pulse oximetry".

Quarantine

KIIs:

Home and Institution based quarantine:

In the context of whether the quarantine (institutional and home based) procedure was maintained appropriately for the expatriate, the Divisional Policy planners expressed different views about it. Evaluating the possible reasons of inappropriate institutional quarantine, all (100%) of the Policy planners directly or indirectly indicated as - people are reluctant and have lack of knowledge on the infection of COVID-19, the facilities in the quarantine centers are not adequate to stay, and lack of monitoring by the administration and law enforcement agencies.

CASE REPORT - 4

ONE RELATIVE OF MY SON WHILE COMING FROM ABROAD, HE WAS ASKED SOME QUESTIONS BY THE AUTHORIZED PERSON ABOUT HIS DEPARTURE PLACE, TIME OF FLIGHT, WHETHER ANY HISTORY OF FEVER AND COUGHING. THEN THE AUTHORIZED PERSON FILLED UP A PAPER WITH THIS INFORMATION. THAT PAPER WAS ACTUALLY THE COVID-19 QUARANTINE FORM WHEREAS, ALL OF THE QUARANTINE RELATED INFORMATION SUCH AS WHY AND FOR HOW LONG THIS QUARANTINE, WERE WRITTEN. HOWEVER, THE AUTHORIZED PERSON DIDN'T DESCRIBE ANYTHING VERBALLY. WE COULDN'T DEVELOP QUARANTINE MANAGEMENT SYSTEM PROPERLY.

People were not informed properly why this quarantine center set up and about the spread of COVID-19 infection.

Evaluating the possible reasons of inappropriate home-based quarantine, the respondents directly or indirectly indicated scarcity of space at home, only earning member of the family and lack of financial support. Their direct speech has been quoted as –

> ***"Here, the community engagement wasn't proper. There was no proper monitoring of the quarantine system by the local community with making small groups. Therefore, quarantining, isolation and treatment which was assumed to be done at home weren't done properly".***

Also, there was mixing up of home-quarantine and home-isolation as there was lack of follow up procedure. They mentioned that the urban quarantine system could not be established easily as like rural structure. At the Upazila and rural level, sometimes health workers visited the homes and did follow up and few houses could be locked down by the authority. But in the urban area, actually we couldn't do that. We failed in the urban area. Still now people die at home, but we couldn't follow up here properly. Absence of functional 'public' primary health care in urban areas and lack of planning is also reported by someone.

In this context, most of the Policy planners opined that community quarantine center can be established for the people who have limited space in their home and the people need to be forced to stay by the law enforcement agencies. Monetary support and quality food should be provided to the community-based quarantined individual or family from the Government and local authority. Also needs community engagements and NGO supports. The people should be aware largely about the benefit and risk of home quarantine.

One Policy Planners mentioned!

> ***"The underprivileged people should be feed by the community group or engagement".***

The policy planners emphasized on development proper guidelines for maintaining institutional quarantine and isolation. Because, the mentality of home-based quarantine system hasn't been developed yet among the people in Bangladesh.

When the physicians and nurses were asked about the self-quarantine at home after completing his hospital duty, most (91%) of them reported that their hospital

authority provided accommodation facilities for themselves in selected hotels, or in the hospital dormitory or hostel with meal facility. They mentioned, after completing their duty, they undergo through a COVID-19 test after five days and they are allowed to go home if the result is negative.

A 26 years old nurse said**!**

> ***"Previously, our hospital authority managed hotel to keep us in quarantine. And now, the hospital dormitories have been managed for us. We will be kept here for 14 days followed by a COVID-19 test. If test result is negative, then we can go home. And, we will also be self-quarantined for another 6 days in our home".***

But some of them had to stay with their family, trying to keep themselves separated from the other family members.

A 42 years old nurse mentioned**!**

> ***"Yes, I maintain self-quarantine at my home. As my husband is a diabetic patient, I don't want to put him at potential risk. So, I stay in a separate room alone".***

Other nurse mentioned that home quarantine couldn't be ensured, only the infected staffs were disinfected and self-hygiene protocol was followed. During analysis, dissimilarity was found in the doctor's duty roaster in different hospitals. In some hospitals, there was a 10-day duty roaster followed by 14-day quarantine at hotel, followed by a 7-day quality period with family and then back to the duty again for 10 days. But other hospitals didn't follow the same.

A 36 years old physician reported**!**

> ***"Talking about me, I have to go to the hospital on every single day. So, it's not possible for me to spend 14-days quarantine period at the hotel. In that case, senior citizens of my family are staying at different floor other than me and I am wearing mask at home too to ensure safety."***

IDIs:

Maintenance of home quarantine after discharge from hospital:

None of the attendants reported to maintain home quarantine properly after discharge from hospital. And the possible reasons of that were very distinctive. They had a perception that they will not be affected and no one told them that they will have to maintain 14 days quarantine after the discharge.

Some (30%) of them reported that it is not possible to maintain quarantine as they have limited room space in their home.

Some (20%) of them reported that they have to earn their food to eat.

CASE REPORT- 5

A 30 YEARS OLD ATTENDANT REPORTED THAT WHEN HE CAME TO THE HOSPITAL FOR HIS FATHER COVID TREATMENT. HE ASKED THE DOCTORS THAT WHO WILL TAKE CARE OF HIS FATHER AT NIGHT. AS HIS FATHER HAD SOME COMORBIDITY. THEN THE DOCTORS SUGGESTED ANY ONE FROM US WHO ARE YOUNG AND DO NOT HAVE ANY COMPLICATION OR COMORBIDITY CAN STAY WITH FATHER. AS AT NIGHT NO ONE WILL VISIT UNLESS ANY EMERGENCY. NURSES WILL GIVE INSTRUCTION OVER PHONE FOR MEDICATION. HOWEVER, THEY WERE VERY PLEASED WITH THEIR SERVICES AND BEHAVIOR.

