



ORIGINAL ARTICLE

Teleconsultation for pediatric patients with type 1 diabetes mellitus during the COVID-19 pandemic: experience of a university hospital in Brazil

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KEYWORDS

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Abstract

Objective: Evaluate the impact of teleconsultation on glycemic control and prevention of acute complications related to diabetes mellitus in children and adolescents treated in a reference hospital during the COVID-19 pandemic in 2020.

Method: Descriptive study of data from pediatric diabetic patients who received teleconsultation between April and September 2020.

Results: During this period, 143 diabetic patients were evaluated, with a median of 3.4 teleconsultations per patient in the studied period, requiring adjustment of insulin doses in 84.6% of cases. The hospital admission rate was 8.4% due to diabetic decompensation. The metabolic control (HbA1c) became worse in 46% of the sample and improved in 37%.

Conclusion: The teleconsultation promoted health care for patients with diabetes mellitus during the COVID-19 pandemic but was not able to guarantee adequate glycemic control.

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Introduction

The outbreak of severe acute respiratory syndrome resulting from infection with the new coronavirus (SARS-CoV-2) started in China in late 2019, spread rapidly across the world, and was officially recognized as a pandemic by the World Health Organization in March 2020.^{1,2} The first confirmed case of coronavirus infection in Brazil occurred on February 26, 2020, in the city of São Paulo.^{3,4}

According to the Brazilian Diabetes Society, it is estimated that in Brazil, 7.6 per 100 thousand inhabitants under the age of 15 are carriers of type 1 diabetes mellitus (T1DM), with an increase in this incidence being observed in the last decades, particularly in children under 5 years.⁵ T1DM is a chronic disease requiring multidisciplinary follow-up and regular medical assistance. The pediatric endocrinology scientific committee of the Brazilian Society of Pediatrics published a warning note on April 7, 2020, on T1DM and COVID-19 in pediatrics, not recommending elective consultations to avoid the risk of contamination and encouraged contact with the medical team by phone, text messages and e-mails.⁶

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The WHO defines telemedicine as “the provision of health services, where distance is a critical factor, by all health professionals, using information and communication technologies to exchange valid information for the diagnosis, treatment and prevention of diseases and injuries, for research and evaluation, and for the continuing education of health care providers, all in the interest of promoting the health of individuals and their communities”^{7,8}

National and local determinations authorized the use of telemedicine allowed the pediatric endocrinology team to reduce outpatients’ activities to what was strictly necessary.^{7,8}

Teleconsultation had never been carried out on a large scale, and it is not known what the impact was on the clinical control of patients. In this context, this study aimed to assess the impact of teleconsultation on clinical follow-up and metabolic control in pediatric diabetic patients during the COVID-19 pandemic.

Methods

This is a cross-sectional observational study on teleconsultations of diabetic patients under follow up at a Pediatric Hospital of Ribeirão Preto (Hospital das Clínicas, Ribeirão Preto Medical School, University of São Paulo – HC-FMRP-USP) between April to September 2020, during the COVID-19 pandemic.

Data were collected from the review of the exchanged messages between the medical team and patients or their families. The teleconsultation consisted of those that included: sending glycemic controls to the conference by the assistant team, checking the insulin doses in use, verification of the presence of symptoms of diabetes decompensation and the adequacy of insulin doses. The number of telephone calls in the period, the adjustment of insulin doses, the need for hospitalization due to diabetes decompensation, and the comparison of glycosylated hemoglobin values before and during the COVID-19 pandemic were evaluated in this study (April to September 2019). Results of HbA1c reduction in more than 0.5% were considered as improved; those who presented an increase in glycosylated hemoglobin value greater than 0.5% were considered as worsen; results difference of less than 0.5% were considered as no change. The 0.5% cutoff value was chosen at random.

This work was submitted to the Research Ethics Committee and approved via Plataforma Brasil® (No. 4,220,266).

Results

There were 280 T1DM pediatric patients under follow-up during the period of study. 143 patients received contacts for teleconsultation during the period from April to September 2020.

The epidemiological characteristics of the 143 study participants are summarized in Table 1. Females (57%) and adolescents (59%) were the majority of the patients evaluated. Of those 143 patients, 13 were diagnosed during the period of study, and 30% had less than two years of T1DM. During the period of study, 493 teleconsultations were carried out for the 143 pediatric diabetic patients included in the study,

Table 1 Description of pediatric diabetic patients followed by teleconsultation from April to September 2020.

Characteristics	Number of patients (n = 143)
Sex	
Female	82 (57%)
Male	61 (43%)
Age	
Infant (0-2 years)	4 (3%)
Early Childhood (2-7 years)	17 (12%)
Middle Childhood (7-11 years)	37 (26%)
Adolescence (11-20 years)	85 (59%)
Diagnosis time of T1DM	
New cases	13 (9%)
0-2 years of diagnosis	44 (30%)
2-5 years of diagnosis	34 (24%)
5-10 years of diagnosis	32 (22%)
More than 10 years of diagnosis	11 (15%)

with an average of 3.4 teleconsultations per patient in the evaluated period (5 months).

The period for teleconsultations was, on average, 40 hours per week, totalizing 1040 hours.

Insulin doses adjustments were made in 84.6% of the calls. Of the 143 patients evaluated, 8.4% needed hospitalization due to the decompensation of the disease (12 cases). There was no need for more than one hospital stay in the period. In the same period pre-pandemic, the hospitalization rate for diabetes decompensation was 10%.

The glycosylated hemoglobin values were compared from April to September 2020 with the values of April to September 2019. Among the patients, 46% showed worsening, 37% showed improvement, and 17% showed no change of HbA1c during the COVID-19 pandemic. Therapeutic target (HbA1c < 7%)⁹ was achieved in 25% of the patients.

