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Expansion of telemedicine during COVID-19 at a VA specialty clinic

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ABSTRACT

Background: COVID-19 rapidly accelerated the implementation of telemedicine in U.S. Department of Veterans Affairs (VA) specialty care clinics. This mixed-methods study was conducted at a VA medical center to understand the use of telemedicine, and the barriers and facilitators to its implementation, in cardiology outpatient clinics.

Methods: Quantitative analyses modeled monthly trends of telemedicine use over 24-months (March 2019–March 2021) with segmented logistic regression and adjusted for socio-demographic predictors of patient-level telemedicine use. Qualitative interviews were conducted (July–October 2020) with eight cardiology clinicians.

Results: At the onset of COVID-19, likelihood of telemedicine use was ~12 times higher than it was pre-COVID-19 ($p < 0.001$). White (OR = 1.38, 95% CI:1.23–1.54), married (OR = 1.25, 95% CI:1.11–1.40), Veterans with other health insurance (OR = 1.19, 95% CI:1.06–1.35), were more likely to use telemedicine. Veterans with higher health risk factors were less likely (OR = 0.95, 95% CI:0.93–0.97). Facilitators to rapid expansion of telemedicine included prior telemedicine experience; provider trainings; and staff champions. In contrast, lack of technical support and scheduling grids for virtual visits and patient ability/preference served as barriers.

Conclusions: Findings suggest that once mutable barriers were addressed, the medical center was able to expand its telemedicine efforts during COVID-19. Beyond the pandemic, a hybrid of virtual and face-to-face care might be feasible and likely beneficial for healthcare providers and patients in specialty care.

Implications: The ability to rapidly transition from in-person to virtual visits can potentially assist with the continuity of care and management of chronic disease during infectious outbreaks and other major disasters that obstruct traditional care models.

1. Introduction

Telemedicine, the practice of providing care and services to patients using technology at-a-distance,[1] has been shown to eliminate barriers and improve patient access to care, increase continuity of care, reduce hospitalizations, and improve clinical outcomes and quality of life.[2–7] Although telemedicine has been successfully used for many years to extend services to rural communities through the remote monitoring of medical devices or consulting with specialty physicians, widespread adoption of telemedicine has been limited.[8] It is now well recognized that the COVID-19 pandemic rapidly accelerated telemedicine implementation and brought telemedicine to the forefront of medical care delivery.[9]

The U.S. Department of Veterans Affairs (VA) is the largest integrated healthcare system in the U.S.,[10] and its shift to telemedicine in response to COVID-19 was a harbinger of the rapid adoption of telemedicine across the country. In addition to outpatient primary care and inpatient services, each VA Medical Center (VAMC) houses several specialty clinics, which play a critical role in providing care to medically vulnerable patients. Understanding how specialty clinics, such as

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cardiology, provided virtual care during the coronavirus outbreak is important, as patients with heart conditions presented with an increased risk of severe morbidity and mortality due to COVID-19.[11–13] Particularly in the early days of COVID-19, when there was limited knowledge of how to control the spread of the virus, there was a vital need to minimize in-person contact and defer routine care, which resulted in a strong incentive to shift to virtual care. To better understand this abrupt transition to telemedicine in cardiology outpatient clinics at a VAMC, a mixed-methods study was conducted March 2020–March 2021 to: 1) measure trends of telemedicine use before and after COVID-19 onset and identify predictors of telemedicine use (*quantitative*); and 2) understand the processes, barriers, and facilitators of telemedicine expansion in response to COVID-19 (*qualitative*).

2. Materials & methods

2.1. Study setting and design

This study was conducted at a large VAMC in California, which includes a main medical facility and several smaller and less-urban community-based outpatient clinics (CBOCs). This site was chosen because California was consistently one of the most impacted states during the pandemic, with over 4.9 million confirmed cases of COVID-19, accounting for roughly 11% of cases in the U.S.[14] At the onset of the pandemic, the Governor of California declared a State of Emergency on March 4, 2020 and issued a Stay Home Order on March 19, 2020. In response, the VAMC suspended all non-urgent procedures on March 17, 2020 in order to mitigate the spread of COVID-19.

The Division of Cardiology at the VAMC is composed of four clinics: general cardiology; heart failure; arrythmia; and pulmonary hypertension. Each clinic has its own team of healthcare providers, including cardiologists, pharmacists, nurse practitioners (NP), registered nurse (RN) care managers, licensed vocational nurses (LVN), technicians, fellows, and rotating residents. In addition, there are medical support assistants (MSAs), who schedule patient appointments.

