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Clinical Research Article

Specialist Perspectives on Delivering High-Quality Telemedicine for Diabetes: A Mixed Methods Survey Study

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Abstract

Background: Recent recommendations guiding appropriate use of telemedicine for endocrinology care have largely relied on expert opinion due to limited evidence on factors that increase quality of telemedicine care. In this study, we assessed the perspectives of front-line specialists on factors and strategies perceived to increase quality of diabetes care delivered via telemedicine after more than 2 years of widespread use.

Methods: Adult diabetes specialists in 2 academic health systems who recently used video-based telemedicine to provide diabetes care were invited to participate in an online survey study between March and April 2022. Likert-style questions, followed by related open-ended questions, assessed perspectives on availability of key resources, factors affecting quality, and anticipated benefits from telemedicine for diabetes.

Results: Response rate was 52% (56/111). More than half (54%) of participants reported better overall quality of diabetes care with face-to-face care vs telemedicine. Participants reported clinical data supporting high-quality care, such as home blood glucose readings and vital signs, were often not available with telemedicine. Patient factors, including comorbidities and communication barriers, reduced anticipated benefit from telemedicine, while geographic and mobility barriers increased expected benefit. Providers described multiple health care setting resources that could promote high-quality telemedicine diabetes care, including greater support for sharing patient-generated health data and coordinating multidisciplinary care.

Conclusions: After 2 years of sustained use, diabetes specialists identified telemedicine as an important way to enhance access to care. However, specialists identified additional supports needed to increase appropriate use and delivery of high-quality telemedicine care for patients with complex clinical needs.

Key Words: diabetes, telemedicine, specialty care

After rapidly expanding in early 2020, use of telemedicine (defined as synchronous audio or video communication between patients and providers) to deliver diabetes care has been sustained for more than 2 years [1-3]. However, optimal strategies to ensure the quality of diabetes care delivered via telemedicine remain unclear. A recent Endocrine Society policy perspective summarized the limited available evidence, augmented by expert opinion, to identify factors that influence appropriateness of telemedicine for endocrinology care [4]. This statement also offered strategies to support high-quality specialty care via telemedicine but highlighted the need for additional research, such as assessment of provider and patient perspectives, to identify best practices [4]. Given an ongoing shortage of endocrinologists and diabetes care and education specialists (DCES), especially in rural areas of the United States [5-7], use of telemedicine to increase access to specialty diabetes care is likely to continue in the future. Thus, it is critical to build evidence on approaches to optimize the quality of care that diabetes specialists can provide via telemedicine.

Diabetes care delivered via telemedicine has had positive impacts on glycemic and other clinical outcomes, both in trial [8-11] and in nontrial [12-14] settings. With relaxation of strict social distancing measures, the choice of whether to deliver care via telemedicine vs face-to-face has been based on multiple factors including patient self-selection, clinician preferences, and clinic policies. However, evidence for how to determine which patient and clinical factors facilitate high-quality care via telemedicine has not been available to guide these decisions [4]. As a new normal of care delivery develops, health systems will need to determine how to balance access and quality benefits of telemedicine vs face-to-face care for adults with diabetes. Understanding what factors increase the quality of telemedicine care for diabetes is essential to understanding how to strike this balance. Perspectives of diabetes specialty providers are of utmost importance, as patients with increased clinical complexity who may be at higher risk of poor outcomes often receive care in the subspecialty setting [15-17]. In this mixed-methods survey study, we assessed the

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perspectives of diabetes specialty providers on availability of key resources, patient and clinical factors, and strategies that affect quality of telemedicine diabetes care after more than 2 years of widespread telemedicine use.

Materials and Methods

Study Design

This cross-sectional survey study was determined to be exempt from human subjects review and informed consent by the University of Pittsburgh Institutional Review Board. This study used mainly quantitative data from close-ended questions, contextualized with qualitative data collected through open-ended questions as part of a triangulation mixed-methods design [18]. Results are reported according to the Consensus-Based Checklist for Reporting of Survey Studies guidelines [19].

