Diabetes in the COVID-19 emergency: what to assess remotely

Diabetes en la emergencia del COVID-19: qué evaluar de forma remota

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ABSTRACT

Patients with uncontrolled diabetes have immunity disorders and general cellular deterioration. In the recent coronavirus disease (COVID)-19 pandemic, the main factors associated with a worse prognosis were diabetes, hypertension, overweight/obesity, heart and lung diseases, and older age. Efforts are needed to reduce the impact in this group of patients, achieving adequate levels of glycemic and metabolic control. Isolation forced us to challenge ourselves to find another way to support our patients using remote assessments. Telemedicine has become an important alternative to continue attending patients with higher risk factors. The evaluation is different for patients diabetes with and without respiratory symptoms. We also comment on the controversies in the treatment of antihypertensive drugs and nonsteroidal anti-inflammatory drugs for symptomatic treatment in this high-risk patient. Metabolic control and vaccination decrease the possibility of developing bacterial pneumonia and therefore improve the prognosis in case of becoming infected by COVID-19.

Key words: Diabetes. Coronavirus disease-19 pandemic. Telemedicine. Diabetes assessment.

RESUMEN

Los pacientes con diabetes no controlada tienen trastornos de inmunidad y deterioro celular general. En la reciente pandemia de COVID-19, los principales factores asociados con un peor pronóstico fueron diabetes, hipertensión, sobrepeso/obesidad, enfermedades cardíacas y pulmonares y edad avanzada. Se necesitan esfuerzos para reducir el impacto en este grupo de pacientes, logrando niveles adecuados de control glucémico y metabólico. El aislamiento nos obligó a desafiarnos a nosotros mismos a otra forma de apoyo con evaluaciones remotas. La telemedicina se ha convertido en una alternativa importante para continuar atendiendo a pacientes con factores de mayor riesgo. La evaluación es diferente para pacientes con diabetes con y sin síntomas respiratorios. También se comentan las controversias en el tratamiento de fármacos antihipertensivos y AINE para el tratamiento sintomático en estos pacientes de alto riesgo. El control metabólico y la vacunación disminuyen la posibilidad de desarrollar neumonía bacteriana y, por lo tanto, tienen un mejor pronóstico en caso de infectarse con COVID-19.

Palabras clave: Diabetes. Pandemia de COVID-19. Telemedicina. Evaluación en diabetes.

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INTRODUCTION

Patients with uncontrolled diabetes have immunity disorders and general cellular deterioration. These disorders include decreased complement factor 4, cytokine response, chemotaxis, and phagocytosis, among others. These defects are reversible with an adequate glycemic control. Furthermore, some microorganisms become more virulent in a high glucose environment when adherence of the microorganisms to the cells is higher compared to the cells of people without diabetes¹.

In the recent coronavirus disease (COVID)-19 pandemic, some authors^{2,3} described that having diabetes or glucose elevation during infection was not predictive factors for a severe COVID-19 disease. Other reports, including one from the first publications from Wuhan, China, showed that the main factors associated with a worse prognosis were comorbidities such as diabetes, hypertension, overweight/obesity, heart and lung diseases, and older age. Mortality from COVID-19 in patients without comorbidities was 1.4%, compared to patients with different comorbidities: cardiovascular diseases (10.5%), diabetes (7.3%), and hypertension (6.3%)⁴. Until further analysis is made, the premise should be to reduce the impact in this group of patients, achieving adequate levels of glycemic and metabolic control.

Since at the times of this publication, there is no vaccine available, the most important steps to are: (1) not get infected and (2) avoid spreading the disease to others. Isolation measures force us to challenge ourselves to another way of supporting patients: remote consultations. Telemedicine has been an important tool specially to support marginalized areas, however, important alternative to continue attending patients with higher risk factors.

It is important that patients know that there are other ways to communicate with physicians in case of the patients about the possibility of having their follow-up by electronic means (video communication platforms and video calls) or by telephone. An agenda can be agreed to dedicate specific time to attend the patient's needs, not necessarily emergencies.

You use telephone or video call, it is important to consider some priority aspects.

WHAT ARE THE KEY POINTS TO COVER DURING ASSESSMENT?

Start with the main reason for consultation, any symptoms or concerns, and above all, the presence of respiratory symptoms in the patient and his family. Make sure you check previous laboratory tests and notes, and all the relevant data for the assessment. If the patient has medical tools that can be used during the call (glucometer, sphygmomanometer, and oxymeter), ask the patient to have them handy to check metabolic control and physical examination.

