

Implementing the Digital Equity for Stroke Approach (DESA): A Qualitative Study of Multilevel Barriers and Facilitators to Equitable Telehealth Implementation in Safety-Net Settings

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Abstract

Background

Telehealth and remote physiologic monitoring (RPM) have transformed hypertension management and stroke prevention, but these benefits are not distributed equally. Safety-net health systems serving low-income, racially, and linguistically diverse populations face persistent barriers to telehealth adoption that threaten to widen existing disparities. This qualitative study explored the barriers and facilitators that providers and hospital administrators perceive as shaping telehealth adoption. Ultimately, these insights will inform the implementation of the Digital Equity for Stroke Approach (DESA), a telehealth-enabled, equity-focused stroke prevention pilot intervention within a safety-net academic medical center in Central Brooklyn.

Methods

As part of a larger mixed methods pilot randomized controlled trial evaluating DESA, 19 semi-structured key informant interviews were conducted with physicians and hospital administrators between April 2021 and February 2025. Interviews were audio-recorded, transcribed, de-identified, and analyzed using CFIR-guided deductive coding combined with inductive thematic analysis informed by interpretive phenomenological analysis.

Results

Thematic analysis yielded four overarching themes: (1) digital infrastructure and technological barriers, (2) health equity and the digital divide, (3) implementation process and organizational change, and (4) patient and provider experience and preferences.

Conclusions

Equitable telehealth implementation in safety-net settings requires coordinated investment across policy, infrastructure, and workforce levels rather than technology access alone. Sustained reimbursement parity for audio-only visits, expanded digital navigation staffing, and trust-building strategies represent actionable levers for health systems and policymakers seeking to prevent telehealth from reproducing existing health inequities.

Background

The rapid expansion of telehealth since the COVID-19 pandemic has fundamentally reshaped how health systems deliver care.¹ Video visits and remote physiologic monitoring (RPM) have emerged as

transformative tools for managing hypertension and preventing stroke recurrence.²⁻⁴ These tools offer a valuable opportunity to help patients manage blood pressure (BP), making care more engaging, convenient, and efficient.^{5,6} Yet this technology's benefits have not been equal across all groups in the US. Racial, ethnic, and regional disparities persist in the prevalence of hypertension, stroke incidence, and stroke recurrence – conditions strongly linked to inadequate BP control.⁷ Additionally, limited access to primary care, unreliable broadband internet connectivity, and other social determinants further compound disparities.^{8,9} Interventions that improve BP monitoring and communication between patients and clinicians may play a pivotal role in mitigating disparities. Emerging evidence suggests that digital health tools, when effectively implemented, can enhance health outcomes of patients controlling their BP.^{3,4,5} Given telehealth's promise and persistent inequities, there is a clear need to improve implementation within safety-net systems.

A systematic review of 45 articles on telehealth implementation in safety-net primary care found high levels of patient and clinician acceptance, with broad agreement that telehealth can deliver quality care beyond the pandemic and enhance efficiency, expand access, and improve outcomes, particularly by overcoming barriers like transportation, unstable housing, and scheduling difficulties.¹⁰ However, the review also identified substantial barriers to equitable outcomes, including weak administrative and clinical workflows, insufficient implementation expertise, limited staff training, and inconsistent interpretation services for patients with limited English proficiency.¹⁰ These organizational barriers are compounded by patient-side challenges such as limited digital literacy, unreliable broadband, low-quality devices, and privacy concerns, raising the risk that telehealth expansion could worsen existing disparities without thoughtful implementation.¹⁰

Subsequent studies reinforce these gaps. Digital literacy challenges, limited broadband, and provider workload strain reduce clinician enthusiasm and patient engagement¹¹, while inadequate translation support, fragmented platforms, and insufficient administrative support increase staff burden and risk widening disparities for patients with limited English proficiency.¹² Successful remote BP monitoring adoption depends on culturally responsive support staff, such as bilingual community health workers, to help patients navigate language needs, literacy barriers, and transportation challenges, particularly among migrant and minoritized populations.^{13,14} Yet high device costs and inadequate training continue to limit implementation, while sustainability is challenged by non-billable staff time and reimbursement policies that may not adequately cover approved monitoring devices.^{13,14}

A PRISM-guided study of 11 primary care clinicians and staff across a large urban safety-net system found that staffing shortages and disorganized workflows directly undermined the quality and equity of telehealth.¹⁵ Without dedicated personnel and streamlined team processes, clinics struggled to help patients meet basic technology needs, underscoring the upfront investment required for telehealth to succeed.¹⁵ A related study of 11 digital health navigators in the Los Angeles County safety-net system similarly found that in-person, culturally and linguistically tailored instruction was essential.¹⁶ Together,

these findings highlight both the human resource demands and the importance of culturally responsive strategies in digital health implementation.