Setting

Diabetes specialty providers at both academic health systems where the survey was administered care for adults with both type 1 and type 2 diabetes at multiple outpatient university-affiliated clinic locations in urban, suburban and rural settings, as well as Veterans Health Administration (VHA) centers. At the time of survey administration, university-affiliated clinics at both health centers provided 20% to 40% of outpatient visits via telemedicine, with visit modality at the discretion of the patient and provider. Protocols for scheduled telemedicine diabetes visits at university-affiliated clinics at the time of the study included prescreening of patients by medical assistants via phone or patient portal with request to upload or send blood glucose data prior to visits and instructions on how to access the video platform.

Survey Content

Surveys included 5 introductory questions regarding provider use of video visits for telemedicine diabetes care, followed by 4 blocks of questions addressing distinct domains: availability of care resources, comparison of quality of care elements between video and face-to-face visits, factors that impact potential benefit from video vs face-to-face visits, and resources that could improve quality of diabetes specialty care delivered through video visits. Video visits were defined as "one-on-one remote consultations with patients through synchronous video." Respondents were asked to disregard their experience with audio-only telemedicine visits when responding to the survey. Blocks were comprised of multiple-choice matrix questions that asked participants to use a 5-point Likert scale indicating their response or select "Not applicable/Not sure." Each block of multiple-choice questions was followed by an open-ended question soliciting additional feedback on that topic. Respondents were free to skip any question. Additional survey items asked respondents about their professional training, practice setting, and experience. To ensure anonymity, participants were not asked about potentially identifying characteristics including gender, age, race, or ethnicity.

Survey Administration

All 111 specialty providers (endocrinologists, endocrinology fellows currently in training, advanced practice providers, DCES) who were active members of the divisions of endocrinology in 2 large academic health systems and practicing clinicians at university-affiliated clinics or the associated VHA systems were invited to participate in the survey. As this study focused on care of adults with diabetes, pediatric endocrinology providers were not invited to participate. A total of 1 initial invitation and 2 reminder emails were sent between March and April 2022 to complete the survey via a web-based survey tool (Qualtrics XM, Provo, UT). Providers had to have provided diabetes care through video visits in the prior 6 months to be eligible to participate. Responses were collected anonymously, and as IP address was not collected, respondents were not prevented from completing the survey multiple times. No compensation was provided for survey completion.

Analysis

Quantitative results are presented descriptively, with frequency and proportion of each response. Likert categories were collapsed as noted in tables. Participants with missing data were excluded from analysis of each question individually, and the number of participants responding to each question is reported in the tables. As no demographic information was collected and responses were anonymous, nonresponse error could not be addressed in analyses. Responses to open-ended questions were reviewed by 3 team members (M.Z., L.E., and A.S.A.), who identified common themes that emerged from the responses. Responses were then categorized into themes through consensus-building. Selected quotes from each theme are presented to add context to quantitative findings.

Results

Of 111 invitations, 58 diabetes specialty clinician respondents answered screening questions, and 56 were eligible for a 52% effective survey response rate. Response rates were lower for participants who did not identify as attending endocrinologists (35% for fellows, 26% for advanced practice providers, and 43% for DCES). Respondents were primarily physicians (81%) practicing in university-affiliated academic clinics (81%) in urban settings (62%, Table 1). Seventeen percent reported using video visits prior to COVID-19. Almost 40% of respondents reported that 25% to 49% of their outpatient diabetes visits were conducted via video in the 6 months prior to the survey, while the remaining respondents were split between conducting less than one-quarter via video and more than half of their diabetes visits via video. Results are presented as composite results for all participants, as results did not differ significantly based on respondent role (endocrinologist, fellow, advanced practice provider, or DCES).

