



Telemedicine implementation and use in community health centers during COVID-19: Clinic personnel and patient perspectives



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ABSTRACT

In March 2020, federal and state telehealth policy changes catalyzed telemedicine adoption and use in community health centers. There is a dearth of evidence on telemedicine implementation and use in these safety net settings and a lack of information reflecting the perspectives of patients with limited English proficiency. We conducted in-depth interviews with clinic personnel and patients during the pandemic in two federally qualified health centers that primarily serve Chinese and Latino immigrants. Twenty-four interviews (clinic personnel = 15; patients who primarily speak a language other than English = 9) were completed remotely between December 2020 and April 2021. Interview scripts included questions about their telemedicine experiences, technology, resources and needs, barriers, facilitators, language access, and continued use, with a brief socio-demographic survey. Data analyses involved a primarily deductive approach and thematic analysis of transcript content. Both FQHCs adopted telemedicine in a few weeks and transitioned primarily to video and audio-only visits within two months. Findings reveal third-party language interpretation services were challenging to integrate into telemedicine video visits. Bilingual personnel who provided language concordant care were seen as essential for efficient and high-quality patient telemedicine experiences. Audio-only visits were of particular benefit to reach patients of older age, with limited English proficiency, and with limited digital literacy. Continued use of telemedicine is contingent on reimbursement policy decisions and interventions to increase patient digital literacy and technological resources. Results highlight the importance of reimbursing audio-only visits post-pandemic and investing in efforts to improve the quality of language services in telemedicine encounters.

1. Background & significance

The coronavirus disease 2019 (COVID-19) pandemic catalyzed rapid adoption and implementation of telemedicine beginning March 2020 (Eberly et al., 2020; Koonin et al., 2020). The pandemic drastically shifted health care from in-person to remote to mitigate risk of infection. Federal and state telehealth policy changes were adopted as temporary measures, including financial incentives (i.e., changes to reimbursement like payment parity between in-person and telemedicine visits), licensing modifications, and relaxed privacy standards, to increase utilization (Keesara, Jonas, & Schulman, 2020; Shachar, Engel, & Elwyn, 2020).

Steep telehealth increases during COVID-19 presents a unique opportunity to investigate factors that influence telemedicine use in safety net settings. Pre-pandemic, there was limited adoption and use of

telemedicine live video communication (and other modalities) among low-income and marginalized populations and safety net healthcare organizations (Anthony, Campos-Castillo, & Lim, 2018; Park, Erikson, Han, & Iyer, 2018; Rodriguez, Saadi, Schwamm, Bates, & Samal, 2021). Community health centers like Federally Qualified Health Centers (FQHCs), who predominantly serve patients who are uninsured or are Medicaid recipients, have historically lagged in adoption and use due to reimbursement and licensing issues. In 2016, only 37.6% of community health centers reported using telehealth (Shin, Sharac, & Jacobs, 2014).

Telemedicine can improve healthcare access and health outcomes in medically underserved communities by addressing structural barriers like transportation, excess wait times, childcare responsibilities, inconvenient appointment times, and regional medical provider shortages (Bashshur et al., 2016; Donelan et al., 2019; Gordon, Solanki, Bokhour, &

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Gopal, 2020; Reed et al., 2020). Telemedicine can be a low-cost option and expand communication opportunities with a provider (Kruse et al., 2017). Digital divide barriers persist, however, and influence adoption and use. These barriers range from individual (i.e., low digital literacy) to structural levels (i.e., geographic location, broadband internet access, device affordability) (Hilbert, 2011; Ramsetty & Adams, 2020). Existing barriers to healthcare access (availability and quality of language services) (Schiaffino, Nara, & Mao, 2016) may also impact use for patients with limited English proficiency (LEP) (Anaya, Hernandez, Hernandez, & Hayes-Bautista, 2021).

During the pandemic, many academic medical centers and private medical organizations leveraged prior telemedicine experience and existing infrastructure to scale up operations. FQHCs encountered rapid and abrupt telemedicine adoption and implementation processes, possibly due to existing organizational barriers in personnel, professional development, and technological capacities (Lewin & Baxter, 2007; Lori, Bouskill, Jessica, Mimi, & Shira, 2020; Payán et al., 2017) and reimbursement concerns (Lin et al., 2018; Shin et al., 2014). While emerging telemedicine research from the pandemic reflects physician perspectives (Gomez, Anaya, Shih, & Tarn, 2021), evidence is lacking from FQHCs and the perspective of other clinic personnel and patients.

Flexibilities adopted during the pandemic are actively being considered for permanent adoption across the country. While policies that reduced security measures for telemedicine are likely to reverse, the federal government and several states are debating whether to remove reimbursement for audio-only services. Funders and practitioners are also seeking interventions to address the digital divide and expand telehealth access and improve its quality for medically underserved patients.

This study investigates how FQHC personnel and patients used and experienced telemedicine during the pandemic with a focus on language service provision. We examine the organizational, patient, and technology facilitators and barriers to telemedicine implementation and use in FQHCs, which are particularly understudied among safety net settings (Payán & Rodriguez, 2021; Rodriguez, Bates, Samal, Saadi, & Schwamm, 2021). Findings address a pressing need for empirical data on telemedicine experiences in safety net settings to advance equitable policy and practice.

2. Methods

This study investigates experiences on telemedicine implementation and use from the perspective of personnel and patients in two FQHCs during the pandemic. We identify barriers and facilitators to use and provide policy and clinical recommendations to sustain use in safety net settings.