MANAGING MILD OR MODERATE RESPIRATORY SYMPTOMS

Tell patients to stay at home, most patients have a mild disease and can be managed at home. The affected person needs isolation for 2 weeks or till the symptoms resolve. Remember that distance is part of the treatment to avoid spreading the disease. In this case, planning is of importance. Advise the patient to have enough drugs to continue their treatment for diabetes, hypertension, lipid control, thyroid disease, or any other drugs that the patient normally takes. Train your patient and/or family members to have the complete information in their cellphones or internet in case they need to take the patient to an emergency room. Be prepared to provide the patient with a log or resume of the therapies you recommended in case they need to go to the hospital or if they require additional evaluations. Ask them to keep in touch with you via phone, SMS, WhatsApp, mails, or video calls in case.

Glucose can go high in any infection. Implementing "days of sickness" strategies are necessary to act promptly (Table 1). Remember the patient to avoid self-medication or suspending their usual treatment.

Table 1. Self-care measures for patients with diabetes during sickness days

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- Continue taking glucose control medicine and/or applying insulin unless your doctor tells you otherwise.
 - Measure blood glucose levels more frequently every 3-4 h, in case of presenting two measurements with figures > 250 mg/dl of glucose, you should immediately contact your doctor as it is likely that it requires an adjustment in the medical treatment.
 - Stay hydrated, consume at least 2 l of water a day, to avoid dehydration.
 - Stop exercise
 - Check the presence of ketones in the blood if there are glucose levels higher than 250 mg/dl (in people with type 1 diabetes).
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Controversy exists over the use of nonsteroidal anti-inflammatory drugs (NSAIDs) in the treatment of COVID-19. To determine whether NSAIDs affect antibody production, *in vitro* studies found that ibuprofen, naproxen, and acetylsalicylic acid inhibit antibody production, with ibuprofen being the most effective. An antiviral of some NSAIDs, such as indomethacin, has been suggested⁵. There are many possible confounding variables that must be considered, such as the fact that patients who take NSAIDs the most severe end up hospitalized. There is insufficient evidence right now suggest the withdrawal or use of a specific NSAID. It is suggested that good hydration and acetaminophen are the safest symptomatic treatments in this case⁶.

MANAGING SEVERE RESPIRATORY SYMPTOMS

In case of fever, cough, headache, or dyspnea, an appropriate evaluation needs to be done. Remote physical examination will be almost impossible by phone and difficult by video. Patients could help during a remote physical examination using instruments they might have at home (thermometer, sphygmomanometer, oxymeter, and glucometer). Smartwatches and apps can measure biomarkers. Despite their accuracy is not be the best, they become the only available option at this moment⁷.

If video may be the best approximation available at that moment, consultation is possible, assess the patient's characteristics (whether they are lying in bed or skin features, flushing, pallor, and cyanosis). Congestion of the throat is present in 2% of COVID-19 cases⁸, and evaluation of oropharynx might be difficult in video. Record exactly what you can and what cannot be evaluated. For respiratory assessment, ask the patient how well they are breathing, if there is any difficulty speaking, breathing harder/faster, and shortness of breath. If hypoxia or difficult breathing is present, patients should immediately go to an emergency service for oxygen treatment. It is suggested that hospitalized patients stop treatment with metformin and sodium glucose cotransporter-2 inhibitors; in these patients, insulin is the preferred treatment to control hyperglycemia⁶.

IF THE PATIENT DOES NOT HAVE RESPIRATORY SYMPTOMS AND WISHES TO ESTABLISH COMMUNICATION TO MONITOR THEIR DIABETES

After evaluating and answering your main reason for consultation, raise awareness of the risk factor of having diabetes, hypertension, obesity, and advanced age, but without promoting fear. For that reason, point out the importance of staying on control goals.

- a) Glucose control: ideally, hemoglobin A1C (HbA1c) should be < 7%. Since HbA1c is the glucose average for 3 months and patients will need to go to take blood tests, evaluating HbA1c will not be as easy as it would be in a normal assessment. Therefore, evaluate capillary glucose measurements: glucose before meals should be between 80 and 130 mg/dl and 2 h after meals < 180 mg/dl. The goal recommendations for assessing glycemic variability are time in range > 70% with hypoglycemia < 4% in those who have continuous or flash glucose monitoring. Adjust treatment as needed.
- b) Blood pressure will be difficult to evaluate during a phone/video call evaluation. If the patient has a sphygmomanometer, ask them to monitor twice a week to check blood pressure control. If

the measurements are out of range (normal < 130/80mmHg), adjust treatment as needed. COVID-19 uses angiotensin-converting enzyme 2 (ACE2) to bind to cells in the lung epithelium, intestine, kidneys, and blood vessels. The virus reduces the availability of this isoenzyme, decreasing the vasodilator action of angiotensin. This would increase the activity of angiotensin II on its receptor, causing an increase in inflammatory factors, lung tissue damage, and development of acute lung failure. Blocking the angiotensin receptor II (angiotensin II receptor blockers [ARB]) receptor increases ACE2, which could facilitate the entry of the virus. However, there is little evidence to demonstrate it and establish a recommendation for the withdrawal or change of treatment with ACE inhibitors or ARB. The evidence for the withdrawal or changes of ACE or ARB is uncertain. In patients with hypertension treated with these drugs, the suppression or change of medication can predispose to uncontrolled blood pressure, decompensation, and increased cardiovascular risk. According to the statement issued by the American Heart Association (AHA), it is suggested to continue with the treatment and individualize the decision to change or withdraw in high-risk patients according to their renal function, hemodynamic, and clinical status^{9,10}.

