

Guide on Diabetes and COVID-19 for Healthcare Professionals in Bangladesh

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Abstract

The world is suffering from a pandemic of coronavirus disease-2019 (COVID-19), and people with diabetes mellitus (DM) are more vulnerable to the serious effects of the COVID-19. This interaction is alarming, considering the high transmission rate of COVID-19 and the global prevalence of DM. Considering the importance of the link between COVID-19 and DM, Bangladesh Diabetic Association has formed a panel of national and international experts in the field of public health, diabetes, and endocrinology to provide some evidence-based guidance for the prevention and care of people with DM during the COVID-19 pandemic.

Keywords: Bangladesh, diabetes and COVID-19, healthcare professionals

BACKGROUND

Coronavirus disease-2019 (COVID-19) is an infectious disease caused by the most recently discovered coronavirus (currently named severe acute respiratory syndrome coronavirus 2 [SARS-CoV-2]). This new virus and infection were unknown before the outbreak began in Wuhan, China, in December 2019. This virus was found in both animals and humans. In humans, it is known to cause respiratory infections ranging from the common cold to more severe diseases such as Middle East respiratory syndrome (MERS) and severe acute respiratory syndrome (SARS).^[1-3] The World Health Organization (WHO) declared the outbreak of COVID-19, a Public Health Emergency of International Concern on January 30, 2020,^[4] and on March 11, 2020, announced

a pandemic.^[5] A total of 7,231,354 confirmed cases and 409,387 confirmed deaths were documented in 215 countries, areas, or territories till June 9, 2020. A total of 71,675 confirmed cases and 975 confirmed deaths were recorded in Bangladesh till June 9, 2020.^[6]

Diabetes mellitus (DM) has already become a worldwide epidemic. On December 20, 2006, the UN General Assembly passed a resolution (61/225) and declared November 14 as World Diabetes Day.^[7] This landmark resolution recognizes DM as a chronic, debilitating, and costly disease associated with significant complications that pose severe risks to families, countries, and the entire world. The International Diabetes Federation (IDF) has predicted that the number of

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individuals with DM will increase from 463 million (with a prevalence of 9.3%) in 2019 to 700 million (10.9%) in 2045, with 80% of the disease burden restricted in low- and middle-income (LMIC) countries.^[8]

DM is known to worsen outcomes of other similar viral infections such as SARS-CoV or the H1N1 virus.^[9] This interaction is alarming, considering the high transmission rate of SARS-CoV-2 and the global prevalence of DM. The overall proportion of DM in COVID-19 is about 5.3%–20%, and the mortality rate is about 2.3–15%.^[9] Initially, many diabetic patients remain asymptomatic or present with milder symptoms.^[9] It resembles the silent symptoms people with DM experience also in other clinical conditions such as myocardial infarction. It may cause a life-threatening delay in providing the needed care, finally resulting in a poorer prognosis. We need a country-specific recommendation to halt the COVID-19 spreading and appropriate management; thereby, we can reduce the fatality related to COVID-19. We already have a good number of guidelines for the management of diabetes. However, the recommendations authored by our group add to the existing guidelines by considering specific points for the prevention and management of people with diabetes and COVID-19.

PREVENTION OF CORONAVIRUS DISEASE-2019

Prevention at healthcare level

Health care workers are playing a critical role in the COVID-19 outbreak response. According to WHO, responding to COVID-19 requires serious preparation and response, which includes equipping healthcare workers and healthcare facility management with the information, procedures, and tools required to work safely and effectively.

- A. Protecting hospital/clinics dealing with people with DM
 1. Separate screening and waiting area for suspected cases.
 2. Provision of alcohol-based hand rub or soap and water handwashing stations for the use of healthcare workers, patients, and visitors.
 3. Limit the number of visitors. Visitors have to maintain the recommended distance and advise to wear the required personal protective equipments (PPEs).
 4. Perform regular environmental cleaning and disinfection.
- B. Protecting healthcare workers dealing with people with DM
 1. Provide PPEs to all the employees from health professionals, security personnel and cleaners, etc.
 2. Train all the health workers on the importance, selection, and proper use of PPEs.
 3. Train to spot symptoms of potential COVID-19 infection.
 4. Know the case definition and have a decision flow diagram available and accessible for reference at the screening station.