Availability of key Elements of Diabetes Care in Video Visits

Table 2 displays respondent ratings of availability of key elements of care during video visits, while Table 3 shows respondent ratings of availability of these elements in video visits compared to face-to-face care. As shown in both figures, respondents reported that many elements key to providing high-quality diabetes care are often not available in video visits or are less available than in face-to-face visits. Regarding elements of the physical examination, 93% of providers reported that home-measured vital signs were available half of the time or less during video visits (Table 2). The

Table 1. Characteristics of provider survey participants (n = 56)

Characteristic	n (%)
Type of training, n = 47	
Physician	38 (80.85%)
Nurse practitioner or physician assistant	6 (12.77%)
Diabetes care and education specialist	3 (6.38%)
Years providing diabetes specialty care, n = 46	
Currently in training	6 (13.04%)
<5 years independent practice	16 (34.78%)
5-15 years independent practice	17 (36.96%)
>15 years independent practice	7 (15.22%)
Practice location, n = 45	
Urban	28 (62.22%)
Suburban	14 (31.11%)
Rural	3 (6.67%)
Practice setting, n = 46	
University-affiliated academic clinic	37 (80.42%)
Veteran's Health Administration	5 (10.87%)
Both	2 (4.35%)
Neither	2 (4.35%)
Used video visits prior to COVID-19	10 (17.86%)
Proportion of outpatient diabetes visits conducted via video over prior 6 months	
1–24%	17 (30.36%)
25–49%	22 (39.29%)
51–75%	12 (21.43%)
>75%	5 (8.93%)

Table 2. Availability of care elements in video visits for diabetes (n = 54 providers)

Care element	Response n (%)			
	Never or sometimes	Half of the time	Frequently or almost always	Not sure
Vital signs	43 (79.6)	7 (13.0)	4 (7.4)	0
Glucometer data	24 (44.4)	18 (33.3)	12 (22.2)	0
CGM data	13 (24.1)	18 (33.3)	23 (42.6)	0
Relevant outside records	17 (31.5)	13 (24.1)	22 (40.7)	2 (3.7)
Accurate medication regimen	8 (14.8)	8 (14.8)	36 (66.7)	2 (3.7)
Diabetes-related bloodwork results	7 (13.0)	18 (33.3)	29 (53.7)	0
DSMES coordinated with visit	40 (74.1)	2 (3.7)	9 (16.7)	3 (5.6)

Abbreviations: CGM, continuous glucose monitor; DSMES: diabetes self-management, education, and support.

overwhelming majority of providers rated the availability of vital signs (98%) and elements of physical exam needed for clinical decision-making (76%) as better with face-to-face care (Table 3). With regard to patient-generated self-monitoring data, 78% of providers reported that glucometer data was available during video visits half of the time or less, and 57% that continuous glucose monitoring (CGM) data was available half of the time or less. Availability of patient-generated blood glucose readings was rated as somewhat or much better with face-to-face care compared to video visits by 72% of providers for glucometer data and 75% for CGM data. In responses to open-ended questions, providers described how lack of this information impacts their ability to provide high-quality care for diabetes and related conditions, including contributing to clinical inertia, difficulty providing personalized education, and difficulty managing key comorbidities (Table 4, row 1). In addition, providers discussed that significant patient effort is sometimes required to ensure availability of key elements during video visits, such as self-monitoring data, and identified highly engaged patients who transmit home blood glucose and vital signs before visits as most likely to benefit from video visits for diabetes care (Table 4, row 2).

Table 3. Comparative availability of care elements between VV and F2F care (n = 54 providers)

Care element	Response n (%)			
	VV somewhat or much better	No difference	F2F somewhat or much better	Not sure
Vital signs	1 (1.9)	0	53 (98.1)	0
Key elements of physical exam	0	12 (22.2)	41 (75.9)	1 (1.9)
Glucometer data	7 (13.0)	8 (14.8)	39 (72.2)	0
CGM data (n = 52)	4 (7.7)	9 (17.3)	39 (75.0)	0
Relevant outside records	1 (1.9)	40 (74.1)	12 (22.2)	1 (1.9)
Accurate medication regimen (n = 52)	4 (7.7)	26 (50.0)	22 (42.3)	0
Diabetes-related bloodwork results	0	30 (55.6)	24 (44.4)	0
DSMES coordinated with visit	0	20 (37.0)	31 (57.4)	3 (5.6)

Abbreviations: CGM, continuous glucose monitor; DSMES, diabetes self-management, education, and support; F2F, face-to-face; VV, video visit.

