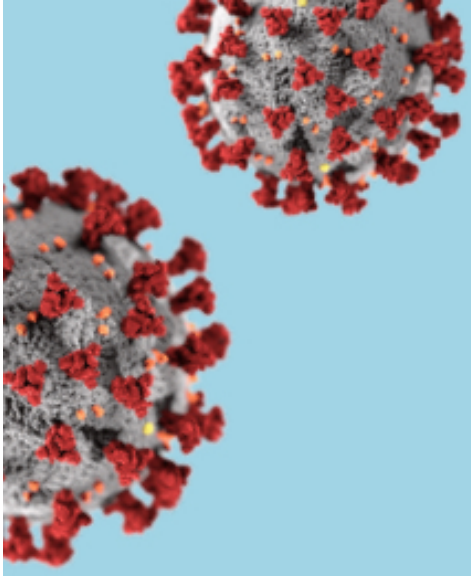

Management of COVID-19 Cases

Experiences of Physicians in the US and Bangladesh

A Publication of
Scientific and Social Secretary Desk
Bangladesh Medical Association of North America
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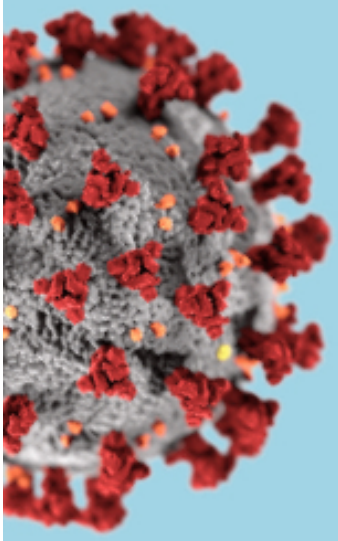

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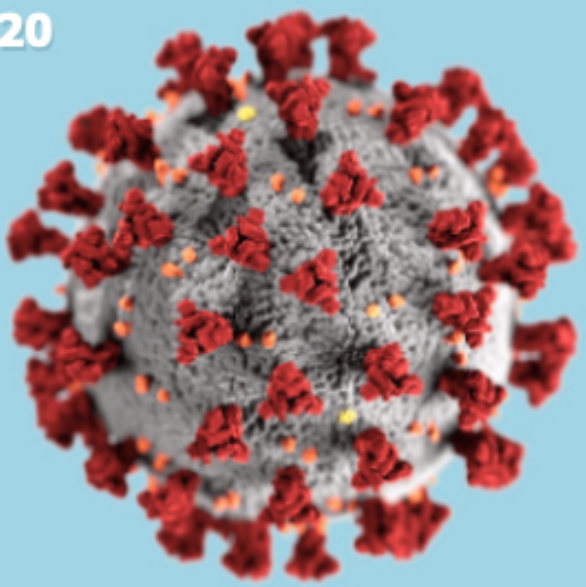

Management of COVID-19

Experiences of Physicians in the US and Bangladesh

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August 2020

Table of Contents

Acknowledgements

We would like to offer our heartfelt thanks to all the physicians who volunteered their valuable time during weekends and share their experiences about managing COVID-19 patients and help save lives from the ravages of the COVID-19 pandemic.

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Thanks to Naveed Shakoor for designing the cover page and Rayan Mamoon for helping format the handbook.

President's Message

Dear Friends and Colleagues,

We welcome you to read this handbook on various methods of management of COVID-19 cases both in the United States (US) and Bangladesh. Evidence based management is crucial especially in the context of a pandemic caused by a virus that we still do not know much about. We are all learning new information almost every month about how it affects people and how we can prevent and treat it. Physicians and other health care workers are the frontline fighters for COVID-19. Throughout the last few months, many BMANA members stepped up by not only fighting at the frontline of this pandemic, but also by finding the time to educate healthcare workers on the ever-evolving management of COVID-19 through online seminars. We will remain vigilant as an organization that is able to unite during times of crisis and is able to effectively help our communities all around the world. We have a lot of collective experience and we can be a great resource for one another. We are very proud to share this terrific resource with our colleagues all over the world so that the information can be used to help save lives.

Dr. M. Ziaur Rahman, MD

President

Bangladesh Medical Association North America

Editorial

For the first time in BMANA history a series of webinars were conducted during the months of March, April and May by the Scientific and Social Secretary Desk, Central BMANA. This was done to create a revolutionary platform in which frontline healthcare workers in the US could discuss different COVID-19 management, treatment, and prevention options and share advice with Bangladeshi physicians. During these times of unpredictability, we believed it was our responsibility to spread awareness of emerging prevention, treatments and procedures that would allow healthcare workers around the world to prepare themselves when it would be their time to fight the virus. Each webinar also reached between six and eleven thousand online viewers across the globe. In order to help update all doctors and document these discussions on COVID-19, this report was created based on the information presented in the webinars. Opinions expressed in this handbook are those of the individual physicians and not of BMANA. Twelve young physicians transcribed the webinar discussions from all three webinars in order to make this handout. This project will provide them with important experiences and will enrich their resumes.

Dr. Md. Yusufal Mamoon, MD

Scientific and Social Secretary

Bangladesh Medical Association North America

Summary

The Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) or COVID-19 pandemic has created havoc worldwide including in the United States (US) and Bangladesh. Physicians and other health care workers are the frontline fighters for dealing with those who become sick with COVID-19. Evidence based management is crucial especially in the context of this new type of virus that we still do not know much about. As a response to the COVID-19 pandemic BMANA Scientific and Social Secretary Desk has been organizing webinars for physicians around the world.

These webinars are intended to provide physicians and healthcare workers with the management practices for COVID-19 patients in the US and Bangladesh. Healthcare workers who have experience managing COVID-19 patients share advice and discuss treatment options with other physicians and healthcare workers. These webinars also target young physicians who have recently graduated from medical school/college, so that they can benefit from the knowledge shared during the webinars. The speakers in the webinars are physicians, researchers, and public health experts from the US and Bangladesh. About 56 speakers shared their experiences during the three webinars. About 6,000-11,000 people, mostly physicians from the US, Bangladesh and other countries participated in these webinars.

The COVID-19 virus is evolving continuously and as such we also have to evolve the way we manage and respond to this virus. As more information becomes available we may have to modify the preventive and management practices mentioned in this handbook. None of the treatments mentioned in this handbook were confirmed by clinical trials at the time of writing this handbook. Management also differed by severity of condition – most cases that get hospitalized tend to be more severe. Management regimen should be modified for mild or moderate conditions. Most of the management (prevention and treatment) practices mentioned in this handbook took place in hospital settings. None of these management practices should be used by non-physicians. All hospitals in the US use PPE and isolate COVID-19 patients.

The information in this handbook was collected from three webinars organized during April and May 2020, and reflects the situation during those times.

04/26/2020 Ever-changing landscape of COVID-19 management and practical experiences of frontline doctors in NY and NJ

05/03/2020 Interactive webinar on COVID-19 management

05/10/2020 Interactive session on COVID-19 management

The recordings of the webinars are available through the following links:

Webinar1:
https://www.facebook.com/sina.i.alam/videos/10216866971559050/?__cft__[0]=AZV_MLnc7eAiboOa9U7EzOsfL9i6Hr4_0cRFPd3lRDpvfcUri53X8U70o6HLP__12-0-hVsD6f2snnzmDK8iqXLgR-ceEChXxmuL-YDVeTKC32SdwDXoAZag9OfyOM_u25D9S1piu_ozyOZ1jZMdUKVA&__tn__=-UK-R

Webinar2:
https://www.facebook.com/sassdcbmana/?__cft__[0]=AZWdQSTc845N4bifQjBEHNo4fV5lrXN4ILs5yZw1BJNqJJmZ2gbbdlZEEsM9FnXMhwd-Lz2MTv71lCCWGGjK7VDB97gAHap3SdUkovboWFoRp6CmyiKzZokz0QwaG3jHSMzkAPGm1PNR2XdQsWhCdHPpCbsIul93iBhZ8hemq7N4K9RJkSzRxyT2fMQMyLFnShk&__tn__=%2CdkC%2CP-y-R

Webinar3:
https://www.facebook.com/sassdcbmana/videos/256045672181487/?__cft__[0]=AZUg3otzeUusL4rcVpPaWs3L53wZCp0QSpnpkwOiOgsDDLdpB-LgTtsDSeYEd62RKw1MPKFCJQk7bqWJrpZponOut1ShDNcBuINlcBnEpCjgZjUiLpW-oLGL9Vzi77j93phIRsCCvcGQrL55jwmBvG-0nxThnGNWzKYsVhunC4HfxPLFgjpauc_FI3ijSr0vjCM&__tn__=-UK-R

https://www.facebook.com/sina.i.alam/videos/10216866971559050/?d=n

Sina Ibn Alam was live.
Apr 26 ·

Ever-Changing Landscape of COVID-19 management; Scientific and Social Secretary Desk, BMANA.

6.8K Views

https://www.facebook.com/103086118065103/videos/256700555479837/

Scientific and Social Secretary Desk, BMANA Central was live.
Posted by Sina Ibn Alam
May 3 ·

COVID 19 management.
Scientific and Social Secretary Desk BMANA

10K Views

https://www.facebook.com/103086118065103/videos/256045672181487/

Scientific and Social Secretary Desk, BMANA Central was live.
Posted by Sina Ibn Alam
May 10 ·

Covid 19-webinar

11.9K Views

Scientific and Social Secretary Desk, BMANA Central was live.
Posted by Sina Ibn Alam
May 31 ·

Webinar on COVID management.

8.3K Views

Summary of Recommendations

Issues	Recommendations
Prevent spread of COVID-19 virus	General public ● Wear face covering when in public spaces. ● Physical distancing: keep 6' or more distance when in public spaces. ● Wash hands frequently with soap (20 seconds). ● Avoid going to public spaces unless for essential services. Hospital setting ● Use Personal Protection Equipment (PPE). ● Isolation of COVID-19 patients. Community setting ● Testing of all age groups – priority essential services. ● Contact tracing & quarantine.
Scarcity of Personal Protective Equipment (PPE)	● Try to manage PPEs personally rather than waiting for the government or institution. ● Instead of using paper gowns, OT gowns can be washed and reused. ● Masks can be reused; study shows that masks don't lose their integrity after washing. ● PPE use should depend on viral load e.g. in ICU full PPE with N95 mask should be used, but in outpatient where viral load is low a simpler barrier precaution is needed (e.g. only mask)
Minimizing transmission and anxiety among physicians	● Telemedicine should be encouraged for both patients' and physicians' safety. ● Involve higher administration in encouraging, counseling, assuring, and providing training on how to use PPE and how to work safely. ● Physicians, non-physicians, nurses, technicians, pharmacists, infection control specialists, lab personnel, IT specialists should form a team; and a team leader should brief about the current updates every day. ● CDC guidelines about going back to work: doctors may return to work 10 days after onset of symptoms (if mild symptoms) or 3 days after complete resolution of symptoms. ● Justification of "7 days duty, 14 days quarantine" theory when the number of active healthcare workers become less in the field.

Hospital management policy in urban settings	• All hospitals must be able to deal with COVID-19 patients. • Hospitals should not be separated as COVID-19 and non-COVID-19 facilities. Each hospital must develop a triage system to isolate COVID-19 patients from non-COVID-19 patients. In non-COVID-19 hospitals, there should be at least one isolation unit. • In countries like Bangladesh, the government should step forward and take proper steps to assign all private hospitals along with government hospitals to deal with this crisis. • It is unethical to delay a critical patient's treatment while waiting for the test results. • There should be some COVID-19 free specialized hospitals such as cancer hospitals, kidney hospitals.
Scarcity of ICU, ventilation facility, and physicians with adequate expertise	• CPAP, BiPAP, and all non- invasive ventilations should not be given preference as alternatives as they are aerosol-generating procedures. Two things can be done — one, build more negative pressure rooms or two, focus on more supply of high flow O_2. • Arranging supply of pulse oximeters in different wards and outdoor patient settings to help diagnose hypoxia in COVID-19 patients.
Hospital management strategy at Upazila Health Center (UHC) level, scarcity of O_2 cylinder and other resources	• Small and big hospitals should divide COVID-19 and non-COVID-19 in ER based on sign/symptoms and have COVID-19 and non COVID-19 wings in inpatient care. • Arranging supply of pulse oximeters in different wards and outdoor patient settings to help diagnose hypoxia in COVID-19 patients. • Using an O_2 concentrator is suggested. It is a machine that takes O_2 from the air and delivers 6-7 L/min O_2 and can run where there is electricity in the facility.
Strengthening public health activities	• Strengthen communication and surveillance. • A permanent panel should be established not only for the emergency situations but also for all kinds of national problems.

Changing public perception	• Social awareness should be raised against all social stigma. Renowned faces like artists, politicians, leaders should be utilized to come forward and can make some videos raising social awareness. • Spreading this message at the government and non-government level is important. Making advertisements in a culturally competent way (e.g. songs) to create awareness about what is dangerous and what is not, so the information reaches everyone even in villages. • Facebook is a good way of spreading awareness and conveying information but we should be careful. • Think about the future projection and create leadership who will take responsibility and plan accordingly at the administrative level. • After discharging COVID-19 patients from the hospital they must be advised on the importance of isolation, quarantine and using correct fitting masks/facial coverings to prevent further transmission in the family. • People should be educated about the usage of pulse oximeters so that they can use them at home. It is a cost-effective device patients can buy by themselves. • Due to the huge demand of pulse oximeters, they may be sold out but both healthcare providers and patients can download an app in the smartphone and measure blood oxygen saturation level by themselves.
Inadequate testing facility	• Tests should be done for all age groups to avoid biased results. • RT-PCR lab should be prepared in every district. • Sample collection can be done in a hospital-based manner and then can contact centrally, like IEDCR in Bangladesh.

Speakers from the Webinars

1. Prof. Konok Kanti Barua, Vice Chancellor, Bangabandhu Sheikh Mujib Medical University, Dhaka.
2. Prof. Ziauddin Ahmed, Nephrology Attending, Temple University, Philadelphia.
3. Prof. Abul Kalam Azad, Principal, Dhaka Medical College, Bangladesh.
4. Prof. Ayesha M. Sikder, MD, Pulmonary Medicine and Rehabilitation, Prestonsburg, KY.
5. Prof. Mujibur Rahman, Head of Dept of Medicine, DMCH, Bangladesh.
6. Prof. Chowdhury Ahsan MD, FACC, FSCAI, Cardiology Program Director, University of Nevada School of Medicine, NV.
7. Prof. Abdul Wadud Chowdhury, Head of Cardiology Dept. Dhaka Medical College and Hospital, Bangladesh.
8. Dr. Sarder A. Nayem, Laparoscopic Surgeon, Chairman, Japan Bangladesh Friendship Hospital, Bangladesh.
9. Prof. Robed Amin, Department of Medicine, Dhaka Medical College, Bangladesh.
10. Prof. Zakir Hossain, Ex-Principal, Dinajpur Medical College, Dinajpur, Bangladesh.
11. Prof. Rezaul Karim, Principal, Shaheed Ziaur Rahman Medical College, Bagura, Bangladesh.
12. Dr. Rafique Ahmed, MD, Consultant Cardiac Electrophysiologists, Union Memorial Hospital, MD.
13. Dr. Bimalangshu Dey, MD, Assoc. Prof. of Medicine, Massachusetts General Hospital, Bone Marrow Transplant Program, MA.