A CFIR-guided focus group study identified multilevel barriers and facilitators to RPM implementation within publicly funded health systems.¹⁷ Consistent with prior work, healthcare professionals described multi-level challenges such as low digital literacy, language barriers, uneven IT infrastructure, limited device availability, and insufficient staff training. This reflected broader digital determinants of health¹⁸ and contributing to disparities in RPM adoption.¹⁷ Participants emphasized the need for tailored training and dedicated resources to support clinical and nonclinical staff, particularly in rural settings where workforce shortages and infrastructure gaps are more pronounced.¹⁷ These findings point to the need for region-specific strategies to ensure equitable access and viable RPM implementation, and align with well-documented digital divide patterns in which disparities in internet access, device availability, and digital literacy remain most pronounced among low-income, older, non-English-speaking, and minority populations.^{19–21} Addressing these disparities requires a dual focus: reducing patient-facing barriers to engagement while targeting the organizational conditions that determine whether equitable implementation is possible.

The digital divide also separates well-resourced private systems from public safety-net systems. Private systems generally have stronger digital infrastructure, integrated video platforms, and robust IT support that enable widespread use of high-quality video visits linked to greater patient satisfaction.^{19,22} In contrast, safety-net systems more often rely on audio-only visits due to limited internet access, device availability, staffing, and digital literacy.^{19,22} Reimbursement structures deepen this divide: private systems benefit from commercially insured patients and higher telehealth payments, while Medicaid-reliant safety-net systems often receive unequal pay for audio-only visits, discouraging investment in technology or staffing.²² The result is a stratified telehealth landscape in which private-system patients access more flexible, higher-quality digital care while safety-net patients face persistent structural hurdles, deepening existing health disparities.^{19,20,22,23}

The evidence underscores a persistent digital divide that limits the effectiveness of telehealth and remote monitoring in safety-net settings. The Digital Equity for Stroke Approach (DESA) was developed in direct response to these gaps, employing a multi-layered strategy that addresses both clinical and structural barriers by providing broadband internet access, enhancing caregiver engagement, enabling flexible two-way communication via telehealth, text, or email, and supporting continuous remote BP monitoring. To integrate this approach into routine stroke aftercare and scale it across similarly resourced systems, understanding the real-world conditions that shape its implementation is essential. As part of DESA's formative development phase, this study asks: What barriers and facilitators do clinicians, administrators, and system stakeholders perceive as shaping the adoption and implementation of a telehealth-enabled, equity-focused stroke prevention intervention in safety-net settings?

Method

Study Design and Setting

This qualitative study is part of a larger mixed methods pilot randomized controlled trial assessing the feasibility of DESA, a digital health intervention using remote blood pressure monitoring to reduce stroke recurrence among patients in Central Brooklyn hospital systems. This qualitative component employed semi-structured key informant interviews to explore implementation experiences and barriers. The study was conducted within an academic medical center serving predominantly low-income, racially and linguistically diverse communities in Central Brooklyn. Broadly, we hypothesized that a digital solution designed by and for our community, with key clinician stakeholder buy-in, would have a positive impact on reducing racial disparities in stroke morbidity, mortality, and care. As part of the digital equity plan used to develop the intervention and uncover ongoing implementation issues, 19 key informant interviews were conducted between April 2021 and February 2025 to gain insight on cited challenges and barriers to telehealth implementation during and following the pandemic shutdown.

Participants and Recruitment

Physicians and hospital administrators from a range of specialties were invited to participate. Participants were identified using convenience and snowball sampling; inclusion required use of telehealth in care delivery or direct involvement in implementing or optimizing telehealth services. Table 1 lists the characteristics of study participants. Of the 19 participants, 16 were physicians from specialties such as primary care, psychiatry, neurology and neurosurgery, pediatrics, and obstetrics and gynecology. Additionally, three hospital administrators that represented different departments across the hospital system were also interviewed. No prior relationships were established between the research team and the participants before study commencement.

Interview Guide Development

The semi-structured interview guide was developed using common themes published in the literature^{24–31} and the Consolidated Framework for Implementation Research (CFIR)³² to explore key factors that influence telehealth implementation across multiple levels within a safety-net setting relevant for our diverse patient population in Central Brooklyn. CFIR informed a priori domains related to inner and outer setting conditions, implementation climate, and organizational readiness. Key interview domains included: (1) individual experiences with telehealth technology, (2) perceived benefits and barriers to implementation, (3) organizational readiness and resources, (4) patient engagement and equity considerations, and (5) policy and institutional factors affecting adoption. The key informant interview guide was pilot-tested prior to study implementation with the principal investigators (AA and DK), who possess expertise in qualitative methodology and interviewing techniques. The guide was developed specifically for this study and is provided as supplementary file.