As shown in Tables 2 and 3, the majority of providers felt that there was no difference in availability of health system data between video and face-to-face visits. Fifty-four percent reported that diabetes-related bloodwork results were frequently or almost always available during video visits, and 67% reported the same availability of accurate medication regimen (Table 2). On the other hand, when asked about diabetes self-management education (DSMES), most respondents (78%, Table 2) reported that coordination between DSMES and endocrinologist or advanced practice provider visits was available half of the time or less during video visits, and 57% (Table 3) rated the availability of DSMES aligned with visits somewhat or much better with face-to-face care.

Table 4. Themes and selected responses to open-ended questions

Lack of key care elements in telemedicine visits reduces quality of care
- "Video visits are convenient but this comes at a cost of lack of labs, foot exam, device downloads, immunizations etc." –*Endocrinologist, 5-15 years in practice*
- "Lack of vital signs at times makes it difficult to monitor and effectively treat other related comorbidities such as HTN and overweight/obesity." –*Endocrinologist, 1-5 years in practice*
- "Main limitation is access to glucose data remotely (including … CGM) … This often leads to clinical inertia and not being able to make medication adjustments to achieve glycemic goals." –*Endocrinologist, 1-5 years in practice*
- "Without glucose data, the DSME [Diabetes Self-Management Education] visit is incomplete. Some patients come to appointments with the mindset that 'I will hand them the meter,' which cannot happen during a video visit." –*Diabetes care and education specialist, > 15 years in practice*

Video visits require more effort on the part of patients
- "It is a great platform if the patient comes prepared." –*Physician assistant, 1-5 years in practice*
- "Expectations for the patient to prepare (upload data or fax info to our office) *prior* to the virtual visits. Some patients think this is a more laid-back way of seeing a doctor but don't do the work to help themselves and us through this process." –*Endocrinology fellow in training*
- "[Video visits] do place more responsibility on the patient in some ways, ie, going to get labs after the visit (rather than doing when already in office for an in-person visit)." –*Nurse practitioner, 1-5 years in practice*

Video visits less beneficial in certain scenarios
- "Initial consult visits for diabetes, particularly when there is no ability to review glucose data remotely." –*Endocrinologist, 1-5 years in practice*
- "In-person visits are better for patients with SDOH and learning barriers. Although many of these patients have transportation and other issues so in those cases a CDE or nurse calling in advance … makes those visits most productive." –*Endocrinologist, 5-15 years in practice*

Ongoing assessment of appropriateness for video visits is needed
- "Prescreen patients for appropriateness to conduct video visits … it would be good to create a screening tool and identify patients who do not have good audio video internet connections and those who have limited means to upload data." –*Endocrinologist, 5-15 years in practice*
- "My approach is that if a patient cannot share these [blood glucose] data, virtual visits should not be an option." –*Endocrinologist, > 15 years in practice*
- "Recommend all patients with diabetes … to visit once yearly for a face-to-face visit. This will allow foot exams, eye exams, immunizations, physical exam to be completed." –*Endocrinologist, 5-15 years in practice*

Support before, during, and after visits may enhance quality of care
- "I can be a better provider, if ancillary support is given like precharting, vitals, medications, provide glucose data, CGMS, insulin pump data prior to the visit." –*Endocrinologist, > 15 years in practice*
- "Staff available to collect information prior to visit (ex glucose logs or ensure connection of remote data transmission/pump uploads, etc.) and immediately available IT/tech support to assist with any connection problems." –*Nurse practitioner, 1-5 years in practice*
- "Having diabetes education linked with the visits." –*Endocrinologist, 5-15 years in practice*
- "Better ways to get [patients] the orders/lab orders they need for the next visit." –*Endocrinologist, > 15 years in practice*
- "Practice videos for things such as medication (eg, insulin pen, dulaglutide pen) and meter use." –*Endocrinologist, 5-15 years in practice*

