

1 Patient Perspectives on Using Telemedicine During In- 2 Center Hemodialysis: A Qualitative Study

3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56

Q1 Trenton M. Haltom, Susie Q. Lew, Wolfgang C. Winkelmayr, Glenn M. Chertow, Allison Jaure, and Kevin F. Erickson

Rationale & Objective: In the wake of the coronavirus disease 2019 (COVID-19) pandemic, the United States federal government expanded originating telemedicine sites to include outpatient dialysis units. For the first time, nephrology practitioners across the United States could replace face-to-face visits with telemedicine for patients receiving in-center hemodialysis. This study describes patients' perspectives on the use of telemedicine during in-center hemodialysis.

Study Design: A qualitative study.

Setting & Participants: Thirty-two patients from underserved populations (older, less educated, unemployed, persons of color) receiving in-center hemodialysis who used telemedicine with their nephrologist during the COVID-19 pandemic.

Exposure: Telephone semistructured interviews were conducted in English or Spanish.

Q2 Outcomes: TK.

Analytical Approach: Transcripts were thematically analyzed.

Results: We identified 6 themes with subthemes: adapting to telemedicine (gaining familiarity and confidence, overcoming and resolving technical difficulties, and relying on staff for communication); ensuring availability of the physician (enabling an

immediate response to urgent medical needs, providing peace of mind, addressing patient needs adequately, and enhanced attention and contact from physicians); safeguarding against infection (limiting COVID-19 exposures and decreasing use); straining communication and physical interactions (loss of personalized touch, limited physical examination, and unable to reapproach physicians about forgotten issues); maintaining privacy (enhancing privacy and projecting voice enables others to hear); and supporting confidence in telemedicine (requiring established rapport with physicians, clinical stability of health, and ability to have in-person visits when necessary).

Limitations: Interviews were conducted later in the pandemic when some nephrology care providers were using telemedicine infrequently.

Conclusions: Patients receiving in-center hemodialysis adapted to telemedicine visits by their nephrologists in the context of the COVID-19 pandemic and observed its benefits. However, further considerations regarding communication, privacy, and physical assessments are necessary. Integrating telemedicine into future in-center hemodialysis care using a hybrid approach could potentially build trust, optimize communication, and augment care.

Complete author and article information provided before references.

Correspondence to
K.F. Erickson (kevin.
erickson@bcm.edu)

Kidney Med.
XX(XX):100848. Published
online month xx, xxxx.

doi: 10.1016/
j.xkme.2024.100848

© 2024 The Authors.
Published by Elsevier Inc.
on behalf of the National
Kidney Foundation, Inc. This
is an open access article
under the CC BY-NC-ND
license ([http://
creativecommons.org/
licenses/by-nc-nd/4.0/](http://creativecommons.org/licenses/by-nc-nd/4.0/)).

To prevent the spread of SARS-CoV-2 while maintaining access to care, the Centers for Medicare and Medicaid Services issued emergency waivers starting in March 2020 to facilitate the use of telemedicine. These waivers lifted geographic restrictions and expanded originating telemedicine sites to include the home and outpatient dialysis units.¹⁻³ Nephrology practitioners in the United States replaced face-to-face visits with patients receiving in-center hemodialysis with telemedicine—many for the first time.⁴

Small pilot programs assessing the feasibility of telemedicine for in-center hemodialysis care have found that, despite technical difficulties, patient-reported outcomes were either similar or improved compared with in-person care.⁵⁻⁸ In a United States survey of patients using telemedicine while having in-center hemodialysis during the COVID-19 pandemic, most patients reported satisfaction seeing their nephrologist using telemedicine.⁹ Yet, qualitative analyses of patients with kidney disease who were not receiving hemodialysis suggest more varied

experiences with telemedicine with patients reflecting on its strengths and limitations.^{10,11} Thus, more in-depth (ie, qualitative) perspectives of patients receiving in-center hemodialysis on telemedicine remain unknown.

Federal waivers allowing telemedicine for in-center hemodialysis expired on May 11, 2023; following a temporary extension period, telemedicine for in-center hemodialysis will no longer be reimbursed after December 31, 2024.¹²⁻¹⁴ Although several federal laws have been introduced to make aspects of telemedicine waivers permanent, none have explicitly addressed in-center hemodialysis.¹⁵⁻¹⁷ As clinicians and policymakers consider the future role of telemedicine for in-center hemodialysis, it is important to understand patient experiences. This is particularly true for underserved populations (eg, older, less educated, unemployed, persons of color, rurally located, etc.) who comprise a disproportionately higher share of patients receiving hemodialysis and who may experience unique challenges with the use of telemedicine.^{18,19} In the current study, we describe

PLAIN-LANGUAGE SUMMARY

This study describes patients' perspectives on the use of telemedicine while receiving in-center hemodialysis during the coronavirus disease 2019 (COVID-19) pandemic. Data are derived from semistructured interviews with thirty-two patients from underserved populations (older, less educated, unemployed, persons of color). We identified 6 major themes including adapting to telemedicine, ensuring availability of the physicians, safeguarding against infection, straining communication and physical interactions, maintaining privacy, and supporting confidence in telemedicine. These findings suggest that patients receiving in-center hemodialysis adapted to telemedicine visits by their nephrologists in the context of the COVID-19 pandemic and observed its benefits. However, further considerations regarding communication, privacy, and physical assessments are necessary. Integrating telemedicine into future in-center hemodialysis care using a hybrid approach could potentially build trust, optimize communication, and augment care.

underserved patients' perspectives and experiences with telemedicine for nephrology care during in-center hemodialysis.

