



Closing Disparities in Pediatric Diabetes Telehealth Care: Lessons From Telehealth Necessity During the COVID-19 Pandemic

Priya Prahalad,^{1,2} Brianna Leverenz,¹ Alex Freeman,¹ Monica Grover,¹ Sejal Shah,¹ Barry Conrad,¹ Chris Morris,¹ Diane Stafford,¹ Tzielan Lee,³ Natalie Pageler,^{4,5} and David M. Maahs^{1,2}

The coronavirus disease 2019 (COVID-19) pandemic necessitated using telehealth to bridge the clinical gap, but could increase health disparities. This article reports on a chart review of diabetes telehealth visits occurring before COVID-19, during shelter-in-place orders, and during the reopening period. Visits for children with public insurance and for those who were non-English speaking were identified. Telehealth visits for children with public insurance increased from 26.2% before COVID-19 to 37.3% during shelter-in-place orders and 34.3% during reopening. Telehealth visits for children who were non-English speaking increased from 3.5% before COVID-19 to 17.5% during shelter-in-place orders and remained at 15.0% during reopening. Pandemic-related telehealth expansion included optimization of workflows to include patients with public insurance and those who did not speak English. Increased participation by those groups persisted during the reopening phase, indicating that prioritizing inclusive telehealth workflows can reduce disparities in access to care.

Telehealth has been used to successfully deliver pediatric diabetes care (1–3) and is generally well accepted by patients and caregivers (4–6). Much like other centers worldwide (7–11), Stanford Children’s Health rapidly expanded telehealth capacity during the coronavirus disease 2019 (COVID-19) pandemic. In this observational study of retrospective data from July 2017 to June 2019 and prospective data from July 2020 onward, we describe the population of patients attending telehealth visits before the COVID-19 pandemic (1 July 2017 to 15 March 2020), during shelter-in-place conditions (15 March to 30 June

2020), and during the partial reopening (16 March to 31 October 2020). We describe workflows developed in our practice to reduce disparities in telehealth use.

Research Design and Methods

Clinic Description

The diabetes clinic at Stanford Children’s Health has three primary locations in Northern California and two satellite clinics. The clinic takes care of 1,000 children with diabetes, 38.4% of whom have public insurance and 17.4% of whom are non-English speaking. Certified diabetes care and education specialists (CDCESs), registered dietitians (RDs), social workers, and interpreters are available at all clinic visits.

Study Population

All telehealth visits for diabetes between 1 July 2017, when the program started, and 31 October 2020 were identified. Institutional review board approval was obtained on 2 July 2019 to retrospectively collect data from July 2017 to May 2019 and prospectively going forward. Data on telehealth visits were pulled from the medical record system based on an encounter type of “Telehealth.” Chart review was performed to obtain patients’ primary language and insurance type.

Telehealth Workflow Changes During the COVID-19 Pandemic

Stanford Children’s Health enabled telehealth visits to patients’ homes starting in July 2017. Patients and

¹Division of Pediatric Endocrinology, Stanford University, Stanford, CA; ²Stanford Diabetes Research Center, Stanford University, Stanford, CA; ³Division of Pediatric Rheumatology, Stanford University, Stanford, CA; ⁴Division of Critical Care Medicine, Stanford University, Stanford, CA; ⁵Information Services Department, Stanford Children’s Health, Stanford, CA

Corresponding author: Priya Prahalad, prahalad@stanford.edu

<https://doi.org/10.2337/cd20-0123>

©2022 by the American Diabetes Association. Readers may use this article as long as the work is properly cited, the use is educational and not for profit, and the work is not altered. More information is available at <https://www.diabetesjournals.org/journals/pages/license>.

families who elected to have telehealth visits were required to have a stable Internet connection, Epic MyChart, and access to a laptop or desktop computer. In November 2017, mobile device functionality was added to increase access for patients. Providers chose candidates for telehealth and approached families to schedule telehealth visits for their next follow-up appointments (Figure 1A). Diabetes providers specifically required families to upload diabetes data the night before a visit and obtain a laboratory A1C if their child with diabetes was not on a continuous glucose monitoring (CGM) system. For those using CGM technology, providers used the glucose management index CGM metric as a proxy for A1C.

Providers were responsible for connecting to the visits themselves, troubleshooting connection issues, asking patients for the location of their device data, and accessing the downloaded data. If patients were unable to upload their diabetes data, providers would walk them through the process.

Before the COVID-19 pandemic, patients could meet with physicians, nurse practitioners, CDCESs, and diabetes psychologists using the telehealth platform. Social workers and RDs did not have workflows for telehealth visits and therefore could not participate. If providers were performing telehealth visits from sites with an in-person interpreter, providers could use an interpreter at the site; otherwise, providers would have to use telephone interpreters.