Telemedicine is defined as two-way, real-time interactive communication between a physician (or other healthcare provider) and patient using both audio and video capabilities. We broadened the definition to include telephone/audio-only communications because the Centers for Medicare & Medicaid Services (CMS) added flexibilities for audio-only visits in March 2020 (Centers for Medicare & Medicaid Services, 2020).

2.1. Sample and recruitment

We recruited two FQHCs with assistance from a community health center consortium in Northern California. One FQHC serves a large Latino immigrant community and the other serves a large Chinese immigrant community. Both began offering telemedicine visits March/April 2020. Pre-pandemic, neither offered telemedicine visits or used a telemedicine platform.

A liaison from each FQHC assisted with purposive sampling and distributed study information via email and phone. Due to social distancing and shelter-in-place orders, recruitment protocols and data collection relied on computer and phone-mediated approaches (Howlett, 2021).

Eligible personnel were involved in telemedicine adoption decisions or implementation. Eligible patients: 1) were adults (24–85 years old), 2) spoke a non-English language as their primary language, 3) had a diagnosis of at least one cardiometabolic condition, and 4) had at least one telemedicine encounter (video, audio-only) in 2020. Eligible and interested individuals signed up for an interview using a virtual scheduling system or by contacting study staff.

2.2. Procedures

Data collection tools included two interview guides for personnel and patients, respectively. The interview guides are included as a supplementary appendix. The guide covered COVID-19 telehealth experiences (barriers, challenges, successes, perceived benefits, satisfaction), technological and support resources, language access, perceived sustainability, and recommendations. Development of the interview guides was informed by Consolidated Framework for Implementation Research (CFIR) domains and components (Damschroder et al., 2009) as well as past empirical research focused on telemedicine implementation (Barney, Buckelew, Mesheriakova, & Raymond-Flesch, 2020; Lyles et al., 2016, 2019; Portz et al., 2019; Scott Kruse et al., 2018). Interview tools were reviewed by members of the research team, a digital health expert, and FQHC stakeholders.

We also asked personnel about their organizational tenure and responsibilities, and patients about their country of birth, years in the U.S., household size, household income, insurance status, and diagnosed conditions. A bilingual Spanish native speaker and professional Chinese translator translated the patient data collection instrument. Bilingual researchers and assistants fluent in Spanish and Mandarin reviewed and finalized the tools. Translated tools were pilot tested with two individuals in each language prior to their use in the field.

Interviews were completed over a five-month period beginning December 2020. A co-investigator with experience collecting interview data completed personnel interviews using Zoom (Zoom, 2020). Two research members fluent in Mandarin and Spanish, respectively, completed patient interviews over the phone.

Interviewers began by introducing themselves, explaining the purpose of the study, confirming eligibility, and obtaining verbal consent. Interviews were audio recorded upon receipt of oral consent. All interviews were audio-recorded with permission (range: 45–85 min). Data collectors took field notes and wrote a memo with information on key themes after each interview. Recruitment ceased when data saturation was obtained for these themes. Participants received an e-gift card for their time (\$25 for clinic personnel; \$20 for patients). UC Merced's Institutional Review Board approved study protocols and materials prior to their use.

2.3. Data management and analysis

Clinic personnel and Spanish-speaking patient recordings were transcribed verbatim in their original language using automatic audio transcription software. Transcripts were reviewed and edited by research assistants who carefully listened to each audio file. The data collector who completed interviews in Mandarin listened to the recordings to add further details in the memos with select quotes in lieu of a transcript.

Clinic personnel interview transcripts were uploaded and analyzed using Dedoose (Dedoose Version 8.0.35, 2018), a mixed methods data analysis software, using thematic analysis. We used a deductive approach to develop a universal codebook with themes identified *a priori* from implementation science and organizational capacity frameworks (Damschroder et al., 2009; Payán et al., 2017) and relevant telehealth literature (Barney et al., 2020; Chwistek, 2020; Lau et al., 2020; Lyles et al., 2016; Portz et al., 2019; Scott Kruse et al., 2018). The codebook was pilot tested with three transcripts to assess the coding structure and identify emergent themes.

The final codebook included 22 themes and 107 codes. A research assistant independently coded all personnel transcripts to streamline data

analysis (Nevedal et al., 2021). A co-author [J.L.F.] reviewed all coded content and provided feedback before developing analytical summaries. The team discussed preliminary findings. Exemplary quotes were identified using all interview data and non-English quotes were translated for inclusion in this article. Quantitative data was input into Microsoft Excel and analyzed using descriptive statistics.

3. Results

Twenty-four respondents participated across two FQHCs including 15 clinic personnel and nine patients. Table 1 includes clinic personnel characteristics and Table 2 includes socio-demographic characteristics of patient respondents.

Slightly over a quarter of clinic personnel primarily identified as leaders or managers (n = 4, 26%), 20% as healthcare providers, 40% as care coordinators or community health workers (CHWs), and 13% as operations/support staff (i.e., administrative support, information technology). Respondents had an average organizational tenure of 5.3 years (SD: 5.1 years) at their FQHC. Mean age was 39 years and 80% were female (n = 12). Over a third (42%) identified as Hispanic/Latino and 33% as Asian American or Pacific Islander. A majority (67%) reported high Spanish fluency.

Patients' mean age was 59 years (SD: 11.6 years) and 89% were female. Average time in the U.S. was 25 years. Over half reported an annual household income below \$20,000 per year and had Medicaid as their primary health insurance. All patients were diagnosed with hypertension and/or type 2 diabetes (per the eligibility criteria), and nearly half also had high cholesterol (n = 4).