METHODS

We report this study using the Consolidated Criteria for Reporting Qualitative Health Research (COREQ).²⁰

Participant Recruitment and Selection

Eligibility criteria included adults (aged 18 or older) who participated in telemedicine appointments for in-center hemodialysis after the start of the COVID-19 pandemic (March 2020). Using convenience sampling, we recruited participants by providing local physicians and dialysis facility nursing staff with flyers to share with their patients. These flyers informed patients of the study. Interested patients called our research team who then determined their eligibility. All recruitment occurred in a large metropolitan area in the southwestern United States. Participants were included in the study if they could speak either English or Spanish; 2 research assistants and 1 interviewer were fluent in Spanish. Recruitment and interviews occurred between February and November 2022. Study activities were approved by a Baylor College of Medicine Institutional Review Board (protocol H-48994).

Data Collection

We developed a semistructured interview guide from extant literature and discussion among the research team attuned to issues related to policymaking (Table S1).

Interview domains included patients' experiences, processes, benefits, challenges, and the future of telemedicine for in-center hemodialysis care. Two interviewers, including a qualitative methodologist (TMH) with a decade of qualitative research experience and a nephrologist (KFE), conducted interviews among all English-speaking participants. Spanish-speaking participants were interviewed by another nephrologist. Interviews generally lasted <30 minutes. Interviews were conducted by telephone, audio-recorded, and transcribed. Spanish interviews (n = 6) were translated before transcription. Neither nephrologist was involved in the direct care of patients and were not known to participants before interviews.

Data Analysis

We coded transcripts using an iterative process and following thematic analysis.²¹ Data collection, recruitment and analyses overlapped. The sample size was determined based on data saturation. This occurred when we stopped identifying new information from interviews and thus concluded data collection.

We coded transcripts using Atlas.ti web (v5.13.0-2023-08-25).²¹ To create the initial codebook, 2 coders (TMH, KFE) inductively identified a range of participant experiences. We further developed the codebook until we reached agreement for a final version. Two coders reviewed each transcript and then grouped concepts into themes and subthemes. This form of investigator triangulation ensured that we captured the full breadth and depth of data in the analysis.

RESULTS

Thirty-two patients participated in interviews. See Table 1 for demographic and self-reported clinical characteristics. Though we did not intentionally recruit patients considered underserved, our sample reflects the heterogeneity of the large, diverse metropolitan area from which we recruited. Participants were majority female (56%) and Black (66%); about one-third were Hispanic (28%). Patients tended to be older (50s [31%] or 60s [38%]), with lower educational attainment (85% had a high school degree or lower), single (53%), and unemployed (59%; excluding retired or disabled). Approximately one-third of participants had a caregiver (28%). Few had difficulty hearing or communicating (9%). Patients commonly reported diabetes (38%) or hypertension (59%) as causes of their kidney disease.

We identified 6 themes and respective subthemes described below. We provide further support in Table 2 and Table S2. We refer to participants using pseudonyms.

Theme 1: Adapting to Telemedicine

Participants used "telemedicine" interchangeably with "telehealth" and referred to telemedicine using a variety of terms (eg, Telecheck, teleconference, FaceTime, etc.).

Table 1. Participant Demographic and Self-Reported Clinical Characteristics (N = 32)

Characteristic	n (%)	Characteristic	n (%)
Sex		Highest education	
Male	14 (44)	Less than high school	7 (22)
Female	18 (56)	High school/GED	20 (63)
Age category, y		College degree or more	5 (16)
30s	2 (6)	Employment status	
40s	6 (19)	Full time	1 (3)
50s	10 (31)	Part-time	2 (6)
60s	12 (38)	Retired	6 (19)
70s	1 (3)	Disabled	4 (13)
80s	1 (3)	Not employed or other	19 (59)
Race		Interview language	
White	5 (16)	English	26 (81)
Black	21 (66)	Spanish	6 (18)
Asian	1 (3)	Has a caregiver	9 (28)
Mixed	2 (6)	Cause/type of Kidney Disease ^a	
Other	1 (3)	Diabetes	12 (38)
No answer	2 (6)	Hypertension	19 (59)
Ethnicity		Other/unknown	11 (34)
Hispanic	9 (28)	Difficulty hearing or communicating	3 (9)
Relationship status		Other medical or psychiatric conditions ^b	
Single	17 (53)	Cardiac disease	1 (3)
Married	4 (13)	Stroke	3 (9)
Widowed	4 (13)	Arrhythmia	1 (3)
Separated/divorced	6 (19)	Cancer	2 (6)
Cohabiting	1 (3)	Depression/anxiety	6 (19)

Notes: Percentages may not add up to 100% because of rounding.

^aPatients could report more than one cause of kidney disease.