14. Dr. Habibur Rahman, MD, Pulmonary Critical Care, Queens Hospital Center, NY.
15. Dr. Maksood Chowdhury, Pediatrician, Ex-President, BMANA.
16. Brigadier General Dr. Md. Yunusur Rahman, Director, Sylhet MAG Osmani Medical College, Sylhet.
17. Dr. Riaz Chowdhury, MD, PhD, AGAF,FACG, Assoc.Clinical Prof.Gastroenterology, UNC Chapel Hill,NC.
18. Dr. Tasbirul Islam, MD, Assoc. Prof. Pulmonary/Critical Care, Indiana University, IN.
19. Dr. Rumi Ahmed Khan, MD, Program Director, Pulmonary and Critical Care Medicine Fellowship Program, Assoc. Professor of Medicine,University of central Florida.
20. Asif Saleh, Executive Director, BRAC, Bangladesh.
21. Dr. Mohammad Zaman, MD, Infectious disease specialist, Coney Island Hospital, NY.
22. Dr. M. Alam, Assist. Prof. of Zucker School of Medicine at Hofstra/Northwell, Infectious Disease Specialist, NY
23. Dr. Mohammad Islam, MD, Neurology attending, Queens Hospital Center, NY.
24. Dr. Munibur R. Khan, MD, Attending Physician of Psychiatry,
Creedmoor Hospital, NY.
25. Dr. Mohammad Alauddin, Clinical Assist. Professor, Mercy Fitzgerald Hospital, PA.
26. Dr. Basher M. Atiquzzaman, Director of Digestive and Liver Center of Florida, Faculty, College of Medicine, University of Central Florida.
27. Dr. Ishtiaq Mannan, Country Director, Save the Children Fund, Iraq.
28. Dr. Muhammad Shames Tabriz, MD, Infectious disease consultant, Assoc. Prof. University of Illinois at Chicago
29. Dr. Iftikher Mahmood. Pediatrician, President and CEO, Hope Foundation.
30. Dr. Adiba Geeti, Assoc. Program Director, Bridgeport Hospital, CT.
31. Dr. Ahmed Morshed, MD, Cardiology Attending, Maimonides Hospital,NY.
32. Dr. Aminul Islam, Assist. Prof. of Respiratory Medicine, Dhaka Medical College, Bangladesh.
33. Dr. Ariful Islam, MD, Assoc. Program Director, Raritan Bay Hospital, NJ.
34. Dr. Abu Sahin, MRCP (UK), FCPC (Med), Assist. Prof. of Medicine, Rajshahi Medical College, Bangladesh.
35. Dr. Ferdousi Shilpee, MD, Community Physician, NY.
36. Dr. Kawser Ahmed, MD, Assist. Prof. Department of Medicine, Queens Hospital Center, NY.
37. Dr. A. Nasser Khan, MD, FACC, FRCP, Interventional Cardiologist, The Iowa Clinic, Adjunct Professor, University of Iowa.
38. Dr. Muhammad Rahman, Attending physician, Coler Hospital, Roosevelt Island, NY
39. Dr. Md Aticul Islam, MD, Infectious disease and HIV specialist, Jamaica Hospital Center, NY.
40. Dr. Md. Samiul Huda, Junior Physician, Bangladesh.
41. Dr. Md. Yusufal Mamoon, MD, Assist. Prof. Medicine Dept. Queens Hospital Center, NY.
42. Dr. Mohammad Basith, MD, Assist. Prof. Medicine Dept. Queens Hospital center, NY.
43. Dr. Mushtaq Mahmood Titas, Internist & Pediatrician, North Ohio Heart, Ohio Medical Group, Ohio.
44. Dr. Naquib Uddin, Scientist, Johns Hopkins School of Medicine, MD.
45. Dr. Rabiul Halim Munna, Assoc. Consultant of Critical Care Medicine, Asgar Ali Hospital, Bangladesh.
46. Dr. Raihan Rabbani, Square Hospital, Dhaka. Bangladesh
47. Dr. Rajasree Roy, MD, Haemato-Oncology Attending, The Cancer Institute of Hospital, St. Francis Hospital, The Heart Center, NY.
48. Dr. Rumana Sabur, MD, Community Physician, Bronx, NY.
49. Dr. Russella Mirza, Resident Physician, Louisiana State University Health Center, LA.
50. Dr. Sadia Shajmin Siddiqua, Senior Consultant of Surgery, Kuwait-Bangladesh Friendship Government Hospital, Dhaka, Bangladesh.
51. Dr. Shafique Chowdhury, MD, Modern MD Urgent Care, Brooklyn, NY.
52. Dr. Shamsul Bhuiyan, MD, Community Physician, Bronx- NY and NJ.
53. Dr. Shaown, Kuwait Maitree Hospital, Dhaka, Bangladesh.
54. Dr. Sheikh Mahfuzul Hoq, MDS, MPH, ED, Yale New Haven and Bridgeport Hospital, NY.
55. Dr. Suhaila Khan, MD, MPH, PhD, CEO, SHK Global Health, CA.
56. Dr. Syed Tariq Reza, Assist. Prof. Critical Care Medicine, Dhaka Medical College, Bangladesh.

Chapter 1:
Prevention and Management in the US

COVID-19 Worldwide Status and Prevention of Spread

Dr. Suhaila Khan[55] discussed the status of COVID-19 pandemic around the world and the preventive aspects of this pandemic. She shared data that showed that the virus was causing less morbidity and mortality in some countries compared to others. There were about 70 clinical trials of vaccines underway in different countries around the world and they would be available sometime in 2021 for mass use. In the meantime, there was no specific treatment for COVID-19 infection, only symptomatic treatment to save lives. The emphasis is on prevention for deadly infections like COVID-19. The countries which are emphasizing and taking action on "prevention" are seeing lower morbidity and mortality from COVID-19 virus. The preventive activities need to happen at all levels of population from the day-to-day life of the general public to hospital settings. These are:

General public
- Wear face covering when in public spaces
- Physical distancing: keep 6' or more distance when in public spaces
- Wash hands frequently with soap
- Don't touch mouth, nose, eyes
- Avoid going to public spaces unless for essential services

Hospital/clinic setting
- Use PPE
- Isolation of COVID-19 patients

Community setting
- Testing of all age groups – priority essential services
- Contact tracing
- Self quarantine if feeling sick or exposed

Centers for Disease Control and Prevention (CDC) Guidelines for Isolation and Quarantine

Isolation: COVID-19 positive cases are separated from non COVID-19 cases.
Quarantine: If someone is exposed to a COVID-19 positive patient without any protected measures, then s/he must follow quarantine.

CDC published 2 different guidelines on isolation and quarantine for health care professionals and non-health care professionals:
For non-health care professionals

- Discharge criteria should be fever-free, oxygen saturation level is good, proper oxygen supply facilities at home, and feeling better.
- Protocol for discontinuation of home isolation are:
  - The individual has been fever-free for at least 24 (previously 72) hours without using fever-reducing medications, **and**
  - improvement in respiratory symptoms (e.g., cough, shortness of breath), and
  - At least 10 days have passed since symptoms first appeared;

- Return to Work Criteria for HCP with SARS-CoV-2 Infection
- Symptom-based strategy for determining when HCP can return to work.
- *HCP with mild to moderate illness who are not severely immunocompromised:*
    - At least 10 days have passed *since symptoms first appeared* and
    - At least 24 hours have passed *since last* fever without the use of fever-reducing medications and
    - Symptoms (e.g., cough, shortness of breath) have improved
- *HCP with severe to critical illness or who are severely immunocompromised[1]:*
    - At least 20 days have passed *since symptoms first appeared*
    - At least 24 hours have passed *since last* fever without the use of fever-reducing medications and
    - Symptoms (e.g., cough, shortness of breath) have improved.

Prof. Ayesha Sikder[4] treats both COVID-19 patients and non-COVID-19 patients. If proper PPE is used, then there is no need for a health care worker to quarantine after exposure to a COVID-19 patient.

Management of Outpatients and Inpatients, Use of Telemedicine

Dr. Rumana Sabur[48] categorized her patients vigilantly from the very beginning of COVID-19 pandemic. She considered all patients as potential COVID-19 patients. Mild symptoms were managed with acetaminophen and cough medicine. Her practice found azithromycin very responsive. She thinks patients with mild symptoms spread the disease but they were unaware of this fact. So, she emphasized on lots of assurance and counseled them on the following:

- staying at home and not going to work
- maintaining isolation from other family members
- adequate hydration
- rest

She also stressed on checking saturation with pulse oximeters as many patients might not be aware of shortness of breath; instead, they complained of feeling tired during their daily activities.

Dr. Ferdousi Shilpee[35] also emphasized on assuring and counseling her patients. She also focused on telemedicine for the protection of both doctors and patients.

Dr. Shamsul Bhuiyan[52] treated patients, including many Bangladeshi Americans with COVID-19 symptoms from early March at Bronx and New Jersey. But due to the inadequacy of proper safety equipment such as separate thermometer or BP machine for every patient, he started managing patients via telemedicine. Based on the presentation of patients the management was as follows:

For patients with typical mild presentation (>90% with low-grade fever, sore throat, anosmia, taste changes, etc.): management from home with vitamin supplements including vitamin C and zinc. Symptoms persisted for mostly 1-2 weeks (in some cases 4 weeks).

For patients with high fever (101°F or more): Oseltamivir and azithromycin combination in some patients. Patients improved symptomatically by the second or third day.

Patients with suspected symptoms were prescribed thermometers, pulse-oximeters for self-monitoring (pulse, oxygen saturation, temperature, etc.) at home to avoid unnecessary hospital visits and minimize the risk of infection. Patient education on symptoms of pneumonia were also provided.

Emergency hospitalization was strongly advised when the oxygen saturation dropped to 92% or below or on the appearance of pneumonia-like symptoms.

Dr. Adiba Geeti[30] managed both inpatients and outpatients in hospital settings.

It took 2-3 weeks to establish lockdown in the city of Bridgeport by direct phone calls and phone calls from public health nurses for contact tracing. Every day new COVID-19 guidelines are briefed in the beginning of the day.

Doctors are providing treatment over the phone wherever needed. Patients are checking their own blood sugar and blood pressure and informing the doctor over the phone.

In outpatient - only patients with severe symptoms or significant medical problems are coming in person to the clinics. Any suspected or documented COVID-19 patients are called and managed over the phone. Covid-19 diagnosed patients with moderate to severe sign symptoms are sent to the emergency department and called in by physicians ahead of the emergency department charge nurse to prevent delays and contamination of others.

Surgical mask and a pair of gloves is given to the physicians working in the outpatient area for the whole day. N-95 masks are asked to be used for the longest survival days (90 days) and need to be recycled after disinfected properly by the health system. She is changing to scrubs and luckily got a face shield (though face shield isn't mandatory for outpatient treatment) which she is using with the mask and gloves while seeing the patient. She is not touching her mask with the gloves so it can be reused. For inpatient setup doctors are using N95 masks with face shields, head covers, and gowns. They are reusing the N95 mask for the next patient as it is covered with a face shield.

Inpatient care - Nurses are directly checking COVID-19 positive patients once every day. If a patient is complaining of worsening symptoms and continuous pulse oximetry is showing worsened condition like hypoxia - the next level of care is triggered.

Dr. Shafique Chowdhury[51] shared an event that took place at the end of February 2020. A 35 year old woman came with flu or common-cold-like symptoms (fever, cough, chills). She had a recent travel history (France). Flu and strep tests were negative. On the patient's insistence, she was referred to a COVID-19 testing site (test results unknown). She was suspected to be the "Patient Zero" for the clinic as the physicians developed symptoms of COVID-19 (high fever, sore throat, chills, joint pain, anosmia, etc.) one day after exposure to her. The doctor was tested negative for flu and strep throat, went into voluntary isolation out of an abundance of caution, and returned to the practice 2 weeks later following complete improvement of symptoms. By that time, the urgent care started receiving more COVID-19 patients and the staff switched to wearing N95 masks from surgical masks. The cases started to increase from then onward. At least 7-8 patients/day needed referrals for immediate hospitalization. Maximum patients came with shortness of breath (most commonly) and moderate-to-high fever. Pulse oximetry in those patients was 60%-70%. X-ray findings showed bilateral pneumonia. When COVID-19 tests returned as positive, these patients were referred to the hospital. If a patient had oxygen saturation of 99%, they were sent home, even if they had mild pneumonia. Doctors prescribed cough medicines, acetaminophen, and azithromycin for the management at home. 80% of suspected COVID-19 patients had been getting better and there had been no ER referrals.

Dr. Muhammad Rahman[38] discussed management in hospitals and nursing homes. He recommended Azithromycin for young patients, Doxycycline for older patients and Hydroxychloroquine for limited patients. IV fluid and O_2 support as necessary.
Recommended Test: CBC, Chemistry, D-dimer.
There were very few patients who had high WBC and who were treated with doxycycline and iv ceftriaxone.

Dr. Kawser Ahmed[36] discussed the first COVID-19 case in Queen's Hospital that came through. Two weeks after exposure, he felt symptoms of COVID-19 and tested positive. His whole family was suspected with COVID-19 positive. He tested negative recently and is back to his work, where he was welcomed warmly as a COVID-19 winner. He also suspects most of the health care professionals will be COVID-19 positive if tested. But he encouraged them not to fear and continue to fight against COVID-19 with proper preparation.

Physical Examination of COVID-19 Patients

Dr. Bimalangshu Dey[12] and Dr. Md. Yusufal Mamoon[41]

- In the US only one physician will enter the physical examination room, unless more physicians are required.
- Pregnant physicians and physicians with comorbidities will not perform physical examinations of COVID-19 patients. Usually younger physicians are preferred for the task.
- Identify if there is any clinical evidence of DIC (Disseminated intravascular coagulation).
- Any ischemic process in fingers, toes, ears indicate higher probability of developing clots.
- Formation of microthrombi is common and venous thromboembolism is frequently seen in COVID-19 patients.
- Treatment for that is similar to any other thromboembolism ensuring they do not have any contraindications for anti-coagulants.

