



Isolation and Education During a Pandemic: Novel Telehealth Approach to Family Education for a Child With New-Onset Type 1 Diabetes and Concomitant COVID-19

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A multidisciplinary team, including pediatric endocrinologists, certified diabetes care and education specialists (CDCESs), registered dietitians, psychologists, and social workers is recommended to provide comprehensive medical care and education for children with newly diagnosed type 1 diabetes and their families. Diabetes education can be delivered in an ambulatory setting (home or clinic) or in the hospital inpatient setting (1,2). The standard of care at our pediatric institution, Texas Children's Hospital (TCH) in Houston, is hospital admission for all children with newly diagnosed type 1 diabetes requiring insulin therapy for safe medication management and education. The child, parent(s), and other caregivers receive in-person comprehensive diabetes education by our multidisciplinary team that occurs over ~2 days before hospital discharge.

However, the COVID-19 pandemic has abruptly affected many aspects of human life, including health care delivery. Concurrent new-onset type 1 diabetes and COVID-19 in a pediatric patient pose a unique challenge for the diabetes care and education team. In this case report, we present a child with new-onset type 1 diabetes and concomitant COVID-19 who was admitted to a Special Isolation Unit

(SIU). Rather than our usual in-person pediatric diabetes education, we implemented a novel telehealth approach in an effort to limit the risk of virus transmission to staff and preserve personal protective equipment (PPE), while still achieving the goal of comprehensive new-onset diabetes education.

Case Presentation

A previously healthy, 10-year-old girl presented to a telehealth visit with her pediatrician with a 2-week history of cough, shortness of breath, abdominal pain, and vomiting in the setting of SARS-CoV-2 (COVID-19) positivity in immediate family members. She was immediately sent to the TCH Emergency Center because of concern that she had COVID-19 that would require a higher level of care.

Upon arrival, her review of systems was also positive for polyuria, polydipsia, and unintentional weight loss of 12% of her body weight in the past month. Laboratory evaluation revealed a glucose of 581 mg/dL, A1C >14.0%, β -hydroxybutyrate of 10 mmol/L, and pH of 7.05, consistent with a diagnosis of new-onset diabetes with diabetic ketoacidosis (DKA). Because of her respiratory symptoms and history of exposure to family members with COVID-19, a SARS-CoV-2 PCR test was performed. While the result was pending, the patient was initially admitted to the pediatric intensive care unit for DKA treatment. When a positive SARS-CoV-2 test result was returned, she was transferred to TCH's SIU for continued management.

TCH's SIU is a biocontainment unit designed and staffed to provide both acute and critical care for infants and children with serious or life-threatening infectious diseases. The eight-bed unit consists of negative pressure isolation rooms and contains a Biological Safety Level 3 laboratory. Our patient's DKA resolved on hospital day 2 after management with an insulin drip and intravenous fluids.

Questions

1. How should one provide family education for a child with new-onset type 1 diabetes and concomitant COVID-19 who is admitted to an SIU, especially when

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<https://doi.org/10.2337/cd20-0044>

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the caregiver is also in isolation at home because of COVID-19?

2. What are the components and processes needed to ensure that new-onset diabetes education via telehealth is effective and safe?
3. What are the potential challenges, barriers, and opportunities for telehealth in educating the families of children with new-onset diabetes and concomitant COVID-19?

Commentary

The COVID-19 pandemic has caused immense disruption to health care systems that necessitate the adoption of novel methods for delivering high-quality care. Health care delivery via telehealth has expanded both nationally and internationally in an effort to provide timely and safe medical care while minimizing the risk of transmitting SARS-CoV-2, the virus strain that causes COVID-19 among patients and health care providers (3–7). Telehealth policy changes occurring during the COVID-19 pandemic have evolved rapidly (8). Telehealth has been used in providing care for established patients with diabetes (9–11), as well as for new-onset type 1 diabetes in both pediatric and adult patients (12,13).

In this case report, we present a child with new-onset type 1 diabetes and concomitant COVID-19, which posed a unique challenge for the diabetes care and education team. At our institution, the inpatient diabetes education process is typically started at bedside with the patient and family once DKA has resolved. Given that only limited staff with specialized training were allowed to enter the patient's SIU room and family members were not allowed in the hospital because of her COVID-19 status, we quickly adapted our in-person pediatric diabetes education model to a telehealth platform to deliver safe medical care and education for the patient and her family.

Before the educational telehealth sessions, our new-onset diabetes educational handouts, a blood glucose meter, lancing devices, and insulin pen demonstration kit were couriered to the family's home. The CDCES used the same brand of supplies for telehealth education to avoid any potential confusion for the family. Video conference sessions using a Health Insurance Portability and Accountability Act (HIPAA)-compliant video conferencing platform were scheduled for the parent (who was not at the hospital because of having COVID-19) with the endocrinologist, CDCES, and dietitian. The team oriented the parent to telehealth and the video conference platform.

On the first day of education, the endocrinologist called the parent first to review the care plan and address any

questions and concerns. Using video telehealth, the CDCES conducted a 3-hour comprehensive diabetes education session, and the dietitian provided a nutrition consultation and tailored nutrition plan. The parent successfully demonstrated competency in diabetes care, including the basic knowledge and skills needed to safely manage diabetes at home, by completing and passing our standard post-education assessment. Because of the patient's young age, she was provided limited age-appropriate diabetes self-management education at bedside, including how to use a blood glucose meter, by the nursing staff of the SIU.

The patient coped appropriately during her SIU stay while being separated from her family. She and her family communicated frequently using their personal smart devices to connect virtually face-to-face for greatly needed emotional support. Additionally, our social worker performed comprehensive assessment with the patient and her family via telehealth to identify potential barriers to optimal diabetes management and provided tailored psychosocial support.