^bOpen-ended question where patients could report multiple.

Gaining Familiarity and Confidence

Some patients felt they needed time to become used to communicating with their physician through telemedicine given the new technology. Patients had not used telemedicine for in-center hemodialysis previously, but some had used telemedicine in other medical settings. With the onset of the COVID-19 pandemic, telemedicine for in-center hemodialysis occurred by video with audio or audio only, often on a tablet device provided with assistance by the dialysis facility and managed by facility staff. Participants reported that physicians addressed routine talking points (eg, asking how dialysis is going) and specific issues (eg, blood pressure and laboratory test abnormalities).

Overcoming and Resolving Technical Difficulties

Participants rarely recalled technological challenges when using telemedicine for their in-center hemodialysis treatments. When technical issues did occur, patients mentioned dialysis facility staff assisted and initiated telemedicine visits to preemptively reduce technical issues.

Relying on Staff for Communication

Participants explained how they relied on ancillary dialysis facility staff to help with communication during telemedicine visits and to relay questions, concerns, and

information to the physician. Some patients felt telemedicine was “killing two birds with one stone” (Lucy, 50s, Black) because they could speak with clinicians using telemedicine during a dialysis session. Lucy continued, “I mean you’re right there getting your dialysis; you can sit there and talk. ... And if you have any problems, you can let the [nurse] know, and [my doctor will] just call the prescription in. If you have any concerns, he’ll let her know.” Spanish-speaking participants valued assistance from bilingual staff, particularly. As Valentina (50s, Hispanic) experienced (Table 2) and Barbara (60s, Black) noticed, nurses would “help other patients, especially the Spanish-speaking patients, translate for the doctor.”

Theme 2: Ensuring Availability of the Physician Enabling Immediate Responses to Urgent Medical Needs

Patients reported receiving telemedicine as a way for their physician to respond to specific, time-sensitive medical needs, such as high blood pressure, problems during dialysis, or medication refills, which provided reassurance. In one such situation, Martin (60s, Black) recalled how, “if you need your doctor right then you can, you know, you can FaceTime him or call him.” Valentina remarked how, “I felt good because ... he took the time to return my call and have a consult with me.” Telemedicine enabled this

Table 2. Themes and Exemplar Quotes

Theme 1: Adapting to Telemedicine	Subtheme	393
"When it started, I was surprised because I had not had an experience with that. But then ... it was easier to adjust to the visits because you understood what was going on." (Victoria, 60s, Black)	<i>Gaining familiarity and confidence</i>	394
"Sometimes for some reason, but very rarely, the image froze, and our connection was cut off. But ... that's just technology and you do run that risk." (Valentina, 50s, Hispanic) ^a	<i>Overcoming & resolving technical difficulties</i>	395
"With patients who only speak Spanish, normally, there'd almost always be a nurse there who spoke Spanish and she's the one who translated." (Valentina, 50s, Hispanic) ^a	<i>Relying on staff for communication</i>	396
Theme 2: Ensuring Availability of the Physician		397
"If you need to like get another prescription or something like that, the doctor can go ahead and take care of that right then and there or whatever. So, it's very convenient." (Levi, 60s, Black)	<i>Enabling an immediate response to urgent medical needs</i>	398
"It works good because I can always just get in touch with her, and then I just tell them, and they just call her up and I'm able to talk to her as if I went into the doctor's office." (Maeve, 60s, Black)	<i>Providing peace of mind</i>	399
"In a video call, I felt her—the doctor—like she was there with me. Everything was the same, if I had a concern, I immediately consulted her, and she already gave me the answer." (Lola, 60s, Hispanic)	<i>Addressing patient needs adequately</i>	400
Theme 3: Protecting/Safeguarding Against Infection		401
"[During the pandemic] they were very interested in ensuring that we didn't get sick, that we were constantly on dialysis, that we didn't miss out." (Mariana, 40s, Black)	<i>Limiting exposure to COVID-19</i>	402
"[D]uring the pandemic [telemedicine] was kind of frequently. You know, once a week during the pandemic ... But now he comes in more back to normal." (Barbara, 60s, Black)	<i>Decreasing use with reduced risk of COVID-19</i>	403
Theme 4: Straining Communication & Physical Interactions		404
"You see them and you're talking to 'em [on telemedicine] but it's just not quite the same as if a person is standing there in front of you and you're talking. Before COVID, you know, we'd shake hands, but now we don't. It's just that personal touch." (Doris, 70s, Black)	<i>Loss of personalized approach</i>	405
"Because I forget something, and then if he's there ... I can ask him to come back. But with telehealth, once he off the phone, he off the phone." (Veronica 40s, Black)	<i>Unable to re-approach physicians about forgotten issues</i>	406
Theme 5: Maintaining Privacy		407
"The one on the phone was a little bit more comfortable ... because the phone is right close to you." (Lucy, 50s, Black)	<i>Opportunities to enhance privacy</i>	408
"The person next to you can hear you just like if you on the phone talking to any other person. But if your doctor is there, you can ask him to come a little closer." (Veronica, 40s, Black)	<i>Projecting voice enables others to hear</i>	409
Theme 6: Supporting Confidence in Telemedicine		410
"[If I were to change doctors,] I think I'd have to develop a strong relationship with him first before I could have a strong telehealth visit with him." (Doris, 70s, Black)	<i>Requiring established rapport with physicians</i>	411
Interviewer: "Do you regularly wish that he was there to examine you in person?" Doris: "Only if I'm having a situation where I think that he should be there to take a closer look at me and see what's going on with me." (Doris, 70s, Black)	<i>Clinical stability of health</i>	412
"I think it would be just like having money on hand—if you need it, you can put your hands on it. [laughter] Like, if you need your doctor right then you can call him." (Martin, 60s, Black)	<i>Ability to have in-person visits when necessary</i>	413