Five patients completed the interview in Spanish and three in Mandarin. The last was a Tongan native speaker who opted to complete the interview in English, but primarily spoke Tongan and relied on interpretation services in healthcare settings.

3.1. Telemedicine platform adoption

Personnel from both clinics described swift processes to adopt and use telemedicine platforms and modalities at the beginning of the pandemic. Several agreed the pandemic accelerated adoption of video and audio-only visits, which had not been offered at either FQHC. While both began offering audio-only telemedicine appointments soon after the shelter-in-place order, each approached adoption of video visits differently. Clinic A elected to experiment with various telemedicine

Table 1
Characteristics of clinic personnel respondents (n = 15) from two federally qualified health centers.

Characteristic	N (%)
Clinic role/position	
Leader or manager	4 (26%)
Health care provider (e.g., physician)	3 (20%)
Care coordinator or community health worker	6 (40%)
Operations/support staff	2 (13%)
Organizational tenure in years, mean (SD)	5.3 (5.1)
Age in years, mean (SD)	39 (9.4)
Female	12 (80%)
Race/ethnicity ^a	
Asian American or Pacific Islander	4 (33%)
Hispanic/Latino	5 (42%)
Non-Hispanic white	2 (17%)
Other race ^b	1 (8%)
Fluent in Spanish ^a	8 (67%)

Notes: Rows may not add up to 100% for certain characteristics if respondent(s) did not answer a question.

^a Race/ethnicity and Spanish fluency were collected only for those whose organizational responsibilities include patient interaction (n = 12).

^b Other does not include the response options American Indian/Alaska Native and Black/African American, which were not selected by respondents.

Table 2

Socio-demographic characteristics of patient respondents (n = 9) from two federally qualified health centers.

Characteristic	N (%)
Age in years, mean (SD)	59 (11.6)
Female	8 (89%)
Race/ethnicity	
Asian American or Pacific Islander	4 (44%)
Hispanic/Latino	5 (56%)
Country of birth	
China	3 (33%)
El Salvador	1 (11%)
Mexico	4 (44%)
Tonga	1 (11%)
Years in the United States, mean (SD)	25 (12)
Household size, mean (SD)	3 (1.7)
Annual household income	
Below \$20,000	5 (56%)
\$20,001-\$34,999	1 (11%)
\$35,000-\$49,999	1 (11%)
Don't know	2 (22%)

platforms, eventually settling on Zoom as their primary platform and retaining doxy.me, a Health Insurance Portability and Accountability Act (HIPAA) compliant service, as a backup by June 2020. Clinic B had already set up Zoom on some devices prior to the shelter-in-place for videoconferencing and spent the first month of the lockdown setting up their workflows, determining HIPAA compliance for the platform, and training physicians and medical assistants on its use. By mid-April, Clinic B offered video visits to patients.

3.2. Clinic-level barriers and facilitators

Qualitative data from clinic personnel on clinic barriers and facilitators to telemedicine implementation mapped onto three organizational capacity themes: personnel, professional development, and technological capacities (Table 3).

A key implementation barrier was the negative impact of COVID-19 on operations, which included the financial impact of losing patient volume/revenue and personnel shortages. Personnel identified as central to facilitating implementation and use, included: 1) champions at various levels (leadership, peers) to provide leadership, motivation, and expertise; 2) clinic staff (e.g., CHWs, medical assistants) responsible for preparing patients and intake processes prior to each visit; 3) information technology (IT) personnel to issue equipment and provide technical support; and 4) bilingual personnel who provided high quality language concordant care. Respondents said having personnel committed to providing patient-centered care and serving marginalized patients also facilitated their rapid transition to remote care.

Professional development capacity refers to personnel knowledge and familiarity with telemedicine as well as the availability of trainings or learning resources. Personnel with limited telemedicine knowledge and prior experience struggled, saying a lack of knowledge and uncertainty about appropriate use was challenging in the face of rapid implementation and workflow changes. Some said it was difficult to assess the validity of different sources when they encountered conflicting information. Reimbursement policy confusion was particularly difficult to navigate.

In addition to implementation champions (personnel capacity) who provided individual expertise and assistance, respondents listed a variety of external resources, including peer organizations, community health center consortia, the California Primary Care Association, and online resources by OCHIN that provided accessible information about telemedicine.

A facilitator to implementing audio-only visits consisted of prior experience using the telephone for patient care. Several personnel said audio-only visits were easy to implement because the telephone was a technology already used to communicate or follow-up with patients before the pandemic (without reimbursement).

Table 3

Clinic-level barriers and facilitators to telemedicine implementation by organizational capacity during the pandemic in two federally qualified health centers in Northern California, clinic personnel interviews (n = 15), 2020–2021.

