

Telemedicine in the COVID-19 era: Taking care of children with obesity and diabetes mellitus

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Abstract

Severe acute respiratory syndrome coronavirus 2 infection was declared a pandemic in January 2020. Since then, several measures to limit virus transmission have been imposed; among them, home confinement has been the most severe, with drastic changes in the daily routines of the general population. The “stay at home” rule has impaired healthcare service access, and patients with chronic conditions were the most exposed to the negative effects of this limitation. There is strong evidence of the worsening of obesity and diabetes mellitus in children during this period. To overcome these issues, healthcare providers have changed their clinical practice to ensure follow-up visits and medical consultation through the use of telemedicine. Telemedicine, including telephone calls, videocalls, data platforms of shared telemedicine data platforms mitigated the negative effect of pandemic restrictions. Published evidence has documented good metabolic control and weight management outcomes in centers that performed extensive telemedicine services last year during the pandemic. This review discusses studies that investigated the use of telemedicine tools for the management of pediatric obesity and diabetes.

Key Words: COVID-19; Pandemic; Children and adolescents; Obesity; Diabetes; Telemedicine

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Core Tip: Quarantine confinement during the coronavirus disease 2019 pandemic has negatively impacted patient wellbeing because of difficulties in attending medical consultations. Healthcare providers have offered telemedicine support for patients with

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chronic diseases, such as children with obesity and diabetes, to overcome this obstacle. Telemedicine has been shown to be effective in ensuring continuity of healthcare. Improvements are needed to reduce challenges to social inequalities in telehealth accessibility.

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INTRODUCTION

In January 2019 a new severe acute respiratory syndrome (SARS) caused by a previously unknown coronavirus infection was firstly reported in China[1]. Since then, the diffusion of the so-called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) or coronavirus disease 2019 (COVID-19) has reached pandemic proportion. To date, about 96 million confirmed cases and more than 2 million COVID-19 deaths have been reported worldwide by World Health Organization[2].

With the aim of containing the spread of COVID-19, several governments have imposed restrictive policies promoting social isolation and “stay at home”. National lockdowns lead to sudden and radical changes in social interactions and in study and working conditions. In particular, several economic activities, school attendance, and some healthcare services have been drastically reduced and became less accessible for population. Moreover, even in nations that did not apply quarantine measures, healthcare utilization was reduced because of the fear of being infected[3]. In previous health crises, such as the SARS and Ebola epidemics, declines in healthcare utilization and delayed appointments were associated with poor health outcomes and increased mortality for chronic diseases[4,5].

Similarly, during the past year, patients with diabetes and obesity have experienced a reduced quality and continuity of healthcare support because of reduced contact with healthcare providers. To help minimize this phenomenon and adverse health outcomes, telehealth services have been rapidly implemented in several countries as an alternative to in-person visits[6]. Telemedicine is a powerful tool that allows the continuity of healthcare services; and at the same time, minimizes virus diffusion. Specific infrastructures, healthcare provider skills, and patient Internet/mobile devices are needed to allow the use of telehealth appointments (Table 1). This technology appears to be particularly helpful for the management of chronic diseases such as obesity and diabetes in the context of long-term quarantine measures.

In our Pediatric Department at the University of Campania Luigi Vanvitelli, telemedicine has been performed to ensure continuing clinical management of children and adolescents with type 1 diabetes during two lockdown periods (March-May 2020 and October-December 2020). In our experience, patients were satisfied with the telemedicine service as it allowed them to attend visits while avoiding the risk of being infected. Our patients were confident with continuous glucose monitoring (CGM) and cloud storage of records, but complained of the lack of face-to-face meeting and some Internet-connection issues. Our aim is to review the current literature about the success in applying telemedicine healthcare services in support of pediatric obesity and diabetes.

OBESITY

Indirect consequences of the COVID-19 pandemic on obesity are three-fold; increased incidence of new cases, worsening of disease severity, and barriers to access of healthcare services. In fact, quarantine measures have significantly changed children's daily routines to those favoring an unhealthy lifestyle. Stay at home restrictions have been associated with increased snacking and assumption of high-calorie foods and sugar sweetened beverages[7-9]. In addition, sports activities and outdoor play have been reduced and screen time has increased, favoring sedentary behavior[9,10].