Notes: We refer to patients using pseudonyms. The term "telemedicine" is used interchangeably with "telehealth."

^aTranslated from Spanish.

immediate connection between patient and provider to address such needs.

Providing Peace of Mind

Patients reported comfort and peace of mind knowing their physician was available at any time through telemedicine. Lola (60s, Hispanic) commented how, “If we needed something, and she couldn’t get to the center, we were still communicating by video call.” Mia (40s, Hispanic) agreed, “[telemedicine] gives you an advantage to be able to communicate with your dialysis doctor when necessary.” They felt telemedicine facilitated doctors’ abilities to assuage concerns and answer questions.

Addressing Patient Needs Adequately

Many participants reported receiving similar time and attention to problems and concerns from their physician with telemedicine compared with in-person encounters. Levi (60s, Black) relayed how “[telemedicine visits] are as long as you want them to be ... and really get to the issues that’s really bothering you. It’s more efficient with them using [telemedicine]. You get the same thing accomplished because you’re actually talking to the doctor.” Participants reported visits were generally brief in both settings. Although length of visits varied, patients felt their providers addressed their needs.

Enhanced Attention and Contact From Physicians

One patient reported the physician being more attentive with telemedicine, highlighting benefits of “eye-to-eye” contact. From Jerry’s (40s, Black) perspective, “it made me feel like he was right here talking to me though he wasn’t here. I felt better communication and understanding of what he was trying to tell me and what I needed to do.” Calling telemedicine “unique,” Jerry joked how, “I was able to look him in his eye and see was he lying or not. He was able to look me in my eyes and see was I lying.” Levi also felt telemedicine was “more personal” because “you just have more comfort talking to a doctor on telemedicine than you do in person. So, to me it was very, very personable. And as far as I’m concerned, I like that better.”

Others noted that telemedicine enabled physicians to maintain regular contact even when they would otherwise be too busy to come into the clinic in-person. Lucy appreciated the effort, acknowledging doctors’ busy schedules and how her doctor was “still trying to reach out and see what was going on and did we need anything.” Lola considered this an “advantage” because she never stopped communicating with her doctors, “If we needed something, and [my doctor] couldn’t get to the center, we were still communicating by video call.” Likewise, Rosa (60s, Hispanic) thought “the important thing is to be able to talk about what I felt and everything, even if it was via telehealth.” Thus, constant communication helped facilitate doctor-patient relationships and telemedicine.

Theme 3: Protecting/Safeguarding Against Infection

Limiting Exposure to COVID-19

Participants understood safety concerns related to the spread of COVID-19 as a primary reason for the use of telemedicine by their nephrologist. Some felt telemedicine provided them the opportunity to continue to receive care and communicate with their nephrologists throughout the pandemic. Lola imagined a situation in which telemedicine was not available during the pandemic and was grateful for the opportunity to continue her dialysis care because “imagine, if you felt unwell there in the dialysis clinic and the doctor wasn’t there, and if there was no video call—how would we communicate with her? We[d] continue with our discomfort.” Being able to see and engage with their doctors was key to continuing care, particularly during the pandemic-related social and physical distancing.

Decreasing Use With Reduced Risk of COVID-19

As the height of the COVID-19 pandemic “went down” (Jerry) some participants noted that physicians stopped using telemedicine as frequently, “now he comes in more [in person], back to normal” (Barbara). Patients reported some nephrologists continued to use telemedicine variably with in-person visits.

Theme 4: Straining Communication and Physical Interactions

Loss of Personalized Approach

Some patients reported more personable encounters in-person, noting a lack of “hands on” and “personal touch” with telemedicine. Ana (50s, Hispanic) also felt physicians were in a hurry to move on to the next patient during telemedicine, whereas in-person she feels more comfortable “with him sitting there and I can explain my situation to him.” In person, some patients felt interaction was “more sincere” (Veronica, 40s, Black) and that they were “more trusting” of their doctors (Mia). Adding to his comment that it “feels a little weird” engaging with the doctor over telemedicine, Linh (30s, Asian) observed that with “face-to-face, you can joke around.”

Limited Physical Examination

Patients noted physicians were unable to examine them fully using telemedicine. For example, Barbara expressed how during the pandemic, she had “shortness of breath during COVID, a whole lot of weakness. ... In telehealth, they can’t listen to your lungs or your heart. You can just only explain to them.” Marissa (80s, Black) explained how telemedicine “covers everything except for hands on. That’s the only difference. But if it’s not an instance where you need hands on, it’s great.” Patients generally did not feel this limitation affected the care they received but described circumstances when they would want their physician to see them in-person.