Overall Quality and Benefits of Diabetes Care Delivered Through Video Visits

As shown in Table 5, 54% of clinicians reported that overall quality of diabetes care is somewhat or much better with face-to-face care, while only 6% felt video visits deliver higher quality care. Providers reported that some key elements of the clinician-patient relationship were superior with face-to-face care, including building rapport (69%) and their ability to assess patient's understanding of treatment plan (54%). On the other hand, many providers felt that there was no difference in quality of several aspects of care, including assessment of medication adherence (72%), assessment of lifestyle and social circumstances that affect diabetes management (58%), and involvement of family members and caregivers in visits (52%). About half of providers reported that they develop the same plan during a video visit as they would during a face-to-face visit (56% most of the time or always), while 22% reported that they develop the same plan less than half of the time.

Factors That Impact Perceived Quality and Patient Benefit From Video Visits

As shown in Table 6, clinical and patient factors that contribute to complexity affected provider perceptions of quality and patient benefit from video visits for diabetes as they are currently delivered. For clinical factors, 56% of providers reported that patients with a comorbid mental health diagnosis benefit more from face-to-face care, and 47% reported the same for patients with multiple comorbid chronic conditions. With regard to diabetes technology, the majority (60%) of providers perceived that patients who use insulin pumps were also benefitting more from face-to-face care, while for patients who use CGM, 44% of providers reported no difference in face-to-face vs video visits, and 38% perceived face-to-face is more beneficial. For patient factors, 84% perceived that face-to-face care is benefitting patients with low health literacy, and 93% reported the same for patients with low technological literacy.

Other factors including the patient-clinician relationship and communication also influenced provider perspectives on perceived benefit from video visits as they are currently delivered. Most (64%) reported that patients being seen as a new consult were more likely to benefit from face-to-face care. However, providers felt that having an established relationship with a patient increased the benefit from video visits: 47% reported that patients whom they have previously seen for routine care would benefit more from video visits (Table 6). Similarly, 56% reported the same for patients with whom they communicate frequently through portal messages. In addition, providers identified communication factors that impact the patient-clinician relationship as reducing benefit from video visits. Seventy-eight percent reported that patients who require a translator were benefitting more from face-to-face care.

Finally, the majority of providers reported that patients with barriers to accessing traditional face-to-face care were more likely to benefit from video visits compared to face-to-face care (Table 6). Seventy-one percent of providers reported that patients with a history of frequent no-shows were somewhat or much more likely to benefit from video visits. Ninety-one percent reported that patients with that patients who live >1 hour away or use public transit were more likely to benefit from video visits, and 84% reported that patients with limited mobility were more likely to benefit from

Table 5. Comparative quality of diabetes care elements in VV vs F2F care (n = 48 providers)

Care element	Response n (%)			
	VV somewhat or much better	No difference	F2F somewhat or much better	Not sure
Overall quality of diabetes care	3 (6.3)	19 (39.6)	26 (54.2)	0
Ability to build rapport with patients	1 (2.1)	14 (29.2)	33 (68.8)	0
Ability to assess patient's understanding of treatment plan	0	22 (45.8)	26 (54.2)	0
Ability to assess medication adherence (n = 47)	1 (2.1)	34 (72.3)	12 (25.5)	0
Duration of visit	21 (43.8)	19 (39.6)	8 (16.7)	0
Ability to assess lifestyle and social circumstances that affect diabetes management	11 (22.9)	28 (58.3)	8 (16.7)	1 (2.1)
Involvement of family members or caregivers in care	15 (31.3)	25 (52.1)	8 (16.7)	0
Involvement of other diabetes care team members (DCES, etc) (n = 47)	2 (4.3)	22 (46.8)	23 (48.9)	0

Abbreviations: F2F, face-to-face; DCES, diabetes care and education specialists; VV, video visit.