The San Francisco Bay Area issued COVID-19 shelter-in-place orders on 16 March 2020, and a majority of visits for diabetes were transitioned to telehealth. A

divisional clinical operations group was established with site leads to rapidly iterate virtual visit processes (Figure 1B). During this time, there were no strict entry criteria for telehealth other than being able to connect to the Internet. Patients could upload their diabetes data or send a picture of handwritten glucose logs. CDCESs contacted families on the day before their clinic visit with device download assistance or instructions on sending photographs of handwritten logs. On the day of the telehealth visit, medical assistants (MAs) or front desk staff called patients 15 minutes before their appointment to connect them to the visit and troubleshoot connection issues. They also determined where device data were uploaded and messaged this information to providers. Since the transition to telehealth occurred at the institutional level, protocols were developed for social workers and RDs to participate in telehealth and for hospital-employed interpreters to join virtually in a multiparty telehealth visit. In addition, approval was provided for telehealth to occur from the home of health care providers, clinic staff, and interpreters. During the reopening phase, the same processes were used.

Statistical Analysis

χ^2 Calculations were performed to determine the change in the proportion of patients who were non-English speaking and/or publicly insured and were accessing telehealth. Pre-COVID-19 visits were compared with shelter-in-place and reopening visits. Reopening visits were compared with shelter-in-place visits to assess the sustainability of our efforts. A *P* value <0.05 was considered statistically significant.

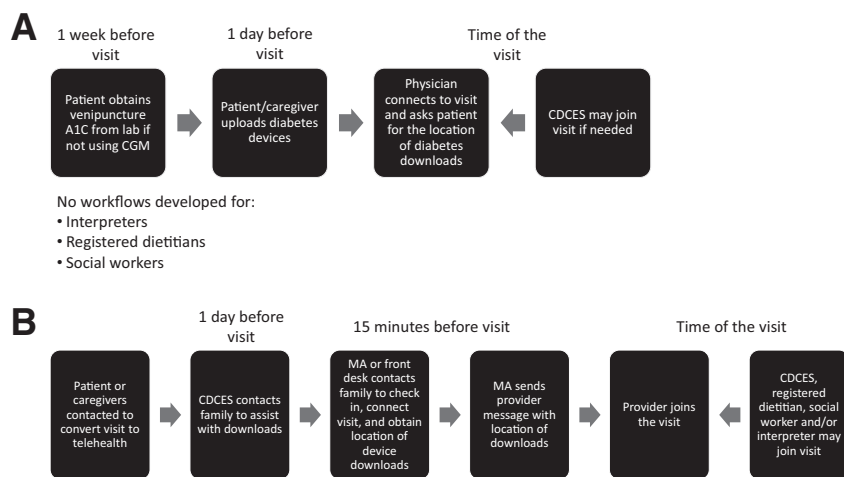


FIGURE 1 Workflows for telehealth visits before the COVID-19 pandemic (A) and after the development of improved workflows during the COVID-19 pandemic (B).

Results

Growth of Telehealth Over Time

Between 1 July 2017 and 31 October 2020, there were a total of 2,106 telehealth visits by 906 unique patients. Before COVID-19, there were a total of 172 telehealth visits (102 unique patients) by 13 providers; during shelter-in-place orders, there were 977 telehealth visits (672 unique patients) by 29 total providers; and during reopening, there were 957 telehealth visits (550 unique patients) by 32 providers.

Patients Across Demographics Could Participate in Telehealth Visits

Before COVID-19, patients were only able to participate in telehealth visits if they were referred by their provider. In this period, only 26.2% of virtual visit participants were publicly insured (Figure 2A) compared with 38.4% of our overall diabetes population. When COVID-19 necessitated a transition to all virtual clinics, telehealth was offered to all individuals, and 37.3% of the telehealth visits during the shelter-in-place period were for individuals with public insurance. This 42.4% increase in telehealth visits in the publicly insured population was statistically significant ($P = 0.005$). Telehealth uptake by children with public insurance was greater during reopening than before COVID-19 ($P = 0.04$). There was no difference in telehealth uptake between the shelter-in-place and reopening periods.

Similarly, because of inconsistent interpreter workflows, only 3.5% of visits before COVID-19 were with non-English-speaking patients (Figure 2B) despite 17.4% of the overall diabetes population identifying as non-English-speaking. The development of interpreter workflows during the COVID-19 pandemic led to 17.5%

of telehealth visits being conducted with non-English-speaking patients, and this increase (4.97-fold) was also statistically significant ($P < 0.001$). Telehealth uptake by non-English-speaking patients remained higher during reopening compared with before COVID-19 ($P < 0.001$), and there was no difference compared with shelter-in-place visits.