Unable to Reapproach Physicians About Forgotten Issues

Some patients liked in-person visits better because “if you need something else you can just walk up to your doctor and hey, ‘blah blah blah,’ versus on the video call when the guy holding the iPad leaves, it feels like the doctor is not much available anymore” (Linh). Agreeing, Amy (50s, Black) noted that “once they hang up, this day is a wrap,” and added how she “can remember better when he’s in-person” because she feels she has more time with her doctor. Indeed, having the time to think about questions while physicians continue their rounds in-person offers the chance to call them back over to talk.

Theme 5: Maintaining Privacy Opportunities to Enhance Privacy

When discussing sensitive topics with their physician, patients discussed concerns about a lack of privacy in the dialysis center. Robert (60s, Black) expressed concern over “nosy” neighbors next to him. Realizing her appointment would be via telemedicine, Veronica would often cut the visit short and go back to sleep because, “I didn’t want to discuss anything because I got one [person] to the left and one to the right, and one in front of me. But when you in-person, ain’t nobody but me and [my doctor].” Not all patients shared this discomfort, however.

By contrast, several patients reported more privacy with telemedicine. Lucy was “fine” with the privacy of telemedicine “because they bring the phone right close to you.” Otherwise, patients were not bothered by concerns about privacy for either in-person or telemedicine visits. They noted that these encounters are not particularly personal in either case. The routine nature of visits contributed to their lack of concern about privacy given that their nephrologists ask similar questions each time.

Projecting Voice Enables Others to Hear

In relation to privacy, patients reported needing to speak louder on telemedicine devices, making it more likely that others could hear them. Eleanor (50s, Black) commented how “you really don’t want to talk because if something’s personal, you don’t want everybody to hear it. At least if she[is] right there [in-person], you can like kind of whisper it to her.” Veronica explained how she must “project” so her physician can hear her with the downside that “not only can the doctor hear you, but everybody else can hear you.” To address this issue, patients would whisper, ask the doctor to come closer, call the doctor separately, or avoid asking questions altogether.

Theme 6: Supporting Confidence in Telemedicine Requiring Established Rapport With Physicians

Established trust and a strong existing relationship with their clinician made patients feel comfortable seeing their physician via telemedicine. Maeve (60s, Black) spoke to

the importance of how her relationship with her doctor made telemedicine work because “I trust her, you know? She’s getting in touch with me, and I know what’s going on, and she’ll give me the right answer. ... It’s just something about looking at her and talking to her whether she’s there or not. I trust her.” Developing a bond like Maeve’s can take time, however. Doris (70s, Black) described how her nephrologist had helped her over the years and through multiple illnesses which contributed to her comfort using telemedicine. Without an existing bond, some patients were concerned that seeing a new physician via telemedicine would be a challenge. Among Spanish-speaking patients like Rosa, being able to communicate in their preferred language was especially “important” and “fulfilling” after frustrations of getting “stuck” on words in English.

Clinical Stability of Health

Some patients felt telemedicine visits worked well because they did not have significant health issues. It was just as easy to discuss routine dialysis-related topics using telemedicine than in-person. Describing his health as “not really that complicated,” Thomas (40s, mixed race) expressed indifference about which modality he saw his doctor, “If she’s there [in person] or if she’s on [telemedicine], I’m glad to see her.” Victoria (60s, Black) reported, “as for me, you know, it’s just a follow up to see if ‘I noticed this on your labs and is that true? And has it changed or what has happened’ and that’s it.” Patients were mostly concerned about seeing their doctor when there were changes in their health because “the only thing they ask is if there’s a change. ... So, it’s kind of like they don’t see you no more until changes are back” (Harry, 50s, Black).

Under other circumstances, patients preferred face-to-face visits. Doris noted that “kidney patients sometimes get short of breath and heart situations. But if the doctor’s there with you, he can examine you and make recommendation, but he would have to tell someone else to do the recommendation if he’s not there.” Doris went on to say that if she had a “situation” she would then want to see the nephrologist in-person. Put simply, if patients felt clinically stable, they did not perceive the need to meet with their kidney doctor.

In-Person Visits When Necessary

Many patients valued a combination of telemedicine and in-person visits because they ensure continued communication. While some issues required “hands on” evaluations as in Doris’s above experience, others’ mild concerns could be addressed over telemedicine. To this end, Levi appreciated the “convenience” of telemedicine because “it’s almost like them being right there in person... if you need to get another prescription, the doctor can take care of that.” Telemedicine thus met many patients’ needs; in their minds, in-person visits were unnecessary and could be replaced by telemedicine in some cases.