Table 1 Telemedicine infrastructure

Privacy	Security of data should be obtained <i>via</i> platforms ensuring data encryption, integrity, and confidentiality
Technology	Instruments required to ensure good performance of telehealth visits, include Internet stability, webcams, multiaccess platforms, and access to electronic health records
Consent	Patient should give declared consent to telehealth
Billing	Each visit must be well-documented to receive reimbursement. A platform that properly documents care will help with reimbursement procedures

Longitudinal projection models have estimated an increase of pediatric obesity prevalence that is directly related to the duration of lockdown measures. United States school closures for 6 mo in 2020 has been estimated to be responsible of an increase of 2.4 percent points in childhood obesity prevalence and 0.2 z-score body mass index points in 2021[11]. Therefore, there is an urgent need to implement and regulate healthcare support during the COVID-19 pandemic. It should also be taken into account that medical weight management intervention for obese children and adolescents is effective when highly intensive (*i.e.* at least 26 contact h over 6 mo)[12].

To overcome these challenges, telehealth and mobile health technologies have been used alongside standard therapy for pediatric weight management. Available evidence highlights the efficacy of these tools in improving weight loss, behavioral change, and drop-out rate[13-16]. However, data about the use of health technologies as an exclusive intervention for obesity management are scarce. In New York City, the tertiary center for pediatric weight management of New York-Presbyterian, Columbia, and Weill Cornell hospitals, have exclusively performed telemedicine appointments since March 2020. The group provided nutritional, physical activity, and psychological support thanks to a virtual interdisciplinary team. The authors describe how available facilities such as shared electronic health records and the possibility of simultaneous access of several health providers, made a rapid transition to telemedicine possible. They reported an increased rate of access to telemedicine pediatric weight management visits to 76%-89% from 55%-65% before COVID[17]. This increase might be explained by the wide availability of mobile technology in the population and the reduction of barriers linked to the travel needed to reach healthcare services. However, telemedicine has concerns that should be addressed. Firstly, privacy and Internet security should be empowered using safe dedicated platforms for weight management visits that meet regulation requirements. Encryption should be provided to ensure data integrity and confidentiality. In addition, appointment billing forms should clearly describe the time spent by each healthcare provider with the patient and which platform was used for the visit. Moreover, and of great importance, assessment of weight and other parameters, such as blood pressure and heart rate, are important concerns, considering that medical decisions are made on the basis of those parameters[18]. In addition, some patients said that they were not confident with video-call appointments and preferred to wait until in-person visits will be available. That was probably due to social and economic inequalities that constitute barriers to wider acceptance of e-technologies in the population[19]. Those inequalities can be found in other countries. Some countries that already had a telemedicine infrastructure quickly implemented not-in-person healthcare. Others needed a longer time to develop efficient platforms and telemedicine assistance, which had a negative impact on patient wellbeing[20]. Long-term studies will document the effectiveness, accessibility, and feasibility of telehealth in pediatric obesity care. If found to be effective and accessible it may have potential as a key tool even in non-pandemic management.

DIABETES MELLITUS

As with obesity, home confinement imposed by governments during the COVID-19 pandemic has negatively impacted diabetes mellitus management. Limited access to physical activity, fresh foods, and healthcare services are all responsible for poor glycemic control[21]. In addition, the negative psychological effects of confinement and disruption of daily routines on therapy adherence should be considered. Previous studies reported that telehealth, including email, phone calls, and videos, were effective tools in lowering hemoglobin A1c (HbA1c) levels both in type 1 and type 2 diabetes mellitus in addition to face-to-face visits[21-24].

Several studies have evaluated the effects of changes in healthcare services during the COVID-19 pandemic on children with diabetes from the points of view of both patients and healthcare providers. An electronic survey conducted by the International Society for Pediatric and Adolescent Diabetes from March 2020 to April 2020 investigated the most common challenges and management strategies of healthcare professionals taking care of pediatric patients with diabetes[25]. The survey was completed by 215 diabetes centers in 75 countries. Most centers were in the United Kingdom and the United States. In-person visits continued in only 16.5% of the centers, and the majority of patients was followed by telemedicine, with good compliance. However, disparities in telehealth availability were reported[25]. The survey also revealed an increased incidence of severe acute diabetic ketoacidosis (DKA) as for the first time in type 1 diabetes patients. It might be hypothesized that fear of contagion delayed contact with health services, leading to more severe cases that required emergency department care[25]. Similar findings have been reported by the Italian Society for Pediatric Endocrinology and Diabetes, which registered a lower rate of newly diagnosed type 1 diabetes but a higher rate of severe DKA in 2020 compared with 2019[26].