Table 6. Factors that impact anticipated benefit from VV vs F2F care for diabetes (n = 45 providers)

Factor	Response n (%)			
	VV somewhat or much better	No difference	F2F somewhat or much better	No experience
Comorbid mental health diagnosis	9 (20)	10 (22.2)	25 (55.6)	1 (2.2)
Multiple chronic comorbid conditions	10 (22.2)	13 (28.9)	21 (46.7)	1 (2.2)
HbA1c above individualized goal	4 (8.9)	21 (46.7)	20 (44.4)	0
Multiple daily insulin injections	4 (8.9)	22 (48.9)	19 (42.2)	0
Uses insulin pump	7 (15.6)	11 (24.2)	27 (60.0)	0
Uses continuous glucose monitor	8 (17.8)	20 (44.4)	17 (37.8)	0
New consult	0	15 (33.3)	29 (64.4)	1 (2.2)
Previously established patient	21 (46.7)	18 (40.0)	6 (13.3)	0
Frequently uses portal messages	25 (55.6)	15 (33.3)	5 (11.1)	0
Low health literacy	0	7 (15.6)	38 (84.4)	0
Low technological literacy (n = 44)	0	3(6.8)	41 (93.2)	0
Requires translator	1 (2.2)	6 (13.3)	35 (77.8)	3 (6.7)
History of frequent no-shows (n = 44)	31 (70.5)	9 (20.5)	4 (9.1)	0
Uses public transportation or lives >1 hour away[a]	41 (91.1)	1 (2.2)	3 (6.7)	0
Limited mobility	38 (84.4)	5 (11.1)	2 (4.4)	0

Abbreviations: F2F, face-to-face; VV, video visit.
[a]Data for "uses public transit" and "lives >1 hour away" are displayed on the same row, as responses were identical.

video visits. In open-ended questions, providers described how previsit support calls and mixing video with face-to-face care could improve the quality of video visits for these populations (Table 4, rows 3 and 4).

Resources to Improve Quality of Diabetes Video Visits

Providers identified multiple resources in the health care setting that would improve the quality of diabetes care delivered through video visits by addressing many barriers noted here. The resources ranked as very or most important to improving care quality by the most providers include additional staff support for patient sharing of home blood glucose data (100% of providers ranked as very or most important), patients connecting to video visits (81%), and collecting the accurate medication regimen (70%). A majority of providers also reported that staff support for patients reporting home vital signs (57% of providers identified as very or most important) and coordinated involvement of multidisciplinary clinicians, including DCES, in video visits (59%) would improve care quality. In addition, two-thirds of providers felt that follow-up by multidisciplinary diabetes team members, such as DCES or nurses, to assess patient progress on diet and lifestyle modification, medication adherence, and blood glucose trends between video visits would enhance quality of telemedicine diabetes care. In open-ended responses, providers described additional support before, during, and after video visits that