Table 3. Consideration of the Future of Telemedicine for In-Center Hemodialysis

673	Continued role for telemedicine in the future: Because of enhanced availability and the sense that telemedicine addressed key	729
674	concerns, some patients saw telemedicine having a significant a role in in-center hemodialysis care moving forward.	730
675	Interviewer: "Would you rather have in person visits?" Harry: "No. [laughter] I don't see the point. ... I like [telehealth], it just fits me	731
676	perfect. He calls me in the middle of dialysis, that is absolutely perfect because it's either that or I'm watching TV, so I don't mind	732
677	doing that." (Harry, 50, Black)	733
678	"I think that was something that was of great benefit to a lot of people. You know, I'm really glad that the staff and the different	734
679	people came up with the kind of idea to benefit the patient." (Henry, 50s, Black)	735
680	"I think some of the advantages would be you could have visits more often if you need to because you can use telehealth at any	736
681	time." (Doris, 70s, Black)	737
682	"I think [telehealth] gives dialysis a good credibility record that they take the time to get that venue for the patient, that, you know,	738
683	they allow us to [use telehealth] with our doctor, which is a great convenience for the patient. ... I think that's a great, great tool. But I	739
684	mean, I think it's a great tool for any entity." (Martin, 60s, Black)	740
685	Limited role for telemedicine in the future: Not all patients were enthusiastic about telemedicine for their in-center hemodialysis	741
686	visits often because of the newness of the technology and perceived lack of connection with their nephrologists.	742
687	"I don't really like it over the phone. I ain't with all the new technology, but I go along with it. I'm just old-fashioned. I like being in	743
688	person. I can see them, and talk with them, and tell them how I feel. telehealth is just somebody that make me a little nervous."	744
689	(Robert, 60s, Black)	745
690	"I don't like it... I would rather feel comfortable with him sitting there and I can explain my situation to him. ... I wish we could go back	746
691	to the way we were." (Ana, 50s, Hispanic)	747
692	"If I felt bad, I don't feel like it's of any use at all to just call on video if the doctor's not going to be here. So, for me, I'd prefer it to be	748
693	in person." (Isabella, 30s, Mixed-Hispanic) ^a	749
694		750
695	Notes: We refer to patients using pseudonyms. The term "telemedicine" is used interchangeably with "telehealth."	751
696	^a Translated from Spanish.	752
697		753
698		754
699		755
700		756
701		757
702		758
703		759
704		760
705		761
706		762
707		763
708		764
709		765
710		766
711		767
712		768
713		769
714		770
715		771
716		772
717		773
718		774
719		775
720		776
721		777
722		778
723		779
724		780
725		781
726		782
727		783
728		784

When asked to consider the future role of telemedicine for in-center hemodialysis, some patients supported its continued use while others preferred to return to all in-person care (Table 3).

DISCUSSION

Our analysis of patient experiences with telemedicine identified key themes that were meaningful to patients, including adapting to telemedicine, ensuring availability of the physicians, safeguarding against infection, straining communication and physical interactions, maintaining privacy, and supporting confidence in telemedicine. Consideration of patients' input can inform how telemedicine should be integrated into future in-center hemodialysis care.

Positive experiences with telemedicine suggest how telemedicine can be used to improve hemodialysis care in the future. For instance, participants valued telemedicine as a way to limit exposure to COVID-19. In addition to respiratory illness, dialysis facilities can encounter outbreaks of other infectious illnesses, such as *Clostridium difficile* infection and hepatitis.^{22,23} In response to these outbreaks, telemedicine could be used to limit the spread of infection by clinicians who must round on multiple patients. Participants also valued telemedicine as a way to help their clinicians immediately respond to urgent medical needs when specific issues arose. In the future, telemedicine could be used to help clinicians respond more directly and effectively to acute issues. It could also help clinicians provide a higher intensity of care in anticipation of acute issues. Evidence suggests that closer attention from clinicians during hemodialysis may be beneficial following hospital discharge and may help expedite placement of

arteriovenous access in patients new to dialysis.^{24,25} Altogether, telemedicine could improve health outcomes by facilitating clinician visits during these important care transitions.

Negative experiences with telemedicine suggest how its future use should be limited. Participants reported a perceived loss of personalized medical care. This was a fundamental limitation when telemedicine was used to care for patients with advanced chronic kidney disease.¹⁰ A care model that only includes telemedicine risks missing personalized care. Instead, a hybrid model, where telemedicine complements in-person care, may be optimal. A hybrid model that required an in-person visits every 3 months was legislatively mandated for patients receiving home dialysis telemedicine and has been effective at improving health outcomes and lowering costs in other chronic diseases.²⁶⁻²⁹

Participants also discussed limitations with the physical examination performed during telemedicine visits. In some instances, devices such as the electronic stethoscope and wearables could help fill gaps in the physical examination.³⁰ Participants reported concerns that telemedicine visits did not offer them the valued opportunity to call their physician back to ask follow-up questions. Thus, it would be important for future telemedicine programs to include an opportunity for participants to ask follow-up questions before clinicians finish their telemedicine rounds. Moreover, participants expressed concerns over loss of privacy because they had to speak loudly to be heard on the telemedicine device, which thwarts patient discussion. The use of headphones or microphones could help to address this issue.

In other clinical settings, technical challenges are common and can limit patients' access to telemedicine.³¹⁻³³

Older patients or those living in remote areas where internet connectivity is limited may be disproportionately affected. Yet, a small study of telemedicine in hemodialysis indicated that technical issues were relatively uncommon.⁹ Our findings are consistent. Specifically, although some participants reported an adjustment period, technical issues were rare. Assistance from dialysis staff and wireless internet infrastructure in dialysis facilities may help address common challenges to the use of telemedicine.