Dr. Ariful Islam[33] started seeing COVID-19 patients from March. He made the following recommendations:

Atypical presentations: Quite a good number of patients came with encephalopathy, aggressive behavior, focal neurologic deficit. Some patients came with only gastroenteritis or acute coronary syndrome or kidney failure or ITP without any respiratory sign symptom. Physicians must be very vigilant about atypical presentations.

Management steps: Initial encounter is mostly for Risk Stratification: what is the outcome of the patient based on current data and age, comorbidities such as diabetes, hypertension etc. Doctors should also look for inflammatory markers in the first encounter.

Some patients were disproportionately hypoxic compared to the chest X-ray. Some chest X-ray reports showed ARDS patterns but the patients looked better. Auscultation findings were also atypical in some patients where there were no rhonchi or crackles but chest X-ray findings were severe. So, chest X-ray must be a parameter. He recommended not to rely on auscultation findings.

Some patients were hypoxemic, but they had no tachypnea and they were comfortable. Seeing D-dimer for initial presentation is recommended. If there is elevated WBC, think of secondary infection. Most patients presented with neutropenia or normal to below normal WBC but if WBC is high during initial presentation then secondary infection should be considered.

Treatment plan:

-There is no specific treatment.
-Key point of treatment is supplementary oxygen. Intubation should be avoided unless necessary.
-Noninvasive ventilation is better than invasive ventilation.
-Supportive care helps. Hydration should be given as many patients come with acute kidney failure.
-Prevention of venous thromboembolism: Enoxaparin daily dose was used to minimize exposure. If D-dimer is high, full dose anticoagulation should be given if not contraindicated.
-Avoid CTA due to risk of more exposure and risk of more kidney failure with contrast. Based on D dimer and based on clinical scenarios consider anticoagulation. Avoid any medication that prolongs QTc. ACEIs and ARBs can be continued.
-Antibiotics depend on patients' condition and individual basis. IL 6 inhibitor, hydroxychloroquine, Azithromycin, convalescent plasma should be given after deciding case by case scenario.
-Strongly discourage combining Azithromycin with Hydroxychloroquine because of risk of related QT prolongation in ECG.

Dr. Md Aticul Islam[39], Infectious disease specialist, suggested that along with all the typical symptoms look for poor prognostic signs including ferritin level, LDH level, D-dimer level and lactic acid level.

There are four categories of hospital admitted patients based on outcome. Some patients come with normal oxygen saturation, may need a mask, and get better in 2-3 days regardless of anything. Some patients linger with nasal cannula followed by a non-rebreather mask and within 6-7 or 8-10 days after lingering sufferings they go home. Other patients come to hospital and stay 3-7 days taking all the

modalities including nasal cannula, non-rebreather mask, BIPAP followed by intubation but do not come out in 90% cases. These cases are very dangerous and are called cytokine storms.

Initially HIV medication (protease inhibitors), hepatitis c medication such as Ribavirin with Interferon were tried but did not work. Antimalarial drugs, Hydroxychloroquine and plus/ minus Azithromycin were also utilized with little success. Ramdesivir was effective in producing good outcomes in some mild to moderately severe patients. IL 6 inhibitor, Tocilizumab works a little bit to suppress inflammation. Plasma exchange transfusion is helping but it is still under research. There is no vaccine yet.

There is no supporting data from CDC or FDA on prophylaxis and it may harm patients. D-dimer can be very high and there is a high risk of thromboembolism because this virus reduces anti-thrombin effects. Patients should be given Enoxaparin if kidney function is good and if kidney function is not good then heparin could be given. So, heparin and Enoxaparin are helpful along with IV fluid. Oseltamivir does not help. Steroid works once Tocilizumab is given and then administering steroid after 48 hours can also help. ACEIs are still controversial. They can vasodilate and are anti-inflammatory. No need to stop ACEIs. NSAID should be avoided. Acetaminophen can be used.

Dr. Mohammad Alauddin[25] recommended that when a patient comes to the ER; basic lab, CXR and evaluation should be done to determine whether the patient has mild, moderate or severe symptoms. After admission, O2 monitoring is most important. Some patients do not have symptoms but are severely hypoxic. O2 saturation of 90-95% should be maintained through the nasal cannula. Start with 2L of O2 through the nasal cannula and gradually increase up to 5-6 L. If a patient is unable to maintain O2 saturation, then Oxymizer is used to give concentrated O2 . Oxymizer is a simple device which is used to give O2 up to 10 L. If O2 saturation still cannot be maintained, then non-rebreather is used. It can be used to give O2 upto 14-15 L. The goal is to maintain O2 saturation >92%. If the O2 saturation goes below 88-89%, a non-invasive method (eg: CPAP, BIPAP) is used. Aerosol forming instruments should be avoided.

Anticoagulant is used for every patient as COVID-19 has thromboembolic effects. The D-dimer test is done in the ER.

D-dimer 3 (different values in different labs)- Prophylactic Enoxaparin is given.

D-dimer >3 but no symptoms of pulmonary embolism – Enoxaparin 40 mg BID is given.

D-dimer >3 and symptoms of pulmonary embolism - therapeutic Enoxaparin followed by oral anticoagulant.

Some patients were found with massive pulmonary embolism involving the right ventricle.

Patients predisposed with Asthma, COPD: a short course of steroid (Prednisone or Methylprednisolone) is used if the patient has wheezing.

Recommendation for Restrictive Lung Disease with difficulty in breathing:

-Incentive spirometry.

-Proning - for a few hours every day helps with oxygenation.

The goal is to maintain O_2 saturation without using invasive ventilation.

Other monitoring: Renal function, Liver function, Inflammatory markers monitored every other day.

Dr. Tasbirul Islam[18] outline the management of COVID-19 patients as follows:

Supportive therapy and specific therapy for hypoxia: O_2 therapy. Start with nasal cannula, if it doesn't work then high flow oxygen should be given, proning then noninvasive ventilation, then invasive ventilation, lastly Nitric oxide and lately, ECMO.

Proning - improves oxygenation and prevents the patient from developing respiratory failure requiring intubation.

Nebulizer - should be avoided as an aerosol generating procedure but can use inhaler maximum 6-8 pups. If needed, it can be used in a negative pressure room. If not available, a single room with well ventilation can be used cautiously.

BAN (breath actuated nebulizer): better than conventional nebulizer.

MDI is encouraged with or without a spacer, and can be used to the vented patients through the tube.

Antibiotic: to prevent secondary infection 3rd gen cephalosporin with Azithromycin or doxycycline should be good. Treatment duration with antibiotics: 5 days. If not used first, start if WBC, procalcitonin increase, presence of chest infiltrate, hypoxia worsens. Treat as community acquired pneumonia patients until the result confirms COVID-19.

Acetaminophen - to control temperature and address the pain.

Silent/happy hypoxia - clinically no shortness of breath. Check with pulse oximeter even if no complain

Recommendations:

-Every hospital should have COVID-19 and non COVID-19 units.

-Ensure flawless supply of oxygen and every big hospital needs a central supply of oxygen.

-Buy high flow oxygen devices to provide oxygen supply to ARDS and COPD patients.

-Use pulse oximetry for every COVID-19 patient.

-Use anti-inflammatory drug like Tocilizumab, steroid, convalescent plasma, or anticoagulant as per recommendation.

-ARDS patients should be treated with Dexamethasone 20mg IV daily for 5 days, then 10mg with tapering dose.

-Hydrocortisone should be used in case of hyponatremia, mineralocorticoid insufficiency.

-Steroid should be used early.

Management of Hypoxia

Dr. Rumi Ahmed Khan[19]

Hypoxia - lack of tissue oxygen.

Hypoxemia - low PO_2 in blood, ensure PO_2 >60% to prevent hypoxemia, SaO_2 should be around 95%. A-a gradient is a better tool than PF ratio for measuring progression. Hypoxemia mechanism- V/Q mismatch(early) and shunting (later stages).

If needed, intubation must be done in a negative pressure room by an expert person wearing a N95 mask.

Happy hypoxemia: hypoxemia without significant work of breathing; no intubation is suggested.

Fluctuating oxygen level - no need to intubate, it may come back up. Increasing the oxygen level is recommended. HFNO: high flow nasal cannula is easy to use, safe and not aerosol generating.

CPAP vs BIPAP: CPAP preferable as less aerosol generating.

According to Dr. Gattinoni, patients have two types of lung phenotypes -

a) L type- more or less clear lungs.

b) H type- more consolidation.

H type needs more PEEP, L type needs more oxygen.

APRV is better mechanical ventilation and proning is a great salvage therapy to improve oxygenation.

Dr. Habibur Rahman[14] added that COVID-19 has 3 phases and 3 major causes of morbidity and mortality. Initial phase includes flu-like symptoms, conscious and unconscious hypoxemia, increasing fever and 90% of CT scans come out with abnormal findings. After 7-8 days the cytokine storm starts. In the final stage, hemolymph phagocytic syndrome occurs. He mentioned that in management of viral clearance, a Chinese study used steroids in severe lung diseases for 17 patients and found positive results. If patients become more dyspneic, hypoxemic in that case steroid should be started and there was improvement from his experience.

Risk of Exposure

Prof. Ayesha M Sikder[4]

High risk/exposure:

Being in a room without a mask for prolonged close contact; during aerosol generating procedures when the HCP's eyes, nose or mouth were not protected.

Medium risk:

HCP with prolonged close contact with a face mask.

HCP wearing PPE with N95 face mask during AGP and changing it after finishing procedure is recommended.

Low risk:

Contact with patients using masks (N95/surgical) or respirators. Eye protection with face shield further lowers risk.

Do not forget to decontaminate stethoscope, eyeglasses, etc.

Recommendations:

-N95 respirators with PPE are recommended in aerosol generating procedures (intubation, bronchoscopy, suctioning, turning, disconnection from vent).

-Regular masks including PPE are part of droplet and contact precautions.

-PPE: Includes masks, glove, gown, eye/face shield/safety goggles.

-Negative pressure rooms: Lower risk of cross-contamination among rooms and infection of staff as air is exhausted directly outside.

-HEPA filter: removal of submicron particles- reduces virus transmission.

-In Bangladesh COVID-19 patients and non COVID-19 patients should be triaged separately.

The routes of transmission are as follows:

-Contact (direct or indirect).

-Droplet > 5 µm (Rides on droplet), by coughing, sneezing, talking within 3 feet

-Airborne < 5 µm (tuberculosis, measles, SARS-COV1).

-CDC states that COVID-19 transmission occurs from an infected person within 6 feet via respiratory droplets or by touching a contaminated surface. During AGP SARS COV2 has the risk of aerosolizing.

Management in ICU

Prof. Ayesha Sikder outlined a general recommendations:

-During the pandemic, all patients with respiratory symptoms in ICU should be suspected of COVID-19.

-Intensivists and allied teams should have up to date info.

-All ICUs should develop institutional guidelines and action plans (simulate) regarding high risk procedures; e.g. intubation, proning, CPR etc.

-ICU management strategies:

Fluid management: In the absence of shock/ hypoperfusion- conservative fluid management is recommended by the surviving Sepsis guidelines; all patients need CVP monitoring.

Oxygen therapy: It is the mainstay pulmonary treatment in ICU care. Hypoxemia is well tolerated in COVID-19 ARDS patients, which is silent.

There are 3 categories:

Stage I: SaO2>94%, with or without pneumonia.

Stage II: SaO2<94%, with or without pneumonia.

Stage III: Really low SaO2, in this situation patients need significant O2 support or ventilation.

Usually Stage II & III patients need ICU in the current scenario. Target saturation should be >92%.

<u>Medications & other measures in ICU:</u>

-Pressors: Norepinephrine.

-Empiric antibiotics: Ceftriaxone is recommended by CDC.

-VTE Prophylaxis
-Corticosteroids: usually used in moderate to severe disease
-Acetaminophen: to keep fever down.
-Bronchodilators: nebulized medications should not be used, MDI with spacer is recommended.
-Antivirals: Remdesivir reduced duration of illness
-HCQ is still controversial
-Anti IL-6: Tocilizumab
-Convalescent plasma

Dr. Tasbirul Islam[18]

Tocilizumab has been used to reduce inflammation in COVID-19 positive patients. If Hscore (for reactive hemophagocytic syndrome) is more than 169-170, Tocilizumab is given.

Using steroid first is recommended and then Tocilizumab, as it is expensive. Preferably dexamethasone (due to less water retention because of no mineralocorticoid activity) or methylprednisolone first, then tocilizumab.

Steroid dosage: High dose is recommended. According to the DEXA-ARDS protocol, 20 mg dexamethasone IV is given for 5 days, then 10 mg is given for another 5 days.

Methylprednisolone dose: 60-80mg, Q6 hr.

Steroid controversy: According to the Annane/French trial steroid works; whereas in other trials, it doesn't. According to the Society of Critical Medicine, steroids can be used in septic shock patients on vasopressors.

Meduri trial: steroid works.

DEXA-ARDS trial: A Spanish trial on COVID-19 patients. Steroid is used when PF ratio <200. It decreases the mortality, need of a ventilator and ICU length of stay.

It's not effective to use early according to some opinions as it might enhance the viral replication (according to Dr. Lee, 2014); if steroid is used within the first 5 days, it'll increase the viral load significantly, but decrease the clinical deterioration as well. In Fang papers and Wang papers on COVID-19, it didn't increase the viral load and decreased ventilator death & oxygen requirement.

Adrenal trial - Steroid in septic patients doesn't have any effect on mortality but sub-group analysis of ARDS patients with sepsis showed that it worked.

Approach trial - Steroid decreases the mortality and decreases shifting to ventilator and ICU length of stay.

Steroid can also be used in septic shock and severe pneumonia.

Respiratory failure requires HFNO, NIV, Intubation

Inflammatory markers: D-dimer, LDH, CRP, ferritin are usually high.

IL-6 three times normal.

Tocilizumab Dosage: 4-8 mg/kg IV is given as a single dose, another dose can be given 12 hours later, 2 doses are better for critically ill patients otherwise according to a Chinese study a single dose is appropriate. Side effects - pneumonia, UTI, gastrointestinal perforation(rare).

COVID-19 patients with shock should be treated the same as septic shock; Norepinephrine is the drug of choice, then other vasopressors are suggested. If a patient in shock requires 2 vasopressors- Hydrocortisone 50 mg Q6 hr should be added. Almost 30% of ICU patients would likely have AKI. Chest auscultation in COVID-19 patients is not recommended on a daily basis.