To address the two study aims, a parallel mixed-methods approach was used, where quantitative analyses and qualitative interviews were conducted simultaneously. These two components allow us to understand the full spectrum of how telemedicine was adopted and utilized during COVID-19. This study was part of a larger study that examined telehealth implementation at three clinics at a VAMC[15] and was approved by the local Institutional Review Board.

2.2. Quantitative methods

For the quantitative portion, VA administrative and clinical electronic health records from the VA Corporate Data Warehouse (CDW) were used to extract outpatient cardiology encounters using distinct clinic codes for audio (telephone) and video visits for the entire 24-month study period. The main dependent variable was outpatient cardiology visits, which included both in-person and telemedicine visits (telephone or video), excluding any cardiology visits that could not have been conducted via telemedicine (e.g., EKG). For this study, telemedicine was defined as synchronous remote patient care regardless of modality type,[16] telephone or video. The study cohort included all persons who had any visit at the VAMC between March 1, 2019 and March 1, 2020 (12 months before onset of COVID-19) and/or between March 2, 2020 and March 30, 2021 (12 months after onset of COVID-19), who were not deceased prior 3/2/2020. As such, 5527 cardiology patients (14,229 visits) 12-months before COVID-19, and 3690 cardiology patients (10,800 visits) 12-months after the onset of COVID-19 were included in the study. Individual-level interrupted time series (ITS) analysis through segmented logistic regression on repeated monthly observations of telemedicine use over 24-months (March 1, 2019 thru March 1, 2021) was used. ITS was divided into four segments: 1) pre-COVID (12-monthly observations of telemedicine use rates up until March 2020), 2) onset of COVID-19 (three monthly observations starting with the implementation of stay-at-home orders), 3) re-expansion of in-person services at the VAMC in June 2020 (three monthly observations), and 4) start of 2020 flu season in November 2020 (six monthly observations). Analyses included patient- and provider-level clustering and adjusted for socio-demographics (age, gender, race/ethnicity, marital status, health insurance), and health risk factors (Nosos). The Nosos comorbidity score is a cost-based risk adjustment scale used by the VA. The higher the score, the higher the comorbidity risk.[17] Statistical significance level was set at $p < 0.05$. Analyses were conducted in Stata (v.15).

2.3. Qualitative methods

The target population for the qualitative interviews consisted of VAMC employees (clinicians, administrators, program directors, IT personnel, other staff), rotating fellows, and residents involved in providing telemedicine services within the four cardiology outpatient clinics during the COVID-19 pandemic. One-on-one semi-structured 30–60-min telephone interviews (average length 41 min) were conducted from July–October 2020 until data saturation was reached,[18] resulting in interviews with eight clinicians (four cardiologists, two NPs, one pharmacist, and one fellow). The interview guide was developed under the guidance of clinical members of the project team and is described in further detail elsewhere.[15]

Audio files were transcribed and analyzed using the rapid analysis approach.[19,20] The initial step in the analytic process was the development of a summary table document, organized by key domains, and derived from the interview guide. This document was tested by all members of the project team using a single transcript and was modified to reflect additional domains that emerged from data analysis. The remaining transcripts were divided and individually summarized by the analytic team, with each team member also conducting a second, random review of the remaining manuscripts to ensure consistency. These individual summary documents were then consolidated into a single, high-level summary to identify key themes. These themes were then discussed and confirmed with clinical project team members.

3. Results

3.1. Quantitative results

Fig. 1 and Table 1 display the results of the segmented logistic regression, intercept shifts and slopes. In the pre-COVID segment, there was evidence of a slight increasing monthly trend in telemedicine use. At the onset of COVID-19 (month 12, March 2020), telemedicine use was

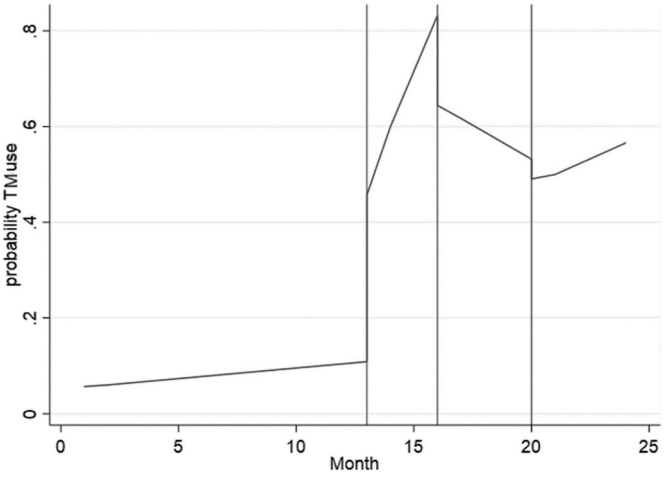

Fig. 1. Segmented regression for probability of telemedicine use for cardiology.