Interview Process

Key informant interviews (30–50 minutes) were conducted over Zoom by trained researchers working in close collaboration with the study DESA study principal investigators (AA and DK). At the start of each interview, researchers introduced themselves and shared the study's objectives, context, and goal for the interview: specifically, to gain perspectives regarding the existing infrastructure of telehealth and the implementation of digital technologies in health systems serving marginalized populations in Central Brooklyn, with the ultimate goal of creating a digital equity plan to better meet patient needs. Interviews were recorded and verbal informed consent was obtained from all participants. Recordings and transcripts were stored securely on password-protected institutional servers and de-identified to ensure confidentiality. These transcripts were manually cleaned and edited, reviewed against the audio recordings to ensure accuracy, and then uploaded into Dedoose (version 10.0.59). Field notes and jottings were made immediately following each interview and discussed amongst the interviewers to capture context, key observations, and reflective insights. Dedoose was used for further cleaning and editing of the transcripts, followed by thematic analysis using interpretive phenomenological analysis (IPA)^{33–35} to make sense of participants experience using or supporting the implementation of telehealth for care delivery.

Data Analysis

The CFIR, a determinant framework, was selected as a coding framework for its systematic structure for identifying barriers, facilitators, and contextual factors affecting telehealth implementation across diverse organizational settings. Its constructs helped researchers understand complex factors within the innovation (e.g., adaptability of telehealth), outer setting (e.g., policies and incentives), inner setting (e.g., available resources), individuals involved (e.g., roles and characteristics), and implementation process (e.g., planning and engaging).

Researchers began with data immersion, reviewing recordings and taking detailed notes on observations, reflections, and initial insights, with attention to language use, context, and distinctive phrases or emotional responses. A team of three researchers (EN, SP, AHR) independently coded transcripts line by line, organizing codes into broader categories; to ensure intercoder reliability, the team dual-coded 6 transcripts and met regularly to resolve discrepancies through consensus. Coding combined deductive codes based on the CFIR framework and existing telehealth literature with inductively emerging themes, capturing both theory-driven and novel insights. Researchers repeatedly listened to recordings to deepen their understanding of context, tone, and timing, and reviewed the full dataset for recurring patterns and exemplar quotations. The team then met to refine the coding structure and resolve discrepancies through consensus, enhancing validity and minimizing individual bias while allowing space for novel, data-driven insights. Saturation was achieved when no new themes emerged from the final three interviews.

Ethical Considerations

This research study was approved as through the SUNY Downstate Health Science University Institutional Review Board ([1849255] Digital Equity for Stroke Approach (DESA) Pilot Study). This study adheres to COREQ guidelines for quality reporting of qualitative findings.

Results

A total of 19 key informants participated in individual interviews conducted between October 2021 and February 2025 (Table 1). The majority of participants were clinicians (n = 16, 84.2%), with the remaining three serving in administrative roles across ambulatory care and family medicine settings. Participants represented a range of specialties, including psychiatry, pediatrics, obstetrics and gynecology, HIV primary care/infectious disease, neurology, neurosurgery, and cardiology. Most participants fell within the 40–59 age range, with one participant aged 70 or older. Just over half of participants identified as female (n = 10, 52.6%), and approximately half identified as Black, African, African-American, or Caribbean-American (n = 9, 47.4%). The remaining participants identified as White or European (n = 7, 36.8%), Asian (n = 1, 5.3%), or Other (n = 2, 10.5%).

Table 1
Study Participant Self-Reported Characteristics

Interview Date	Role	Specialty	Age Range	Self-identified Gender	Self-identified Race/Nationality
Feb 2025	Administrator	Ambulatory Care	50–59	Female	Black, African, African-American, Caribbean-American
Dec 2024	Provider	Neurology	40–49	Male	White or European
Aug 2024	Provider	Pediatrics	50–59	Female	Black, African, African-American, Caribbean-American
July 2024	Provider	Pediatrics	50–59	Male	Other
July 2024	Provider	Psychiatry	50–59	Male	White or European
July 2024	Provider	Psychiatry	50–59	Male	White or European
July 2024	Provider	Psychiatry	60–69	Female	Black, African, African-American, Caribbean-American
March 2024	Provider	HIV Primary Care/ Infectious Disease	40–49	Female	White or European
March 2024	Provider	Pediatrics	40–49	Female	Black, African, African-American, Caribbean-American
March 2024	Provider	HIV Primary Care/ Infectious Disease	40–49	Female	Black, African, African-American, Caribbean-American
March 2024	Provider	Neurosurgery	40–49	Male	Black, African, African-American, Caribbean-American
Jan 2024	Provider	Obstetrics and Gynecology	70 or older	Male	White or European
Jan 2024	Provider	Obstetrics and Gynecology	40–49	Male	Other
Jan 2024	Provider	Obstetrics and Gynecology	50–59	Female	Asian
Oct 2021	Provider	HIV Primary Care/	40–49	Male	White or European