For example, an attendant enumerated**-**

> ***"Each and every person of my family went to hospital for my father. I went too. So, it was not possible to maintain quarantine".***

Another one said!

> ***"As I didn't have any symptoms, so I wasn't in home quarantine".***

Another 30 years old patient-cum-attendant mentioned!

> ***"All five members of our family were COVID positive. So, we all used to stay together".***

Accommodation for the attendants: Few (30%) of the attendants reported that there was no staying facility for the attendants in the hospitals while few (40%) reported to get facility to stay in a separated room, and few (30%) stayed in the same room with the patients.

An attendant stated!

> ***"There was no staying facility at the hospital for the attendants. If anything required for the patient, the hospital authority used to call the attendants over phone followed by collection of the required things from them at hospital gate".***

Another attendant mentioned!

> ***"I was with my father all the time. It was not possible to maintain distance or other formalities with my father"***

Regarding safety, 90% attendants said they used various sorts of self-protective equipment during their hospital stay like N95 mask, hand gloves and protective glasses. And these PPE they had to purchase by their own. Hospital authority didn't provide any PPE or proper counseling for protection.

> **Example of quarantine using the local technique**
>
> **At the very beginning of the COVID 19, where we faced a lot of difficulties to control, at that time the hill track each and every people at Bandarban district prepared a separate temporary resident for the expatriate and they bound all to stay there for 14 days and that's why COVID 19 is still control there. This people are more aware than us.**

Hospital Management of COVID-19 Patients

IDIs:

Difficulties faced to get admitted into a hospital:

In this regard, mixed sort of scenarios was reported by the patients. Although all (90%) of them reported that they didn't face any difficulties, few (10%) reported little hassle and difficulties during admission. Those who were referred from another hospital as COVID-positive case or showed the positive report himself, got admitted easily.

CASE REPORT -6

A PATIENT FACED LOTS OF DIFFICULTIES. DURING ADMISSION, THEY JUST HANDED OVER THE ADMISSION FORM TO ME AND SAID GO TO THE WARD AND GET ADMITTED. THEY DIDN'T MENTION IN WHICH WARD, WHERE IS THAT WARD, WHETHER THE SEAT/BED IS ALREADY PREPARED OR NOT. THEY SHOWED A WARD BOY. THEN THE WARD BOY INSTRUCTED TO GO TO 2ND FLOOR, THEN TO FIND OUT THE CORONA WARD, AND TO CHOOSE ANY BED AS MY WISH. I DID ALL

KIIs:

Management of hospital admitted patients:

Regarding the patient handling the physicians mentioned about 2 different system prevailing-

- In General hospital – first patient attends the emergency, tested for COVID-19 and then referred to the COVID dedicated hospital if tested positive. This is one of the possible reasons of delayed treatment.
- In COVID dedicated hospital – when patients attend the emergency, medical officers sort out the patients as positive/negative/suspected based on their symptoms and advise admission if fulfill the admission criteria in hospital guideline. Patients having mild to moderate symptoms are admitted in ward and patients admitted in emergency department with critical status are referred to ICU unit.

Regarding the components of COVID-19 case management system:

the service providers mentioned that the primary care management system includes ICU support, oxygen support, ventilation, maintaining social distance, maintaining donning doffing area are the components. They also included all the PPE what they use to protect themselves like face shield, gloves, head cover, mask, surgical mask, N95 mask, surgical gloves, PPE, gum boot, shoe cover as the components of case management system.

CASE REPORT-7

A 32 YEARS PHYSICIAN REPORTED THAT WHEN A PATIENT COMES WITH COVID-19 SYMPTOMS, HE/SHE IS REFERRED TO THE ISOLATION UNIT. THEN A COVID-19 TEST IS DONE, IF THE REPORT IS POSITIVE THEN HE/SHE IS REFERRED TO THE DEDICATED CORONA HOSPITAL FOR ADMISSION. THAT HOSPITAL WILL PROVIDE CORONA TREATMENT. WE ALSO COUNSEL AND MOTIVATE THE CORONA PATIENTS AND GIVE MENTAL SUPPORT MOSTLY, AS THEY BECOME MENTALLY WEAK, PSYCHOLOGICALLY DEPRESSED".

Practicing COVID-19 case management protocol:

Regarding whether COVID-19 case management protocol is practiced adequately or not, mixed sort of responses has been found among the physicians and nurses. More than half (56%) of them reported that they practiced, few (20%) don't practice and the others (24%) practice with some limitations means followed partially and sometimes they used their personal skill also.

- Those who practiced the protocol stated by a 36 years old physician!

"We are following 100% of the Govt. protocol of COVID-19 case management system. We have adjusted the protocol based on the local availability". **A 26 years old nurse mentioned,** ***"Yes, at first we had some lacking, but now we are providing all sort of necessary things".***

- Those practiced with few limitations and challenges, mentioned as-

> ***"Yes, I think these are practiced in our hospital. We have adequate PPEs and other facilities. But here, we are in shortage of manpower. There is one service provider against 15-20 patients",*** stated a 29 years old nurse**!**

One physician reported!

> ***"Actually, maintaining the full protection procedures for patients and attendants is a quite tough job. We have room for PPE donning and doffing but there isn't any maintaining system, so it's ultimately useless".***

- Few of them reported directly that they didn't practice or unable to practice adequately. One physician stated!

> ***"being a govt. hospital, we have huge manpower but for managing COVID-19 patients, we lag behind due to lack of oxygen supple and masks. We can't provide better ICU support and can't supply oxygen for more than 15 liters."***

Some of the respondents reported that in the corona ward, the gaps between beds are not enough to maintain safety protocol. And, they couldn't manage to provide the residential facility to the attendants.

Existing Facilities in the hospitals:

The physicians and nurses reported both positive and negative views regarding the existing facilities in the hospital. The cause of this difference was different hospitals have different facilities available for COVID-19 management. Some (40%) of them mentioned that ICU, CCU, central oxygen supply system available, some (35%) reported not available rest of them not answered about this.