5. Use a triple layer surgical mask if working within 2 meters of the patient.
 6. Clean and disinfect equipment (e.g., stethoscopes, blood pressure cuffs, and thermometers) between each patient use.
 7. Perform hand hygiene frequently. Use alcohol-based hand rub or wash hands with soap and water:
 - Before touching a patient
 - After touching patient surroundings
 - Before engaging in clean/aseptic procedures
 - After body fluid exposure risk
 8. Before addressing any patient, put on:
 - a triple layer surgical mask that covers the mouth and nose
 - disposable gloves
 - a clean, long-sleeve gown
 - eye protection such as goggles
 9. Do not touch eyes, nose or mouth with gloves or bare hands until proper hand hygiene has been performed.
 10. If any health professionals start coughing, sneezing or develop a fever after providing care, report your illness immediately to the concerned authority like Government designated hospitals or IEDCR (Institute of Epidemiology, Disease Control and Research) or DGHS (Directorate General of Health Services) or see a nearby designated hospital immediately and follow their advice. For any query call to 16263 or 333.^[6]
- C. Prevention at personal level (people with DM)
1. A frequent wash of hands with soap and water for at least 20 seconds or use alcohol-based sanitizer with at least 60% alcohol, especially before eating or drinking and after using the bathroom and blowing your nose, coughing, or sneezing, and after being in public.
 2. Cover nose and mouth when coughing or sneezing with a tissue or a flexed elbow, then throw the tissue in the closed bin.
 3. Avoid touching eyes, mouth, or nose when possible.
 4. Use triple-layer surgical mask.
 5. Disinfect frequently touched household objects (like a door handle, switch).
 6. Maintain distance from sick individuals and who are in isolation.
 7. Do not share food, tools, glasses, and towels.
 8. Avoid public gathering.
 9. If someone present with symptoms such as fever, cough, shortness of breath, especially if he/she believe he/she may have been exposed to COVID-19 patient or live in or have recently traveled to an area with the ongoing spread of disease, call nearby Government designated hospitals or IEDCR or DGHS or see a nearby designated

hospital immediately. For any query call to 16263 or 333.^[6]

10. Maintain contact with your physician for any query.
11. Diabetic patients registered through BADAS Centers and BADAS Affiliated Associations can call 10614 (Ibrahim Healthline) and COVID-19 and diabetes helpline (01891766417), to obtain primary medical advice.

Management of coronavirus disease-2019 with people with diabetes mellitus

A. Early diagnosis

1. Diagnostic criteria based on clinical signs and symptoms^[10]

Suspect case

- a. A patient with acute respiratory illness (fever and at least one sign/symptom of respiratory disease, for example, cough, shortness of breath), AND a history of travel to or residence in a Country/location reporting community transmission of COVID-19 disease during the 14 days prior to symptom onset.

OR

- b. A patient/healthcare worker with any acute respiratory illness AND having been in contact with a confirmed or probable COVID-19 case in the last 14 days prior to symptom onset.

OR

- c. A patient with severe acute respiratory illness (fever and at least one sign/symptom of respiratory disease, for example, cough, shortness of breath; AND requiring hospitalization) AND in the absence of an alternative diagnosis that fully explains the clinical presentation.

Laboratory testing should be done in all the suspected cases

Probable case

- a. A suspect case for whom testing for the COVID-19 virus is inconclusive. Inconclusive being the result of the test reported by the laboratory.

OR

- b. A suspect case for whom testing could not be performed for any reason.

Confirmed case

- a. A person with laboratory confirmation of COVID-19 infection, irrespective of clinical signs, and symptoms.

2. Laboratory findings

- The test is a real-time reverse transcription-polymerase chain reaction (rRT-PCR) assay that can be used to diagnose the virus in respiratory and serum samples from clinical specimens.^[11]
- At a minimum, respiratory material should be collected—upper respiratory specimens (nasopharyngeal and oropharyngeal swab or wash), and/or lower respiratory specimens (sputum and/or endotracheal aspirate or bronchoalveolar lavage).
- The FDA has approved a qualitative immunoglobulin M (IgM)/immunoglobulin G (IgG) antibody test for SARS-CoV-2 using the serum, plasma (EDTA or citrate), or venipuncture whole blood. IgM antibodies generally become detectable several days after initial infection, while IgG antibodies can be detected later.^[12]
- Normal or low TC of WBC, lymphopenia, high CRP, high D-dimer, low Procalcitonin. If these are associated with bilateral pneumonia in a chest x-ray (finding more in the peripheral lower zone of chest) or ground-glass opacity in CT scan of the chest is diagnostic of COVID 19 in this current time.^[10]
- CBC, LDH, ferritin, D-dimer, ALT, creatinine, and blood sugar are daily investigations. High D-dimer level is associated with poor prognosis in COVID-19 infected patients.

