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From Surviving to Thriving: A Qualitative Study of Adapting Telehealth Systems for Specialty Diabetes Care Across Four California Medical Centers

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Telehealth continues to play an important role in specialty diabetes care, but there are variations in how this care is delivered. This article reports on clinician and clinic staff perspectives on providing specialty telehealth diabetes care at four large academic medical centers in California and provides several key recommendations for optimizing telehealth-delivered diabetes care.

For people with type 1 diabetes or complicated type 2 diabetes, specialty diabetes care is necessary to maintain quality of life and avoid adverse health outcomes. The American Diabetes Association recommends routine visits with an endocrinologist for these individuals to maintain optimal control of their diabetes (1). Missed diabetes visits are associated with suboptimal glycemic control and increased diabetes-related complications (2).

Telehealth is one strategy for improving access to endocrinologists, who are scarce and concentrated in urban areas (3–6). Outpatient specialty diabetes care is particularly amenable to telehealth because of its reliance on patient-generated data and limited need for physical exams and procedures. Despite this, telehealth was uncommon in diabetes care before the coronavirus disease 2019 (COVID-19) pandemic. However, in spring of 2020, there was rapid adoption of telehealth because the public health emergency allowed reimbursement for telehealth visits and stay-at-home orders prohibited in-person interactions (7).

More than 3 years after the beginning of the pandemic, telehealth care for diabetes remains common. As

telehealth continues to play a central role in how people with diabetes receive specialty care, it is necessary to deliberately optimize telehealth operations, workflows, and systems, recognizing that these adaptations may differ from best practices for in-person care delivery. The first step toward thoughtful adaptation is an understanding of the practices that facilitate high-quality care; however, evidence examining specific practices around telehealth for diabetes care is scarce (8). To fill this gap, we conducted a qualitative study of clinician and staff perspectives on providing telehealth specialty diabetes care at four large academic medical centers in California. The purpose of this study was to identify clinic- and provider-level practices that have positive and negative impacts on the provision of telehealth specialty diabetes care.

Research Design and Methods

Setting, Participants, and Study Design

We conducted and reported our study in adherence to the COREQ (Consolidated Criteria for Reporting Qualitative Research) guidelines (9). For this qualitative study, we conducted interviews with providers and staff involved in specialty diabetes care across four University of California (UC) health systems: UC Davis, UC San Francisco, UC Los Angeles, and UC San Diego. We identified participants through purposeful sampling, starting with existing contacts within the health systems, to identify information-rich cases. Participants were recruited through direct e-mail, and subsequent participants were identified through snowball sampling.

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Most participants were not already known to the study team. We continued to recruit participants until we had achieved thematic saturation and had spoken with at least one pediatric endocrinologist, adult endocrinologist, diabetes educator, and administrative staff member at each institution. Interviews were completed via videoconference between January and August 2022. This study was approved by the UC Davis Institutional Review Board.

Interview Guide

The authors created a semistructured interview guide based on previous literature on telehealth for specialty diabetes care (10–12) and the authors' collective experience with telehealth diabetes care. The guide included open-ended questions asking participants to describe how telehealth is offered in their clinic, their experience with telehealth, their perceptions of the appropriateness of telehealth for different types of individuals and situations, challenges they have faced, helpful practices, and plans for using telehealth in the future. The guide also included structured questions about telehealth policies, telehealth use in the clinics before the pandemic, attendance and no-show rates during telehealth visits, and use of specific platforms or technologies. The interview guide was pilot-tested with a pediatric endocrinologist (S.S.C.), who was also involved in the development of the guide.

Qualitative Analysis

One faculty researcher (S.C.H.) and one medical student trained in qualitative methods (M.S.) conducted the interviews. Interviews lasted ~60 minutes each and were transcribed verbatim by a professional transcription service. Data were analyzed using qualitative content analysis with the qualitative software Dedoose (13). The researchers (S.C.H. and M.S.) then used line-by-line coding to code each transcript using the constant comparative method, through which each line is compared with previous lines to identify themes (14). The researchers met after independently coding the first three transcripts to discuss and refine the codebook and subsequently met three additional times to discuss additional codes and preliminary themes. Excerpts were categorized by code and reviewed by the larger research team. Recommendations were generated and refined through group discussion of themes.