A physician mentioned!

> ***"We have all facilities for COVID 19 positive patients. Even if they need surgery, gynecological or other medicine support we can provide them all. If any child becomes positive, we have especial pediatric corona unit for them".***

A 28 years old physician also expressed their inability to provide service properly in spite of having plenty of manpower.

Medical equipment supplies:

Regarding the supply of medical equipment, most (85%) of the physicians and nurses reported that their hospitals didn't have adequate medical supplies such as PPEs like N-95 masks, hand gloves, shoe covers, oxygen delivery devices, and few medicines. Sometimes they needed to buy few things personally for themselves, or need to reuse. Some (40%) of them was expressed their concern about the quality of the PPEs. To identify the possible reasons of these inadequate supplies they reported as limitation of Govt. budget, bureaucratic complexities, mismanagements, political issues etc.

A 28 years old physician stated!

> ***"We have some lacking of N-95 masks, shoe covers and others. As Bangladesh is a developing country, our Govt. must have some limitations and bureaucratic complexities. However, we have to consider this. Moreover, we doctor are committed to serve the people in crisis. So being in this noble profession, we have to overlook many such lacking and try to serve with our best".***

A 28 years old physician mentioned!

> ***"We have enough gown supply, but we face lacking of N-95 masks & shoe covers. So, we need to use normal surgical masks with doubled layer. So, confusion is there all around about our safety".***

IDIs:

Among the patients those who admitted in hospital, most (90%) of them admitted in to the hospital according to their own wishes based on their severity of illness. And, few (10%) of them were advised by doctors, colleagues or authorities of their company where they worked. Almost all of the patients of the study reported that they were admitted in hospital after getting COVID-19 infection except one, who was

CASE REPORT- 8

A PHYSICIAN REPORTED THAT HIS HOSPITAL FACING THE SHOTAGE OF SOME ESSENTIAL MEDICINE, HAND GLOVES, OXYGEN DELIVERY DEVICES. HE THOUGHT THAT THE PROBLEMS CAN BE SOLVED BY INTERNAL COLLABORATION BETWEEN THE ORGANIZATIONS. SOMETIMES, IT CAN ALSO BE MANAGED LOCALLY.

WHEREAS, THAT OXYGEN, ANTIVIRAL MEDICINE, ANTI-INFLAMMATORY MEDICINE, STEROID AND ANTIBIOTICS AVAILABLE IN ORAL FORM OR INTRAVENOUS FORM. HYDRO-NASAL CANNULA/MASK IS ALSO AVAILABLE IN NEARBY HOSPITAL WHERE ONE OF MY FRIENDS WORKING

in self-isolation at home for 14 days. Regarding the service, the patients stated that some patients were kept in general ward, while some were kept in separate room/cabin or isolated corona ward/unit with maintaining proper rules. There were also separated wards for the hospital staffs reported by a patient-cum-nurse.

Mixed sort of experiences and comments were reported by the patients and attendants regarding the hospital services. Although, most (85%) of the patients and attendants reported very positive about the hospital facilities and services, yet some of the patients and attendants reported in negative (15%) way in terms of lack of hospital staffs such as nurses, ward boys, and cleaners. Few of them reported inadequate supply of oxygen and some medicines, also mentioned about delayed

delivery of test results. Community engagement also influenced the hospital admission. However, few of the patients and attendants reported totally negative and dissatisfying experiences and comments on hospital services whereas, most (90%) of them were satisfied.

IDIs:

One patient mentioned**!**

> ***"We were kept in general ward, but the beds were placed maintaining 3 feet distances".***

CASE REPORT-9

A 53 YEARS OLD PATIENT REPORTED THAT WHEN HE GOT CORONA LIKE SYMPTOMS, THE VILLAGERS INFORMED THAT TO THE LOCAL AUTHORITY. AND THEN, SOME PEOPLE FROM A HOSPITAL CAME TO TAKE HIM TO THE HOSPITAL WHICH IS THE VERY GOOD EXAMPLE OF COMMUNITY ENGAGEMENT.

CASE REPORT-10

A 33 YEARS OLD PATIENT ENUMERATED, “NEITHER THE DOCTORS, NOR THE NURSES EVEN THE WARD BOYS CAME TO US FOR NONE OF THE DAY…. THERE WAS NO IMPORTANCE ON HOW I WAS, SUCH AS WHETHER I HAD MEAL OR NOT, AND I GOT THE THINGS PROPERLY OR NOT. USUALLY, JUST THEY WERE USED TO CONTACT OVER TELEPHONE RATHER THAN COMING BY SELF TO KNOW. THERE WAS NO IMPORTANCE ON WHAT I SHALL NEEDED, JUST I NEEDED TO PUSH THEM. TO MEET WHAT I NEEDED, I CONTACTED THEM OVER TELEPHONE, AND THEN THEY BROUGHT THE THINGS, KEPT IN A PLACE AND INFORMED ME, THEN I WENT TO RECEIVE THESE. SAME THING HAPPENED REGARDING PROVIDING MEAL. SOMETIMES, NURSES CONTACTED ME OVER PHONE AROUND 10 AM WHETHER I NEEDED ANY MEDICINE OR NOT. JUST THAT’S IT. …”.

CASE REPORT -11

A 37 YEARS OLD PATIENT MENTIONED, “THE AUTHORITY IS TRYING THEIR BEST TO PROVIDE THE BEST SERVICES, AND WE ARE SATISFIED WITH THEIR SERVICES. IN CASE OF MEDICINES OF A COVID-19 PATIENT, HOSPITAL AUTHORITY BEARS FULL PACKAGE THROUGH SOCIAL WELFARE UNIT OF THE HOSPITAL. FOOD QUALITY IS VERY GOOD. NURSES TAKE GOOD CARE OF THE PATIENTS. WHEN I WAS THERE WHAT I SAW, THEY VISITED US VERY OFTEN AND LOOKED AFTER IF WE NEED ANYTHING, HOW WERE WE FEELING, GAVE US MEDICINES, LIKE THAT. HOWEVER, THERE ARE LACK OF OXYGEN SUPPLY, WARD BOYS AND NURSES”.