Theme	Key Finding	Supporting Quote(s)
Personnel capacity	B Negative impact of COVID-19 on operations	<ul style="list-style-type: none"> - It was furlough and sick leave and various things while our volume was way down initially. (Physician 2, Clinic A) - There was a good two-week period where we were very, very short staffed and that made everything challenging. (Operations Staff, Clinic B)
	F Implementation champion at various levels (leader, peer)	<ul style="list-style-type: none"> - What helped me was to have somebody within my staff to be like a champion. (Manager, Clinic A) - [Physician] is not officially the chief information officer, but the lead for the EMR. He was able to also take on the mantle of really steering our organization to the transition to telehealth, and he had a great fellow/intern who helped coordinate all this. (Physician 2, Clinic A) - The program manager made sure all MAs and RNs knew exactly what was happening. She came up with the workflow so everybody knew what to expect. She even came up with kind of a cheat sheet on how to walk a patient through setting up Zoom or the telephone calls. (Operations Staff, Clinic B)
	F Clinic staff to prepare ahead of a visit	<ul style="list-style-type: none"> - [CHW] took a lot of time explaining it to patients and that kind of helped in the long run because she kind of did the pre-visit work and [patients] were set to see the provider. (Manager, Clinic A) - The day of their appointment, for doing phone visits, the MA will be the one who initially calls them—whether that be for video or for phone to kind of just do more intake. (CHW 2, Clinic B)
	F IT personnel for equipment and technical support	<ul style="list-style-type: none"> - Our next challenge ... was, oh my gosh, how in our EMR are we going to differentiate these visits? So we had our programmer create, in our charting and our electronic medical record, you would submit your codes, your CPT codes. (Operations Staff, Clinic A) - IT team made sure that everybody, especially those working remotely, had access to everything they needed and that our EHR was set up. (Operations Staff, Clinic B) - Our tech team, our IT, they really helped getting us all the Zoom IDs and all of that, giving us all these written instructions on how to do and what to do. (Manager, Clinic B)
	F Bilingual personnel who provide high quality, language concordant care	<ul style="list-style-type: none"> - If I'm in the clinic and have a patient on the video call, and I have another staff member who can speak that patient's language, I might just invite that staff person in on the Zoom and then they can do translation there as well. (Physician 1, Clinic A) - We're fortunate because we have many staff members who are bilingual in one of those languages. We're usually able to do direct translation during our clinical encounters. (Leader, Clinic A) - One of the main things that we work on is that most of our providers are at least bilingual ... we have staff members that are bilingual and multilingual. We cover some of the major ones ... we have Mandarin-speaking, Spanish-speaking, Vietnamese. (Leader 2, Clinic B)
	F Commitment to patient-centered care and serving marginalized populations	<ul style="list-style-type: none"> - Many of our providers have been practicing for years and none of them were doing telehealth. So to ask them, all of a sudden, to care for patients, this was a big change and they really just picked up and ran with it. We had the issues we ran into, were mostly logistical, technical, operational issues. We didn't have anybody throw their hands up and say 'I refuse. This is ridiculous.' And on the same side, it's a lot of different workflows for our support staff. So MAs and nurses as well. Everyone was very adaptable to trying it out and, even if it doesn't work perfectly, we're going to work together and share best practices to figure out how we can get it going. (Leader, Clinic A) - I think because we made taking care of patients the most important. (Operations Staff, Clinic B) - The more difficult resource investment was trying to get useful best practices and knowledge. (Leader, Clinic A) - One big issue would be getting information from different sources. Sometimes the information would differ so it was like, okay so who do we go with and who do we believe. (Operations Staff, Clinic B) - It was very new to everyone, so everyone was very confused—everyone as far as the staff, patients. The workflows were updated every week or twice a week, so it was hard to keep everyone on the same page. (CHW 1, Clinic B)
Professional development capacity	B Lack of knowledge or uncertainty about appropriate use	<ul style="list-style-type: none"> - We had a lot of trepidation as to whether those would be considered equally in terms of video visits. And it felt like several times during the year we were making preparations to say, okay, no more telephone whatsoever because we're unlikely to get reimbursed. (Leader, Clinic A) - [Phone visits are] not full charge. As far as like any payments or insurance on the end of the clinic I'm not entirely sure. (CHW 2, Clinic B)
	B Reimbursement policy confusion	<ul style="list-style-type: none"> - OCHIN has ... Ella, like this like content library. It has a lot of tutorials and so that's where I've gone to and searched if I had any questions about telemedicine. (Manager, Clinic A) - At various points we reached out to other organizations who are struggling with the same changes, to get feedback on what they were doing. The California Primary Care Association has been a strong proponent, provided a lot of resources, which has been helpful. (Leader, Clinic A) - One of our biggest partnerships is Community Health [Partnership]. They helped us get in contact with other clinics in the area. We were able to kind of bounce off different ideas and different resources available in the community to better serve our patients. (CHW 3, Clinic B)
	F Experience communicating by telephone	<ul style="list-style-type: none"> - We didn't have that much experience doing video visits, but we were always using the telephone to communicate with patients. So that wasn't a hard transition. (Care Coordinator 1, Clinic A) - The physicians call patients to discuss abnormal labs. (Manager, Clinic B)
Technological capacity	B Lack of private workspaces for personnel	<ul style="list-style-type: none"> - The clinic rooms were empty so we're mostly crouched out there and then our MA would be at their workstation. (Physician 2, Clinic A) - Because MAs share the same workspace, because the HIPAA issue, they're not allowed to be on a video call where there is a patient's face visible. That's the reason they don't use Zoom. They just dial into Zoom calls on their phone. (Manager, Clinic B)
	B Limited equipment for patients in home settings	<ul style="list-style-type: none"> - We had blood pressure monitors donated by AHA, but those are limited in supply. (Physician 1, Clinic A) - If we could get remote patient monitoring for blood pressure or even remote patient monitoring for glucometers, then you might really be able to reduce the need for in-person care. (Leader, Clinic A) - I wish it was possible to, for example, patients that don't have access to a smartphone to borrow a smartphone or some patients can't purchase a blood pressure machine and ... they don't have insurance, to have that equipment to offer it to patients who can't afford them. (CHW 1, Clinic B)