Intubation

Prof. Ayesha Sikder opined that a plastic box (shield) during intubation in ICU is recommended.
-Assemble team: staff number should be limited.
-Inside room: Airway expert physician, 1 RT and 1 ICU nurse.
-Outside room: Second doctor in PPE ready to assist, second nurse to assist, one nurse to chart from outside.
-Visual assessment from outside by cameras, baby monitors, video laryngoscope (if available), difficult airway cart/box (includes laryngoscope, LMA, ETC), Incubation shield and crash cart.

Recommendation for CPR as follows:
-NRB mask with filter on exhalation port.
-Bagging should be avoided.
-HFNO (High Flow Nasal Oxygen) could be used.
-Intubation by the best available expert (single attempt) is recommended.
-CPR should be on hold during intubation.
-RSI (Rapid Sequence Intubation) with anesthetics.
-Use Viral filter, CO2 detector.
-If NP swab is negative, but there is high COVID-19 suspicion- send a deep tracheal aspirate for viral PCR with closed suction from ET Tube.
-Safety should be on primary focus.
-Do not rush: each attempt should be at it's best.
-Assemble labs.
-Routine daily CXR should be avoided.
-CT scan should not be routine.
-ECHO.
-Bronchoscopy: (high risk) CDC recommends only in paralyzed ventilated patients.
-Reduced usage of stethoscopes, helps reduce exposure.

SSS CAMPAIGN 2020
-Management of sepsis
-Management of ARDS (low tidal volume vs higher)
-Management of shock: conservative fluid; recommendation- norepinephrine, vasopressin>epinephrine; corticosteroid. Oxygen if SPO2<90%, goal >92%.
AGMP (Aerosol Generating Medical Procedures)
-CPR
-AMBU bagging
-Noninvasive ventilation (CPAP/ BiPAP etc.)
-High-flow nasal 02
-Nebulized medications during intubation,
-Proning
-Extubation
-Disconnect from ventilation if coughing (if 300 miles an hour) (suctioning of airways)
-Bronchoscopy (strongly discouraged)
-Sputum induction (not indicated)

Dr. Habibur Rahman recommended that low molecular heparin should be used as 60 mg for adults and should be started at intermediate dose, then deep breathing exercise, proning and oxygen supplementation could help a lot of patients and prevent them from coming to hospitals.
First week is the best time for using plasma and Remdesivir, he added.

Prof. Ayesha M Sikder described her opinion regarding proning:
-SARS-COV2 causes pneumonia, micro emboli vs pulmonary edema, multiorgan failure, ARDS.

-ARDS prevalence – up to 17%, MR high.
-Recruitment of dorsal lung volume.
-Increase of dorsal lung volume.
-Increasing chest wall elastance.
-Decreasing alveolar shunt (Gattinoni AJRCCM 2013).
-Improving tidal volume.
-PAO2 was higher without changes in pH or PCO2 (Scaravelli J CRIT CARE 2015).
-Up to 12 hours a day (2-hour intervals).
-Proning can be used as adjunctive therapy for improving ventilation.
-Awake Patients Can Prone Themselves.

Awake pronation:
-Popularized in the era of COVID.
-Stepwise approach.
-HFNO.
-HFNO + Prone.
-NIV.
-NIV + Prone.
-Decreased incubation rate- pred 75% - actual 45% (Small Study, Ding et al Crit Care 2020).

Risks of Proning:
-Accidental removal of ET tube.
-Limited access to the venous route.
-Bending of catheters, chest tube.
-Pressure wound.
-Eye, facial edema.
-GERD.
-Skin injury.
-Patients should face the ventilator.
-Change position every 2 hours.
-Need 3-5 individuals to be prone.

Related ICU Management:
-Patients of suspected/ positive cases – contact & droplet precautions.
-The HCW should don proper PPE.
-HCW should also exercise strict handwashing, cough etiquette, surface cleaning & proper disposal of PPE. Use a doffing buddy to point out the mistakes.
-Avoid touching of mouth, nose & eyes with unwashed hands.

Pulmonary Complications:
-Hypoxemia: oxygen is key.
-ARDS bs pure hypoxemic respiratory failure
-Micro emboli.
-Ground glass/ crazy paving on chest imaging
-ICU deaths are high (up to 70%).
-Supportive care.
-Incentive spirometry.
-Anticoagulation.
-Noninvasive ventilation vs invasive.
-Continue ACE-I.

Cause of Death:
-Respiratory failure (98-36%).
-Sepsis (100-42%).
-Secondary infections (50-10%).
-Others: cardiac, renal failure.
-Old age.
-Underlying medical condition.
-High SOFA score.

Dr. Rabiul Halim's[45]opinion regarding ABCD management:
First requirement is oxygen therapy, which can help to reduce the need for a lot of mechanical ventilators. We should be more concerned about high flow Oxygen therapy.
Symptomatic treatments:
-Simple antibiotics like Cefixime, Levofloxacin, ±Doxycycline works well.
-DVT prophylaxis is important.
-Arrhythmia and hyponatremia can increase mortality rate, in that case we should monitor intake-output chart and hydration therapy. Who are complaining about sweating, palpitation and/or tachycardia we should do ECG in clinical setup. Patients with loose motion can be treated by providing ORS and Nitazoxanide.

Management of COVID-19 Patients with Cardiovascular Symptoms

Dr. Ahmed Morshed[31]

From the middle of March, the Cardiology Department divided the patients into 2 categories depending on symptoms and labs for triage purposes. Triage was done based on history, physical examination and on CXR findings as RT PCR results were available after 72 hours. Every patient was provided with surgical masks and if a mask was not available, a bandana was given to every patient. Operator numbers were limited to a minimum for every procedure. N95 masks were recommended to be used at all times. During the procedures N95, surgical mask on top of N95, face shields were worn. Followings were triage criteria :

1. COVID-19 Suspected - H/O fever, cough, sob, chest pain suggestive of pleuritic chest pain, H/o contact with covid case, travel history, CXR and CT non contrast suggestive of COVID pneumonia while awaiting for RT PCR test results.
2. COVID-19 Non-suspected - Absence of fever, other symptoms and CXR/CT non contrast not suggestive of pneumonia while awaited for RT PCR test result.
3. RT PCR was done only in admitted patients.

Common presentations of CV disease with covid pneumonia were:

1. Chest pain
2. SOB
3. Absence of fever, very few patients had fever, even though they had CXR findings suggestive of pneumonia or positive RT PCR.

Mechanism of CV complications in COVID patients:

1. Direct myocardial injury by SIRS COV2, Myocarditis
2. Cytokine storm.
3. Hypoxia
4. Plaque rupture and coronary thrombosis.
5. Adverse effects of antiviral.
6. Hypokalemia due to SARS cov2- RAAS interaction with urinary K loss

Most common lab findings:

Elevated troponin, elevated inflammatory markers

Managements

1. Hydroxychloroquine and Azithromycin were started for covid suspected and covid confirmed patients as per hospital protocol. We adopted a protocol of EKG monitoring of those patients on Day 0 and day 3 to see QTc prolongation. Decision was made to stop these combinations if QTc is more than 500 msec. We found a good number of patients, approximately 25% of patients developed QTc prolongation. In the middle of April, we decided to stop the combination of Azithromycin and HCQ as the initial treatment. Our internal data showed these combinations were posing more risk of cardiac arrest than benefit.

2. Patients who were already on ACEi and ARB continued their medications. But we did not start ACEi/ARBs in newly diagnosed cardiomyopathy routinely. Some newly diagnosed cardiomyopathy patients were started ACEI or ARB, if the patients did not show worse prognostic signs of COVID such as increasing requirements of oxygen, elevated inflammatory markers along hemodynamically stable.

3. From 10th march, all elective procedures including echocardiography, stress test, elective angiograms, TAVR, Mitra clip had been cancelled. The reason for postponing elective procedures were increased risk of transmission of infection to healthcare workers along with patients. Only emergency procedures such as primary PCI for STEMI were continued.

4. For STEMI with covid suspected patients following protocol were adopted. Once STEMI patients were in ED, we tried to rule out/in COVID pneumonia by history, physical and CXR findings. In some cases we missed the door to balloon time for obtaining CXR/ CT Chest.

For High Risk STEMI such as with cardiogenic shock, massive anterior wall MI, MI with AV block, Inferior MI with RV failure , plan was to do primary PCI

STEMI without high risk features described above : Thrombolytics

Despite the protocols of fibrinolytics, we thrombolysed only 1 patient in the last 3 months of covid surge.

Our STEMI volume went down to 30% in the last 3 months (March- May) in comparison to year 2019. Data from other hospitals in NYC, Italy did show the significant reduction of STEMI numbers. The etiology of reduced STEMI

Patients were possibly a combination of multiple factors. fear of coming to hospital,increased numbers of out of hospital cardiac arrests were possibly some of the reasons for decreased numbers of STEMI.

5.For STEMI Noncovid patients : Primary PCI were done.

6.For Covid suspected/confirmed NSTEMI patients only medical therapy was given unless hemodynamically unstable or persistent ischemic.

7.For COVID negative NSTEMI patients left heart catheterization with a view of revascularization was done.

8.We also have seen 3 patients with late presentation of STEMI with mechanical complication. Those were interventricular septal rupture and acute mitral regurgitation.

9.During PCI, a heavy clot burden was seen in STEMI patients. We had 1 patient who came with STEMI. On Left heart catheterization we found the left main thrombus, other vessels did not show any lesion. After PCI of the left main along with Impella placement, the patient's hemodynamic status improved. In a few minutes he deteriorated to cardiac arrest and we found his peripheral and central lines were clotted. He succumbed to death even after continued cpr for 45 min with advanced life support.

10.We started DVT prophylaxis and full therapeutic doses of anticoagulation in the very initial stage of covid surge (about middle of march). We had 2 COVID patients with pulmonary embolism which pushed us to start anticoagulation protocol. We used mainly enoxaparin and apixaban. the protocol was following : Patients with

a. Moderate to severe symptoms + high O2 requirements + elevated D-Dimer: a full therapeutic dose of enoxaparin (1mg/kg BID) or Apixaben 5 mg bid were given

b. Mild to moderate symptoms + low o2 requirements: a prophylactic dose of Apixaban was given (2.5mg/bid)

11. Not all STEMI were real stemi. Some were STEMI mimics (about 50%). STEMI mimics STEMI in EKG without any vascular lesion.

12.All COVID patients were discharged with DVT prophylaxis with apixaban 2.5 mg bid for 14 days.

13. Monitoring of electrolytes with a target K> 4, magnesium > 2.0 mg/dl

14. Severe hypokalemia is associated with severe disease. Severe hypokalemia were seen in about 20% of CICU patients who had increased oxygen requirements and on ventilators. Correction of hypokalemia was challenging in some severe patients. Interestingly, improvement of urinary K loss and improvement of hypokalemia were shown associated with improvement of pneumonia and oxygen requirements in some patients.

15. Significant Troponin (10x upper limit of normal) elevation were seen more in moderate and severe patients and ventilated patients suggestive of poor prognostic signs.

16. Tachyarrhythmias especially atrial fibrillation and bradyarrhythmias were common in severe patients (about 16%).

<u>Challenges:</u>

1.STEMI with late presentation

2.Triaging CV patients as some CV symptoms were intermingled with covid symptoms

3.significant numbers of HCW were infected

4.lack of enough supply of PPE. In the beginning of surge, we used N95 for 2 weeks without replacing into new.
5.Ventilated patients did not do well.

Prof. Wadud Chowdhury[7] added that famotidine is beneficial for patients with heart failure.

Prof. Chowdhury Ahsan[6] discussed how hospital administration can ensure proper treatment for all cardiac patients and all COVID-19 patients which can present with myocarditis, MI and different types of cardiac symptoms. Hospital admission should be reduced except for severely ill patients. Patients must be divided into 3 groups under a triage system in the emergency room--

- For COVID-19 suspected patients with mild symptoms, usual care must be provided. And treat at home. Close obs, vitals , pulse oximetry
- For patients with moderate symptoms, admit
- For confirmed COVID-19 patients with severe manifestations, management should be done in the ICU.
- If rapid RT-PCR is not available, then the patients should be divided depending on the exposure history, fever, symptoms, chest x ray, and blood count (lymphopenia).[13]
- After proper assessment and laboratory evaluation if the patient is suspected of being COVID-19 positive, full protection measures must be taken. Dr. Chowdhury Ahsan also opined that STEMI can be true STEMI or STEMI mimics because many patients may have normal coronaries but ST segment changes. They had one COVID-19 patient with hypercoagulable state and thrombosis in coronary arteries.

COVID-19 and CV care:

STEMI and COVID-19 positive : please consider thrombolytics where possible. (this will save the essential PPE's and reduce exposures).

STEMI and COVID-19 suspected: please consider thrombolytics where possible.
Wait for COVID-19 test results may not be possible.
Troponin positive is common and may not type 1 MI.
Thromboembolism reported commonly; Acute PE and Stroke even in the young.
Consider LMWH as a prophylactic dose(1mg/kilo) or therapeutic (1 mg bid in highly suspected cases with D Dimer more than 3000ng/ml.

Resource utilization: Not echo as routine to minimize exposure.

Whether it is type 1 or type 2 MI we need to be very careful as Type 2 can be due to hypoxia related myocardial injury. These cases require more than the usual care. Address the hypoxia, although this can be very difficult. The other one is cytokine related myocardial inflammation and myocardial injury and troponin rise.

We are not doing Echo routinely unless the patient has hypoxia, is proven to have or is suspected of having PE, or the patient is hemodynamically unstable or reason to believe underlying CAD and need to look for Regional Wall Motion abnormalities.