Results

All clinicians approached agreed to participate in an interview except three, who did not respond to the

recruitment e-mail. We completed interviews with 26 participants, including 5 pediatric endocrinologists, 7 adult endocrinologists, 4 diabetes educators, 2 diabetes pharmacists, and 8 administrative staff members involved in diabetes care (including patient navigators, medical assistants, and clinic managers/supervisors). Participants reported a mix of telehealth use in their practice, with some offering primarily telehealth visits and others offering telehealth only on certain days or when requested by a patient. The six main themes derived from the interviews and corresponding recommendations were grouped into two major categories: 1) optimizing telehealth operations for specialty diabetes care and 2) improving quality of telehealth diabetes visits. Table 1 summarizes the identified themes and recommendations.

Category 1: Optimizing Telehealth Operations

Theme 1. Maximizing remote access to patients' diabetes data

Specialty diabetes care involves reviewing patients' diabetes data to assess how they are managing their diabetes on a daily basis. These data are typically obtained from continuous glucose monitoring (CGM) devices, insulin pumps, and/or blood glucose meters. During visits, clinicians review these data with patients and adjust treatment as needed. For in-person visits, individuals commonly bring their devices to the clinic, where office staff upload their data to a secure, Web-based platform for their clinician to view. However, telehealth visits require that individuals upload their own data to these platforms before visits. Although many newer diabetes devices allow for passive uploading from a mobile device, configuring and maintaining this capability can be challenging for individuals without a high level of digital literacy.

Our study participants reported that most of their patients (an estimated 75–95%) are currently able to upload their data successfully before telehealth visits. Some clinics had developed more effective strategies to maximize patients' success at uploading data before telehealth visits. One strategy that was viewed as highly effective was designating "diabetes navigator," an administrative staff person who could be responsible for reaching out to patients before visits to ensure that their device data were uploaded and to assist with this process as needed. Effective diabetes navigators also work proactively with patients during in-person visits to ensure that they are prepared to upload data remotely for future telehealth visits.

TABLE 1 Summary of Themes and Recommendations**Category 1. Optimizing Telehealth Operations for Specialty Diabetes Care**

Theme 1. Remote access to patient-generated glucose data is essential for high-quality telehealth diabetes visits.

Recommendation 1. Adopt strategies and workflows that maximize data collection ahead of video visits, such as using designated diabetes navigators and check-in calls.

Theme 2. Many people have difficulty scheduling follow-up visits after a telehealth appointment.

Recommendation 2. Develop workflows to facilitate efficient and easy scheduling of follow-up appointments for telehealth visits, such as video interaction with check-out staff.

Theme 3. Team-based care is important for diabetes management but can be difficult to deliver via telehealth.

Recommendation 3. Develop workflows that allow for effective and efficient team-based care using synchronous and asynchronous interactions.

Category 2. Improving Quality of Telehealth Diabetes Visits

Theme 4. Telehealth provides unique opportunities for providers to understand the patient's home environment and provide relevant education.

Recommendation 4. Take advantage of the patient's home environment (e.g., looking at pill bottles, equipment, and food labels) to identify potential challenges in diabetes self-care and offer pertinent advice.

Theme 5. Patients often treat video visits with less focus and attention than in-person visits (e.g., joining the visit while driving or in another distracting environment), which leads to poor-quality visits.

Recommendation 5. Set expectations for video visits using formal guidelines that are communicated to patients ahead of time.

Theme 6. Telehealth offers an opportunity to review patient data together using screen sharing, which can improve therapeutic insights for patients and clinicians.

Recommendation 6. Integrate data sharing into telehealth visits and adopt platforms that make this possible.

“One of the more common [diabetes devices] can now be uploaded through a mobile device. But it takes a really long time and a lot of connection to data. So, we’re trying to reach out to those families more ahead of time and get them started on it like a week ahead so it can sync.”—Diabetes navigator 1

For clinics that do not have the assistance of a diabetes navigator or other designated staff person, a significant amount of physician time (including during visits) is often spent helping patients upload data or read data verbally.

“I will say, I have spent a lot of visits essentially being tech support. That is a very common theme, especially earlier in the pandemic. Lots of visits, I spent entire visits with people like just figuring out how to get their [CGM system] connected or how to get their pump connected.”—Adult endocrinologist 5

Theme 2: Ensuring the follow-up visits are scheduled after a telehealth appointment

Providers reported unreliable and inconsistent methods of scheduling follow-up visits after telehealth visits. Many reported that a lack of an efficient workflow led to delays in care for some patients.