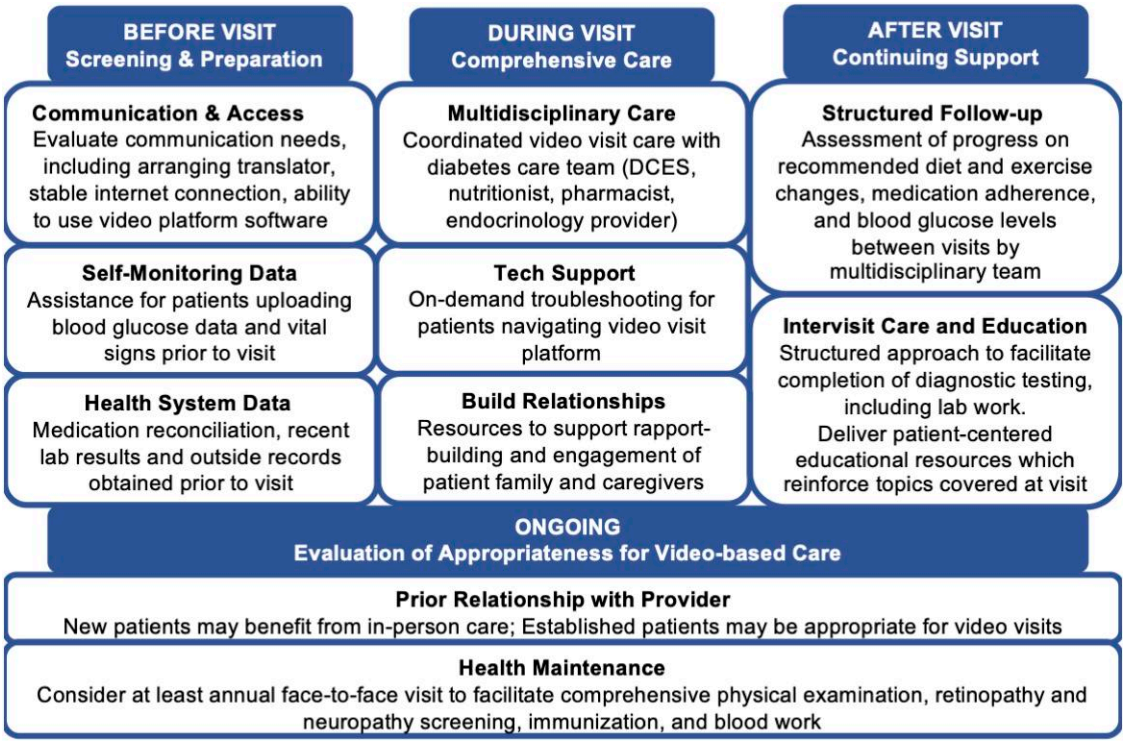

Figure 1. Approaches to enhance quality of video visits for specialty diabetes care reflected in provider perspectives.

could enhance quality for patients who have access and communication barriers. This included previsit outreach to facilitate sharing of home blood glucose readings and identify communication needs, coordinated multidisciplinary care and IT support during visits, and structured follow-up and support between visits (Table 4, row 5).

Discussion

This study assessing endocrinology specialists' perspectives on quality of telemedicine care for diabetes after longer-term use indicates that providers see telemedicine as an important way to enhance access to diabetes specialty care, especially for patients who face obstacles to accessing face-to-face visits. However, there are multiple aspects of current approaches to telemedicine visits that specialists report present barriers to delivering high-quality, patient-centered care when compared to face-to-face care, including availability of patient-generated data to guide treatment and coordinated multidisciplinary care. Specialists identified and described concrete, actionable strategies to improve quality by addressing modifiable factors throughout the process of telemedicine care, which are summarized in Figure 1. In addition, our results underscore that telemedicine has persisted as a means of delivering diabetes specialty care: the majority of providers had never used telemedicine prior to the COVID-19 pandemic, and more than half reported ongoing use for a significant proportion of outpatient diabetes visits more than 2 years later. As telemedicine is an important means to enhance access to diabetes specialty care and will likely continue to be used in the future, continued efforts to support high-quality care via telemedicine are crucial.

This study adds to the recent Endocrine Society policy perspective by providing new evidence assessing the views of front-line endocrinologists and diabetes specialists on factors and strategies to improve quality of diabetes telemedicine. The policy perspective identified 5 key domains that guide appropriate use and influence quality: clinical factors, clinician factors, patient factors, the patient-clinician relationship, and the health care setting and technology [4]. Our findings align with this framework, as most key elements of quality identified by endocrinology specialists in our study fall within these domains. In the clinical domain, endocrinology specialists identified factors including treatment complexity and comorbidities as reducing the anticipated benefit from telemedicine. In the patient domain, providers anticipated less benefit for patients with low health literacy, and elements of the patient-clinician relationship, such as communication and an established rapport, were noted by providers as important to determining benefit from telemedicine visits. However, use of telemedicine to overcome barriers to face-to-face care was perceived as a major benefit. These findings are consistent with prior work in which endocrinology providers report that telemedicine may be less effective for patients with high medical complexity or concerns for nonadherence but is most useful for established patients and those who face obstacles to accessing face-to-face care [20]. This specifically includes patients with geographic or transportation barriers, those who have comorbidities including mental health and conditions that limit mobility, as well as other factors such as work or caregiving responsibilities or immunocompromised states. In these patient populations, telemedicine allows for more flexible, safe, and equitable access to patient-centered care. Recent recommendations, as well as approaches described by specialists in this study, suggest that a hybrid care model with telemedicine punctuated by at least annual face-to-face visits may provide optimal quality [4], but best practices to support patients who are unable to access