The issue about prolong QTs: Hydroxychloroquine and Azithromycin combination does not work. If we look at the WHO report on Malaria in 2016 the QT prolongation rate and arrhythmia, the incidence was very low but we cannot apply it to COVID-19 patients because Azithromycin increases QTc and Azithromycin also inhibits cyp450 metabolization of Hydroxychloroquine. Therefore, this combination does increase QTc far more commonly than in the WHO Malaria report. Malaria also did not affect the heart while COVID-19 can cause myocarditis and instability of the action potential scenarios, creating an

ideal set up for arrhythmias. For these reasons we are observing the higher number of arrhythmic deaths and complications from the use of Hydroxychloroquine.[1]

Management of COVID-19 Patients with Renal Symptoms

Prof. Ziauddin Ahmed[2]

- It is observed that many chronic dialysis patients were diagnosed COVID-19 positive. So, different sections with different groups of nurses and doctors with proper PPE should be arranged to treat COVID-19 patients and non-COVID-19 patients
- A company named "Mesoblast" started a clinical trial with the application of stem cell therapy in patients with kidney disease. After the therapy, the creatinine level was on average 9, which is remarkably high and requires dialysis. But, it was observed that patients who were treated with immunomodulators before therapy had a gradual decrease of creatinine without dialysis. This signifies that if cytokine can be controlled beforehand, then cytokine-induced acute tubular necrosis of the kidney can be avoided, and this also decreases dialysis requirement massively.
- Possible causes of frequent development of ATN among COVID-19 patients —
    - Possible direct effect of hydroxychloroquine
    - As COVID-19 positive patients develop lung infiltrations, fewer fluids are given to those patients for possibility of developing ARDS , so they become dehydrated, this precipitates ATN
    - Direct cytokines mediated toxicity due to SARS-CoV-2 infection. Autopsy shows tubular cells containing the virus.
    - Clotting is also seen in patients with dialysis despite heparin treatment

Renal support:
Most of the AKIs are prerenal. Fluid is not recommended, if X-ray shows ARDS. But small bolus (250 ml bolus Q6 hr) could be given to clinically dry patients presenting with hypotension. Dialysis can be done in the presence of AKI.

Initial hydration improves creatinine. If ATN or toxic nephropathy develops- mostly dialysis is needed and BUN rises. High volume CRRT is preferable, systemic Heparin is recommended to prevent clotting. Peritoneal dialysis (cycler PD) is better as there is less exposure to the patient.

A separate dialysis unit could be set up for COVID-19 patients.

Dr. Rumi Ahmed Khan shared an event where a patient from New York was on vent and developed kidney failure. His potassium was going up but the hospital had a hemodialysis machine shortage. They put him on peritoneal dialysis, and he died. Peritoneal dialysis is not a good tool to reduce potassium. His potassium level rose to 7.8 and the patient died. So, hemodialysis machine shortages can be fatal.

Management of COVID-19 Patients with GI symptoms

Dr. Basher M. Atiquzzaman[26]
Common GI manifestation: Nausea, anorexia, vomiting, diarrhea.
30-40% cases: Increased LFT, more increased in pre- existing liver disease patients.
Ischemic colitis: Fatality rate increased in comorbid patients, especially in ventilated patients.
Treatment:

Famotidine: used as prophylaxis as it is blocking the ACEI, preferred over PPI. It can be used for all hospitalized patients.

Swab for RT-PCR:

Rectal swab can also be used instead of pharyngeal swab. 24% of patients were found stool positive even after two weeks of getting infected.

Oropharyngeal transmission:

Oropharyngeal transmission has not been proven or established to be the only route of transmission so far.

Dr. Riaz Chowdhury[17] also urged on sewage testing for COVID-19. He suggested the following:
No proof of transmission but the COVID-19 might be secreted through a feco-oral route. So universal precautions should be taken during colonoscopy and rectal procedure.

Proper hand washing and cleaning should be maintained with extra caution after defecation.

Precautions in GI procedures of COVID-19 positive patients. For upper endoscopy, ERCP, EDG: according to the national guideline, N95 masks are highly recommended with proper fitting. Otherwise surgical masks will do.

Management of COVID-19 Patients with Neurological Complications

Dr. Mohammad Islam[23] discussed his experience of treating COVID-19 positive patients presenting with neurological symptoms-

- Physicians should always bear in mind that patients with signs/symptoms of stroke or altered mental status can be a suspected case of COVID-19.
- Most common neurological complication is stroke and without typical symptoms of COVID-19. Patients come with typical stroke symptoms, hemiparesis, brain stem signs – swallowing difficulty, aphasia.
- Management is similar to a normal stroke patient. If the patient comes within 4 hours tPA is given. If the patient comes after 4 hrs aspirin is given due to its anti-inflammatory property. If the patient is COVID-19 positive, LMWH is also given. If there is renal failure or other contraindications, IV heparin is preferred.
- Along with these treatments patients are treated as regular COVID-19 patients.
- Another neurological complication is acute necrotizing hemorrhagic encephalopathy. These patients come with altered mental status. In MRI Bilateral symmetric areas of focal hemorrhaging are observed. These patients are treated with IVIG/ plasmapheresis
- Some patients are coming with encephalitis which is like viral encephalitis with spinal tap showing no organism. For these patients, if COVID-19 positive, symptomatic treatment is given along with LMWH and during discharge factor IXa inhibitor is added.
- Very few patients are coming with typical GBS like features.

Dr. Habibur Rahman added that brain MRI showed an abnormality in all patients (11 out of 11). 3 out of 20 had microvascular thrombosis. A small number of patients had some hemorrhagic lesions in the brain stem.

Dr. Munibur R. Khan[24]**,** Attending Physician of Psychiatry, opined that a patient's clinical status and medication combination should be assessed;

-In case of using antipsychotic drugs like haloperidol, QTC prolongation should be checked. -Mood stabilizer and antidepressant should be an option.
-Lithium level should be checked weekly.
-Clozapine causes side effects like seizure.
-In the case of antidepressants like Citalopram, the dosage should not be more than 20 mg if the patient is more than 60 years.

Management of Pediatric Patients

Dr. Maksood Chowdhury[15], pediatrics attending**,** shares his experience of pediatric COVID-19 patients management--
In NY, around 73 cases were confirmed of having pediatric multi systemic inflammatory syndrome due to cytokine storms.
S/S:

- Non pitting rash all over the body
- systemic vasculitis, mucocutaneous rashes like kawasaki disease, myocarditis, dilated cardiomyopathy,
- chronic hypoxia⟶ increase heart rate⟶ further increase in oxygen demand.

Suggestion:

- Early evaluation should be done to avoid severe complications.

Dr. B.M. Atiquzzaman adds pediatric patients who show skin manifestations at fingers and toes like blisters, aphthous ulcers, etc., they showed quite remarkable results with Famotidine. So it helps to understand that Famotidine starts to work with the ACEi receptor and helps with vascular manifestation.

Plan for Post COVID-19 State

Dr. Sheikh Mahfuzul Hoq[54] explained the principles for this as follows:

Contact isolation, contact finding, transmission interruption, and the disease needs to be treated not in the hospital but outside as much as possible in the community. The risk increases more when the patients come to the hospital. Connecticut State has established different community resources for different vulnerable groups and different communities.

In the ER the patients are separated as COVID-19 positive and negative. As different parts of Connecticut are having different peaks at different times, so resource shifting and focus shifting is important.

<u>How to define new normal and how do we operate in new world</u>

Opening the normal operation before a complete risk assessment and complete planning is going to be a tremendous risk for a second wave during the fall and the next winter.

Three components for opening up any community are:
-Testing.
-Case tracing, case isolation.
-Community participation for restoring confidence.

The timing and the testing can be predicted and worked out with a good planning team and mathematical modeling. We know what the backlogs are, who are the visitors and what are the places that are essential.

Categorize the patients into 4 different categories:
-Elective
-Elective but time sensitive
-Urgent
-Emergent

For any procedural or diagnostic area, the emergent and urgent are the one we need to open first and for the time sensitive (cancer treatment and diagnostic procedures) cases. We must get a wide availability of testing. We also need to understand the antibody test.

Proper Dead Body Handling and Disposal

Dr. Russella Mirza[49] suggested developing a written policy for dead body handling and disposal.
-When a patient dies, the nurse informs doctors and family.
-No visitors are allowed in the hospital.
-All necessary forms are filled out by a nurse.
-A team should be created consisting of nurses and police officers, who will do the processing of the body and transfer it to the morgue. Dead bodies can be temporarily stored in morgue.
-People handling dead bodies should wear PPE as they will be handling dead bodies closely.
-Dead bodies should be put in a body bag. If the body bag is unavailable, put a mask on the dead body. Use disinfectant to wipe the dead body and wrap with 2 cloth sheets.
-Full PPE is not required once the dead body is put inside the body bag. Only masks and gloves can be used.
-Funerals can be done with a small number of people.
-Washing dead bodies should be avoided.
-Training people to efficiently handle dead bodies of COVID-19 patients.
-Room of the patient must be properly cleaned
-5 tablespoon bleach in 1 gallon water - can be used to clean the room. All surfaces should be cleaned. Clothes should be soaked in soap water for 30 mins. As per CDC, risk of cleaning staff is very low.

Chapter 2:
Prevention and Management in Bangladesh

Actions Plan for Strengthening Bangladesh's COVID-19 Response - Summary

The COVID-19 pandemic hit Bangladesh in March 2020. The first known case was reported on March 7, 2020. Infections remained low until the end of March but saw a steep rise in April. So far the most affected areas in Bangladesh are Dhaka, Narayanganj, Gazipur; and the least affected areas are Bogra, Sirajganj, and Joypurhat. Bangladesh is also trying to lower the rate of infection transmission through various measures.

A proposed action plan is as follows:

- **Provide oxygen treatment for all District and Upazila Hospitals**: Send 100,000 Oxygen Concentrators (10 LPM) and accessories to provide effective, prompt treatment.
- **Organize community, home care, and isolation facilities**: Provide a 'home care package' for delivery via media and telephone/SMS guidance and 'community care facilities' with rapid access to health care via COVID-19 outposts telemedicine and oxygen supply.
- **Expand Hospital Capacity** for Covid-19 treatment outside Dhaka by mapping hospitals as Covid-19 response centers and setting up new ones by Army engineering and medical services.
- **Increase the number of healthcare providers** by mobilizing doctors, nurses, medical technologists, new graduates. Provide high-quality PPEs and treatment for their safety.
- **Increase Covid-19 testing significantly to more than 100,000 tests** a day with widespread testing facilities including by the Private Sector. Use both high-quality antigen tests alongside PCR tests.
- **Use data on Covid-19 cases to Model, predict and plan for National, District,** and Upazila level patient treatment needs.
- **Mobilize all available private sector medical capacity for treatment and isolation.**
- **Contract public and private enterprises to manufacture essential supplies**: several million PPEs per month, pulse oximeters, oxygen concentrators, ICU unit equipment, etc. Import raw materials and equipment as needed. These expenditures will stimulate the economy.
- **Review Evaluation effectiveness of Zoning Strategy** by monitoring infection trends. Prepare a back-up plan to go for a lockdown in urban areas, except for essential sectors and services.
- **Double the health sector budget in 2020/21 budget to fight Covid-19** – by using and increasing Tk. 10,000 crore block grant. Use Ministry of Finance technical support and oversight for Budgeting, procurement, accounting, auditing, and implementation.
- **Appoint full time "Incident Commander" reporting directly to the Prime Minister, who will direct and coordinate the Covid-19 response** with the support of the whole administration, experts, private sector, and civil society. Provide regular Risk Advisory Communications and Situation Updates to create trust and confidence in the people.

Status of COVID-19 in Dhaka

Dhaka Medical College and Hospital (DMCH)

Prof. Abul Kalam Azad, DMCH is a large specialized hospital with lots of units and all the possible facilities. Hence, it was designated to manage COVID-19 positive patients. Many COVID-19 patients came to DMCH for treatment from the first week of March, and due to the initial improper planning, many doctors and nurses got infected. Later, the hospital's burn unit, which has 500 beds and a proper ICU facility with uninterrupted high flow oxygen availability, was declared as the "COVID-19 management section".

DMCH declared they will treat both COVID-19 and non COVID-19 patients. All patients come to the emergency department, where a triage system is developed to redirect the patients into 3 different zones based on their COVID-19 infective status.

- Zone 1 for confirmed COVID-19 patients, Zone 2 for suspected COVID-19 patients, and Zone 3 for non COVID-19 patients.
- Arrangement of an isolation ward for suspected COVID-19 patients.
- Ensuring proper treatment facilities for non-COVID-19 patients.
- Providing RT-PCR testing facility by the virology department of DMC

DMCH faced several challenges:

- A limited number of beds.
- Patients from all over Bangladesh are referred to DMCH.
- COVID-19 patients require high oxygen flow. However, it was a challenge for DMCH to have sufficient arrangements to meet the oxygen requirements for a high number of patients.
- Scarcity of proper protective equipment for health care providers.

To address these challenges, the DMCH management arranged some training programs for all the staff. These included:

- How to manage COVID-19 patients.
- How to use and dispose of PPE (Personal Protective Equipment)

DMCH management is trying to gather knowledge from all over the world about COVID-19 management and develop their management planning according to that.

Dr. Syed Tariq Reza[56] adds that DMCH has set up a new ICU, which has 10 beds for COVID-19 patients but these beds are not enough to accommodate the increasing demand.

Prof. Mujibur Rahman[5] mentioned that there is an overwhelming number of patients in the outpatient dept. Patients who come with fever, cough, breathing difficulty, and chest x-ray showing bilateral pneumonia are immediately admitted to the suspected COVID-19 zone. High flow oxygen is given to them and ECG is done to screen out any cardiac complications. He reports a shortage of N95 masks but ensures that other PPE is available. For treatment purposes, hydroxychloroquine is given in low dose if no pulmonary symptom is present along with doxycycline/amoxicillin. He emphasizes that guidelines for when the patients should be transferred to ICU are still unclear.

Prof. Wadud Chowdhury[7] says in his department every doctor receives patients with proper precautions due to the risk of transmission of COVID-19. Physicians first look for chest symptoms, CBC, chest X-ray, and CRP are ordered immediately following ECG and prothrombin time. Patients presenting with MI are managed with thrombolytics and LMWH. Patients and their attendants are provided with masks and safe distance is maintained between two beds. Prof. Chowdhury also shared his concern regarding proper demarcation of green, red and amber zones since common space is shared for physical examination and preparing the documents without any separate entry and exit path to the examination

area. Lack of adequate PPE and proper training on how to use them is causing panic among healthcare workers. Patients with comorbidities who need regular check-ups on blood sugar/BP etc. are facing challenges to meet their needs. He also points out that nursing care has room for improvement in order to meet the required standard. Information is lacking in the lower level of health care workers i.e. ward boys and cleaners. This is especially concerning since they possess a high risk of transmitting the infection to the staff and patients in the hospital. Keeping all the challenges in mind, he concluded with 2 easy but effective recommendations for physicians— sanitize hands every time after physical examination, if possible change gloves and avoid daily physical examination of patients unless necessary.

Bangabandhu Sheikh Mujib Medical University (BSMMU)

Prof. Konok Kanti Barua[1] said that initially the government planned to designate BSMMU as COVID-19 patient management hospital. And different steps were taken. On March 21, an isolated section was designated for COVID-19 patients. Initially, the ability to diagnose COVID-19 was minimal. Later, from April 1, the RT-PCR lab test was started. Then the Government removed BSMMU from the list of COVID-19 management hospitals. But BSMMU continues working via a triage:

- Rapid RT-PCR test and identification of COVID-19 positive patients. Refer them to COVID-19 designated hospital.
- Refer non-COVID-19 patients to indoor departments for proper management.
- Emergency departments of BSMMU, Gynecology, Neuro-medicine, Cardiology, and all other departments are working efficiently to manage patients.