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Table 3 (continued)

Theme	Key Finding	Supporting Quote(s)
B	Difficulty integrating a third-party language interpretation service	<ul style="list-style-type: none"> - <i>The [language] company we use, it's not easy to dial into Zoom in the EHR. That's why sometimes we have to resort to using a phone call while they do a video call to the patient. (Leader, Clinic A)</i> - <i>With our tele-video visits, when we have to use that, it becomes a bit more of a challenge because the translation services they're connected via telephone and it's one of those where it's putting the landline on speaker close to the computer. It's not ideal. (Leader 2, Clinic B)</i> - <i>I had to call like eight times one time to reach the patient. When we use the interpreter language line, if they call the patient, that comes up as a 1-800 number. Many patients don't like to pick up. I don't either. I don't blame them. (Physician, Clinic B)</i>
F	Investing in equipment and software for use in office or remote settings	<ul style="list-style-type: none"> - <i>We had a big push to get laptops to those who still needed them. To make sure they were outfitted with our VPN so that people could still be working within our network and HIPAA compliant technology rules to do their work remotely. (Leader, Clinic A)</i> - <i>For computers that the screens did not come with a webcam, webcams were purchased. We've invested in better headsets for staff so they are able to communicate and use their hands with the computer. (Leader 2, Clinic B)</i>
F	Option to use audio-only visits	<ul style="list-style-type: none"> - <i>I think it's just a lot easier on phone. There's no connection issues. (Manager, Clinic A)</i> - <i>We were doing as much telephone telemedicine as we could that was appropriate for the type of care. Not all clinical care can be done by telephone, it doesn't quite meet the clinical need for a patient. But in lieu of having video access, we started with that and then quickly were able to add video capability as well. (Leader, Clinic A)</i>

AHA = American Heart Association; B = barrier; CHW = community health worker; CPT = current procedural terminology; EHR = electronic health record; EMR = electronic medical record; F = facilitator; HIPAA=Health Insurance Portability and Accountability Act; IT = information technology; MA = medical assistant; RN = registered nurse; VPN = virtual private network.

Multiple technological capacity barriers were identified, including: 1) lack of private workspaces for personnel (particularly medical assistants) who provide or assist with the delivery of care; 2) limited equipment to support telemedicine in home settings; and 3) difficulty integrating a third-party language interpretation service into a telemedicine visit, which was said to be inefficient and added time to a visit.

A facilitator consisted of having adequate equipment and software to support telemedicine in office or remote settings. Both FQHCs invested in resources for providers and staff at the start of the pandemic, purchasing work laptops, external monitors, microphones, headsets, and software, to support HIPAA compliant telemedicine use and ergonomically friendly workplaces.

The ability to use audio-only visits and obtain reimbursement was described as an important facilitator. Many used audio-only as a default with fewer technological limitations. Some said their clinic heavily relied on phone visits early in the pandemic and used them as a transitional technology while they increased their video visit capacity. Personnel from both FQHCs said audio-only visits persisted at a higher rate than video throughout the pandemic.

3.3. Patient-level barriers and facilitators

Data on patient barriers and facilitators reveal the importance of individual-level factors, the home environment, technology, and interpersonal support and technical or language assistance (Table 4).

Individual-level patient barriers were older age, LEP, and limited digital literacy. Patients with these characteristics were said to avoid or dislike video visits, had limited access to devices, or had greater trouble using video technology and required assistance.

Housing and the home environment also impacted use. Personnel said patients who lacked housing were the most marginalized and it was difficult to reach them using any modality. Among those with housing, lack of privacy in larger households and not having adequate space for confidential and private conversations was problematic.

Technological barriers included having insufficient equipment or services, like a lack of devices or consistent broadband internet access, to support high quality video visits. An important facilitator to overcome these barriers consisted of audio-only visits, which many said were highly accessible and helpful—particularly for those at greatest risk of delaying care during the pandemic.

Telemedicine convenience was an important facilitator to promote continued use and contribute to high satisfaction. Reduced wait times, reduced travel costs, and fewer transportation-related issues were

mentioned as helpful, particularly for patients with chronic illness or limited mobility.

The availability of individuals for interpersonal support and technical or language assistance helped patients overcome barriers identified. Patients with family members to assist with the use of technology had an easier time using video visits. Based on patient interview data alone, clinic staff who taught patients to use platforms prior to a visit increased familiarity with the process. For patients with language service needs, having language concordant providers or a trusted source (i.e., family member, clinic personnel) interpret was preferable to a third-party service because of the comfort and trust afforded by these existing relationships in addition to fewer technical and communication/interpretation barriers.

3.4. Continued use and reimbursement policy

A majority of personnel expressed interest in continuing to offer video and audio-only visit modalities beyond the pandemic. Most expected a hybrid model to emerge whereby clinics would offer a full range of modalities (in-person, video, audio-only), contingent on appropriate use, health needs, and patient preferences. Respondents said they expected in-person visits to dominate and telemedicine to comprise 25%–50% of visits if offered.

Personnel indicated that continued telemedicine use largely hinged on federal and state reimbursement policy decisions. In the words of a care coordinator, “as long as the insurance covers the cost of telemedicine, [clinic] will continue offering that.” Operations staff spoke of the importance of reimbursement policy and its impact on clinical operations: “Clinics like ours have been hesitant to really open the floodgates and think about what we can do with telehealth because we are so nervous about reimbursement.” Several leaders and providers said their clinic would experience a steep drop-off in overall telemedicine volume if audio-only visits were reimbursed at a low rate.