Our study has limitations. Having only recruited participants in a single metropolitan area, our findings may not be applicable to other locations, especially those in rural areas. Because we included participants who spoke either English or Spanish, our results may not apply to persons who speak other languages, including those who may have recently immigrated from Asian countries. Many of the interviews were conducted later in the pandemic when physicians used telemedicine less frequently. In instances where physicians had stopped using telemedicine, participants relied on memory. Experiences of telemedicine during the pandemic may differ from experiences in a setting where there is no pandemic.

In summary, in our study of primarily Black and Hispanic participants receiving in-center hemodialysis in a major metropolitan area, many participants adapted to telemedicine visits by their nephrologists in the context of the COVID-19 pandemic and observed its benefits. However, further considerations regarding communication, privacy, and physical assessments are necessary. Integrating telemedicine into future in-center hemodialysis care using a hybrid approach could potentially build trust, optimize communication, and augment care.

SUPPLEMENTARY MATERIALS

Supplementary File (PDF)

Q5 **Item S1:** Interview guide for patients.

Q6 **Table S1:** Extended Table of Themes and Exemplar Quotes.

ARTICLE INFORMATION

Authors' Full Names and Academic Degrees: Trenton M. Haltom, PhD, Susie Q. Lew, MD, Wolfgang C. Winkelmayer, MD, MPH, ScD, Glenn M. Chertow, MD, MPH, Allison Jaure, PhD, and Kevin F. Erickson, MD, MS

Q7 **Authors' Affiliations:** Center for Innovations in Quality, Effectiveness and Safety, Baylor College of Medicine, Houston, TX (TMH, KFE); Department of Medicine, Section of Health Services Research, Baylor College of Medicine, Houston, TX (TMH); Division of Renal Diseases and Hypertension, George Washington University, Washington, DC (SQL); Section of Nephrology, Baylor College of Medicine, Houston, TX (WCW, KFE); Division of Nephrology, Stanford University School of Medicine, Palo Alto, CA (GMC); School of Public Health, University of Sydney, Sydney, NSW, Australia (AJ); and the Baker Institute for Public Policy, Rice University, Houston, TX (KFE).

Address for Correspondence: Kevin Erickson, MD, MS, 2002 Holcombe Blvd, Mail Code 152, Houston, TX 77030. Email: kevin.erickson@bcm.edu

Authors' Contributions: All authors made substantial contributions to the design of the project and interpretation of data. Each author contributed important intellectual content during article drafting or revision and accepts accountability for the overall work by ensuring that questions pertaining to the accuracy or integrity of any portion of the work are appropriately investigated and resolved. **Q8**

Support: This work was funded by a grant from the National Institute of Diabetes and Digestive and Kidney Diseases (R01DK128209). **Q13**

Financial Disclosure: Dr Erickson reports receiving personal fees from Acumen LLC., Outset Medical, and Boehringer Ingelheim and honoraria from Dialysis Clinics, Inc. Dr Lew reports consulting for Novo Nordisk. Dr Winkelmayer reports having received honoraria from Akebia, Anthos, Ardelyx, AstraZeneca, Bayer, Boehringer Ingelheim, Cadrenal, GlaxoSmithKline, Merck, Novartis, Natera, Pharmacosmos, Unicycive, Vera, and Zydus. The other authors have no relevant financial interests.

Acknowledgements: Special thanks to Wendy Guido, Lourdes Pelaez, and Siloe Alvarado, MD, for their help recruiting and interviewing Spanish-speaking participants; Ariel Harrison for her help recruiting and coding; and Merin Thomas for her administrative work.

Peer Review: Received February 22, 2024, as a submission to the expedited consideration track. Evaluated by 2 external peer reviewers, with direct editorial input from the Editor-in-Chief. Accepted in revised form May 3, 2024.

REFERENCES

- Centers for Medicare and Medicaid Services. Medicare Telemedicine Healthcare Provider Fact Sheet. In: U.S. Department of Health and Human Services, ed. Baltimore, MD: CMS; March 17, 2020.
- Centers for Medicare and Medicaid Services. Additional Background: Sweeping Regulatory Changes to Help U.S. Healthcare System Address COVID-19 Patient Surge. In: U.S. Department of Health and Human Services. CMS; March 30, 2020.
- Neuman M. CMS expands Medicare coverage of telehealth services for in-center dialysis visits amid COVID-19. *Nephrol News Issues*. March 20, 2020.
- Renal Physicians Association. RPA Telehealth Survey Results. In: RPA. June 2, 2020.
- Rumpsfeld M, Arild E, Norum J, Breivik E. Telemedicine in haemodialysis: a university department and two remote satellites linked together as one common workplace. *J Telemed Telecare*. 2005;11(5):251-255.
- Whitten P, Buis L. Use of telemedicine for haemodialysis: perceptions of patients and health-care providers, and clinical effects. *J Telemed Telecare*. 2008;14(2):75-78.
- Lunney M, Lee R, Tang K, et al. Impact of telehealth interventions on processes and quality of care for patients with ESRD. *Am J Kidney Dis*. 2018;72(4):592-600.
- Young A, Orchanian-Cheff A, Chan CT, Wald R, Ong SW. Video-based telemedicine for kidney disease care: a scoping review. *Clin J Am Soc Nephrol*. 2021;16(12):1813-1823.
- Lew SQ, Kaur G, Sikka N, Erickson KF. In-center hemodialysis unit patient experience with telehealth. *Hemodial Int*. 2023;27(2):193-196.
- Ladin K, Porteny T, Perugini JM, et al. Perceptions of telehealth vs in-person visits among older adults with advanced kidney disease, care partners, and clinicians. *JAMA Netw Open*. 2021;4(12):e2137193.
- Tang J, Howell M, Roger S, Wong G, Tong A. Perspectives of kidney transplant recipients on eHealth: semistructured interviews. *Transplant Direct*. 2022;8(12):e1404.