IDIs:

A 50 years old patient stated**!**

> ***"Services as a new hospital are pretty much satisfactory. All the doctors and nurses were very cordial to all patients. They took proper care of us. They took care of us with patience and were always concern about how were we doing, what we needed, and all. Only the washrooms were not clean and food quality should be improved. At last I can say our hospital provides the best services as a govt. hospital".***

An Attendant reported**!**

> ***"Here, the services are quite good but the test facility is very poor here because of lack of manpower. So very often we had to take patients out to test from other private centers, which were sometimes difficult for severely ill patients".***

Capacity building of the healthcare providers

KIIs:

Training on the use of PPE:

Most (85%) of the physicians and nurses reported that they didn't receive any training on PPE use. They have just learned it from internet, from the hospital authority, online guideline from DG Health, or from the senior doctors. Whereas few (15%) of them reported that they received institutional training.

A 28 years old physician mentioned!

> ***"We were briefed by our hospital authority. And, I also collected some information from internet about how to use PPE appropriately".***

A 26 years old nurse enumerated!

> ***"Yes, I got the training on how we will wear PPE, how we will put off PPE, where we will keep PPE after putting off, how we will wear mask, how we will put off mask. I also suggest increase the training facilities more".***

Training on the hospital case management:

Most (80%) of the physicians and nurses reported that they didn't receive any training. They have just gathered some knowledge from internet, from the COVID-19 case management guidelines, and also from the senior doctors or Director of their hospital. Few (20%) of them reported that they received trainings, which were either institutional based such as from DG Health and Civil Surgeon's office, or online based. Most of the training

CASE REPORT-12

A 28 YEARS OLD PHYSICIAN MENTIONED THAT WHEN HE JOINED, THIS DISEASE WAS COMPLETELY NEW IN THE COUNTRY. THERE WAS NO SUCH OPPORTUNITY FOR INSTITUTIONAL TRAINING OR SOMETHING. THEY WERE ONLY INSTRUCTED BY THE DIRECTOR SIR AND OTHER SENIOR DOCTORS ABOUT THE PROTECTION, DUTY TIME, CASE MANAGEMENT, AND ALL OTHER THINGS".

receivers reported that they felt competent enough to manage a COVID-19 case after the training. However, a nurse also believed that more training sessions should be held to make the health professionals more confident, and believed there are still some scopes for improvement.

KIIs:

A 42 years old nurse enumerated!

> ***"No institutional training. I only completed an online based course on COVID-19 case management upon my own interest".***

Another 29 years old physician said!

> ***"Before starting duty in COVID-19 dedicated unit, no official training was held. Doctors are working just as the demand for the situation".***

A 30 years old physician stated!

> ***"Of course, the training was good AND trained by medical consultants. We were trained about donning doffing, how to use PPE and feel confident enough to manage patients".***

Risk Reduction:

All the Policy planners believed that the risk reduction process of being infected by COVID-19 among the doctors and nurses can bear a high impact on strengthening the COVID-19 case management system. In risk reduction use of PPE in proper way is one of main strategies. In this regard when they were asked that whether they are following all the instructions of PPE use or not, most (90%) of them replied they are following appropriately. Some (10%) of them also reported that all instructions can't be followed accurately.

CASE REPORT- 13

[ONE PHYSICIAN AGED 36 SAID THAT SCREENING FACILITY SHOULD BE THE PRIORITY NUMBER ONE. THE PATIENTS WILL RECEIVE TREATMENT IN THE HOSPITAL, BUT HOSPITAL SHOULD BE IDENTIFIED WITH ZONING FACILITY LIKE GREEN, YELLOW AND RED ZONE. DOCTORS WILL BE AT THE GREEN ZONE, PATIENTS COMING WITH SYMPTOMS AND NOT CONFIRMED POSITIVE WILL BE IN THE YELLOW ZONE, AND LASTLY THE RED ZONE FOR POSITIVE PATIENTS. DOCTOR AND NURSE WILL KEEP COMMUNICATION WITH PATIENTS THROUGH MICROPHONE WHILE ISOLATED PATIENTS WILL BE KEPT IN A ROOM WITH GLASS PROTECTION, AND LASTLY THE AVAILABLE MANPOWER. AFTER FULFILLING ALL THESE COMPONENTS, THE TREATMENT SHOULD BE CONTINUED ON. I THINK THESE ENLISTED FACILITIES ARE THE COMPONENTS OF CASE MANAGEMENT OF COVID-19 PATIENTS TO PREVENT AND CONTROL INFECTION]

KIIs:

One of the Policy planners stated**!**

> ***"If the risk reduction process of being infected by COVID-19 among doctors and nurses is implemented, their risk of infection will be less".***

One nurse said**!**

> ***"Yes, obviously. If we don't follow, we will be affected, we will suffer, and we will be died".***

A 36 years old physician mentioned**!**

"To be honest, all instructions can't be followed accurately. We don't have separate donning and doffing room at every floor. Due to lack of infrastructure and manpower for this sudden arisen situation we are facing this problem. Specially, the interns are not quite well acquainted regarding proper donning and doffing. So, I think training should be arranged for PPE maintaining, donning doffing formalities".