Kuwait-Bangladesh Friendship Government Hospital

Kuwait Bangladesh Friendship Government Hospital is the first COVID-19 treating hospital in Bangladesh. It is a general hospital with 200 beds. All the patients were cleared before preparing this hospital for COVID-19 treatment. The first case was received on 6 February. The hospital received more than 400 COVID-19 patients and some suspected patients also. After the PCR test comes out negative, they discharge the patients. ICU has 26 ventilators, 10 are being used and the other 16 are ready for the treatment of the patients.

As per government rule, all the physicians of the COVID-19 hospital who are under 50 years old should take care of COVID-19 patients, **Dr. Sadia Shajmin Siddiqua**[50] is also taking care of COVID-19 patients despite being a general surgeon. For the last 2 months, she has been engaged in policy making and coordinating the hospital staff and physicians. The hospital is conducting its work by the criteria set by DGHS of health, Bangladesh. They are using the guideline given by The Society of Medicine and DGHS. They used Hydroxychloroquine and Doxycycline. Immunoglobulins were administered to some patients in the ICU, and they were cured. ICU treatment is mostly oxygen therapy. Doctors are trying not to intubate the patients until completely necessary. There are several groups of physicians who are taking care of ICU patients. Sometimes the physicians modulated the treatment plan according to symptoms. Hydration and oxygen therapy were the mainstay of treatments. Until now the death rate of the hospital is 4% and most of the deaths occurred in ICU.

Status of COVID-19 outside Dhaka

Sylhet MAG Osmani Medical College Hospital -- Brigadier General Md. Yunusur Rahman[16] mentioned that proper masks, PPEs and gloves are provided for all physicians in his hospital. All the necessary steps are taken for the protection of the newly appointed intern doctors in his hospitals.

Shaheed Ziaur Rahman Medical College, Bogra -- Prof. Rezaul Karim[11] mentioned that all academic classes and professional examinations are being suspended until further notice, online classes are being held to maintain the flow. Cases are kept in control by isolating COVID-19 hospitals from non COVID-19 hospitals. In addition, a RT-PCR lab has started up in his hospital.

Rajshahi Medical College Hospital -- Dr. Abu Sahin[34] expressed concerns regarding limited resources in his hospital. A triage could not be developed at his hospital. Proper masks and O_2 facilities are not available.

Dinajpur Medical College Hospital -- Prof. Zakir Hossain[10], currently there are 4 RT-PCR machines outside Dhaka—2 in Rajshahi and 2 in Rangpur division. The Bangladesh government has promised to establish more than 20 labs across the country. Critical patients are admitted into hospitals less frequently than before due to social stigmatization, fear of identity revealing, social isolation and risk of acquiring more infections from the hospital stay.

Rohingya population -- Dr. Iftikhar Mahmood[29], shared insight on COVID-19 management among Rohingya people in Cox's Bazar.

- Strict lockdown is applied in Cox's Bazar now.
- No one is affected among 10,00,000 Rohingya people residing in the camp so far due to strict restriction policy.
- A 50-bed hospital is available now for women, 50 more beds are expected to be made soon.
- No testing facility available.
- Medication: No specific guidelines are fixed yet. Chloroquine, hydroxychloroquine, and azithromycin are under consideration.
- Negative pressure environment: not applicable here due to the fragile infrastructure of the camp.
- Referral to tertiary hospitals becomes harder now due to strict lockdown and fear of further transmission.
- Misinformation and fear has prevented the recruitment of qualified health care professionals.
- There is a lot of social stigmatization.

Status of healthcare workers in Bangladesh

Prof. Robed Amin[9] **and other physicians** mentioned that currently, 900+ physicians are affected by COVID-19 in Bangladesh and the number is growing. All healthcare workers in the country are following the "7 days duty, 14 days quarantine" rule.[41] Fear and anxiety are frequently observed among physicians and nurses.

Prof. Sardar A. Nayeem[8] expressed his concern regarding doctors and health workers being more infected in Non-COVID-19 hospitals. As they have no facility to test the patients.

Dr. Mohammad Basith[42] shared that he got infected after working for 2 weeks with COVID-19 positive patients. He had mild fever and body aches. He stayed separated from the rest of the family for 14 days. He also used a separate bathroom and utensils. After being fever free for 3 days, he went back to work.

Strengths and challenges of Bangladesh's battle against COVID-19

Dr. Mushtaq Mahmood Titas[43] discussed some strengths and weaknesses of Bangladesh's battle against COVID-19.

Strengths:

- Highly experienced clinicians
- Not much political pressure
- Due to frequent mutations, the strain now might be weaker. Compared to other places, it might be affecting fewer people in Bangladesh
- The innate immunity is better in the Bangladeshi population than many other countries
- The health sectors are spread out at the root level, so a larger portion of the population can be reached.
- Due to high heat in Bangladesh, fomites might survive less

Challenges:

- Dense population
- Lack of resources
- Confusion in policymaking
- Not enough awareness among the mass population[33]

COVID-19 management plan followed by physicians in Bangladesh

Prof. Robed Amin, gave definitions and management of 3 types of cases as follows:

Mild: Influenza-like symptoms, telemedicine is recommended.

Moderate: Pneumonia develops at this phase, confirmed by chest X-Ray. Patients should come to the hospital.

Severe: Respiratory rate >30/min and shortness of breath; the patient should be admitted to ICU with appropriate O_2 support.

Prof. Mujibur Rahman, initially the COVID-19 management system was chaotic. The central command was unable to properly command and manage the workforce, making everyone confused about how they should deal with COVID-19 patients. There were some reasons behind the failure of proper management:

- At first, hospitals failed to divide patients under triage policy (COVID-19 patient, suspected patient, non-COVID-19 patient).
- Patients came to hospitals late when their oxygen saturation was below 80%. High flow oxygen cannot increase more than 10%, so the mortality rate increased.
- Due to social stigma, patients hide their exposure history and symptoms; and they come to the hospital too late and die.

Current management plan:

- Mild cases: No hospital admission. Patients should be managed at home.
- Moderate cases: Patients with shortness of breath and pneumonia must be admitted into the hospital.
- Severe and critical patients: Admission into ICU.

Treatment:

- High flow oxygen should be given to patients.
- Symptoms of COVID-19 induced pneumonia and community-acquired pneumonia are similar, and without lab results, they cannot be distinguished. In the meantime, antibiotics can be administered while the COVID-19 test result is pending.

- Hydroxychloroquine and Azithromycin combination are in the general guideline and are administered with caution for patients with moderate symptoms. Hydroxychloroquine is forbidden in -
    - Elderly patients with cardiac comorbidity.
    - If patients have prolonged QT intervals.
- Remdesivir is recognized as an emergency drug for critical COVID-19 patients. As it is expensive and given in IV route, it must be applied to only severely ill patients.

Prof. Dr. Robed Amin, for the majority of the people in Bangladesh, appropriate isolation at home is challenging. So, physicians are following the discharge criteria in 2 ways based on the availability of COVID-19 testing facility.

- If a testing facility is available, one single negative test is enough for discharge.
- If a testing facility is not available then meeting any of the following criteria is enough to discharge the patient --
    - 3 days after fever subsides
    - No symptoms
    - Improvement in chest X ray findings
    - 14 days from the first appearance of symptoms[41]

Follow up:
Although follow-up is essential for COVID-19 patients since they can develop cytokine storms 14 days later, there are not enough facilities for patient follow-up in Bangladesh.

Dr. Tasbirul Islam emphasized that a total of between 1100 to 1300 ICU beds are available in Bangladesh, and 80% of them are in Dhaka. There are only 500-700 functioning ventilators, and around 80% of them are also in Dhaka. 80% of the ICU's and ventilators are owned by the private sectors. Furthermore, there are only 5000 total hospitals, 100 of which have ICU facilities. Due to the lack of resources it is imperative that both the private and government sectors work together.
Chinese data: 5% may need ICU care
Italian data: 15% may need ICU care
US: 12% may need ICU care.

ICU patient:
CBC, CRP, LFT, electrolytes could be done daily or every alternate day. If rising CRP, D-dimer or lymphopenia is exhibited, steroid or tocilizumab should be used aggressively.
Fluid input and output- keep the patient dry/negative balance.
VTE prophylaxis- Full anticoagulation in ICU patients.

Non-ICU patient:
DVT prophylaxis: enoxaparin 30 mg BID; in obese patient (BMI> 40): 40 mg BID (patient should be monitored due to the risk for DIC).
Caution: Blood sugar has to be checked from the whole blood, not from fingerpick to avoid false high results. Doctors might give insulin, which may cause hypoglycemia.

Nutrition:
Those who are on tube feeding or on Pressors - should be on NPO. For those who are hemodynamically unstable, on Pressors, or who have unstable respiratory status - are not recommended to go for a full nutrition goal.
Small bowel feeding is not recommended in shock patients (risk of nonocclusive bowel necrosis & perforation), it is better to avoid small bowel feeding in hemodynamically unstable patients.

COVID-19 testing facilities in Bangladesh

Prof. Robed Amin said that there are 28 hospitals with testing facilities in Bangladesh. But RT-PCR machines are also available in many universities in the country. He underscores the importance of approaching them to ensure proper testing facilities for the mass people.
Prof. Dr. Mujibur Rahman ensures that Dhaka University is going to participate in testing COVID-19 very soon and many private or autonomous universities are also stepping up.

Dr. Raihan Rabbani[46] shared his experience regarding COVID-19 testing in Bangladesh. At first the patient with symptoms of COVID-19 was refused admission. They also could not get admitted to a hospital dedicated for COVID-19 as the diagnosis for COVID-19 was not confirmed.

Possible solution: patients with COVID-19 symptoms can be admitted and isolated into separate cabins. COVID-19 sample is taken during admission. The Government gave permission to do RT-PCR only for admitted patients. Not for outdoor patients. Private sector was not included in the planning for COVID-19 in the beginning.

Role of private hospitals

Dr. Sarder A. Nayem, discussed that private hospitals provide 60-70% medical support in Bangladesh and they are eager and willing to provide all kinds of medical support to the COVID-19 patients. However, there are certain instructions from the government which are not allowing them to do so. (According to National Guideline of Bangladesh: page 6, no 5: “All suspected, confirmed and probable COVID-19 cases will be managed according to the severity in designated COVID-19 hospitals.”)

Role of BRAC

Asif Saleh[20] discussed the role of BRAC in managing the pandemic in the country at the community level. Due to scarcity of RT-PCR labs outside Dhaka, it takes 6 days to collect samples and to get results from outside Dhaka. So, BRAC has taken some steps after planning with DGHS to help the process of sample collection by setting up some Kerala style kiosks for the short term where samples will be collected. These booths will be set up in 19 hot spot districts where COVID-19 outbreak has occurred. They have planned to add the following measures:

- Establishment of a community clinic-based support team in each union that will include 1 community clinic worker, 1 volunteer doctor, and 1 BRAC worker. Their job will be the following:
    - Receive calls from the IEDCR COVID-19 virus hotline.
    - Identify the highly suspected cases and arrange testing for them.
    - Trace contacts when COVID-19 is confirmed.
- Due to lack of awareness and social stigma, most people outside Dhaka, tend to hide that they have symptoms of COVID-19. So, BRAC is going to collect samples outside Dhaka from suspected cases and provide food to people under lockdown. This will help keep the lockdown in place.
    - BRAC is working on creating mass awareness by arranging campaigns. Approximately, 1 lakh of field workers have visited 50 lakhs of households to make people aware about handwashing and social distancing.

Chapter 3:
Recommendations for Bangladesh

Proper use of PPE

Prof. Ayesha Sikder highlighted information regarding proper use of PPE. Proper use of PPE and understanding the extent of exposure gives confidence and reduces psychological stress among healthcare personnel.

Masks are the most important part of PPE's and they should either be surgical/N-95/KN-95 masks. Other important parts of PPE's are gloves, face shield, gown, head cover or full PPE. Face, nose, mouth & eyes need to be protected according to the extent of exposure (High, Medium, Low).

High exposure when in contact with patients on high flow oxygen, non-invasive ventilators, bronchoscopy, nebulizer treatment requires full PPE.

For medium exposure N-95 mask, face shield, regular gown, gloves are enough, full body PPE is not required.

Low risk (clinical round or brief physical encounter with patient) face shield & surgical mask are enough. Also, change gloves and wash hands every time you touch someone.

Dr. Muhammad Shames Tabriz discussed the misconception that the infections among health care workers are becoming attributed to only a lack of N95 masks when there are also other factors such as contact transmission from hands, doorknobs, phones, surfaces, fomites and droplets, which are being wrongfully overlooked. Putting emphasis on direct and indirect contact prevention can stop the spread of the infection from other healthcare workers (e.g.- cleaners) to doctors.

Dr. Rumi Ahmed Khan discussed proper methods for using masks and other PPEs:

- N95 masks in the US, KN95 in China, and FFP2 in Italy: all are similar types.
- Should be worn from the outside, never touch the inside.
- Should be fitted airtight.
- Push the metal part tight enough. If eyeglasses are not becoming cloudy, then the masks are working fine. Otherwise it is not fitted.
- Buso cap is needed only when you are in an aerosol generated procedure.
- Eyeglasses and face shield should be cleaned after every use.
- Gown should be rolled inside out and gloves should be removed at the same time and then should be discarded.
- Masks can be reused as there is a study showing that the masks don't lose their integrity after washing.
- In USA N95 masks are being reused after disinfecting with Hydrogen Peroxide vapor. Eye shields could be reused by washing them with soap because soap is the best killer of viruses.
- Surgical gowns can be kept beside the patient and discarded in a bucket of soap after handling the patient. At the end of the day those gowns could be washed and reused.

Dr. Adiba Geeti, PPE use should depend on viral load e.g. in ICU full PPE with N95 mask should be used but in outpatient where viral load is low only barrier precaution is needed (mask is more important).

Doffing:

Inside room- gloves, gown
Outside room- face shield, masks or all in anteroom
Wipe all equipment with disinfectant- stethoscope, watch, glasses, etc.

Use a checklist.
Have a doffing buddy.
Staff may choose to change scrubs.
Take a moment to debrief and review.

Prof. Ziauddin Ahmed added that reusable PPE's made from cotton, cotton/polyester or mixed cotton and polyester could be used. Even used PPEs from COVID-19 patients could be washed with soap and then reused.