Interview Date	Role	Specialty	Age Range	Self-identified Gender	Self-identified Race/Nationality
		Infectious Disease			
Oct 2021	Provider	Cardiology	60–69	Male	White or European
Oct 2021	Provider	Neurology	60–69	Male	White or European
Oct 2021	Administrator	Family Medicine	40–49	Female	Black, African, African-American, Caribbean-American
Oct 2021	Administrator	Ambulatory Care	40–49	Female	Black, African, African-American, Caribbean-American

Qualitative analysis of key informant interviews yielded four overarching themes related to telehealth implementation in safety-net settings: (1) Digital Infrastructure and Technological Barriers; (2) Health Equity and the Digital Divide; (3) Implementation Process and Organizational Change; and (4) Patient and Provider Experience and Preferences. The themes, core categories, and sub-categories are presented in Table 2 and described with illustrative quotes below and in the appendix.

Table 2

Themes, core categories, and sub-categories identified from key informant interviews

THEME 1: DIGITAL INFRASTRUCTURE AND TECHNOLOGICAL BARRIERS	
Patients' Access to Devices and High-speed Internet	Technical barriers
	Digital connectivity issues
	Device/smartphone for telehealth
Organizational Infrastructure and System Readiness	Asymmetric staff proficiency
	Structural implementation gap
	Low support staff to provider ratio
Workflow Integration Challenges	Availability of technical support for patients and providers
	Clinic workflow conflicts
	Work Infrastructure
	Schedule integration difficulties
	Provider time constraints to troubleshoot technical issues
THEME 2: HEALTH EQUITY AND DIGITAL DIVIDE	
Access, Equity, and Resource Availability	Telehealth as an equity lever
	Two-tiered System
Digital Literacy and Capability	Digital divide
	Digital literacy
	Linguistic inaccessibility
Patient population characteristics	Socioeconomic considerations
	Age-related considerations
	Digital accessibility considerations
THEME 3: IMPLEMENTATION PROCESS AND ORGANIZATIONAL CHANGE	
Implementation Strategies	Tailoring Strategies
Implementation Support	Patient navigation and care coordination
	Teaming
Policy and Financing	Reimbursement
	Policy approaches

THEME 1: DIGITAL INFRASTRUCTURE AND TECHNOLOGICAL BARRIERS	
THEME 4: PROVIDER AND PATIENT PREFERENCES AND EXPERIENCE	
Perceived Patient Preferences and Experience	Benefits
	Privacy concerns
	Medical mistrust
Provider Preferences and Experience	Care preferences
	Audio-only preferred over videoconferencing
	Technical workarounds
	Provider comfort and satisfaction
	Concern for limited social interaction
	Benefits to providers
	Caregiver considerations
	Insight into home environment
	Physical examination limitations
	Clinical appropriateness

Theme 1: Digital Infrastructure and Technological Barriers

This theme captured the pervasive technological and infrastructural challenges that key informants identified as central obstacles to telehealth implementation in safety-net settings. Participants described barriers at multiple levels, from patients' access to devices and high-speed internet connection, to gaps in organizational readiness, to the difficulties of integrating telehealth into existing clinical workflows.

Patients' Access to Devices and High-Speed Internet

Key informants noted that while most patients had internet-connected devices, some still lacked smartphones or a reliable connection necessary to participate in telehealth visits. For patients in safety-net systems facing socioeconomic barriers, limited or unstable internet access created a fundamental barrier to connecting with essential care. Participants also questioned whether reliance on smartphones over stationary computers compounded these challenges, as some patients struggled to engage with telehealth platform interfaces on smaller devices.

We have many patients who still use flip phones, which limits our digital reach.

Organizational Infrastructure and System Readiness

Beyond patient-level barriers, participants described significant gaps within CFIR's Inner Setting domain that limited organizational readiness for telehealth at scale. Staff proficiency was variable wherein some staff were highly capable of supporting telehealth while others lacked the training or confidence to do so, creating inconsistencies in the patient experience. Participants also identified structural implementation gaps, including inadequate infrastructure for onboarding patients or training staff as well as a low support staff-to-provider ratio that left providers without the assistance needed to troubleshoot technical difficulties during or between visits.