B. General management

1) General advice for people with DM during COVID-19 outbreak

1. Gather the contact information from your doctor and hospital.
2. For people with diabetes register in different centers/hospital of BADAS and its affiliated centers, keep their diabetes guidebook on-hand.
3. Preserve your last prescription for consultation with diabetologist.
4. Have enough regular medications for two-four weeks in case you cannot get to the pharmacy to refill your prescriptions.
5. Ensure you have enough device supplies (i.e., vials, pens, syringes, strips, needles, etc.)
6. Ensure all your medications have refills available, so you do not have to leave the house if you become ill.
7. Have extra supplies like rubbing alcohol, hand sanitizers, and soap to wash your hands.
8. Keep simple sugars (e.g., glucose tablets, hard candies, juice) on-hand in case you need to treat low blood glucose, which may occur more frequently with illness.
9. Have ketone strips available (if you have type 1 diabetes).
10. Review sick days management protocol.

2) General management of people with diabetes during illness

If anyone present with symptoms such as fever, cough, shortness of breath, and may have been exposed to COVID-19 patient or live in or have recently traveled to an area with the ongoing spread of disease, he needs to contact the nearby designated hospital immediately.

General guidelines to manage diabetes during an illness should be followed. If a person with diabetes becomes diseased with COVID-19, the following steps should be followed

1. Take diabetes medication as usual and should never be stopped without physician's consultation.
2. Frequent self-monitoring of blood glucose should be continued.
3. Drink extra (sugar-free) fluid and try to eat as normal.
4. Measure body weight every day. Losing weight while eating normally is a sign of hyperglycemia
5. Check body temperature at least twice daily or more frequently if there is a fever. A fever may be a sign of infection.
6. During fever, plenty of fluids intake: 120 to 180ml every half an hour is required to prevent dehydration.
7. Followings are symptomatic treatment for Influenza-like illness^[10]
 - Tab Paracetamol 500mg 1 + 1+1
 - Tab Antihistamine (Fexofenadine 120/180mg) 0 + 0+1
 - Antitussive if there is dry cough
 - Steam inhalation/Gurgle of Lukewarm water
- 3) Diet plan for people with DM during COVID-19 outbreak
 1. A previously planned diabetic diet plan is enough for the management of diabetes.
 2. During COVID 19 outbreak foods as fresh fruits, vegetables, foods containing vitamin C, nuts may help to boost up the immunity and can help to combat infection.
- 4) Exercise plan for people with DM during COVID-19 outbreak
 1. Avoid exercise if symptoms of infection.
 2. In situations like the COVID-19 pandemic, there is a restriction in the outdoor movement, and indoor exercise facilities as gyms, sports centers, and swimming pools remain closed.
 3. Daily physical activity is an integral part of diabetes management, helping to maintain blood glucose at recommended levels.
 4. The following are few activities that can be practiced indoor during isolation and social distancing during COVID 19 outbreak.
 - Bodyweight exercises such as push-ups,

squats, deep stationary lunges, sit-ups, or crunches (to strengthen the abdomen) and forward flexes (to strengthen the lower-back muscles).

- Joint mobility and stretching exercises that can be sourced from a common workout, yoga can be done as routines.
 - Jump rope (if physical and medical conditions permit)
 - If available at home
 - Treadmill: 1-h brisk walking (no need to run) or stationary bicycle: two 15-min sessions at variable intensity can be used.
 - During home exercise, it should be remembered to avoid overload and adapt exercise intensity to individual ability and fitness level.
- 5) Treatment plans for COVID-19^[10,13-15]
- Symptomatic treatment is the only approved treatment as of today in affected cases.
 - Various agents may be required according to the severity and stages of the disease. These includes:
 1. Timely providing effective oxygen therapy
 - Starting with low flow, including nasal catheter and mask oxygenation, and, if necessary, nasal high-flow oxygen therapy.
 2. Thromboprophylaxis, for example, low molecular weight heparin (enoxaparin)
 - For patients with creatinine clearance (CrCl) >30 mL/min, 40 mg SC once daily; for CrCl 15–30 mL/min, 30 mg once daily.
 - Thromboprophylaxis should be given until symptom resolves or improves and followed by oral rivaroxaban 10 mg once daily for 1 month
 3. Glucocorticoids, for example, dexamethasone (6 mg) or methylprednisolone (32 mg) or prednisolone (40 mg) oral or IV daily for 10 days
 4. Immunosuppressants, for example, tocilizumab
 - Adult dose (≥18 years): 8 mg/kg (max: 800 mg/dose).
 - Pediatric dose (30 kg—8 mg/kg (max: 800 mg/dose)
 - Duration: 1 dose; can repeat in 12 h if no clinical improvement. Max 2 doses
 5. Antiviral drugs, for example, favipiravir, remdesivir
 - Favipiravir (1600 mg IV on day 1 followed by 600 mg BID from day 2 to day 10) etc.
 - Remdesivir (200 mg IV infusion within 30 min–2 h on Day 1 followed by 100 mg infusion within 30 min to 2 h from Day 2