When grouping patients by both insurance type and primary language, the majority of telehealth visits before COVID-19 were for privately insured patients who spoke English, followed by publicly insured patients who spoke English (Table 1). During the shelter-in-place period, the percentage of publicly insured patients who were non-English speaking increased ($P < 0.001$). In the reopening phase, while the percentage of visits by patients who were non-English speaking with private insurance and English speaking with public insurance remained stable, the percentage of visits by non-English-speaking patients with public insurance decreased from 14.3% during the shelter-in-place period to 11.2% during reopening ($P = 0.04$) but remained significantly higher than before COVID-19 ($P = 0.02$).

Discussion

Before the COVID-19 pandemic, our diabetes clinic had clear disparities in telehealth participation. In our diabetes population, 38.4% of patients have public insurance, but only 26.2% of telehealth visits before the pandemic were for children with public insurance. The cause of this disparity is unclear, but it is likely multifactorial and related to both provider-level and patient-level barriers. Providers would identify patients they thought were good candidates for telehealth, and this process may have been influenced by implicit bias on providers' part about families' ability to successfully participate in telehealth visits. Data from the American

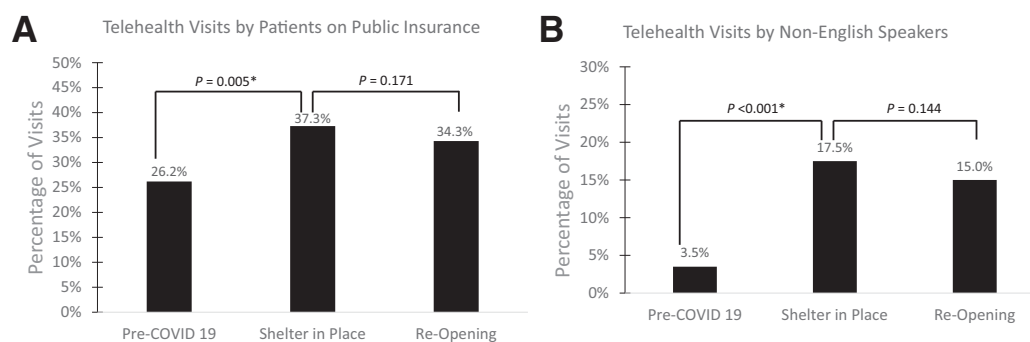


FIGURE 2 A: Percentage of telehealth visits by patients with public insurance before and during COVID-19. B: Telehealth visits by non-English-speaking patients before and during COVID-19.

TABLE 1 Proportion of Visits by Insurance and Language Types

Insurance and Language Group	Before COVID- 19 (n = 171)	During Shelter-in-Place Period (n = 977)	During Reopening Period (n = 957)
Private insurance, English, %	73.8	59.5	61.9
Private insurance, non-English, %	0	3.2	3.9
Public insurance, English, %	22.7	22.9	23.0
Public insurance, non-English, %	3.5	14.3	11.2

Academy of Pediatrics’ California chapter and the Children’s Specialty Care Coalition suggest that provider bias about patients’ access to broadband Internet plays a role in telehealth adoption (12).

In addition, systemic barriers such as the absence of established workflows for ancillary team members also play a role. Non-English speakers are disproportionately represented among patients with public insurance, and the lack of interpreter workflows may have contributed to lower telehealth uptake by publicly insured patients before COVID-19. The gap in telehealth visits for patients with public insurance closed during the shelter-in-place period and was sustained during reopening. The gap in telehealth visits for non-English-speaking patients with public insurance closed during the pandemic but was not fully sustained during reopening, although levels remained higher than they had been before COVID-19.

Although we made great strides in reducing some of our disparities, some patients with limited Internet and/or technology access may have been lost to care. Only 73% of American households have access to broadband Internet at home, whereas 81% of American adults have access to a smartphone (13). Innovative approaches such as telehealth visits to school or partnerships with primary care providers are being explored to offer telehealth to patients with limited Internet or device access (14,15).

Limitations of data include that it comes from a single site with incomplete electronic medical records of race and ethnicity. However, the population seen in our clinic is diverse. More than 38% of the population has public insurance, and 17.4% are non-English speaking. Telehealth has great potential to enable the delivery care while minimizing burdens on youths with diabetes and their families, and our experience can help to inform telehealth processes outside of our institution.

Our data suggest that, before COVID-19, there may have been implicit bias in the selection of patients for telehealth, which created significant disparities in access to care, specifically for patients on public insurance and those who did not speak English. The mass transition to telehealth necessitated by the COVID-19 pandemic demonstrated that many patients can successfully participate in telehealth visits. When telehealth is no longer a necessity, telehealth should be offered to all patients to reduce the implicit bias in provision of telehealth services. In addition, we need to maintain the progress achieved in developing workflows to allow for successful telehealth visits, as well as workflows for key team members such as social workers, RDs, and interpreters to participate in these visits. We should be cognizant of the fact that not everyone has access to the technology needed for successful telehealth visits and develop creative solutions to overcome that barrier. Well-developed workflows can expand the population who benefits from telehealth. Thoughtful application of telehealth has the potential to reduce disparities in care.