The challenge is that not everyone on the team has the same knowledge base as [administrative assistant]. I can't say, 'Talk to someone at the front desk,' because they don't know the platform as efficiently. They should, and perhaps they do to some extent, but [administrative assistant] is much more knowledgeable than the others. It creates a bottleneck; I often have to send patients to the [IT help desk] rather than a local person who knows our process well. That is a barrier to uptake. Instead of our front-desk staff providing the necessary steps, they might just give the patient a QR code or a link to talk to someone else.

Workflow Integration Challenges

A third core category addressed the difficulty of fitting telehealth into clinical practice, with overextended staff and limited real-time technical support for both patients and providers. Workflow conflicts arose when telehealth visits disrupted established scheduling routines, particularly when mixed with in-person appointments. Participants also cited broader environmental constraints like unreliable clinic Wi-Fi and a lack of private, high-connectivity workspaces as hinderances that made it difficult to consistently offer telehealth as a care modality.

"I find I am less on my game with telehealth than when patients are in the office. In-person visits follow a more structured schedule, but telehealth visits are less predictable. Some patients are more comfortable at home and talk at length, whereas they might not say as much in the office. My schedule more susceptible to disruption if I receive a telehealth call between [in-person] visits, for example. It's much more likely to derail my schedule..."

Theme 2: Health Equity and the Digital Divide

This theme illuminated the intersection of telehealth with health equity, highlighting both its potential to expand access and the ways existing social and structural inequities can limit that potential if not intentionally addressed.

Access, Equity, and Resource Availability

Participants held nuanced and, at times, competing views on telehealth's relationship to equity. Several informants framed telehealth as an equity lever, recognizing the genuine potential to reduce barriers to care for patients who face transportation, work schedule, or geographic challenges. At the same time, participants emphasized that realizing this potential required intentional investment in the digital infrastructure of safety-net settings to not relegate marginalized populations to an inferior tier of care.

Most visits are now in person. However, those who remain primarily on telehealth are often individuals with mobility issues, for whom coordinating transportation and caregiving is a significant struggle. Telehealth allows us to check on them more easily.

We have a two-tiered healthcare system...large health systems have begun cherry-picking patients as certain Brooklyn neighborhoods become hip, leaving safety-net hospitals with only the most impoverished Medicaid patients. By taking the private insurance revenue and leaving behind only the poor, they have created a hospital system that simply cannot survive.

Digital Literacy and Capability

A recurring concern was the digital divide between patients comfortable navigating digital tools and those who were not, with varying digital literacy levels a significant determinant of telehealth adoption and success. Linguistic inaccessibility emerged as an additional dimension of this divide, with platforms and patient-facing instructions often available only in English, creating barriers for patients with limited English proficiency.

I don't think you can solve the digital divide without helping patients gain access to digital platforms, whether that is a smartphone or a tablet. The divide starts with the lack of reliable Wi-Fi or telephone service. An institution can have the best telemedicine platform available, but if patients don't have the right gadget in their hands or the access to use it, nothing is going to change.

Providing care for patients who do not speak English as their primary language is an additional challenge. We have to find workarounds to reach them, such as running the video on the computer while simultaneously using a separate interpreter on the phone line.

Patient Population Characteristics

Participants also noted patient population characteristics warranting special consideration in telehealth design. Age was frequently mentioned, as providers noted older patients often struggled to navigate video visit platforms. Socioeconomic barriers were also prominent. Notably, the frequent turnover of prepaid phone numbers made long-term scheduling and consistent patient contact uniquely challenging. Finally, digital accessibility concerns were raised for patients with sensory, cognitive, or physical impairments, for whom standard telehealth platforms often presented a significant barrier to independent engagement.

I don't want to stereotype older folks; I know there are plenty of 80-year-olds who are texting and scrolling social media. However, it is more likely that someone older is going to have more challenges with technology and less comfort with it. I do think [age is a factor].

Our patient population [has] a lot of social determinants of health issues... including communication. Our patients change their phone numbers... every month [or] every other month. Their phones are usually prepaid... so it's really hard to find [them] because of the constant changing. If you book a visit 3 or 6 months out, the chances are they have a totally different number now.

For stroke patients or individuals with disabilities, there are unique challenges. They may not feel they can use both arms at the same time, or perhaps their cognition and memory were affected by the stroke.

Theme 3: Implementation Process and Organizational Change

This theme reflected participants' perspectives on the processes, strategies, and structural factors that shaped how telehealth was successfully implemented and sustained. Using the CFIR framework, coding captured how Outer Setting elements of *Financing and Policies and Laws* shaped the structural landscape safety-net clinics had to navigate when adopting telehealth. The *Implementation Process* also emerged as a critical driver of adoption. Participants highlighted the importance of *Teaming* and robust *Implementation Support*, such as care coordination and patient navigation to manage technical onboarding and bridge communication gaps. Collaboration and *Tailoring Strategies* were essential to supporting telehealth care delivery in safety-net settings, ensuring that patients with limited resources or complex needs remained connected to care.