- to Day 5. Remdesivir should be used at the discretion of consultant working in the hospital)
- 6. Convalescent plasma therapy
 - The donor should be healthy patient recovered from COVID-19 and preferably after 28 days with neutralizing titer more than 1:80 and Binding titer more than 1:1000
- 7. Coronavirus vaccine is in early trials. We have to wait for the future results
- 8. Antibacterial agents may be required for secondary bacterial infection
- 9. Few patients may require a mechanical ventilator
- 10. Chloroquine and Hydroxychloroquine are not recommended
- 6) Glycemic management for people with DM during sick days^[16,17]
 1. Frequent self-monitoring of blood glucose (SMBG) as follows [Table 1]:
 2. These principles are to be followed until the blood glucose is <10 mmol/L and ketone diminishes or disappears.
 3. It may be necessary to take extra insulin to bring down higher blood glucose levels.
 4. Be aware of symptoms of hypoglycemia or severe hyperglycemia.
 5. If there is hypoglycemia 15g of simple carbohydrate like glucose, honey, jam, candy, juice to be taken, and re-check your blood sugar in 15 min to make sure that blood glucose levels are rising. Repeat the cycle if low blood glucose is persisting.

Table 1: Glucose monitoring based on type of diabetes and ketonuria

Type of diabetes	Blood glucose monitoring
Type 1 without ketonuria	Fasting and 2h post meals (after breakfast, after lunch, and after dinner)
Type 1 with ketonuria	All pre and post meals (before and after breakfast, before and after lunch, before and after dinner)
Type 2 without ketonuria	Fasting and 2h post meals (after breakfast, after lunch, and after dinner)
Type 2 with ketonuria	All pre and post meals (before and after breakfast, before and after lunch, before and after dinner)

Table 2: Recommendation for using antidiabetic medication^[18-20]

Medication	Using guidance
Metformin	<ul style="list-style-type: none"> • Not recommended in severe/critical patients, patients with gastrointestinal symptoms or lack of oxygen • Dehydration and lactic acidosis will probably occur if patients are dehydrated, so patients should stop taking the drug and follow sick day rules • During illness, renal function should be carefully monitored because of the high risk of chronic kidney disease or acute kidney injury
Sulfonylureas	<ul style="list-style-type: none"> • It increases the risk for hypoglycemia, should be avoided in patients with severe illness • Adjust dose according to the glycemic levels • Stop if unable to take regular food • Mild/moderate patients using glucocorticoid: for early stage chose short-acting agents; for advanced stage chose middle/long-acting agents if FPG and/or PPG is increased
SGLT2 inhibitors	<ul style="list-style-type: none"> • Not recommended in severe/critical patients, patients with gastrointestinal symptoms or lack of oxygen. • Risk of dehydration, electrolyte imbalance, and diabetic ketoacidosis during illness, so patients should stop taking the drugs and follow sick day rules • Patients should avoid initiating therapy during respiratory illness • Renal function should be carefully monitored for acute kidney injury
GLP-IRAs	<ul style="list-style-type: none"> • Not recommended in patients with gastrointestinal symptoms or dehydration • Dehydration is likely to lead to a serious illness so patients should be closely monitored • Adequate fluid intake and regular meals should be encouraged
DPP4 inhibitors	<ul style="list-style-type: none"> • These drugs are generally well tolerated and can be continued
α-glucosidase inhibitor	<ul style="list-style-type: none"> • Can be used to control PPG • Not recommended in severe/critical patients; or in patients with gastrointestinal symptoms
Pioglitazone	<ul style="list-style-type: none"> • Can be used during the process of glucocorticoid treatment • The regime should be adjusted according to the treatment effect • Better to stop considering its effects especially volume overload and heart failure
Insulin	<ul style="list-style-type: none"> • Insulin therapy should not be stopped • Switch from oral to insulin: use anyone (premix/spilt mix/co formulated/basal bolus) • Already on premix insulin: switch to spilt mix/ coformulated/basal bolus. Use the same total daily dose during switching. • Regular self-monitoring of blood glucose every 2–4h should be encouraged, or continuous glucose monitoring • Carefully adjust regular therapy if appropriate to reach therapeutic goals according to diabetes type, comorbidities, and health status Continue • Use NPH and long-acting insulin during glucocorticoid treatment to control glucose