DISCUSSION

Currently, Bangladesh along with the other countries of the world more or less is going through an unfavorable COVID-19 pandemic situation. After 6 to 7 months of fighting against COVID-19 pandemic situation in the whole country, it was highly important to emphasize on evaluating the current opportunities and challenges and also on the future opportunities and challenges based practical data in order to further strengthen the COVID-19 case management system in Bangladesh. The current study firstly explored the opportunities and challenges of strengthening the COVID-19 case management system in Bangladesh. Targeting to evaluate these, this study uncovered the current opportunities and challenges of keeping the people at risk in quarantine, keeping the positive patients in isolation, and the referral and admitting confirmed COVID-19 patients in the hospitals from the health care provider's, patient's and attendant's, and policy planner panel's point of views, as well as also showed the avenues of future opportunities and challenges along with possible potential strategies to overcome from the policy planner's point of views. Moreover, this study also firstly uncovered the current opportunities and challenges of facilities and services of COVID-19 case management in Bangladesh from mostly the health care provider's as well as receiver's point of views. This study revealed highly significant information related to the opportunities and challenges of strengthening the COVID-19 case management system in Bangladesh. WHO also emphasized on these issues in the guideline on Clinical Management of COVID 19 **(WHO, 2020).**

In the context of possible reasons for spreading of COVID-19 among the mass population as well as health care providers in Bangladesh, the policy planner panel of this study identified several potential possible causes mostly lack of monitoring from the administration and law enforcement agencies, reluctant attitude of the people of not abiding the healthy measures and lack of proper quarantine and isolation process, delayed diagnosis and test report providing, inadequate number testing, failing to

establish community engagement, failing to control root of virus entry (source control), scarcity along with questionable quality of protective equipment, lack of medical supplies, failing to contact tracing, lack testing facilities, inadequate trainings for the health care providers, improper patient and overall management etc. The findings of this study appear quite similar with a very recent report published a national journal namely 'Journal of Bangladesh College of Physicians and Surgeons' which also focused on delayed diagnosis, delayed test result providing, lack of diagnostic capacity, inertia of resource mobilizing process for the implementation of public health interventions (such as social distancing, intense contact tracing, quarantine, case isolation etc.) that exacerbated the situation fast **(Faiz MA,. 2020)**.

A mixed scenario has been reported by the health care providers (physicians and nurses) in terms of available facilities and services for COVID-19 case management in different hospitals of the country. Although few hospitals have been reported with well-equipped and available facilities and services and few hospitals with lacking, yet the lacking of different types of medical supplies (such as PPE, different types of masks, sanitizers, oxygen supply, few medicines in some cases etc.) as well as manpower (such as physicians, nurses, technologists, cleaners etc.) have been reported most commonly. The similar sorts of mixed scenarios and experiences also have reported by the health care receiver group such as patients and their attendants in different hospitals of the country. Definitely, these deficiencies in the facilities, services, and medical supplies in the hospitals can be considered as a potential favorable condition which will lead to a more exacerbated COVID-19 pandemic situation in the whole Bangladesh, which is extremely alarming. According to **Yeasmin et. al. 2020**, more than 1 in 10 health care workers at Mugdha Medical College Hospital was infected with SARS-CoV-2 while working at the hospital similar perception reported from the respondents of our study.

This study uncovered very limited, confined, dissatisfied, and unfavorable opportunities of the system of keeping in home or institutional based quarantine for

the people at risk, the system of keeping in home or institutional based isolation for the positive cases, and the system of the referral and admitting confirm COVID-19 patients in the hospitals from all of the different types of participant's point of views. It has also been reflected that these scenarios were due to different types of challenges as well as mismanagement from the authority and also reluctant manners of the mass population. Moreover, inability to differentiate between quarantine and isolation along with insufficient and inappropriate relevant healthy measures among the patients and attendants, and also the lack of proper infrastructure, living facilities, and livelihood support greatly increased burden of challenges. However, the policy planner panel of the study showed the avenue of opportunities to strengthen the COVID-19 case management system in this country to overcome the situation by the planning or reforming and substantial implementation of national action plans and guidelines with local community engagement and strong enforcement of laws with proper monitoring. To the best of our knowledge none of the study In Bangladesh could be found to compare the findings with present one. However, the "proactive" measures taken by Kerala such as early detection of cases and extensive social support measures that is a "model for India and the world" that we should be followed **(Km et al., 2020).**

Still there is scope for strengthening the COVID-19 case management system. In order to uncover the possible scopes how to strengthen the COVID-19 case management system, the local authority engagement, training of the health care providers and evidence creation are the key. Whereas, Kerala announced complete lockdown before the announcement of national lockdown. The most crucial step was taken on March 15 by announcing an awareness campaign named 'Break the Chain' to create awareness and promote social distancing. In high-risk areas, the police force created an online delivery system of essential food items. Innovative products have been developed as part of beating the Covid-19 in the state. A smart bin called 'BIN-19' has

been launched for the collection and disinfection of Used Face-Mask which is based on Internet of Things (IoT) **(Km et al., 2020)**.

The respondents of this study think the proper set up of quarantine and isolation center will come at first. There should be adequate number of health care providers such as doctors and nurses. If needed, they can be brought from other hospitals or part of the country like China. There should be proper facilities. Should have COVID hospitals where the patients will be admitted. Need proper ICU supports. It needs regular training for the doctors and nurses. Another most important matter is research. We need researches to find out the effective ways of COVID-19 case management. However, we can follow the similar Kerala like model, the first state in India that does away with 'zonal classification' of districts on the basis of Covid-19 spread using GIS technology where more police would be deployed to ensure the strict adherence of quarantine and lockdown norms **(Manorama online. COVID-19 Timeline: A chronology of Kerala's fight against the pandemic. 2020)**.

We need to improve the capacity of both 'stable platform' (such as trained human resources and infrastructure) and infusion of 'fast variables' (such as quarantine and isolation units) for fast emergency response in handling COVID-19 emergency patients. Need to take action to control the sources of COVID-19 infection. Need to diagnose early and to ensure early case isolation, intense contact tracing, quarantining, and social distancing. Need to engage the community to ensure the quarantining and isolation system. Whereas, Kerala, India announces its strategy is trace, quarantine, test, isolate and treat in the beginning only. The state soon began implementing mandatory quarantines for visitors arriving from abroad and from outside of the state, weeks before the Centre instituted similar measures across the country. They also imposed uncompromising controls, were supported by an excellent healthcare system, government accountability, transparency, public trust, civil rights and importantly the decentralized governance and strong grass-root level institutions **(Km et al., 2020)**.