Implementation Strategies

Participants identified a range of strategies and supports that facilitated telehealth adoption within their settings. These efforts often took the form of informal, peer-to-peer training, with junior clinicians supporting senior providers in platform navigation. Concurrently, participants described the proactive outreach conducted with patients before visits to ensure they were technologically prepared and ready to engage when the provider called.

As a teaching hospital, we manage training internally; senior doctors train the juniors, who are generally more tech-savvy and able to navigate platforms easily. We have helpful materials, like booklets and videos prepared by IT, but we rarely need to call for troubleshooting unless the system is completely down. On the patient side, we do our best to guide them remotely – asking them to switch or turn on specific settings – but success depends heavily on their own screen and media literacy. It is much easier for younger parents, whereas older grandparents often find it more challenging.

Implementation Support

Participants underscored the need for robust patient navigation and care coordination in supporting patients through the telehealth experience, from scheduling through the visit itself. The concept of teaming, or coordinated collaboration among clinical and administrative staff, was identified as essential to ensuring that patients received the guidance and support they needed to participate successfully in virtual care.

We need more high-touch personnel – care coordinators, community health workers, social workers, and health coaches – to screen patients, connect them to services, and check in on them. Our nurses should be working at the top of their licenses as care managers, monitoring high-risk patient lists and tracking hospital admissions.

Policy and Financing

Participants situated telehealth implementation within a broader policy landscape, noting CFIR Outer Setting factors such as policies and legislation, reimbursement structures, and payer incentives shaped providers' willingness and ability to offer these services. Several informants discussed how productivity metrics often fail to account for the complexity of safety-net care. Specifically, they noted that the invisible labor of navigating translation services, which adds significant time and reduces clinical nuance, is not reflected in standard productivity requirements.

In our system, doctors are measured by [Relative Value Units (RVUs)]. A doctor at a safety-net hospital like this often has to work through a translator, which adds significant time. You lose so much in that process. Not just time, but nuance. Sometimes a patient speaks for 10 minutes, and the translator says only 4 words. You lose the inflection and body language that make up the majority of communication... the connection is lost, yet the RVU system doesn't account for that extra complexity.

Theme 4: Patient and Provider Experience and Preferences

The fourth theme captured provider perspectives and preferences regarding telehealth, revealing a complex picture in which positive experiences coexisted with important limitations and concerns.

Perceived Patient Preferences and Experiences

From the perspective of CFIR's Innovation Recipients construct, participants described how patients' perceptions, beliefs, and experiences influenced their engagement with telehealth services. Providers discussed a range of perceived patient benefits, including reduced travel burden, greater scheduling flexibility, and the ability to access care from home. However, this convenience was balanced against significant concerns about the privacy and confidentiality of virtual encounters. Medical mistrust also emerged as both a cultural and practical barrier. Participants described patients occasionally providing inaccurate contact information to preserve personal security or avoid perceived institutional threats, such as billing collections. Ultimately, participants argued that digital platforms cannot succeed in isolation from the broader imperative to repair trust between healthcare institutions and the communities they serve.

I anticipate that telehealth is much better for our patients. In pregnancy care, for example, they no longer have to travel ten times for what are often just five- or ten-minute visits. It's much better for them.

I think there's a privacy concern. In person, there is a clear trust between the doctor and patient. But when a doctor is beamed in through a camera, it raises questions: Who else can see this? Where is this data going? Are pictures being taken?

It really comes down to an issue of trust. I don't know exactly how to rebuild that within the medical community, but while we have digital platforms and digital medicine, the real issue lies between the

institution and the community we serve. There is a deep, broken trust; if we can work on repairing that, everything else will be elevated. That distrust of the medical institution is the core problem.

Provider Preferences and Experiences

Provider perspectives on telehealth were similarly multifaceted. As innovation recipients themselves, providers described how their own preferences, comfort, and experiences influenced telehealth adoption and ongoing use. Care preferences varied, with some providers embracing telehealth as a patient-centered modality and others favoring in-person visits for certain encounters. Central to this preference was the challenge of the remote physical exam, a significant limitation identified across specialties. Consequently, clinical appropriateness became a recurring theme, as providers had to develop nuanced judgment about which conditions were well-suited for virtual care and which necessitated an in-person evaluation. Notably, telephone visits were frequently preferred over video visits by both providers and patients in safety-net settings, particularly among older patients and those with limited digital literacy, a finding with significant implications for telehealth policy. Ultimately, informants highlighted provider comfort and satisfaction as vital outcomes, noting that those who felt confident navigating these boundaries were more likely to offer telehealth consistently.