FPG = fasting plasma glucose, PPG = postprandial glucose, SGLT2i = sodium-glucose cotransporter 2 inhibitors, GLP-1RA = glucagon-like peptide-1 receptor agonists, DPP4 = dipeptidyl peptidase 4, NPH = neutral protamine hagedorn

6. Wash hands and clean injection/infusion and finger-stick sites with soap and water or rubbing alcohol.
 7. The antidiabetic agents should never be stopped altogether; dose may need to be reduced.
 8. If the person is on insulin, intermediate or long-acting insulin is continued; the dose may need to be reduced. Shorter acting insulin should be adjusted according to blood glucose values and food intake.
 9. If the person is on OAD the dose is to be readjusted; sometimes the longer-acting OADs may need to be replaced by shorter-acting ones or insulin.
 10. Following conditions require special attention and may necessitate hospitalization: (1) blood glucose remains above 14 mmol/L despite treatment, (2) moderate ketonuria persists despite treatment, (3) vomiting or diarrhea persists for longer than 6 h, (4) sick for 2 days and not getting better, (5) very young individual, (6) abdominal pain, (7) hyperventilation, (8) coexisting serious diseases.
 11. Diabetic physicians should follow the recommendations for using the antidiabetic agents [Table 2].
 12. Diabetic physicians should also follow the diabetes management recommendations based on the level of COVID-19 infections and level of blood glucose [Table 3]
- 7) Follow-up plan after hospital discharge
- Self-isolation till becoming virus-negative which may take a few days to several weeks
 - Maintain good glycemic control
- During delivery time, consult with a respective gynecologist and report to the designated hospital.
 - Affected women with GDM/diabetic pregnancy may take a tab—Azithromycin 500 mg daily for seven days.
 - Hydroxychloroquine is pregnancy category D safety level and not approved by the US Food and Drug Administration (FDA).
- 9) People with DM with hypertension and COVID-19^[10,23-27]
1. People with raised blood pressure may face an increased risk for severe complications if they are infected with the COVID-19 virus.
 2. There are no conclusive clinical data in humans to show that ACE-Inhibitors or ARBs either improve or worsen susceptibility to COVID-19 infection, nor do they affect the outcomes of those infected.
 3. In the absence of any such data the International Society of Hypertension (ISH), European Society of Cardiology (ESC), European Society of Hypertension (ESH) and U.S. Heart Groups strongly recommend that the routine use of ACE-Inhibitors or ARBs to treat raised blood pressure should continue and should not be influenced by concerns about COVID-19 infection.
 4. Limit or avoid nonsteroidal anti-inflammatory drugs (NSAID) and decongestants, especially if blood pressure is uncontrolled.
 5. People taking medication for mental health, corticosteroids, oral birth control pills, immunosuppressants, and some cancer medications should monitor blood pressure to make sure it is under control.

These are the cornerstone in the management after hospital discharge

- 8) Hyperglycemia and pregnancy^[22]
- For hyperglycemia and pregnancy (GDM and diabetic pregnancy), maintain all COVID-19 norms.
 - Routine antenatal follow-up can be done by consulting respective gynecologists and diabetes management to diabetologists.

CONCLUSION

The COVID-19 infection is rising faster in Bangladesh, which is already suffering from the huge burden of DM. Therefore, it is important for people living with DM to take precautions to prevent the virus infection if possible and need to get access to evidence-based practice in healthcare.

Table 3: Treatment target and drug management of diabetes with COVID-19^[21,22]

Stage	Clinical status	FBG (mmol/L)	2 hrs PP (mmol/L)	RBG (mmol/L)	Treatment
Mild disease	Influenza-like illness	4.4–6.1	6.1–7.8		As ongoing (follow the recommendation 11)
Moderate illness	Pneumonia	6.1–7.8	7.8–10.0		S/C insulin
Severe illness/critical	Severe pneumonia, Sepsis, ARDS, Septic shock	–	–	7.8–10.0	I/V insulin infusion

FBG = fasting blood glucose, 2hPP = 2 h postprandial, RBG = random blood glucose, ARDS = acute respiratory distress syndrome, S/C = subcutaneous, I/V = intravenous

Ensure: Blood glucose monitoring, dynamic evaluation and timely adjustment of strategies should be strengthened to ensure patient safety and promote early recovery of patients.

The government of Bangladesh is working to control and contain the COVID19 pandemic. This BADAS guidance is based on the latest evidence available for COVID-19 and DM. We believe this guidance will help healthcare professionals to guide their patients appropriately.

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Conflicts of interest

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Ethical policy and institutional review board statement

Ethical approval was not required for this article.

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