In the context of how resource mobilization process such as training for doctors and nurses, prioritization of essential health services, ensure medical supplies etc. can help in strengthening the COVID-19 case management system, very distinctive as well as vital opinions have been reported in this study. Mobilizing the resources properly will help to implement the front line non-pharmaceutical public health interventions (such as social distancing, intense contact tracing, and case-isolation) quickly. Training can lead a great role. But now there is a problem that the trainings are based online. So, it isn't doing in the appropriate way. Moreover, half of the doctors didn't attend the online training even. Those who attended, they didn't understand properly. In this regard, if it is possible to bring a single doctor of the peripheral hospitals to Dhaka and to train up, then that doctor can train up other doctors and nurses.

Public-private strategic partnership can have a role on strengthening the COVID-19 case management system in Bangladesh and the respondents expressed their views in this regard: Now few hospitals are providing COVID -19 care. But there should have a proper coordination. Private sector also should maintain the WHO guidelines for COVID -19 case management system. It can bear a very good and important impact but it needs to ensure the quality.

To strengthen the COVID-19 case management system in Bangladesh, several highly potential aspects of strategies were explored by the respondents. All of them told that the patient management system as well as overall management need to be strengthened. Also, the monitoring system by the administration and law enforcement agencies should be improved and need to do the contact tracing. They also emphasized on development of a national plan. We need to make a national plan. And, the actions of the national plan are needed to be monitored and followed up properly whether these are maintained or not. Need to train the health care providers, need to engage the people of all classes, need collaboration and coordination with other ministry.

CONCLUSIONS

- The COVID-19 case handling system in Bangladesh is facing a lot of crucial challenges like: inadequate testing; improper isolation procedure; contact tracing in small scale; poor quarantine facility and delayed hospitalization etc.

- At the same time, COVID-19 case handling system in Bangladesh identified a lot of opportunities to strengthen our health system in future like: ensure community engagement; adequate training; skilled manpower; proper utilization of the existing health facilities; creation of zoning facilities in hospitals; mandatory mask use by all; mass awareness development.

LIMITATIONS

There were some limitations in the study which couldn't be overcome by the researchers. As the study period was very short, more policy planners could not be involved in this study. Moreover, it was very challenging to get an interview schedule with the health care providers (physicians and nurses) and policy planners (Divisional Advisors) as they were busy with their respective jobs. There was no pre-existing specific data based available report in Bangladesh to compare the findings from this current study.

BARRIERS AND CHALLENGES

COVID 19 is a new experience for the world as well as for the Bangladesh. We found the developed countries also failed to prevent its massive deaths. However, Bangladesh is one of the densely populated country in the world, and still Bangladesh managing COVID 19 successfully but, yet Bangladesh is not out of danger for massive attack. If, Bangladesh addressed all the barriers and challenges related to the COVID 19 then we will be able to overcome the situation.

The barriers and challenges of strengthening COVID-19 case management system in Bangladesh are-

- We have infectious diseases prevention and control (IPC) act but lacking of implementation
- Overall mismanagement and also individual level mismanagement on COVID case handling system
- Lacking of coordination between administration and law enforcement agencies which is needed to address by a coordinating body
- WHO always emphasize on adequate number of testing and timely test results but we found inadequate testing in Bangladesh
- Almost absence of contact tracing is the biggest challenge for Bangladesh, community transmission is the resultants of its
- Inadequate and improper quarantine and isolation procedure along with absence or improper monitoring system
- Lack of proper infrastructures, facilities, services, and livelihood management for the quarantined and isolated individuals
- Lack of local community engagement
- Inadequacy of medical supplies, facilities and services for the patients as well as health care providers
- Lack of manpower in the hospitals such as physicians, nurses, lab technologists, ward boys' cleaners and others relevant

- Inappropriate control the root of entry of Corona virus (source control) in the ports
- Inadequate level of knowledge and awareness among the population including patients and attendants
- Reluctant attitude on social distancing, hand washing, mask using and testing of the population including patients and attendants
- Provision of patient's attendants in the hospital is another issue of COVID spreading in Bangladesh
- Poor hospital-based waste management system
- Unable to identify the asymptomatic cases due to lack of testing and awareness

RECOMMENDATIONS

a. General recommendations

Based on the findings of the study, in general it is recommended-

- The facilities, services, and supplies for COVID-19 case management system in the hospitals should be improved
- National guidelines for COVID-19 case management should be followed
- Adaptation of national guideline according to local resources
- Local community engagement should be ensured for successful home quarantine and isolation
- Ensure quality services to the quarantined and isolated individuals by providing food, monetary supports, and other relevant facilities
- Need to strengthen the quarantine system in airports
- Ensure contact tracing system followed by quarantine, testing and isolation
- To ensure adequate supply as well as quality of the PPEs for the health care providers
- Health care providers should be trained adequately for case management and self-protective measures (IPC)
- Increase the level of knowledge and awareness regarding COVID-19 infection among the mass-population through mass media
- Number of testing should be increased by ensuring
  - adequate testing kits
  - more skilled technologists
  - test report delivery time should be minimized
  - test cost should be reduced
- To strengthen the hospital waste management and disposal procedures

b. Recommendations at the policy level:

Based on the findings of the study, the following can be recommended for the policy makers

- Should establish national action plan for COVID-19 case management, monitoring, enforcement from the law enforcement agencies to abide the rules and healthy measures
- To update the guidelines for the referral and hospital admission system for COVID-19
- Zoning facilities can be a good option for improving the case management system and infection prevention and control
- To strengthen the monitoring of the institutional and home quarantine system by the administration and law enforcement agencies
- To incorporate the law enforcement agencies with the standard guidelines for the management, implementation and monitoring systems
- To make standard guidelines to establish community and institutional based quarantine and isolation centers as well as to figure out the minimum requirements for the basic and comprehensive facilities, services, and supplies
- To strengthen the strategies for resource mobilization process such as prioritization of essential health services, pathways for medical supplies, public-private strategic partnership, hospital waste management and disposal procedures etc.
- To design and plan the most effective strategies to improve the level of knowledge and awareness regarding COVID-19 infection among the mass-population
- To control the root of entry of the Corona virus in the ports and the local authorities such as police, armed force as well as health care team should be engaged in this regard