My colleagues and I share a common criticism: the video component simply has not worked for our patient population, and none of us are satisfied with it. However, many of us feel a sense of validation – or are spiritually uplifted – by the fact that we are finally being reimbursed for the phone calls we were already making. While I personally have no financial incentive to use it, telehealth has allowed me to maintain patient relationships and provide ongoing care, even if the process hasn't been perfect.

Some participants expressed concern regarding the diminished social interaction inherent in virtual care, noting that telehealth can reduce the relational dimensions of medicine. This was particularly relevant for patients in behavioral health settings who may be socially avoidant, as well as isolated older adults who providers believe would benefit from the therapeutic value of in-person contact. Conversely, providers identified meaningful personal benefits, including increased professional convenience and workload flexibility. Furthermore, telehealth offered a window into the home environment, providing clinicians with novel insights into the social determinants of health, such as housing conditions and family dynamics, that are typically obscured in clinic-based encounters. Finally, participants highlighted the dual nature of caregiver involvement, noting that telehealth sometimes facilitated and sometimes complicated the involvement of family members and caregivers in clinical encounters.

Telehealth has become a little too easy; it's like ordering DoorDash. People can just stay inside all the time and never have to leave. That's a definite downside for those who are socially avoidant... we want them to be interacting more with real people. [Commuting] is a way for them to get some steps in and ensure their anxiety levels on the train or bus don't get too high.

Telehealth does offer a clue as to the patients like home life. You could see like the kid jumping on mom's lap, or you could see some of stressors, some of the real-life things that you don't see during a

traditional office visit.

Patients at risk of a second stroke may face significant barriers. They might struggle with speech or even the physical ability to hold a device. This imposes the responsibility for the telehealth interaction onto their caregivers, adding a complex dimension involving family or facility dynamics.

Discussion

This qualitative study examined the multi-level barriers and facilitators that providers and administrators perceived as shaping telehealth adoption within a safety-net academic medical center serving predominantly low-income, racially and linguistically diverse communities in Central Brooklyn. Thematic analysis of 19 key informant interviews guided by the CFIR yielded four overarching themes, described above. Together, these findings reveal not only distinct implementation challenges but also a pathway through which structural underinvestment reproduces health inequity in telehealth-mediated care: the policy environment shapes what safety-net systems can afford to build, organizational readiness determines whether telehealth can be implemented equitably, and patient digital access is best understood as a downstream expression of these upstream conditions rather than the primary problem itself. Intervening at each level of this pathway is key to identifying the patient-centered, organizational, and policy levers necessary to advance equitable telehealth implementation.

Consistent with this pathway, interviews revealed that patient-level barriers including limited device access, unreliable internet connectivity, variable digital literacy, linguistic inaccessibility, and age-related and ailment-related challenges with platform navigation were extensively described by participants and are consistent with documented patterns of the digital divide among low-income, older, non-English-speaking, and minority populations.^{10,36,37} Participants also asserted how organizational readiness is an essential prerequisite for equitable telehealth implementation. Viewed through the CFIR Inner Setting domain, participants portrayed a safety-net system operating below the threshold required for equitable telehealth delivery. Even when patients had some level of digital access, implementation routinely failed without dedicated digital navigation staff, clear workflows, support for patients with limited English proficiency, robust IT infrastructure, and widespread training capacity. This finding adds to prior implementation science literature that applies PRISM^{15,38} and CFIR^{36,39,40} to safety-net settings where similar internal influences were primary determinants of telehealth adoption. Accordingly, health systems should assess patients' technology access, connectivity, and digital capabilities as a routine part of telehealth planning. For safety-net systems serving Medicaid-dependent, linguistically diverse, and digitally under-resourced populations, understanding these needs is a prerequisite for designing telehealth programs that are equitable and responsive to the populations they serve.

A recurring implementation bottleneck emerged across interviews: a single knowledgeable staff member often shouldered the entire burden of digital onboarding, platform troubleshooting, and provider support. Without this individual, the system lacked redundancy, users were redirected to external IT helpdesks, and the quality of care suffered. This pattern reflects a health facility readiness bottleneck, in which

service delivery breaks down not because of patient access or clinical practice deficits, but because of insufficient staffing and organizational infrastructure.^{41,42} Together, these frameworks suggest that these structural failures are not inevitable features of safety-net care but are modifiable implementation barriers that can be addressed through organizational investment.

Expanding the role of care navigators and community health workers emerged as one of the most promising strategies identified in this study. Rather than relying on dedicated personnel, digital navigation responsibilities often fell to nurses and support staff who happened to have developed the necessary skills. This underscores the need for dedicated staff to screen patients for access barriers, provide technology onboarding, and maintain contact with patients whose communication needs or contact information frequently changed. These findings build on prior research identifying digital navigation as an important strategy for promoting health equity⁴³, while also highlighting a critical implementation gap. In safety-net stroke care, digital navigation extends beyond technology support to include caregiver coordination, language access, and accommodations for stroke-related cognitive, communication, and physical impairments. Accordingly, successful digital navigation programs should be tailored to each organization's staffing, resources, workflow, and patient population. For telehealth to be implemented equitably, investments in digital platforms must be matched by investments in the workforce needed to help patients use them successfully.