“When a person comes into clinic, they leave, and they see some person to check out, right? And when they check

out, they schedule a visit. We don’t have a very good . . . follow-up . . . for the video visit. So a lot of the patients on the video visits don’t schedule their follow-up immediately. And then, like 4 months later, like, ‘Was I supposed to see you?’ And so, that is a little bit of an issue in terms of follow-up, and that may delay the frequency or change the frequency [at] which a patient might be seen.”—Adult endocrinologist 2

Given that lapses in care are associated with short- and long-term morbidity for people with diabetes (15–19), effort is needed to develop and implement mechanisms to ensure that individuals are appropriately scheduled for follow-up in a timely manner. One strategy adopted by some clinics was to automatically schedule follow-up appointments for patients and send this information to them via e-mail, Web portal, and/or telephone. Other clinics attempted to have check-out staff join at the end of video visits or call patients by phone directly after telehealth visits, although this required additional coordination between providers and staff members who were not colocated. One participant mentioned using a dot phrase (a shortcut phrase that can be quickly inserted into a patient note) to mimic the in-person process of scheduling through the front desk. However, others mentioned that front desk staff were sometimes unable to reach patients by phone reliably.

“Now, I have a dot phrase that I just shoot to my front desk saying, ‘Hey, please schedule the next follow-up.’” —Adult endocrinologist 5

Theme 3: Translating team-based care to telehealth visits

Specialty diabetes care is designed and recommended to include many team members in addition to an endocrinologist, including diabetes educators, registered dietitians, diabetes pharmacists, and other staff (1). In-person visits benefit from the physical presence of these team members in one place, but lack of colocated teams can present a barrier to effective telehealth diabetes care or require additional intrateam coordination.

“It’s just me and the patient [on video]. And then, any other follow-up needs that they have would happen separately. Which, that’s like a stark difference, right? Because in person, you can just grab the diabetes educator and be like, ‘Hey, do you have a minute?’ and spend 5 minutes with the person talking . . . and we don’t have that in telemedicine . . . For some reason, I have the perception that, when we’re all just in person, we are frequently running late all the time and so maybe it was less of a big deal to be like, ‘Hey, can I grab you for a second?’ . . . but I would be a lot less likely to go find someone and bring them into my video visit, and I’m wondering why that is? I think, honestly, it would make me feel like I was running more behind, and I don’t know if they’re available.” —Pediatric endocrinologist 2

Some providers reported that they relied heavily on text messages to invite other members of the care team to join a telehealth visit. Other clinics adopted separate appointments such that individuals were scheduled for visits with a physician and a diabetes educator on different days. Some providers minimized the negative impact of virtual visits on this system by conducting telehealth visits in the clinic.

“I actually do my video from clinic, typically. So, I’ll take one of the clinic iPads into an exam room, and I’ll be doing it in there. And then, I’ll pop out and find my nurse and ask for them to go on video. But a lot of providers do the video from home. So they’re not in the clinic, and they’re just texting the other team members saying, ‘Can you join?’” —Pediatric endocrinologist 1

Category 2: Improving Quality of Telehealth Visits

Theme 4: Using patients’ home environment to inform their care

One advantage of telehealth cited by study participants is that it allows care team members to view and better

understand patients’ home environment, which can be particularly relevant and helpful in diabetes care. Clinicians and educators reported that they were able to perform more effective medication reconciliation by asking patients to show them medications and devices, which also prompted discussions about management strategies the patients use at home (e.g., carbohydrate counting).

“I certainly feel like I can see their home environment better if I ask questions about, like, if there’s not clarity about the medications they’re taking, maybe, ‘Go and pull them out, and we can look at them together.’” —Pediatric endocrinologist 1

“Some of the benefit of being on telemedicine is that you kind of get a little bit of a window into someone’s world, right? And, in diabetes care, it’s all about how well you know the person and, you know, their social history.” —Adult endocrinologist 7

Theme 5: Setting expectations for telehealth visits

Study participants reported that the quality of telehealth diabetes care is highly dependent on where patients (and caregivers, for pediatric visits) are located at the time of the visits. Many clinicians cited disruptive environments in which patients are not giving their full attention as a major impediment to conducting successful visits (e.g., if patients are driving or shopping during visits). Some clinicians perceived this to mean that patients were not treating telemedicine visits as “real” visits.