FUNDING

This project was supported by a Stanford Diabetes Center Pilot & Feasibility Grant (P30DK116074) and National Institute of Diabetes and Digestive and Kidney Diseases grant R18DK122422. Philanthropic funding was provided through the LPCH Auxiliaries endowment to help with CGM coverage for a subset of patients.

DUALITY OF INTEREST

D.M.M. has received research support from the National Institutes of Health, JDRF, the National Science Foundation, and the Helmsley Charitable Trust, and his institution has received research support from Bigfoot Biomedical, Dexcom, Insulet, Medtronic, Roche, and Tandem. He has also consulted for Abbott, Dompé, Eli Lilly, the Helmsley Charitable Trust, Insulet, Medtronic, Novo Nordisk, and Sanofi. No other potential conflicts of interest relevant to this article were reported.

Downloaded from <http://ada.silverchair.com/clinical/article-pdf/40/2/153/672940/diacleincd200123.pdf> by guest on 15 August 2022

AUTHOR CONTRIBUTIONS

P.P. and D.M.M. designed the research study. P.P. and B.L. performed the research and analyzed the data. P.P., A.F., M.G., S.S., B.C., C.M., D.S., T.L., N.P., and D.M.M. contributed to the implementation of study procedures. P.P. wrote the manuscript. B.L., A.F., M.G., S.S., B.C., C.M., D.S., T.L., N.P., and D.M.M. reviewed and provided feedback on the manuscript. P.P. is the guarantor of this work and, as such, had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

REFERENCES

1. Bakhach M, Reid MW, Pyatak EA, et al. Home telemedicine (CoYoT1 Clinic): a novel approach to improve psychosocial outcomes in young adults with diabetes. *Diabetes Educ* 2019;45:420–430
2. Crossen S, Glaser N, Sauers-Ford H, Chen S, Tran V, Marcin J. Home-based video visits for pediatric patients with poorly controlled type 1 diabetes. *J Telemed Telecare* 2020;26:349–355
3. Wan W, Nathan AG, Skandari MR, et al. Cost-effectiveness of shared telemedicine appointments in young adults with T1D: CoYoT1 trial. *Diabetes Care* 2019;42:1589–1592
4. Dean P, O'Donnell M, Zhou L, Skarsgard ED. Improving value and access to specialty medical care for families: a pediatric surgery telehealth program. *Can J Surg* 2019;62:436–441
5. Iacono T, Dissanayake C, Trembath D, Hudry K, Erickson S, Spong J. Family and practitioner perspectives on telehealth for services to young children with autism. *Stud Health Technol Inform* 2016;231:63–73
6. Losiouk E, Lanzola G, Del Favero S, et al. Parental evaluation of a telemonitoring service for children with type 1 diabetes. *J Telemed Telecare* 2018;24:230–237
7. Ahn DT. The COVID-19 pandemic: a “tech”-tonic shift toward virtual diabetes care. *J Diabetes Sci Technol* 2020;14:708–709
8. Andrikopoulos S, Johnson G. The Australian response to the COVID-19 pandemic and diabetes: lessons learned. *Diabetes Res Clin Pract* 2020;165:108246
9. 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;22:431–439
10. Peters AL, Garg SK. The silver lining to COVID-19: avoiding diabetic ketoacidosis admissions with telehealth. *Diabetes Technol Ther* 2020;22:449–453
11. Venkatesh N, Paldus B, Lee MH, MacIsaac RJ, Jenkins AJ, O'Neal DN. COVID-19, type 1 diabetes clinical practice, research, and remote medical care: a view from the land down-under. *J Diabetes Sci Technol* 2020;14:803–804
12. Vigi J, Kattlove J, Litman R, Marcin J, Calouro C, Kwong MW. Realizing the promise of telehealth for children with special health care needs. Available from <https://collections.nlm.nih.gov/catalog/nlm:nlmuid-101666172-pdf>. Accessed 28 July 2021
13. Anderson M. Mobile technology and home broadband 2019. Available from <https://www.pewresearch.org/internet/2019/06/13/mobile-technology-and-home-broadband-2019>. Accessed 12 July 2020
14. McConnochie KM, Wood NE, Herendeen NE, ten Hoopen CB, Roghmann KJ. Telemedicine in urban and suburban childcare and elementary schools lightens family burdens. *Telemed J E Health* 2010;16:533–542
15. Wood CL, Clements SA, McFann K, Slover R, Thomas JF, Wadwa RP. Use of telemedicine to improve adherence to American Diabetes Association standards in pediatric type 1 diabetes. *Diabetes Technol Ther* 2016;18:7–14