Understood through the CFIR Outer Setting domain, this study reveals a clear mismatch between telehealth policies which assume that patients and health systems have the resources to support video-based care and the realities of safety-net environments. This disconnect was most evident in the common use of audio-only visits among study participants, building on previous research finding that patients in safety-net settings are significantly more likely to utilize audio-only telehealth rather than videoconferencing because of patient-level and organizational-level barriers.^{44–46} When video visits failed because patients lacked reliable internet access or struggled to navigate telehealth platforms, or had privacy concerns, providers turned to audio-only visits as a more reliable modality. Across specialties, participants described relying on audio-only visits not as a second-best option, but as a practical and patient-centered way to deliver care.

Current reimbursement policies threaten the very approach most accessible to this population. Although pandemic-era waivers temporarily extended payment parity for audio-only visits, this parity remains provisional and varies by state and payer.^{47,48} Participants' experiences reflected a broader two-tiered landscape in which commercially-insured systems can invest in video platforms, IT support, and staff training, while safety-net systems, constrained by chronic underfunding and Medicaid reliance, often cannot. This policy unintentionally rewards the video-based modality that only better-resourced systems and patients are equipped to use⁴⁹ while leaving audio-only parity dependent on temporary waivers. Medicaid reimbursement parity for audio-only telehealth thus represents one of the most important policy levers for equitable access. Productivity models should also better account for the clinical realities of safety-net care, including interpreter-mediated communication, caregiver coordination, and

repeated outreach. This labor is essential to equitable delivery but rarely reflected in current metrics. Without sustained investment in safety-net digital infrastructure, expanding telehealth alone risks widening rather than narrowing disparities.

Finally, these structural dynamics are shaped by trust among historically marginalized populations, where historical and contemporary experiences with healthcare institutions have contributed to enduring skepticism. Several participants described patients providing inaccurate contact information, using frequently changing prepaid phones, or avoiding institutional communication due to concerns about billing, surveillance, or privacy. This finding extends previous work identifying trust as foundational to successful telehealth implementation, particularly among safety-net populations.^{50,51} Together, these findings suggest that telehealth is most effective when it builds upon established patient-provider relationships rather than serving as the initial point of contact. For many safety-net patients, in-person interactions remain essential for establishing rapport and trust, which subsequently facilitate engagement with virtual care.

Conclusion

The CFIR framework provided a rigorous, systematic approach that supports comparison with other telehealth implementation studies, and clinicians and administrators from multiple specialties offered a broad perspective on telehealth adaptation within a single safety-net health system. However, convenience and snowball sampling may have favored participants more engaged with telehealth, potentially underrepresenting more critical or less engaged perspectives.

The extended data collection period provided insight into how evolving policy and reimbursement conditions shaped implementation over time, although some findings may reflect telehealth policies that have since changed. Findings from this single academic medical center may not fully generalize, though the structural conditions identified are consistent with those reported in federally qualified health centers and urban safety-net systems. Future research should include patient perspectives to better understand telehealth implementation from the patient standpoint.

Without addressing the structural constraints facing safety-net health systems, telehealth risks reinforcing rather than reducing existing disparities. These findings underscore the need for coordinated investment in policy, infrastructure, organizational capacity, and digital inclusion to ensure that telehealth functions as a tool for health equity rather than a driver of inequity.

Declarations

Ethics approval and consent to participate:

- Ethical approval for the study was obtained from the SUNY Downstate Health Sciences University Institutional Review Board (IRB Ref: 1849255; Digital Equity for Stroke Approach (DESA) Pilot Study). All methods and interviews were performed in accordance with the relevant guidelines and regulations

regarding studies with human participants, including the Declaration of Helsinki. Verbal informed consent was obtained from all participants prior to recording.

Consent for publication:

- not applicable

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Author Contribution

A.F., D.K. had the idea for the study. A.F., D.K., M.B., and E.N. designed the study. E.N., A.H.R., and S.P. conducted the interviews and developed the analysis with feedback from A.F., D.K., and M.B. E.N. drafted the manuscript. A.F., D.K., and M.B. reviewed the manuscript and provided supervision. All authors contributed to the article and approved the final manuscript.

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Data Availability

The datasets generated and/or analyzed during the current study are not publicly available to protect study participants' but can be made available from the corresponding author upon reasonable request.

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