Table 1
Segmented regression for telemedicine use for cardiology.

	Pre-COVID	Onset of COVID (stay-at-home orders) (Mar 2019–Mar 2020)		Reauthorization of in-person services (Jun 2020–Oct 2020)		2020–2021 Flu Season (Nov 2020–Mar 2021)	
		Intercept Shift	Slope	Intercept Shift	Slope	Intercept Shift	Slope
Telehealth Use	1.07	11.97	2.18	0.27	0.86	0.80	1.05
Change	N/A	N/A	2.03	N/A	0.39	N/A	1.23

Table 2
Predictors of telemedicine use for cardiology during COVID-19.*

Study Covariates	Odds Ratio	Standard Error	95% Confidence Interval	P value
White	1.38	0.08	1.23–1.54	.001
Male	0.92	0.14	0.69–1.23	.565
Age Group: (ref = 18–44)				
45–64	0.90	0.15	0.65–1.25	.516
65–74	0.86	0.14	0.62–1.19	.350
75+	0.83	0.14	0.60–1.16	.285
Married (vs. not married)	1.25	0.07	1.11–1.40	.001
Has non-VA Health Insurance (vs. no non-VA health insurance)	1.19	0.07	1.06–1.35	.004
Health Risk Factors (Nosos)	0.95	0.01	0.93–0.97	.001
Constant	0.03	0.01	0.02–0.04	.001

*Note: Individual-level interrupted time series analysis using segmented logistic regression on repeated monthly observations over 24-months (March 1, 2019 through March 1, 2021) adjusting for patient and provider level clustering; patient sociodemographic variables, health status; provider and site characteristics.

almost 12 times higher than it was at the end of the pre-COVID segment and use continued to increase until the reauthorization of in-person services (month 15, June 2020). Telemedicine use then showed an immediate dramatic reduction followed by a continued monthly reduction. At the start of the 2020 flu season (month 20, November 2020), telemedicine use showed a less dramatic but significant immediate reduction followed by a monthly increase in telemedicine use. Regarding study covariates, White, (OR = 1.38, 95% CI:1.23–1.54), married (OR = 1.25, 95% CI:1.11–1.40) patients and Veterans with other health insurance coverage (OR = 1.19, 95% CI:1.06–1.35), were *more* likely to use telemedicine for cardiology visits. Whereas Veterans who had higher health risk factors, were *less* likely (OR = 0.95, 95% CI:0.93–0.97) to use telemedicine (Table 2).

3.2. Qualitative results

The qualitative interviews allowed us to highlight the critical workflow challenges that providers had to manage and overcome when implementing telemedicine processes within the cardiology clinics. The three themes that emerged from these interviews were: 1) telemedicine implementation strategies; 2) scheduling process; and 3) modes of care delivery. Facilitators and barriers to the rapid expansion of telemedicine were identified within each theme (see Table 3).

3.2.1. Telemedicine implementation strategies

Due in part to the presence of leaders and physicians who advocated for the development of telemedicine capabilities, the Cardiology Division was an early adopter of telemedicine prior to COVID-19. Three of the respondents mentioned having experience providing video consultations via clinical video telehealth (CVT) with the CBOCs. Although VA Video Connect (VVC)[21] also became available prior to the pandemic, there was limited exposure to video telemedicine into patient's homes amongst majority of staff pre-COVID. In contrast, all cardiology staff described using telephone for follow-up visits, relaying lab results, or managing medications. In addition, the arrythmia/electrophysiology clinic had been monitoring patient devices (e.g. pacemakers) remotely for several years.

Table 3
Facilitators & barriers to rapid expansion of telemedicine (TM) in cardiology.