- c) Weight control is important to diminish risks. Weight control will not happen immediately, but it is important that patients continue their nutritional plan and exercise. A balanced nutritional plan will assure that patients get enough nutrients for glucose, lipid, and weight control, as well as vitamins and minerals essential for immune system. Exercise has shown to improve the immune system. Exercise should be done indoors if possible, regarding the patients' age and physical condition. Be careful when starting a new exercise routine and provide prescription for time and maximum intensity goals¹¹. Follow-up of weight loss can be assessed every week.
- d) Quit smoking, since toxins from tobacco damage lung cells and facilitate the entrance of the virus.
- e) Assess vaccine status for influenza and pneumonia. This is a preventive measure that has shown

to decrease the possibility of secondary bacterial pneumonia or atypical pneumonia. However, this might not be the best moment to have vaccines since patients should stay at home, and data in present viral epidemic are not available.

- f) Evaluate anxiety and depressive symptoms. Consider the possibility of new or increasing psychiatric symptoms related to health issues as a red flag. Reassure the patient, if needed, and refer to a specialist. Anxiety, sleep disorders, depression, somatic symptoms, post-traumatic stress disorder, adjustment disorders, and others are common.

ASSESSMENT FOR 1ST TIME PATIENTS

Try making a direct clinical history since at this moment, the most important is to prevent infection from COVID-19. In this case, asking for their age, comorbidities, previous treatment, and main complain are the key aspects for a good phone/video call assessment. Include also evaluation of glucose, blood pressure, and weight, as well as smoking history. Make sure that they understand the importance of the accuracy of all the medical information they give to every physician, including dates, vaccination history, and medical problems. Having them writing down this information will be useful for future online or physical consultations, considering that in the case of an emergency, they may be prone to forget these details and they need to take this information with them. Suggest patients to check with their health service providers about getting prescriptions filled for several months to avoid running out of treatment drugs.

SYSTEMATIZE THE REGISTRY OF INDICATORS

Obtaining information on the evolution of diseases is the greatest tool for carrying out analysis and establishing strategies. In this unprecedented situation, the record of care indicators will be vital. As essential minimum records, we consider the following:

- 1) Age, sex, number of people with whom they have current contact (family or coinhabitants), locality, and means of communication by which the tele-consultation is carried out
- 2) Time of evolution of diabetes, previous treatment, date, and registries of metabolic control before the consultation (last glycated hemoglobin, lipid profile, measurement of blood pressure, weight, and height), comorbidities diagnosed, and their current treatment
- 3) How long has the patient been isolated
- 4) Respiratory symptoms and outcomes.

CONCLUSION

Patients with diabetes are at risk for infections, especially influenza and pneumonia. This risk can be reduced, but not completely eliminated, through good glycemic control and timely vaccination. It is worth mentioning that metabolic control and vaccination decrease the possibility of developing bacterial pneumonia and therefore have a better prognosis in case of becoming infected by COVID-19. There are many websites for diabetes education that can help the patients get reliable information to solve doubts^{12,13}. They can also write down more questions or doubts that can be solved in the following phone/video call evaluations.

KEY POINTS

Recommendations to decrease the risk of developing serious COVID-19 disease in patients living with diabetes, according to the American Diabetes Association and American College of Clinical Endocrinologist^{14,15}:

- In patients with diabetes, the possibility of contracting the virus is similar to people without the disease. When glucose is out of control, the risk of poor evolution increases
- The more health conditions a person with diabetes has hypertension, heart and respiratory diseases,

and obesity, the more likely they are to have serious complications from COVID-19.

- Maintain established diabetes treatment: diet, exercise, and medications.
- Try to stock up on all your medications, test strips, and functional glucometer for 2-4 weeks.
- Keep in touch with your doctor, especially if your glucose is below 80 mg/dl or above 130 mg/dl.

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CONFLICTS OF INTEREST

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ETHICAL DISCLOSURES

Protection of people and animals. The authors declare that no human or animal experiments have been performed for this research.

Confidentiality of the data. The authors declare that no patient data appear in this article.

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