“I had a patient who was shopping in [the grocery store] for her first visit . . . And, you see that more and more. They’re in the car, there’s noise, there is video signal loss, and they’re driving and wanting a new patient visit . . . I think it’s really [that] they don’t appreciate that this is a clinic visit.” —Adult endocrinologist 6

“I’ve talked to people when they’re at the airport, they’re waiting for a flight, or they’re at the beach or whatever. What I try to do is make sure that I have their full attention. And, if I don’t, then I ask if we can reschedule.” —Adult endocrinologist 3

Theme 6: Take advantage of opportunities for data sharing and review

Some clinicians developed strategies for reviewing diabetes data with patients over telehealth visits. Clinicians who successfully adopted a screen-sharing function on the

telehealth platform had positive perceptions of this experience. Those who viewed data on a paper printout or on a separate device such as a tablet experienced more difficulty reviewing data with patients. Screen sharing during telehealth diabetes care visits was perceived as a beneficial opportunity for patients to be more involved in their care and to share insights about glucose patterns in a more efficient manner.

“So, I always have the patient sharing my screen in person. And, I’ve replicated that on [video], and that’s not just their diabetes data, but [the electronic health record]. So, I share [the electronic health record] with them as I’m . . . doing medication reconciliation, or ordering labs. Because, otherwise, you know, there’s a lot of stuff we have to be typing in the computer. And, to the patient, they’re like, ‘What is my doctor doing?’ You know, it looks like we’re distracted doing something else, so I want to share the screen and show them like, ‘No, I’m pulling up your lab orders, and I’m prescribing your medications. And, is this the right med list?’ So, I try to share my screen as frequently as possible.”—Adult endocrinologist 1

“One thing that makes it easier to engage the patient with their diabetes care is setting up the programs and apps to data share and then actually doing the data sharing. I’ve seen it get people more engaged in looking at their own data, like they’re seeing it more, when we start the visit. They’re like, ‘I looked at the estimated A1C. I was noticing it.’ So, I’m seeing that that process has them more engaged.”—Pediatric endocrinologist 1

Discussion

The widespread adoption of telehealth diabetes care took place urgently and haphazardly during the COVID-19 pandemic to meet patient, provider, and population needs under rapidly changing circumstances. More than 3 years later, telehealth continues to play a central role in how specialty diabetes care is delivered. However, minimal evidence is available to inform official recommendations for telehealth use in this patient population. A recent policy statement about telehealth use by the Endocrine Society (8) acknowledges the available evidence for telehealth effectiveness within diabetes care, but notes that the use and frequency of in-person and telehealth visits for a given patient must be individualized based on a variety of factors. It also indicates the need for additional research on what practices can improve telehealth efficiency and satisfaction for clinicians and optimize the delivery of team-based care.

Our study begins to address this need by synthesizing expert opinion on current best practices in telehealth for specialty diabetes care, which can be used to direct ongoing adaptations of telehealth diabetes care delivery while awaiting a broader evidence base. In addition to highlighting specific gaps that should be addressed to improve quality of telehealth diabetes care visits, our findings support the overarching theme that telehealth should not seek to replicate in-person care in a virtual setting, but rather should be thoughtfully designed as a complementary and unique component of diabetes care.

Our study suggests several important strategies to improve telehealth operations for specialty diabetes care. First, dedicated staff support is essential to obtain patients’ device data ahead of telehealth visits. This assistance can improve access to care for individuals with limited digital literacy, save valuable clinician time during visits, and prevent unnecessary rescheduling of appointments. Study participants cited reliable access to patients’ diabetes data as a key factor in whether individuals were offered telehealth visits, a finding that is supported by previous research on telehealth endocrinology care (20,21). Because individuals who have difficulty uploading device data may also face barriers to attending in-person visits, helping these people upload data successfully is crucial to enabling person-centered and equitable specialty diabetes care delivery. Improving this process will also likely improve clinicians’ experience with telehealth visits (22). Second, efficient workflows around scheduling follow-up visits are needed to ensure that individuals do not experience lapses in care, which are associated with poor diabetes outcomes. Third, clinics should identify the best ways to facilitate team-based diabetes care during telehealth visits and create workflows to support this effort, which may vary at the clinic level based on team structure and locations. These findings agree with recommendations recently published by the Endocrine Society and challenges observed during the pandemic at adult and pediatric diabetes centers across the United States (7,8).