Dr. Russella Mirza suggested that N95 masks should be used only when dealing with COVID-19 positive patients. As PPEs are scarce, handmade masks(masks using cotton or t-shirt material) can be used. These masks are used continuously and should never be touched in the front. Hand sanitizer should be used frequently.

Prof. Wadud Chowdhury expressed his concern for ECG technicians, cath lab technicians, and nurses who are at risk of getting infected. Safety must be maintained for everyone on the healthcare team. Proper doffing and donning of PPE and proper disposal is vital. Otherwise, healthcare workers will get infected from fomites. He also put focus on not having enough staff to support severely ill patients. He recommended not to use a fan to prevent the spread of the virus. Social stigma also must be addressed.

Prof. Mujibur Rahman explained the misconception about PPE. It is not mandatory to wear a whole body PPE; N95 masks and surgical gowns can be used for protection.

Dr. Syed Tariq Reza
Use of Clinical criteria for diagnosis.
Use of biohazard bags to discard PPE.
Avoid disposing PPE incorrectly.
He also recommended that a clinical diagnostic criteria should be developed for COVID-19 diagnoses because test results take time. It will improve the level of care.

Dr. Shams Tabriz discussed infection prevention and control measures as follows:
Intervene at 3 levels:

- At patient and visitor level.
- At healthcare facility level.
- At healthcare provider level.

Gown and gloves should be discarded in a bin inside the ward before coming out.
Re-washable gowns can also be used.
Surfaces should be cleaned with 70% alcohol.
Waste management:

Hospitals should have separate units for proper disposal.
Outsourcing can also be done for waste management.

Waste can be disposed of by 3 methods:

Incineration
Autoclave
Pit with lining and covering

It is uncertain what effect ceiling fans have on viral transmission, however it might be reasonable to keep ceiling fans off during rounds to reduce the risk of air-borne infections.

Exhaust fans can be used to create semi-negative pressure.
Negative pressure wards are ideal to treat COVID-19 patients.

Dr. Naseer Khan[37] added that Transesophageal echocardiograms are done using N95 masks, face shields, gloves and disposable surgical gowns. Reusable surgical gowns can be soaked in soap water for 20-30 mins to kill the virus.

Dr. Md. Samiul Huda[40] shared the instructions from ICDDR,B and the limitations - 8 feet pit should be created. PPE should be disposed of inside a biohazard bag and then burned with kerosene. Then it should be covered with soil and then a 3 feet cordon should be made for each biohazard bag. This guideline is not feasible for rural areas because cleaners are not paid properly.

Medication of Choice for COVID-19 patients

Dr. Tasbirul Islam laid out some key management points for COVID-19 patients--

- Ensure plenty of oxygen, paracetamol, antibiotics, I/V fluids, pulse oximeters are present.
- Steroid is only reserved for severe patients like ARDS, Septic shock, Cytokine release syndrome – rapid increase in CRP, LDH, D dimer and in patients whose chest X ray is getting worse or requires more oxygen.
- Do not give steroids to patients with mild symptoms. In fact, steroids may have the opposite effect on these patients.

COVID-19 patients are said to have "Happy Hypoxia" as their symptoms are disproportionate to their hypoxic status. It is not like other lung parenchymal diseases. Within this aspect, pulse oximeters can play an enormous role in finding the clinical condition of a COVID-19 patient.

Dr. Raihan Rabbani[46] opined that Dexamethasone and Methylprednisolone can be comparable in effect. Dexamethasone possibly has better activity. Viral replication occurs mostly within 1 week of symptom onset. Most symptoms which appear later are due to inflammatory changes.

Dr. M. Alam[22] said that on 19th March 2020, 17 new infected patients were admitted and 4 patients were transferred to ICU and treated with Doxycycline and Hydroxychloroquine. Among 50 patients, 9 of them were referred to the hospital from a nursing home, 3 of them died and 45 patients were improved. Bangladeshi treatment protocol should include Doxycycline and Hydroxychloroquine for COVID-19 patients. These combinations do not do much damage and only few patients faced QT interval prolongation.

Mixed opinion about hydroxychloroquine, ivermectin, famotidine, steroid, anticoagulant

Prof. Wadud Chowdhury, said that hydroxychloroquine/Ivermectin should not be used in patients with hypoxia, cardiac condition; it will rather worsen the condition. He shared the results of a study supporting his statement—"proven result of use of ivermectin in a study which was done among 1400 patients from 169 hospitals; 150 ug/kg single dose resulted in a 7.3% death rate vs 21.3% without the medicine" and with ventilation. Overall death rate is 1.4% to 8.5%. Another study claims that the dose needed for treating COVID-19 should be much higher than 200ug/kg. Accidental use of Ivermectin in pregnant women was proven to be safe with minimal side-effects."

Dr. Md. Zaman advised that since currently, there are no proven antiviral treatment options available for COVID-19 we can keep hydroxychloroquine in our guidelines. Early use of this drug may have some benefits since it makes it harder for COVID-19 virus to bind to the Angiotensin II receptors when entering cells, especially before any pulmonary manifestation appears. Once pulmonary manifestation has developed, published reports show no benefit of using hydroxychloroquine. If respiratory distress

starts the drug should be stopped immediately, since several reports point to higher rates of intubation and death in patients who were taking it. Similarly, Ivermectin can be used early in COVID-19 infections, although it's benefits are not yet proven. He strongly preferred the use of doxycycline with Hydroxychloroquine over azithromycin, if antibacterial coverage is required.

In Bangladesh if a rapid diagnostic test is unavailable, hydroxychloroquine or Ivermectin can be administered in those cases. If bacterial infection is suspected then doxycycline or Azithromycin can be used, but avoid Azithromycin with Hydroxychloroquine. On usage of remdesivir he adds, it is an IV drug. It has a specific antiviral effect and can be used in a severely ill patient just before intubation when blood oxygen saturation is below 94%. It cannot be considered for outpatient treatment. In Bangladesh, its usage is extremely limited.

Dr. Riaz Chowdhury and Dr. Rafique Ahmed supported that hydroxychloroquine should only be used in investigation settings. Dr. Rafique Ahmed explains the causes of high incidence of arrhythmia when hydroxychloroquine is used among COVID-19 patients at a higher dose and concurrent use of azithromycin.

Dr. A. Nasser Khan suggested that long term protocols are needed for the 2nd and 3rd wave and the COVID-19 and non-COVID-19 hospital distinctions should be abandoned. Hydroxychloroquine should not be used as prophylaxis. For Bangladeshi patients, medicine for heart failure or angina should be adjusted with a proper dose to keep patients away from hospitals.

Dr. Riaz Chowdhury[17] supported use of famotidine in COVID-19 patients as he presented results from several recent and ongoing studies--

- Northwest University started a trial on Famotidine. It was based on a study done in Wuhan, China, which showed that Famotidine resulted in the largest statistical significant increase in survival rate compared to any other PPI (e.g., omeprazole) used in ICU patients. The result led the university to study Famotidine, and they found that it binds with some receptors of Sars-Cov-2 virus membrane.
- Northwell University in NY published a paper. In that study, they gave IV Famotidine (much cheaper than other PPI) and omeprazole in 187 people. Famotidine was used at a higher dose (7 times than usual). Out of the cohort, 40% of people have been saved. The mortality rate in the famotidine group is 14%, compared to 27% in the other PPI group. After concluding this study, they are now enrolling 200 more people, and the study is ongoing.

The study results might help us to think about using Famotidine in Bangladesh. He also states, for patients with ventilation, we can use famotidine more than IV pantoprazole as it is safer, cheaper, and has better efficacy than most expensive drugs.

Dr. Habibur Rahman[14] explained the pathophysiology:

Virus involving the endothelial cells → releasing subendothelial cells and releasing tissue factors. Thus, promoting coagulation. Cytokines and IL-6 also cause tissue injury and thrombogenesis. Steroid will lower the level of Interferon gamma, cytokines, IL-1. IL-6. So, steroids will be very helpful. Microthrombi can also be found in lungs. For which, steroids will be useful.

If a patient has hypoxemia- steroids should be started.

If a patient has ARDS- Anakinra or anti-inflammatory drugs can also be used as support.

Anticoagulants should be used. Very low risk of bleeding.

After the patient expires, the ventilator should be stopped to prevent aerosolization.

Diagnostic protocols for COVID-19 patients

Dr. Shams Tabriz[28]

PCR Test: Nasopharyngeal swab should be done preferably. There are 2 types of PCR. One is a rapid test and another test is a regular lab test. The rapid test is used for patients who need emergent surgery.

Antibody test: It is time consuming. Clinically detectable IgM may not be achieved until 7 days. So, the patient may have the disease, but the test is negative. For IgG the time can be more than 2 weeks and sometimes up to 3-4 weeks. Several factors can affect this antibody test such as old age, immunodeficiency, cancer or immunosuppressive therapy. Those patients may not mount enough antibodies and the test can be false negative. This is a concern. False positivity is also a concern. Specificity is very high for ELISA tests, but those are not validated.

Antigen test: Depending on timeline and severity of illness the antigen can be positive or negative.

Update on Antigen test: FDA has approved an Antigen test from nasopharyngeal/nasal swab under EUA on May 8. CDC also now included the Antigen test as a direct viral test since May. Antigen tests on samples from nasopharyngeal swabs could be considered in resource limited countries, but locally developed tests need to be validated.

In small centers where testing is not possible, management should consider the following:

- Look at the clinical pictures.
- Look for any COVID-19 case in the community.
- Focused tests such as chest X-ray and CBC. In CBC look for lymphopenia.
- If these 3 components are present, then the case should be considered as COVID-19 positive, unless proven otherwise.
- Pretest probability is important when conducting any test. So, all types of cases should be considered in the context of the clinical pictures. Some cases should be diagnosed based on clinical presentation unless proven otherwise.

Strategies and policies for reducing impact of COVID-19

Dr. Adiba Geeti[30] suggested some policy changes in Bangladesh —

Physicians, non-physicians, nurses, technicians, pharmacists, infection control specialists, lab personnel, IT specialists should form a team and a team leader should brief about the current updates every day.

Small and big hospitals even in Upazila should divide COVID-19 and Non COVID-19 in ER based on sign /symptoms and have COVID-19 and non COVID-19 wings in inpatient.

PPE use should depend on viral load like in ICU full PPE with N95 mask should be used but in outpatient where viral load is low only barrier precaution is needed (mask is more important).

Spreading this message in Govt and Non govt level is important. Making advertisements in a culturally competent way (e.g.-songs) to create awareness about what is dangerous and what isn't, so the news reaches everyone, even in villages.

Facebook is a good way of spreading awareness and conveying information but we should be careful.

Think about the future projection and create a leadership who will take responsibility and plan accordingly in administration level.

Dr. Naquib Uddin[44] emphasized strengthening the public health system with examples --

There are safety officers in the USA (i.e. Johns Hopkins University) who are monitoring the donning and doffing of the health care providers.

Social stigmatization should be removed with renowned faces like artists, politicians, leaders should come forward and can make some videos raising social awareness.

A permanent panel should be established not only for the emergency situations but also for all kinds of national problems.

Leaders should be more careful while delivering information as misinformation might spread rapidly and will create further confusion.

Dr. Rumi Ahmed Khan suggested the following:

Every hospital should be a COVID-19 hospital in Bangladesh.

There should be some COVID-19 free specialized hospitals such as cancer hospitals, kidney hospitals.

Every UHC must have a COVID-19 unit.

Don't only focus on Hydroxychloroquine or other antibiotics rather than focus on proper O_2 facilities.

Planning should be done to build more Negative Pressure Rooms.

He discouraged the protocol of "7 days duty, 14days quarantine" theory because the number of active workers is becoming less in the field.

Dr. Muhammad Zaman suggested the following for field hospitals:

1. Initial Evaluation:

-Physical exam with emphasis on vital signs, skin, and oral cavity.

-O2 saturation (most important admission criteria O2 Saturation < 94% in room air).

2. Isolation:

-Private room or cohort patients in larger rooms.

-Keep windows open.

-Fan blowing towards the windows

3. Work up:

a. All cases: (if available)

-COVID test (Nasopharyngeal PCR or comparable test)

-CBC with differential (Low lymphocyte <1000, neutrophil to lymphocyte ratio >3.5, and low eosinophil <100, highly suggestive of COVID)

-Basic metabolic panel (Na, K CO2, etc), liver function

-chest X ray

b. In higher level hospitals: Ferritin or CRP, d-Dimer, procalcitonin.

4. Oxygen support based on availability, rotate patient's position (more time on prone position); every effort should be made to avoid intubation

5. Experimental treatment of COVID-19: started as soon as possible in symptomatic patients:

A. Ivermectin 18 mg if weight over 60 kg, 12 mg if weight less than 60 kg (single dose, a second dose may be repeated on day 2-3) plus [doxycycline 100 mg twice a day X 7 days or Azithromycin 500 mg on day 1, then 250 mg from day 2-5].

OR

Hydroxychloroquine 400 mg oral twice day on day 1 (BID), then 200 mg oral BID for 4 days (total of 5 days) plus Doxycycline as above (avoid Azithromycin with Hydroxychloroquine)

OR

Favipiravir/Remdesivir: if available

B. Famotidine 40-80 mg oral daily

C. Anti-inflammatory therapy: (if available): Atorvastatin 40 mg daily, Vitamin C 1000 mg daily, Zinc 25 mg daily, Vitamin-D 2000-5000 Units daily

D. Dexamethasone:

-Must be avoided in the first 3-5 days of symptoms onset.

-Once patient has respiratory symptoms, oxygen less than 94% on supplemental oxygen and/or abnormal chest X Ray: start 10 mg daily x 7 days

E. Anticoagulation in higher level hospitals: For patients who is maintaining O2 saturation <94% on supplemental O2, or on mechanical ventilation, or elevated D dimer > 1000: Initiate anticoagulation with Enoxaparin 1 mg/kg subcutaneously q12 hrs if no contraindication; alternative anticoagulation if renal

function impaired.

F. Convalescent Plasma in higher level hospitals: criteria to start similar to dexamethasone, but can be given earlier than dexamethasone.

6. Discharge: If stable for discharge (O_2 sat >94% RA, vitals) may be discharged home to self-isolate; and advise (as much as possible) to stay home, use mask, keep 6 feet distance from other family members, sleep in separate room, use separate bathroom, do not share utensils, frequent hand washing.

Building a negative pressure room

Many panelists suggested from their experience that the scarcity of negative pressure rooms in Bangladesh can be overcome by building temporary negative pressure facilities. The best way to build a negative pressure room is to make a tent—all it needs is an inflow and outflow. It is a closed space where the air is changed 6 times per minute. Air should leave the space through a filter. It can be achieved by joining the HEPA filter with a normal system.