ANNEXURES

Annex 1: Action Plan

Activities	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Finalizing the protocol								
Instrument development								
Data collector's recruitment								
Ethical Approval								
Data collectors training								
Data collection								
Data synthesis								
Data analysis								
Report drafting								
Final report submission								
Dissemination								

Annex 2: Ethical Approval Letter

বাংলাদেশ ইউনিভার্সিটি অব হেলথ সায়েন্সেস
BANGLADESH UNIVERSITY OF HEALTH SCIENCES

Memo No: BUHS/ERC/20/15
Date: 11/06/2020

To
Palash Chandra Banik
Assistant Professor
Dept. of Noncommunicable Diseases
Faculty of Public Health
Bangladesh University of Health Sciences (BUHS)

Subject: Ethical Clearance

The Ethical Review Committee (ERC) of the Bangladesh University of Health Sciences (BUHS) has the pleasure to accord ethical clearance to your Protocol **"Opportunities and challenges of strengthening the COVID- 19 case management system in Bangladesh"** subject to the condition that the guidelines overleaf must be followed carefully.

(Prof MA Hafez)
Chairman
Ethical Review Committee

125/1 Darus Salam Mirpur Dhaka – 1216 Email : info@buhs.ac.bd **Website: www.buhs.ac.bd**

Annex 3a: Interview Schedule/Guideline (Policy planners)

Basic information:

DOB:.....

Name of the Division working for: .....

COVID related information:

1. What are the possible reasons for spread of COVID 19 in Bangladesh?
2. What are the possible reasons for spread of COVID 19 among the health care providers in Bangladesh?
3. Do you think that the quarantine procedure maintained appropriately in Bangladesh for who came from abroad?
4. Which type of quarantine procedure was basically followed?
5. If, no what are the possible reasons not to maintain the institutional quarantine procedure?
6. What are your suggestions regarding the improvement of institutional quarantine procedure?
7. If, no what are the possible reasons not to maintain the home quarantine procedure?
8. What are your suggestions regarding the improvement of home quarantine procedure?
9. Do you think COVID 19 testing is adequate for Bangladesh?
10. What are the possible reasons for inadequate testing?
11. Do you think that, institutional isolation procedure followed appropriately in Bangladesh?
12. What are the possible reasons for lacking of institutional isolation?
13. What are your suggestions regarding the improvement of institutional isolation procedure?

14. Do you think that, home isolation procedure followed appropriately in Bangladesh?
15. What are the possible reasons for not maintaining home isolation procedure?
16. What are your suggestions regarding the improvement of home isolation procedure?
17. Do you think, that the people are getting admission and treatment in to the hospital smoothly for COVID 19 treatment?
18. What is the possible reason do you think not getting admission and treatment?
19. How can we overcome this situation for hospital admission and treatment?
20. Do you think there is a scope for strengthening the COVID 19 case management system?
21. What are the possible scopes for strengthening the COVID 19 case management system?
22. How does resource mobilization process such as training for doctors and nurses, prioritization of essential health services, pathways for medical supplies etc. can bear a high impact on strengthening the COVID-19 case management system?
23. Do you think public-private strategic partnership can bear a high impact on strengthening the COVID-19 case management system?
24. Do you think community participation, cohesion and compliance, and promoting the individual's health awareness can bear a high impact on strengthening the COVID-19 case management system?
    a. Yes
    b. No
25. If yes, comments on that.

    .....

26. Do you think the risk reduction process of being infected by COVID-19 among doctors and nurses can bear a high impact on strengthening the COVID-19 case management system?
    a. Yes

b. No

27. If yes how?

.....

28. What challenges may Bangladesh face to strengthen the skilled and effective COVID-19 case management system?
29. What strategies can be implemented to overcome the challenges of strengthening the COVID-19 case management system in Bangladesh?

Thank you for kind participation!!!

Annex 3b: Interview Schedule/Guideline in English and Bangla (Physicians, Nurses)

ID:
Age:
Gender:
Participant: physician/ nurse:
Hospital/clinic:

Questions:

Q1. What are the components of case management system of COVID 19 patients in Bangladesh?

Q2. Do you think these are adequately practiced in your hospital/clinic?

Q3. If not, what are the possible ways to strengthen the case management system of COVID 19?

Q4. Did you receive any training on case management system of COVID 19? Yes/No

Q5. If yes, was it online or institutional?

Q6. Do you feel competent enough to manage a COVID 19 case after the training?

Q7. If not, do you think that there are still some scopes for improvement?

Q8. Did you receive training on PPE use?

Q9. Are you following all the instructions when you use PPE, if not why?

Q10. Does your hospital/clinic have adequate medical supplies to manage COVID 19 case? If no, what could be the possible reasons for inadequate supplies?

Q11. How do you ensure self-quarantine in home or other place after went back from the hospital duty?

আইডি:
বয়স:
লিঙ্গ:
অংশগ্রহণকারী: চিকৎসক/নার্স:
কর্মক্ষেত্রের প্রকার: হাসপাতাল/ক্লিনিক:

<u>প্রশ্নাবলি:</u>

প্রশ্ন-১. বাংলাদেশের কভিড-১৯ রোগী ব্যবস্থাপনা পদ্ধতির উপাদানগুলি কি কি?

প্রশ্ন-২. আপনি কি মনে করেন এগুলি আপনার হাসপাতাল/ক্লিনিকে পর্যাপ্তভাবে মেনে চলা হয়?