Some leaders and providers also advised shifting away from a fee-for-service (volume-based) reimbursement model to a value-based care model with global budgets for FQHCs to sustain the use of telemedicine and afford flexibility for the delivery of care.

4. Discussion

This in-depth qualitative study with FQHC personnel and patients in two community health centers establishes an important foundation to understanding telehealth use in marginalized communities. We found the

Table 4

Patient barriers and facilitators to telemedicine use by theme during the pandemic in two federally qualified health centers in Northern California, clinic personnel and patient interviews (N = 24), 2020–2021.

Theme	Key Finding	Supporting Quote(s)
Individual-level	B Older age	<ul style="list-style-type: none"> - <i>With that older population, it is a little bit more difficult because they don't know how to use the technology or they need the assistance of their relatives.</i> (Care Coordinator 1, Clinic A) - <i>It's again the younger people who are less than 50 years old, they will accept the video visit. Like older patients, they don't like video visits.</i> (Care Coordinator 2, Clinic A) - <i>Main barriers have been an older population that didn't understand how to use the technology or didn't have internet connectivity in their home or didn't have a device.</i> (Leader, Clinic B)
	B Limited English proficiency	<ul style="list-style-type: none"> - <i>The ones who are left out, left behind by telemedicine tend to be the elderly and non-English speaking and the ones who don't have technology proficiency.</i> (Physician 2, Clinic A) - <i>If you're not proficient in English, it's intimidating to figure out what to download and what the instructions are.</i> (Operations Staff, Clinic A) - <i>Most patients that I interact with are Mandarin-speaking patients. So, a lot of them don't really know how to download the app or use the functions, especially since it's in English.</i> (CHW 3, Clinic B)
	B Limited digital literacy	<ul style="list-style-type: none"> - <i>We definitely have people who really struggle to navigate downloading an app or logging in an account or any error or any issue connecting, can't get the sound to work, etc.</i> (Leader, Clinic A) - <i>I feel like all our patients prefer video visits if it's not an in-person visit, but I think they have issues, digital illiteracy.</i> (Manager, Clinic B) - <i>People not knowing how to use the application of Zoom or how to connect to the televideo visit.</i> (Leader 2, Clinic B)
Housing and the home environment	B Lack of housing	<ul style="list-style-type: none"> - <i>The other population that has been difficult to reach would be the homeless population.</i> (Care Coordinator 1, Clinic A) - <i>We have some homeless patients ... who don't have reliable telephone or internet.</i> (Manager, Clinic B) - <i>It's still a challenge of how we can set visits up for unhoused populations.</i> (Leader 2, Clinic B)
	B Lack of privacy in home settings	<ul style="list-style-type: none"> - <i>We have situations where families live in very small, crowded spaces and they don't have a lot of privacy. It's introduced more complexity for confidentiality and privacy.</i> (Leader, Clinic A) - <i>And they have other issues that they can't discuss with the provider. Personal issues that we cannot discuss easily over telehealth or Zoom video visits.</i> (Physician, Clinic B)
Technology	B Lack of equipment or services	<ul style="list-style-type: none"> - <i>Everything from not having internet access, not having smart devices. At times, people will have both of those items, but they don't work so well. They have unreliable internet access or their internet is shared across many devices.</i> (Leader, Clinic A) - <i>Some of our patients not having internet and access. I think most people at least have a telephone so that has been okay. But if it's something that they could have taken care of through a video visit, that doesn't happen because they don't have these additional amenities.</i> (Manager, Clinic B) - <i>A lot of people need smart phones and help using them.</i> (Spanish-speaking patient, age 45, Clinic A) - <i>Maybe I should have a computer or something like that so we can see each other.</i> (Tongan-speaking patient, age 60, Clinic A) - <i>If given a phone with video capabilities and taught how to use it, I would be open to trying it.</i> (Mandarin-speaking patient, age 80, Clinic B)
	F Availability of audio-only visits	<ul style="list-style-type: none"> - <i>If patients weren't able to use that platform due to poor internet, then we used telephone only, which was very helpful for patients.</i> (Physician 1, Clinic A) - <i>There are diagnoses and conditions that telephone only is completely adequate for. It can be particularly helpful for patients who have challenges with digital literacy.</i> (Leader, Clinic A) - <i>It's still a challenge for a lot of patients so I still do a lot of just phone calls, especially with older patients.</i> (Physician 2, Clinic A) - <i>I've seen an increase of patients that necessarily are no shows or have a hard time coming in. The phone has been beneficial for them and being able to access the care they need.</i> (CHW 1, Clinic B) - <i>It was supposed to be a video call, but I told them I did not have access to the tablet. We used my phone.</i> (Spanish-speaking patient, age 42, Clinic A) - <i>I'm not sure if my phone can do video visits. I just use the phone.</i> (Mandarin-speaking patient, age 80, Clinic B)
	F Convenience	<ul style="list-style-type: none"> - <i>In our patient surveys, I know there are a fair number of patients who have very long drive times or commutes to get to our clinic normally. If we can save them 2 h of commuting for a visit we can do by video, that ... saves them gas money, saves them time, saves traffic.</i> (Leader, Clinic A) - <i>I think it's also very difficult to go and eliminate telemedicine at this point now that convenience has been provided to patients, especially those that have ambulatory issues or transportation issues that makes it difficult for them to come into the four walls of a health center.</i> (Leader 2, Clinic B) - <i>For chronic care, especially if there's some who are immobile or just have trouble traveling to the clinic.</i> (CHW 3, Clinic B) - <i>If you don't have transportation, you will lose your appointment. But if it is by telephone, then you have that option and it helps financially.</i> (Spanish-speaking patient, age 42, Clinic A) - <i>I don't drive so telehealth is more convenient.</i> (Mandarin-speaking patient, age 70, Clinic B) - <i>I enjoy telehealth more because it can save me a lot of time.</i> (Mandarin-speaking patient, age 60, Clinic B)
Interpersonal support and technical or language assistance	F Family members who provide technical assistance	<ul style="list-style-type: none"> - <i>It takes a long time for us to educate, maybe two or three times. Unless we get a little kid at home to help.</i> (Care Coordinator 3, Clinic A) - <i>From the clinic perspective, getting help from some family members to make sure the devices are set up properly in order to transmit the data.</i> (Leader 2, Clinic B) - <i>It was a video call. I have a daughter, she is in college and knows more than me. When I don't know how to do something or use the device, I ask her.</i> (Spanish-speaking patient, age 42, Clinic A) - <i>My daughter was here when I received the video call. I didn't know how to do it, but my daughter showed me and then I could answer the doctor.</i> (Spanish-speaking patient, age 57, Clinic A) - <i>If it's something that I don't know or am confused, my son will help me.</i> (Tongan-speaking patient, age 60, Clinic A)