- 897
898
899
900
901
902
903
904
905
906
907
908
909
910
911
912
913
914
915
916
917
918
919
920
921
922
923
924
925
926
927
928
929
930
12. Executive Office of the President OoMaB. Statement of Administration Policy. In: whitehouse.gov, ed. Washington, DC. whitehouse.gov; January 30, 2023.
13. Physicians and other clinicians: CMS flexibilities to fight COVID-19. Centers for Medicare and Medicaid Services.
14. List of Telehealth Services for Calendar Year 2023. Baltimore, MD: U.S. Department of Health and Human Services; February 13, 2023. cms.gov.
15. Payerchin R. House of Representatives reintroduces telehealth benefits bill. *Medical Economics*. Feb 6, 2023.
16. H.R.4040 - Advancing Telehealth Beyond COVID-19 Act of 2021. United States Congress.
17. H.R. 2617 - Consolidated Appropriations Act. *United States Congress*. 2023.
18. Woodall T, Ramage M, LaBruyere JT, McLean W, Tak CR. Telemedicine services during COVID-19: considerations for medically underserved populations. *J Rural Health*. 2021;37(1):231-234.
19. Purcell LK, Schnitker JW, Moore TM, et al. Health inequities in dialysis care: A scoping review. *Semin Dial*. 2023;36(6):430-447.
20. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care*. 2007;19:349-357.
21. Braun V, Clarke V. *Thematic Analysis, A Practical Guide*. Thousand Oaks, CA: Sage Publications Ltd; 2021.
22. See I, Bagchi S, Booth S, et al. Outbreak of Clostridium difficile infections at an outpatient hemodialysis facility-Michigan, 2012-2013. *Infect Control Hosp Epidemiol*. 2015;36(8):972-974.
23. Weber DJ, Rutala WA, Fried MW. Hepatitis C virus outbreaks in hemodialysis centers: a continuing problem. *Infect Control Hosp Epidemiol*. 2016;37(2):140-142.
24. Erickson KF, Winkelmayer WC, Chertow GM, Bhattacharya J. Physician visits and 30-day hospital readmissions in patients receiving hemodialysis. *J Am Soc Nephrol*. 2014;25(9):2079-2087.
25. Erickson KF, Mell M, Winkelmayer WC, Chertow GM, Bhattacharya J. Provider visits and early vascular access placement in maintenance hemodialysis. *J Am Soc Nephrol*. 2014;25(9):2079-2087.
26. Public law no: 115-123. United States Congress.
27. Schwamm LH. Telehealth: seven strategies to successfully implement disruptive technology and transform health care. *Health Aff (Proj Hope)*. 2014;33(2):200-206.
28. Kroenke K, Krebs EE, Wu J, Yu Z, Chumbler NR, Bair MJ. Telecare collaborative management of chronic pain in primary care: a randomized clinical trial. *JAMA*. 2014;312(3):240-248.
29. Grabowski DC, O'Malley AJ. Use of telemedicine can reduce hospitalizations of nursing home residents and generate savings for medicare. *Health Aff (Proj Hope)*. 2014;33(2):244-250.
30. Weinstein RS, Krupinski EA, Doarn CR. Clinical examination component of telemedicine, telehealth, mHealth, and connected health medical practices. *Med Clin North Am*. 2018;102(3):533-544.
31. Jenkins-Guarnieri MA, Pruitt LD, Luxton DD, Johnson K. Patient perceptions of telemental health: systematic review of direct comparisons to in-person psychotherapeutic treatments. *Telemed JE-Health*. 2015;21(8):652-660.
32. Henry BW, Block DE, Ciesla JR, McGowan BA, Vozenilek JA. Clinician behaviors in telehealth care delivery: a systematic review. *Adv Health Sci Educ Theory Pract*. 2017;22(4):869-888.
33. Scott Kruse C, Kareem P, Shifflett K, Vegi L, Ravi K, Brooks M. Evaluating barriers to adopting telemedicine worldwide: A systematic review. *J Telemed Telecare*. 2018;24(1):4-12.
- 931
932
933
934
935
936
937
938
939
940
941
942
943
944
945
946
947
948
949
950
951
952
953
954
955
956
957
958
959
960
961
962
963
964