face-to-face care at all must also be developed. With ongoing use of telemedicine for diabetes specialty care, it will be crucial for providers, health systems, and researchers to focus on approaches to leverage telemedicine to provide high-quality care that reduces, rather than exacerbates, disparities in diabetes care and outcomes for underresourced populations [21-23].

Providers in our study also described specific additional strategies to improve the quality of diabetes specialty telemedicine by improving patient-centeredness, efficiency, and efficacy and enhancing equitable access. These approaches address multiple points in the process of remote care as seen in Figure 1 and align with strategies proven to be effective in prior clinical trials of diabetes telemedicine [8, 9, 24]. Active involvement of caregivers and multidisciplinary teams during visits can support provision of patient-centered care. Care coordination resources to support self-management and complete preventive care between visits can improve efficacy and efficiency of telemedicine care. Previsit screening to identify and address communication needs can enhance equitable access to care for patients who require translation or other services. In addition, resources such as video visit platforms designed for patients with low technological literacy, readily available tech support, and virtual patient education materials optimized for patients with low health literacy can help ensure equitable access to high-quality care for all patients. Recent calls to combat "telehealth fatigue" focus on using patient-centered care to guide changes to telemedicine for diabetes in order to enhance equity and outcomes [25]. Future studies can build on this work, recent Endocrine Society recommendations, and our findings by examining the impacts of telemedicine, face-to-face, and hybrid models of diabetes specialty care on clinical and patient-reported outcomes for populations that are underresourced or have greater clinical complexity. In addition, patients can be engaged to provide input on development and evaluation of approaches, such as those identified in this study by specialty providers, to meet the unique needs of all patients who use telemedicine to access diabetes specialty care.

This study has limitations that should be considered when interpreting our results. First, it was conducted with specialists working in endocrinology clinics in 2 academic health systems. While these centers are large and have been implementing comprehensive telemedicine protocols, results may not generalize to other care settings with different workflows. In addition, we had a limited number of respondents who practice at the VHA and lower response rates for participants who identified as fellows, advanced practice providers, and DCES; thus, results may not fully reflect the experiences of VHA providers or all members of diabetes specialty care teams. As we were unable to offset nonresponse bias in this anonymous survey study, responses may not be representative of providers who chose not to participate in the survey. However, our response rate of 52% is similar to or higher than other recent survey studies of clinicians [26, 27]. Similarly, as with all studies based on self-report, recall bias may impact provider reports of lack of care elements during video visits, as participants may be more likely to remember times when resources were absent rather than present.

Conclusions

In this updated assessment of the perspectives of practicing diabetes specialists on factors influencing quality of telemedicine diabetes care, providers reported a need for additional resources to align with recommendations for delivering high-quality care via telemedicine, including support to: (1) facilitate sharing of patient-generated health data, (2) identify and address communication needs before visits, (3) coordinate multidisciplinary care with visits, and (4) provide structured follow-up between visits. Analysis of short- and long-term outcomes in diverse clinical scenarios and evaluation of the impact of telemedicine on disparities in care access and quality are next steps needed to validate the specialist perspectives reported in this work. In addition, this additional evidence will be critical to support development of best practices for telemedicine diabetes care in future use. As telemedicine continues to expand access to diabetes specialty care, studies of patient perspectives should be combined with these findings to ensure that telemedicine approaches are patient-centered and meet the needs of diverse adults with diabetes.

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Data Availability

Some or all datasets generated during and/or analyzed during the current study are not publicly available but are available from the corresponding author on reasonable request.

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