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Table 4 (continued)

Theme	Key Finding	Supporting Quote(s)
	F Clinic staff who teach patients to use platforms	<ul style="list-style-type: none"> - I don't really know her position in the clinic, but she always calls and checks in. Like the Zoom. She taught me how to do it. (Tongan-speaking patient, age 60, Clinic A) - The first time I used Zoom, there was an assistant from [clinic] that helped me log in and taught me how to use telehealth. I logged in on my own the second time and it was easy. (Mandarin-speaking patient, age 70, Clinic B)
	F Language concordant providers or trusted sources for interpretation	<ul style="list-style-type: none"> - Patients often prefer to use their family members as translator. We do have access to call like a translation system. I haven't actually had to use it because patients were so sure they wanted to use their family members to translate. (Physician 1, Clinic A) - They feel more comfortable with [CHWs] interpreting. For some of these interpretations being over the phone, they kind of like knowing who it is that's interpreting for them versus someone that they don't necessarily know. (CHW 1, Clinic B) - For me, it is very important that the doctor speak the same language because I don't speak English. I need them to understand what I am saying, and I need to understand what they are saying. (Spanish-speaking patient, age 45, Clinic A) - We don't have a problem because [doctor] is bilingual and that is good because most of us that go to that clinic are Hispanic and we speak more Spanish than English. And most doctors there are bilingual. (Spanish-speaking patient, age 42, Clinic A) - It is very important that [doctor] speaks the same language because that way, we understand each other. (Spanish-speaking patient, age 57, Clinic A)

B = barrier; CHW = community health worker; F = facilitator.

structural vulnerability of patients with LEP excluded them from accessing the full scope of telemedicine services, including video visits, during the pandemic. Our findings help to explain why patients with LEP had lower telemedicine video use during the pandemic (Rodriguez, Betancourt, Sequist, & Ganguli, 2021) and illustrate specific challenges patients encountered like limited digital literacy and difficulty using platforms. At the clinic level, integrating a third-party language interpretation service into a telemedicine visit was challenging and seen as inefficient.

The role of external policy and incentives in the outer setting (Ross, Stevenson, Lau, & Murray, 2016) is critical to telemedicine use. Prior to the pandemic, Medicaid reimbursement was an important determinant of video visits in health centers (Lin et al., 2018) and reimbursement/cost concerns were barriers to adoption and use (Lori et al., 2020; Scott Kruse et al., 2018). When telemedicine reimbursement was expanded to cover audio-only and additional flexibilities were rapidly adopted, we found reimbursement *confusion*—particularly uncertainty around reimbursement for audio-only visits—impeded implementation and threatens to impact continued use. Concerns about insufficient or uncertain reimbursement were identified as top barriers to telehealth use among providers in New York City primary care practices during the pandemic (Chang et al., 2021). It is important for policymakers to be aware of the impact of having temporary policies in place on the sustainability and long-term use of telemedicine.

Our findings add to growing literature detailing organizational structures and processes that enable or hinder telemedicine implementation across healthcare settings and patient populations. We identify important organizational barriers—lack of prior telemedicine knowledge and experience, reimbursement uncertainty, and various technological barriers—that may have contributed to suboptimal implementation, use, and outcomes. Reliance on a variety of external training resources, use of audio-only visits, and investments in upgrading or purchasing new equipment were important factors to facilitate use, in addition to ongoing support by key personnel and champions. Some of our results (e.g., knowledge needed to use the technology) are included in the framework for nonadoption, abandonment, scale-up, spread, and sustainability of health and care technologies (Greenhalgh et al., 2017) and aligned with findings from an updated review of factors that influence e-health implementation (Ross et al., 2016).