The patient was discharged home ~48 hours after admission with strict home quarantine and return precautions. After discharge, a designated CDCES from our new-onset diabetes program contacted the family by phone regularly to review glucose trends, make insulin dose adjustments, and address new concerns. Our psychologist was readily available in case of any psychosocial or behavioral concerns, but no major concerns were identified. Additional telehealth appointments were arranged to educate other family members who would be involved in her diabetes care. Additionally, a telehealth visit with a CDCES was arranged for 2 weeks after discharge to address any educational needs, and a telehealth medical visit with an endocrinologist was scheduled for 4 weeks after discharge. A timeline of patient's care is summarized in Table 1. At the time of this writing, the patient and family are doing well with diabetes management, and they expressed satisfaction with the care and education they received.

Our novel telehealth approach to family education for a child with new-onset type 1 diabetes and concomitant COVID-19 serves as an example of swiftly adapting diabetes education during a pandemic crisis. Notably, our patient did not have a prolonged hospital stay compared with similar cases with traditional in-person bedside teaching. Her clinical course was without any further complications from COVID-19 or diabetes, consistent with anecdotal reports from the International Society of Pediatric and Adolescent Diabetes that children with

TABLE 1 Timeline of Care

		Events
Presentation	Emergency center	Patient was sent to the TCH emergency center by her primary care provider for the concern of COVID-19 infection requiring a higher level of care. Laboratory tests confirmed new-onset type 1 diabetes with DKA. Treatment was started.
Inpatient	Hospital day 1	Patient was admitted to pediatric intensive care unit to continue DKA management while awaiting SARS-CoV-2 PCR test result.
	Hospital day 2	Patient was transferred to SIU after a positive SARS-CoV-2 PCR result was received. After DKA was resolved, she was transitioned to subcutaneous insulin injections, and logistics of telehealth education were planned.
	Hospital day 3	Patient and her parent completed telehealth consultation and education with the inpatient endocrinologist, CDCES, and dietitian. She was discharged ~48 hours after admission.
Outpatient plans	5 days after discharge	Diabetes education was provided for two other family members via telehealth.
	2 weeks after discharge	Second diabetes education session as held for the primary caregiver via telehealth.
	4 weeks after discharge	Telehealth visit was held with endocrinologist.

diabetes have not shown a different disease pattern compared with children who do not have diabetes (14).

We did not experience barriers to technology use with the parent of our patient; however, other situations may raise additional challenges to educating the families of children with new-onset diabetes via telehealth. These may include: 1) families with poor computer/technology literacy; 2) families with no telephone, computer, or Internet access; 3) families for whom English is not the primary language, thus requiring the need of a translator (audio or video); and 4) if the patient is an infant or toddler. Additionally, for families without previous medical experience, there may be significant limitations to delivering telehealth education, especially for teaching procedural and hands-on skills such as checking blood glucose and giving insulin injections.

Further research, innovation, and quality improvement methodologies are needed to deliver safe and optimal medical care in a time of pandemic requiring special isolation. To improve the telehealth diabetes education experience at our institution, we are using existing educational videos and creating new ones in both English and Spanish to address specific knowledge gaps. Recently, we have also procured real-time continuous glucose monitoring (CGM) devices, for which the U.S. Food and Drug Administration has expanded use to include the inpatient setting in light of the current pandemic (15).

Remote monitoring of real-time CGM data by the health care team eliminates the need for frequent fingerstick glucose checks, thus allowing the staff to minimize contact with infected patients and preserve valuable PPE.

Clinical Pearls

- Concurrent new-onset diabetes and COVID-19 pose a unique challenge for delivering effective diabetes care and education.
- During the COVID-19 pandemic, health care professionals need to be creative, flexible, and agile in adapting to alternative methods of delivering the same high standards of diabetes care and support as before the pandemic.
- Telehealth via HIPAA-compliant videoconferencing represents a feasible, safe, and effective approach to providing inpatient medical management and family education for a patient with new-onset diabetes and concomitant COVID-19.
- Our approach could be used in other situations such as involving a noncustodial parent or other family member who may not live close and needs education to have visitation with the child with diabetes.

ACKNOWLEDGMENTS

The authors acknowledge the following individuals for their contributions to the care and education of this patient and her family: Dawn Espinosa, RD, Caroline Elenburg, CDCES, RD, and

Dana Hrobar, CDCES, RD, for their quick thinking and creativity in developing a remote diabetes education plan for the family within hours of her being transferred to the SIU; Carlos Avila for facilitating scheduling of the TeleVideo appointments and guiding the family to prepare for the telehealth medical care and education delivery; Felicia Denner, FNP, for providing impromptu telehealth education and tips to our diabetes team; April Poncik, RN, SIU nurse who provided age-appropriate bedside diabetes education for the patient; and Amy Arrington, MD, PhD, medical director of the TCH SIU, who was the primary attending physician for the patient during her admission and provided her medical care. The authors also thank Maria J. Redondo, MD, PhD, for her review and comments on this manuscript.

DUALITY OF INTEREST

No potential conflicts of interest relevant to this article were reported.

AUTHOR CONTRIBUTIONS

R.S.S. and A.L.C. wrote the first draft of the manuscript. C.W.T. conducted diabetes education. T.R.P. conducted nutrition consultation. All other authors contributed to discussion and reviewed/edited the manuscript. Y.L. wrote the manuscript and critically reviewed/edited the manuscript and oversaw its progress. Y.L. is the guarantor of this work and, as such, had full access to all data and takes responsibility for the integrity of the data and accuracy of the information presented.

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