প্রশ্ন-৩. যদি তা না হয় তবে, কভিড-১৯ রোগী ব্যবস্থাপনা পদ্ধতি দৃঢ়করণ করার সম্ভাব্য উপায়গুলো কী কী?

প্রশ্ন-৪. আপনি কি কভিড-১৯ রোগী ব্যবস্থাপনা পদ্ধতি সম্পর্কিত কোন প্রশিক্ষণ পেয়েছেন? হ্যাঁ/না

প্রশ্ন-৫. যদি হ্যাঁ হয় তবে, সেটা অনলাইন না-কী প্রাতিষ্ঠানিক ছিল?

প্রশ্ন-৬. প্রশিক্ষণের পরে আপনি কোন কভিড-১৯ রোগী ব্যবস্থাপনা করতে নিজেকে যথেষ্ট যোগ্য বোধ করেন?

প্রশ্ন-৭. যদি তা না হয় তবে, আপনি কি মনে করেন যে এখানে উন্নতির কিছু সুযোগ আছে?

প্রশ্ন-৮. আপনি কি পিপিই ব্যবহার সম্পর্কে প্রশিক্ষণ পেয়েছেন?

প্রশ্ন-৯. আপনি কি পিপিই ব্যবহার করার সময় সমস্ত নির্দেশনাবলী অনুসরণ করছেন, তা না হলে কেন?

প্রশ্ন-১০. আপনার হাসপাতাল/ক্লিনিকে কি কভিড-১৯ রোগী ব্যবস্থাপনা করার জন্য পর্যাপ্ত চিকিৎসা সামগ্রী সরবরাহ রয়েছে? যদি না হয় তবে, অপর্যাপ্ত সরবরাহের সম্ভাব্য কারণগুলি কী হতে পারে?

প্রশ্ন-১১. হাসপাতালের দায়িত্ব থেকে ফিরে যাওয়ার পরে আপনি কীভাবে বাড়িতে বা অন্য জায়গায় সেফ-কোয়ারেন্টাইন (স্ব-সঙ্গনিরোধ) নিশ্চিত করছেন?

Annex 3c: Interview Schedule/Guideline in English and Bangla (Patients and Caregivers)

ID:
Age:
Area of residence:
Occupation:
Monthly income:
Educational status:

Questions:

Q1. Can you differentiate between quarantine and isolation?

(Participants: Patients)

Q2. Have you had any overseas travel before you catch COVID 19 infection?

Q3. If yes where went?

Q4. Were you in self-isolation or admitted in hospital when you got COVID 19 infection?

Q5. If you were not in self-isolation, who did give you advise to be hospitalized?

Q6. Did you face any difficulties to get admitted into hospital?

Q7. If yes, could you please tell us in little?

Q8. Were you kept in hospital in separated room or in a general ward?

(Participants: Attendants)

Q9. Did you stay in a same room with the patients or separate room?

Q10. What type of self-protection measures you took during stay in hospital?

Q11. If not, why you did not take any measures?

Q12. Were you in home quarantine for 14 days after went back from the hospital?

Q13. If not, what were the possible reasons?

Q14. Please share your experience in little during the stay in hospital.

আইডি:
বয়স:
বসবাসের স্থান:
পেশা:
মাসিক আয়:
শিক্ষাগত অবস্থা:

প্রশ্নাবলি:

প্রশ্ন-১. আপনি কি কোয়ারেন্টাইন (সঙ্গনিরোধ) এবং আইসোলেশন (বিচ্ছিন্নতাকরণ) এর মধ্যে পার্থক্য করতে পারেন?

(অংশগ্রহণকারী: রোগী)
প্রশ্ন-২. কভিড-১৯ সংক্রমণটি ধরা পরার আগে আপনার কি কোনও বিদেশ ভ্রমণ ইতিহাস ছিল?

প্রশ্ন-৩. যদি হ্যাঁ হয় তবে, কোথায় গিয়েছিলেন?

প্রশ্ন-৪. যখন আপনি কভিড-১৯ সংক্রমিত হলেন তখন কি আপনি সেফ-আইসোলেশন (স্ব-বিচ্ছিন্ন) হয়ে ছিলেন বা হাসপাতালে ভর্তি হয়ে ছিলেন?

প্রশ্ন-৫. আপনি যদি সেফ-আইসোলেশন (স্ব-বিচ্ছিন্ন) না হয়ে থাকেন তবে, কে আপনাকে হাসপাতালে ভর্তি হতে পরামর্শ দিয়েছিল?

প্রশ্ন-৬. আপনি কি হাসপাতালে ভর্তি হতে কোন অসুবিধার সম্মুখীন হয়েছিলেন?

প্রশ্ন-৭. যদি হ্যাঁ হয় তবে, আপনি দয়া করে আমাদের একটু বলবেন?

প্রশ্ন-৮. হাসপাতালে আপনাকে কি আলাদা রাখা হয়েছিল না-কী সাধারণ ওয়ার্ডে?

(অংশগ্রহণকারী: রোগীর পরিচর্যাকারী)
প্রশ্ন-৯. আপনি কি রোগীদের সাথে একই ঘরে থাকতেন না-কী পৃথক?

প্রশ্ন-১০. হাসপাতালে থাকার সময় আপনি কী ধরনের স্ব-সুরক্ষা ব্যবস্থা নিয়েছিলেন?

প্রশ্ন-১১. যদি তা না নিয়ে থাকেন তবে, কেন আপনি কোনও পদক্ষেপ নেননি?

প্রশ্ন-১২. হাসপাতাল থেকে ফিরে যাওয়ার পরে আপনি কি ১৪ দিনের জন্য বাড়িতে কোয়ারেন্টাইনে (সঙ্গনিরোধে) ছিলেন?

প্রশ্ন-১৩. যদি তা না হয়ে থাকে তেবে, এর সম্ভাব্য কারণগুলো কী ছিল?

প্রশ্ন-১৪. দয়া করে হাসপাতালে থাকার সময় আপনার অভিজ্ঞতাটি একটু বলুন

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