4.1. Clinical and policy implications

We assessed barriers and facilitators to using telemedicine from multiple vantage points, which can be of considerable value as a basis for improvement. Patient facilitators and barriers varied from individual-

level factors to structural issues, like a lack of broadband internet access. The latter can be addressed with broader investments in telehealth services and infrastructure outside of the clinic (Scott Kruse et al., 2018), potentially targeting groups such as older patients (Fischer, Ray, Mehrotra, Bloom, & Uscher-Pines, 2020; Phimphasone-Brady et al., 2021; Scott Kruse et al., 2018) and those without housing (Lori et al., 2020) who have greater difficulty accessing or using telemedicine and may lack basic infrastructure and equipment (Wray, Tang, Shah, Nguyen, & Keyhani, 2021). Funding for FQHCs to distribute physical resources (e.g., tablets, smartphones, remote monitoring devices) to patients can help to promote the use of these devices to support and expand video visit rates. Some of these devices can also be leveraged to deliver digital health coaching, which has shown promise for the long-term management and prevention of type 2 diabetes among patients (Gershkowitz, Hillert, & Crotty, 2021).

The results highlight the importance of continued reimbursement for audio-only visits to benefit marginalized populations who rely on the modality due to its accessibility and lower operational complexity compared to a video visit. A survey of 273 centers (June 2021) found 92% of health care administrators reported audio-only telemedicine improved patient access and 85% said it allowed them to reach marginalized populations during the pandemic (National Association of Community Health Centers, 2021). Quantitative studies found greater use of audio-only visits compared to video among Spanish-speaking patients (Rodriguez, Betancourt, et al., 2021) and in primary care practices in socially disadvantaged areas (Chang et al., 2021) and FQHCs (Uscher-Pines et al., 2021). FQHC providers have also attested to the utility of offering audio-only (“low tech”) options for certain services to patients who have difficulty using video visits (Baras Shreibati, 2021). Cumulatively, this evidence and our results provide a strong basis for the continued use and reimbursement of audio-only visits beyond the public health emergency to promote equitable access.

Study results point to the valuable role of key safety net personnel who enabled implementation and expanded telemedicine use, i.e., clinic personnel involved in telemedicine uptake and implementation, those involved in providing technical and social support to patients, and bilingual personnel who provided language concordant care or interpretation. Future efforts are needed to train clinic personnel to improve patient digital literacy and facilitate onboarding for telemedicine visits in workflows. FQHCs and other safety net settings can leverage trusted personnel (e.g., CHWs, care coordinators) to avert issues related to patient mistrust of technology or the medical community (Ramsetty & Adams, 2020). Others have similarly recommended increasing access to technical support staff and investing in building digital literacy skills for meaningful engagement and use (Anaya et al., 2021; Chang et al., 2021;

Lau et al., 2020; Rodriguez, Bates, et al., 2021), particularly for older patients and individuals with LEP.

Our results on the value of language concordant providers and trusted individuals to assist with interpretation are aligned with emerging research on *transcultural health care communication*, which illustrates how language concordant providers with transcultural knowledge can build trust with immigrant patients to advance patient-centered care (Magaña, 2021). Incentives to expand the availability of bilingual providers who can deliver culturally and linguistically appropriate services should be prioritized to enhance the quality of telemedicine in safety net settings. Doing so can help offset low or lack of reimbursement issues for healthcare organizations that serve patients with LEP and dissuade the use of untrained interpreters (i.e., family members) who may pose safety or privacy concerns.

4.2. Strengths and limitations

Study limitations include the use of purposive sampling therefore the results may not be generalizable to other clinical settings, regions, or patient populations. We also focused on recruiting established patients with at least one telemedicine visit during the pandemic and excluded new patients and those who did not use telemedicine. Research is needed to identify patients most vulnerable to exclusion beyond factors identified in this study.

Despite these limitations, strengths include deployment of a rapid, yet rigorous, qualitative data analysis approach and use of a brief quantitative instrument to characterize the sample. Another strength is the inclusion of a varied sample of FQHC clinic personnel representative of a range of organizational roles in addition to sampling patients who primarily speak a language other than English. Our data collection timing also allowed for several months of implementation experience and reflection. Lastly, while in-person recruitment and interviews would have been preferred to capture nonverbal cues like body language, in-person fieldwork was prohibited during the study period due to the pandemic. It is possible that some respondents may have been more comfortable with remote interviews because of the convenience and confidentiality afforded (Howlett, 2021).

5. Conclusion

Rapid telemedicine implementation during the pandemic may have exacerbated access and quality gaps for marginalized patients and safety net settings lacking telemedicine experience. We identify a range of organizational and patient-level barriers and facilitators in FQHCs, establishing an important foundation for future efforts to develop targeted interventions and quality improvement projects that leverage trusted clinic personnel and seek to improve digital literacy skills among patients. Results inform current policy debates by demonstrating the importance of reimbursing audio-only visits to provide access for marginalized patients and the need for additional resources and innovation to improve telemedicine language access services and quality.

Ethical statement

UC Merced's Institutional Review Board approved all study protocols and materials prior to their use (UCM2020-85). We obtained approval for UC Berkeley to rely on UC Merced's IRB review. Participants provided verbal consent to participate and agreed to be audio recorded.

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Authors' contributions

DDP designed and conducted the study in collaboration with LG and HPR. JLF and AAT provided input on the instruments and procedures. DDP and JLF conducted the procedures, including recruitment, data collection, and analysis. LG and HPR provided input on the data analysis procedures and reviewed select outcomes. DDP drafted and revised the manuscript with assistance from JLF. JLF, LG, AAT, and HPR were involved in revising and editing the manuscript draft. All authors read and approved the final manuscript.

Declaration of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

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