In parallel with the lower rate of new cases, several studies conducted during the COVID-19 pandemic reported an improvement of metabolic control in this period[27-31]. Preschool and school-age children with CGM achieved better metabolic control during home confinement. The results might be explained by closer parental control of meal preparation and glucose monitoring, with consequent therapy modulation that was made possible by the “stay at home” rule[27]. In Italy, a Web-based survey revealed that the methods of communication with healthcare professionals were emails, phone calls and text messages. No cases of DKA were reported during lockdown periods. Younger patients, those who were < 12 years of age, were reported to suffer from quarantine restrictions, especially in their approach to the disease. Those patients were all monitored by remote control of CGM[29]. These technologies are a powerful tool for diabetes management, and a large percentage of patients are confident with CGM and insulin pumps. Data from those instruments can be accessed by healthcare providers who can modulate pharmacotherapy and patient compliance with treatment. Therefore, these tools form the basis for rapid application of telemedicine for diabetes care[32].

A pilot study conducted in Singapore reported good satisfaction from parents and adolescents who received telehealth monitoring of type 1 and type 2 diabetes. The patients were referred to diabetes centers only for blood collection and HbA1c monitoring. Education, therapy changes and blood test results were communicated by telehealth devices. Eighty percent of the interviewed adolescents and their parents reported no difference between face-to-face and telehealth visits, the remaining 20% was more satisfied with telehealth facilities than they were with in-person appointments[33].

Other technologies might be helpful in the telehealth management of diabetes. Remote glycemic monitoring with cloud platforms enables clinicians to continuously monitor glycemic control and to adjust therapy. In addition, multidisciplinary management including dietitians, psychologists, and diabetologists should be performed with multiaccess platforms[34]. Experience with the use of customized nutritional and physical activity counselling during quarantine, preparation of weekly food plans and in-home exercise has been reported to result in improved glycemic control[28].

However, healthcare providers have reported several concerns about exclusive use of telemedicine management for pediatric diabetes. A survey conducted in nine countries reported that most centers had insufficient technological support for teleconference appointments, which made telemedicine time consuming. In addition, instability of Internet connections impaired visit performance by increasing the duration and interfering with interpersonal relationships. Moreover, some patients in low-income countries lacked Internet connections, making telemedicine and videocalls impractical. Furthermore, there were difficulties in teaching families about data sharing and receiving information from telemedicine platforms. Another pitfall, which was highlighted by clinicians, was the impossibility of performing clinical examinations, blood tests and comorbidity screening[35]. Regarding comorbidity screening, some studies have described the usefulness of smartphone imaging devices for remote management of diabetic retinopathy. Those devices acquire non-mydratric eye images that have been shown to have a good reliability for retinopathy screening. To date, most findings have been in adults, and no evidence is from studies conducted during the COVID-19 pandemic. However, teleophthalmology might have promise as a tool for diabetic retinopathy screening and follow-up[36].

Telemedicine appears to be a concrete approach for ensuring continuity of healthcare services for pediatric diabetes. It overcomes distance barriers and is cost effective. However, new-onset cases need in-person healthcare assistance to ensure an adequate clinical evaluation of disease severity and family education in glucose monitoring and therapy.

CONCLUSION

The COVID-19 pandemic has dramatically changed the daily life routines of patients and healthcare professionals. Clinicians had to rapidly adjust their practice to face the challenges of home confinement, and patients with chronic diseases are those who are most exposed to the negative effects of healthcare support disruption. Telemedicine is a powerful tool to address these issues, as it does not expose patients to contagion, it overcomes distance barriers, and it allows a multidisciplinary team approach. However, inequalities resulting from the spread of technology infrastructures and mobile/Internet availability for some patients. Efforts to improve those facilities for both healthcare system and patients are needed.

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