Dr. Rumi Ahmed Khan, a viral filter will work. The exhaust air needs to go out through the filter, which can trap the virus from the air.

Dr. Yusufal Mamoon[41] Bangladesh is now converting their spacious buildings e.g. Jamuna Convention Center, into hospitals for COVID-19 positive patients. These vast areas can be converted into a negative pressure area.

Dr. B.M. Atiquzzaman[26] described a negative pressure room from his local hospital. They have made 2 tents. There is one entrance through the 1st tent, and the 2nd one is used for COVID-19 suspected patients with negative pressure facilities with a strong plastic cover. They put one fan in one wall, which passes air out . Another fan is placed on the opposite wall, which passes air in to out. They used industrial fans for the purpose. He also suggests empty spaces e.g. rooftops in Bangladesh can be used for the purpose of building enough negative pressure rooms for COVID-19 patients.

Chapter 4: Q & A

Q. How is severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) most commonly transmitted?

A. SARS-CoV-2 is most commonly spread via respiratory droplets (eg, from coughing, sneezing, shouting) during face-to-face exposure or by surface contamination.

Q. What are the most common symptoms of COVID-19?

A. The 3 most common symptoms are fever, cough, and shortness of breath. Additional symptoms include weakness, fatigue, nausea, vomiting, diarrhea, changes to taste and smell.

Q. How is the diagnosis made?

A. Diagnosis of COVID-19 is typically made by polymerase chain reaction testing of a nasopharyngeal swab. However, given the possibility of false-negative test results, clinical, laboratory, and imaging findings may also be used to make a presumptive diagnosis for individuals for whom there is a high index of clinical suspicion of infection.

Q. Who needs a N95 mask?

A. Dr. Rumi Ahmed Khan: those with close contact with positive patients should wear N95 masks. Every patient should be made to wear a mask - it prevents droplets flying in the air. In non-high-risk situations, surgical masks can be used.

Dr. Ahmed Morshed: healthcare workers using surgical masks were affected because of asymptomatic patients. He recommended that all patients should be assumed COVID-19 positive, and healthcare workers handling these patients should wear N95 masks. Possible air leaks should be checked from the sides of the masks. N95 masks could be reused up to 2 weeks. Protection is a must above the neck such as with N95, face shield, and surgical mask. Ancillary staff should also be given proper protection above the neck.

Prof. Dr. Chowdhury Ahsan: N95 mask filters 95% of any particle over 0.3 micron; whereas, surgical mask filters 80% of any particle, and cloth mask filters 25-30% of any particle.

Q. A COVID-19 positive doctor, came from Khulna to Dhaka with dyspnea and got admitted to Mugda Medical College & Hospital. He also complained of hematochezia. The patient was on steroids. According to the hospital protocol anticoagulant was prescribed. Nothing significant was found on colonoscopy. Is there any association of hematochezia in COVID-19? - Prof. Robed Amin

A. Gastrointestinal manifestation is a common finding in COVID-19. A survey in Italy found that a small number of people develop small intestinal manifestations, but the mechanism of action is unclear. A study was done with 7 cases. Post mortem of 3 of those cases showed:

· All of them went to hypovolemic shock due to bleeding.

· All of them were started on anticoagulants and eventually it was stopped.

· Small intestinal manifestations are common due to their high propensity of ACE receptors. In some areas, edema, and microinfarction and small vessel vasculitis was found.

· All these lead to small intestinal ischemia, and it mainly happened in the first part of jejunum.

· Some patients also developed ischemic colitis. D/D of the patient's hematochezia could be – ischemic colitis or bleeding from the first part of jejunum.

Advice (Dr. B. M. Atiquzzaman):

· Avoid anticoagulants to any patient who develops hematochezia or hematemesis.

· Every patient with gastrointestinal manifestation should start Famotidine as a first line medication. A study in Wuhan, China, shows that patients with digestive system abnormalities and hematochezia were given Famotidine. Famotidine binds with ACE and causes significant reduction in small vessel vasculitis.

Q. On March 8th, the first case of COVID-19 was detected in Dhaka Medical College and Hospital. A family visiting from Italy tested positive for COVID-19 was admitted to Kuwait-Moitri Hospital. After 2 consecutive negative samples they were discharged from the hospital and they visited their home in Shibchar, Madaripur. After 3 weeks all of them were tested positive for COVID-19 by IEDCR. Their parents also tested positive with mild symptoms. They were asymptomatic and were admitted to Madaripur hospital. How to explain this recurrent condition? - Prof. Robed Amin

A. PCR is an amplification test, It can't differentiate the viability of the virus. Cultures are needed to see the viability of the virus.

Viral shedding can be different in different regions of the body. Initially, it is very high in the nasopharynx, but as the disease progresses with lower respiratory tract infections, viral shedding is found more in the lower respiratory tract. PCR can't predict the infectious and non-infectious status. In some cases RT-PCR came back positive several weeks after being negative. It was probably not due to the viable virus but rather due to some intermittent shedding of old virus, which PCR test showed as positive.The cytopathic effect of the virus probably continues for about a week and after that it is primarily the host's immune response that causes the damage. That's why any antiviral is preferred within the 1st few days. Study from South Korea on patients who tested positive after becoming negative proved not to be reinfection as the virus could not be cultured and deemed to be renting nonviable virus from initial infection.

Although Hydroxychloroquine and Ivermectin are widely used, both have many adverse effects. Ivermectin was used in an in-vitro study in Australia, which decreased the viral load 5000 fold. But the doses were 35 times higher than the therapeutic dose.The therapeutic dose of Ivermectin is not useful for the cytopathic effect of the virus.The study was done on animals, and concluded that achieving this high concentration of medicine is not possible in human trials.

Hydroxychloroquine can cause grand mal seizure and torsades de pointes. So, more focus should be given on supportive care and adequate oxygen therapy. (Dr. Md. Tabriz)

German scientist Christian Drosten said that he could never culture a viable virus 7 days after infection. Viral culture is the gold standard test for infectivity. Live virus is infective, not viral RNA. (Dr. Rumi Ahmed Khan)

The highest duration of COVID-19 positivity is 41 days till date. There are two theories to explain 3 consecutive positive tests results. Second test was probably reported wrong. If the second test is correct, and the third one is positive as well, it is probably due to a dead virus; the patient is not infectious. But if a patient persistently remains positive, then s/he should be considered as infectious. (Dr. Tasbirul Islam)

Q. What are the criteria to discharge the patients? Are PCR and nasopharyngeal swabs required to discharge the patients? - Prof. Mujibur Rahman

A. Clinically asymptomatic and oxygen saturation in room air (SaO2) >94% is enough criteria for discharging the patient. (Dr. Md. Zaman)

Q. What should be the advice after discharging the patient as virus shedding continues for more than 2 weeks? - Prof. Dr. Mujibur Rahman

A. Using masks at home is protective. (Dr. Md. Zaman)

Q. Due to the scarcity of ICU facilities,ventilators and inadequate expertise, can CPAP, biPAP and non-invasive ventilation be used by combining the concept of bubble up method in place of ventilators? - Prof. Robed Amin

A. Including CPAP & BiPAP, all non- invasive ventilations are considered as aerosol-generating procedures. That's why, negative pressure rooms are used in the US. But in Bangladesh, as those facilities are not widely available, try to focus on increasing the high flow oxygen machine. With that, 60-70 L/min oxygen can be delivered. It is not an aerosol-generating process, and the PEEP facility is available after each 10L of oxygen. If high flow oxygen doesn't work, then go for BiPAP, CPAP. Try to do it in a single room with an open window. But precautions must be taken by every healthcare professional with a proper N95 mask and PPE. (Dr. Tasbirul Islam)

Q. Can oxygen generators be used in Upazila Health Complexes where there is a scarcity of oxygen cylinders? - Prof. Wadud Chowdhury

A. Use an oxygen concentrator. An oxygen concentrator is a machine that takes oxygen from the air, and there is no fear of running out of oxygen. It can deliver 6-7 L/min oxygen and can run where the facility has electricity. Purchasing pulse oximeters in a large amount is highly recommended. It is very helpful in diagnosing patients with silent hypoxia.

In Bangladesh, High Flow O_2 price: 5 lakh TK

O_2 concentrator 5L price: 60,000 TK, 9L price: 85,000 TK

(Dr. Tasbirul Islam)

Q. What should be the protocol to treat both COVID-19 and non-COVID-19 patients in the same hospital?

A. It has been observed that many patients during admission are found to be COVID-19 negative but after a few days of treatment, they are found to be COVID-19 positive, and thus many healthcare providers are affected by them. This scenario is also observed in dialysis patients. So, hospitals should not be designated as COVID-19 or non-COVID-19. All hospitals should follow protocols to treat both COVID-19 and non-COVID-19 patients. (Prof. Konok Kanti Barua)

Q. How the resources of private hospitals can be used for the pandemic?

A. As COVID-19 is a pandemic all health resources need to be utilized to better deal with it. The government should take proper steps to assign all private hospitals along with government hospitals to deal with this crisis. (Prof. Konok Kanti Barua)

All hospitals should take on all types of patients. It is unethical to delay a critical patient's treatment while waiting for the test results. If all the hospitals come forward and treat all types of patients, then we can expect that the mortality rate will go down, and the troubles for the patients will be minimized. To treat COVID-19 and non-COVID-19 patients in the same hospital, availability and usage of proper PPE must be ensured. (Prof. Abul Kalam Azad)

Q. Can pulse oximetry play a role in identifying the actual critical patients and referring them to ICU and arrange proper treatment as soon as possible?

A. The main management of COVID-19 patients is arrangement of high flow oxygen. Within this aspect, pulse oximeters can play an important role in finding the clinical condition of a COVID-19 patient. DMCH is arranging supply of pulse oximeters in different wards and outdoors to help diagnose hypoxia in COVID-19 patients. As ICU beds are limited, some measures should be taken so that uninterrupted high flow oxygen supply is available in wards. This way mortality can be reduced. (Prof. Mujibur Rahman)

COVID-19-19 patients are said to have “Happy Hypoxia” as their symptoms are disproportionate to their hypoxic status. It is not like other lung parenchymal diseases. The reason for this hypoxia might be microthrombi or some other cause. Even in incredibly low blood oxygen saturation, patients seem to be well tolerated. Thus, pulse oximeters may play a significant role in identifying a patient's condition. Consequently, proper oxygen supply arrangements can be made prior to intubation. Thus, lives of many patients can be saved. (Prof Abul Kalam Azad)

Happy hypoxia occurs due to microvascular dysfunction. Along with microvascular microthrombi, it is due to autoregulation of flow which is induced by two major mechanisms of action - virus infects endothelial cells causing apoptosis, exposed tissue factors make it more thrombogenic; cytokine particularly IL-6 induced thrombogenicity. Along with oxygen therapy, reduction of cytokine load must be ensured. If immunomodulators are not available, glucocorticoids can be administered, which reduces both innate and adaptive immunity. Anticoagulants can also be used. (Dr. Habibur Rahman)

Blood oxygen saturation is one of the vitals that must be observed strictly. Hence, a pulse oximeter is a necessary device. Without a pulse oximeter, it cannot be measured. In the US, many COPD patients are advised to keep pulse oximeters at home to check their oxygen saturation regularly. In Bangladesh people can be educated about its usage and might be allowed to use at home. It is a cost-effective device patients can buy on their own. (Prof. Ayesha Sikder)

Due to the huge demand, pulse oximeters are sold out in many places. Both healthcare providers and patients can download an app in the smartphone and measure blood oxygen saturation level by themselves. (Dr. Md. Zaman)

Q. Who can be given IVIG?

A. IVIG is not used due to a lot of negative data. CPAP, BiPAP are used. After high flow oxygen if saturation is low, consider non-invasive ventilation. Use a N95 mask when entering a patient's room. Handwashing must be done. (Prof. Ayesha Sikder)

Q. Can ventilators be shared among patients?

A. Sharing ventilators is not recommended as everyone has different lung parenchyma, different plateau and peak pressures. In the absence of adequate ventilators it can be shared among patients with similar lung volumes (lung volume synchronization is important) and patients who are deeply sedated. (Dr. Rumi Ahmed Khan)

Q. How to ensure care for non-COVID-19 patients? How to start hospital wards and emergency departments?

A. Suspected patients needed to be kept separate from the confirmed cases. Hotline numbers can be used for different hospitals which can be operated by non-healthcare staff by using a questionnaire. Suspected patients can be triaged - patients with mild symptoms can be sent home, rest of the patients should be kept in separate rooms. After confirmatory testing, patients can be locally treated or can be sent to COVID-19 dedicated hospital according to need.

Q. Can oral anticoagulants like Rivaroxaban be given to patients who are being managed at home?

- Prof. Wadud Chowdhury

A. American Society of Hematology recommends low molecular weight heparin or unfractionated heparin as a preferred method of anticoagulation unless there is active bleeding. Oral anticoagulants are not recommended due to risks of multiple drug interactions especially with antivirals via cytochrome p-450 system.

COVID-19 is a highly prothrombotic state due to intense cytokine storms. D dimer is a very important predictive and prognostic factor of this disease. It is not DIC as platelet count is normal most of the time, PT can be slightly prolonged and PTT can be normal. D dimer is the most important predictor of mortality and disease course. If the D dimer is elevated and the patient does not have any other symptoms, the patient should be admitted and prepared for a more severe clinical course.

Clinical practice- monitor platelet count, PT, PTT. Even with normal platelet count , PT and PTT they should be anticoagulated as it is life saving. If patients develop DIC, treat the cause. If a patient is actively bleeding - FFP, platelets or cryoprecipitate can be given. If the patient has coexisting liver disease PCC should be given.

Proper anticoagulation therapy - according to University of Pennsylvania , everybody should be therapeutically anticoagulated with full dose. According to Stony Brook University, NY, anticoagulants should be given based on D dimer. Patients should be therapeutically anticoagulated with higher D dimer levels. Only prophylaxis with low or normal D dimer. The anticoagulants must be continued in patients with risk when they are discharged. If low molecular weight heparin is not available, prophylactic dose of direct oral anticoagulants can be given. This drug should be continued for at least 4-6 weeks as the patient remains prothrombotic for 90 days. (Dr. Rajasree Roy)

Q. Is steroid used before cytokine storms?

A. In ICU patients with COVID-19 with ARDS/septic shock/symptoms of cytokine release syndrome (rising LDH, lymphopenia) - steroid should be used. Dexamethasone is a good choice as it has mineralocorticoid property, prolonged life, auto tapering and effect last longer. Methylprednisolone can also be given. (Dr. Tasbirul Islam)