In the group of patients with worsening glycemic control, the mean age was 12 years (median 13 years); female predominance (65%), and mean time of diagnosis of 3.4 years.

The average glycosylated hemoglobin (HbA1c) values before the pandemic was compared with the results during the COVID-19 pandemic in 2020. The average HbA1c before the pandemic was 9.2%; on the other hand, the average HbA1c during the pandemic was 9.7%.

Discussion

The teleconsultation in the diabetic population was already an important strategy of follow up even before the current pandemic. During the COVID-19 pandemic, this way of care must be considered and evaluated in order to guarantee the best possible health care for patients.

In the 143 patients, the authors of the present study made the adjustment of insulin doses, review of the

injection technique, and resolution of doubts related to the disease. Even with more frequent contacts, HbA1c values became worst in 46% of patients during the COVID-19 pandemic.

The metabolic control before 2020 was already not adequate. In the group of patients followed in this study, the more frequent contact between the hospital staff and the families did not improve the metabolic control.

A recent publication by the Barbara Davis Center reports success in glycemic control of new cases of T1DM.¹⁰ Patients diagnosed during the pandemic had their education in diabetes and management of insulin doses made exclusively by telemedicine after hospital discharge. A combination of e-mail, video calls, and telephone calls was used to provide guidance, check blood glucose levels, and adjust the medication of these patients, achieving good glycemic control.

A systematic review found that diabetic patients monitored by telemedicine showed a small reduction in glycosylated hemoglobin compared to patients who were exclusively monitored by conventional medical care (-0.31%, $p < 0.001$).¹¹

A study conducted in Turkey to assess the impact of teleconsultations by a multidisciplinary team (doctor, nurse, nutritionist, and psychologist) observed that patients showed an improvement in glycosylated hemoglobin (-0.85%, $p < 0.01$), but the contacts were made on daily base.¹²

The authors speculate if weekly contacts or even daily contacts would improve metabolic control. It is important to remember that the present study's patients are from low income and educated status, with a lot of social issues. In addition, there are other biases to be considered, such as spending more time indoors, contributing to a greater sedentary lifestyle, and possible worsening of the quality of food intake. There was also a predominance of the adolescent age group in the patients of this study, at which time particular characteristics both physiologically (insulin resistance, growth, puberty) and psychologically (social isolation due to the COVID-19 pandemic) may have contributed to a predominance of worsening of the glycosylated hemoglobin values found in these results.

The worsened values and average of HbA1c during telemedicine assistance in this study demonstrate that this new form of patient care needs further studies to ensure adequate clinical management of patients in the future.

Due to the need for a decrease in the number of in-person outpatient consultations, in order to guarantee an effective social distance due to the pandemic by COVID-19, telemedicine provided guidance and assistance to patients. This new form of medical care provided health care for pediatric diabetic patients followed by the Pediatric Endocrinology team. The authors' experience with teleconsultation demonstrated a predominance of worsened HbA1c control in patients. Further studies are needed to assess the real impact of this new form of care in the clinical follow-up of

patients with chronic diseases, such as those with T1DM in the pediatric age group.

Conflicts of interest

The authors declare no conflicts of interest

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References

1. Mahaese E. Covid-19: WHO declares pandemic because of alarming levels of spread, severity, and inaction. *BMJ*. 2020;368:m1036.
2. Johns Hopkins University and medicine. Coronavirus Resource Center. [Cited 2021 March 10]. Available from: <http://coronavirus.jhu.edu/map.html>.
3. Brazil. Ministry of Health. Coronavirus Panel. [Cited 2021 March 10]. Available from: <http://covid.saude.gov.br>.
4. São Paulo. Health Secretariat of São Paulo. Distribution of population, cases and deaths. 2020. [Cited 2021 March 10]. Available from: <http://seade.gov.br/coronavirus>.
5. Brazilian Diabetes Society. Guidelines of the Brazilian Diabetes Society 2019-2020. Part 1. 14..
6. Brazilian Society of Pediatrics. Alert note: Diabetes mellitus and COVID-19 in Pediatrics. [Cited 2021 March 10]. Available from: https://www.sbp.com.br/fileadmin/user_upload/22440b-NA-Diabetes_Mellitus_e_COVID-19_em_Pediatria.pdf
7. Federal Council of Medicine. CFM Official Letter No. 1756/2020 - COJUR. March 19 2020. Law n 13,989, of April 15, 2020. *Diário Oficial da União*. April 16, 2020, edition 73, section 1, page 1.
8. Telemedicine. Opportunities and developments in member states (Internet). second ed Geneva, Switzerland: WHO Press; 2010, [Cited 2021 September 19]. Available from: https://www.who.int/goe/publications/goe_telemedicine_2010.pdf.
9. ISPAD Clinical Practice Consensus Guidelines 2018: Glycemic control targets and glucose monitoring for children, adolescents, and young adults with diabetes.
10. Garg SK, Rodbard D, Hirsch IB, Forlenza GP. Managing new-onset type 1 diabetes during the COVID-19 pandemic: challenges and opportunities. *Diabetes Technol Ther*. 2020;22:431–9.
11. Flodgren G, Rachas A, Farmer AJ, Inzitari M, Shepperd S. Interactive telemedicine: effects on professional practice and health care outcomes. *Cochrane Database Syst Rev*. 2015;2015:CD002098.
12. Döğer E, Bozbulut R, Soysal Acar AŞ, Ercan Ş, Kılınc Uğurlu A, Akbaş ED, et al. Effect of telehealth system on glycemic control in children and adolescents with type 1 diabetes. *J Clin Res Pediatr Endocrinol*. 2019;11:70–5.