Study participants also identified several strategies and opportunities to optimize the quality of virtual diabetes visits. First, they recommended using the home environment to identify and discuss potential barriers to and facilitators of diabetes management. This recommendation aligns with evidence that people learn better in authentic learning environments (23), thereby making telehealth diabetes visits valuable opportunities to enhance patient education, and with evidence that medication reconciliation can be accomplished effectively via telehealth (24). Providers also noted that telehealth offers an opportunity for shared data

review and recommended screen sharing to enhance patients' engagement in their care. This recommendation aligns with findings from a previous qualitative study with a national sample of endocrinologists, which found that screen sharing may facilitate patient education (20). Finally, many providers reported challenges with telehealth diabetes visits when patients joined from distracting environments and suggested the development and dissemination of patient guidelines for successful telehealth diabetes care. Such guidelines should set clear expectations with patients about the environment, attention, and technology needed for video visits; the importance of uploading data before visits; and expectations regarding what will happen during visits. These suggestions mirror those made by other practitioners before and since the start of the COVID-19 pandemic (8,12,21), but will likely require ongoing adaptations by providers and clinics to be implemented consistently.

Strengths and Limitations

Strengths of this study include representation from a large number of clinicians and staff at four different large, academic medical centers. We succeeded in recruiting information-rich participants for interviews to provide perspectives on the use of telehealth for specialty diabetes care at these institutions. One limitation of our study is that we only included providers in California, where attitudes toward telehealth, patient populations, and access to technology may be different from those in other states. Second, we did not speak with department chairs, hospital administrators, or other leaders who may be influential in determining policies and procedures around telehealth. Given that the landscape of telehealth reimbursement is evolving rapidly and indeed has changed dramatically since the start of this study in 2022, we suspect that administrator perspectives about telehealth also have been in a state of flux, whereas clinician perspectives on what makes telehealth visits effective are more durable. However, it is important to note that further exploration of the contextual factors influencing telehealth implementation could improve adaptation of telehealth programs in the future. Despite these limitations, our study offers important insights into ways in which telehealth can be optimized for individuals receiving specialty diabetes care, if and when clinical administrators and leaders support its implementation.

Finally, our study focused only on clinician perspectives, rather than including patient perspectives on using telehealth for diabetes care. Understanding patients'

experiences and preferences is also essential for delivering person-centered care. Data collected during the COVID-19 pandemic indicated that a majority of people with type 1 diabetes in the United States and worldwide who used telehealth felt it was effective and hoped to continue receiving virtual diabetes care post-pandemic (25,26). However, additional research in this area should be prioritized, particularly now that pandemic-associated restrictions on in-person care and corresponding exceptions for telehealth payer coverage have abated. We chose to focus on clinician perspectives and clinic operational factors, and our findings can serve as a complement to ongoing research on patient perspectives so that clinician-informed and person-centered best practices for diabetes telehealth can be developed.

Conclusion

Optimizing telehealth diabetes care practices is essential for improving health equity as well as overall health among people with diabetes. Use of telehealth for specialty diabetes care during the COVID-19 pandemic was lower among marginalized groups (27), and higher telehealth use at the clinic level was associated with higher loss to follow-up for patients with diabetes (28), despite evidence that telehealth diabetes care has the potential to improve many of the access barriers faced by marginalized populations (29). Clinic- and provider-level adaptations suggested by our findings have the potential to improve equity by helping under-resourced individuals upload their diabetes data, receive individualized team-based care, and schedule follow-up visits reliably from their home environments. Our findings serve as a basis for the development of thoughtful and deliberate policies that will benefit all individuals seeking specialty diabetes care as we move into a new era of telehealth.

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DUALITY OF INTEREST

A.B.N. is a full-time employee at Notable (including holding stock options); has received research support from Cisco Systems and Philips; has received consulting fees from Eli Lilly, Intuity Medical, Medtronic, and Roche; has received speaking honoraria from Academy Health and Symposia Medicus; and has received compensation for writing for WebMD. A.B.N. and J.C.W. are medical advisors and cofounders of Tidepool, for which they have received no compensation. J.C.W. has received research support from Abbott Diabetes Care, Dexcom, and Tandem Diabetes Care for work unrelated to this article. No other potential conflicts of interest relevant to this article were reported.

AUTHOR CONTRIBUTIONS

S.C.H. conceptualized and designed the study, conducted interviews and data analysis, and wrote and revised the manuscript. M.S. conducted interviews and data analysis and reviewed and revised the manuscript. A.B.N., J.C.W., P.F.T., J.P.M., and S.S.C. conceptualized and designed the study, assisted with interpretation, and reviewed and revised the manuscript. S.C.H. 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.

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