Theme 1: TM Implementation Strategies	
Facilitators	**Barriers**
• Pre-COVID-19 TM experience o Experience with VA clinical video telehealth (CVT) - requires the patient to travel to the nearest VA community-based outpatient clinic (CBOC) to connect virtually to the main VA medical facility • Staff TM champions o Leadership spearheading efforts to expand TM o Early adopters of TM o Staff taking on additional roles & responsibilities • Training and support o VA Video Connect (VVC) training o Peer-to-peer informal trainings & support for VVC	• Little experience using VVC to patients' home • Beyond one VVC training, no other formal TM trainings • For some providers, lack of proper equipment for video visits
Theme 2: Scheduling Process	
Facilitators	**Barriers**
• Scheduling clerks called patients to transition in-person appointments to TM • Creation and implementation of virtual scheduling grids (telephone and video) for all cardiology providers	• Delays in creation of virtual scheduling grids for cardiology clinics, due to sheer volume of requests from all clinics in VAMC during the first months of COVID-19 pandemic • Double booking for in-person and virtual visits • Difficulty documenting and keeping track of modality of visit
Theme 3: Modes of Care Delivery	
Facilitators	**Barriers**
• No travel time for patients • Video o Providers able to get a better sense about their patients' living situation & environment o Visual of non-verbal cues o Able to conduct physical assessment, albeit limited • Phone o Convenient for a quick follow-up o Easier to use compared to video-conferencing platforms	• Video overall o Patients not having appropriate technology o Lack of suitable internet bandwidth • VVC o Overwhelmed at onset of COVID-19, due to sheer volume of use o Less user-friendly compared to Doximity or FaceTime video platforms • Phone o Less productivity credit for a phone visit

As reflected in our quantitative analyses, all respondents indicated that the complete transition to telemedicine occurred immediately, in response to the VAMC suspending all non-urgent procedures (March 17, 2020) and the Governor's issuance of the Stay Home Order (March 19, 2020). Division of Cardiology leadership met that week to identify which patients still had to be seen in-person and determine strategies for how best to transition cardiology services to virtual care. For example, physicians and pharmacists changed patients' anticoagulation medication, if medically stable and had no risk factors, to medication that did

not need to be monitored as often and changed lab work schedules from 4 weeks to 6–7 weeks to reduce frequency of visits to the clinic.

The transition to telemedicine appointments required a significant shift in staff and workflow responsibilities in order for clinicians to be prepared to successfully provide virtual care. Telemedicine champions began taking on additional roles to help their peers transition to virtual care. Cardiology leadership drafted a protocol that outlined how to code telemedicine patient encounters and NPs created a workgroup that developed several documents to guide cardiology staff, including a telephone script to use when calling patients; a flow diagram that showed how virtual care was to be provided in each of the cardiology clinics; and a spreadsheet that kept track of all appointments. At the onset of COVID some study respondents described insufficient resources (e.g., cameras, microphones) to complete telemedicine visits, so several staff members helped get the proper equipment. Finally, most staff had completed trainings on scheduling and conducting VVC appointments prior to COVID-19, however, there was no time for additional VA trainings to be created. Instead, informal trainings on how to use VVC equipment and software were conducted by peers, and cardiology leadership provided regular updates on guidelines to staff.

3.2.2. Scheduling process

The scheduling process was frequently cited by respondents as the biggest barrier to the transition to telemedicine. At the onset of the pandemic, staff scrambled to call all patients to switch their face-to-face appointments to virtual appointments. Initially, the Cardiology Division did not have enough MSAs to convert or schedule appointments for all clinicians, so providers were calling patients themselves. Providers also spent extra time with their patients troubleshooting connectivity issues, providing IT support, etc. The first major turning point in the telemedicine scheduling process occurred in May 2021, when MSAs were able to assist cardiology providers with calling patients to schedule virtual appointments. The MSAs were given the telephone script written by the NPs and conducted test calls to practice scheduling VVC appointments and assisting patients with setting up VVC.

Prior to COVID-19, cardiology clinics had one single face-to-face scheduling grid per provider. During the first several months of the pandemic, the VAMC was working to develop two new parallel grids for telephone and video appointments, however respondents noted that there were insufficient resources to create all grids simultaneously for the entire medical center and the cardiology clinics were not identified as an early priority. Due to the availability of only the single face-to face appointment grid, all visits (virtual and in-person) continued to be scheduled on this grid, but a note was added in the comment section to indicate the modality of choice (phone, video, or face-to-face) for each appointment. Every provider mentioned that the management of the one scheduling grid was a point of great exasperation for clinicians, who had no easily accessible snapshot of modality types, as well as for patients, as the scheduled appointments appeared as face-to-face on the patient portal, often resulting in patients showing up to clinic:

> *"And [the virtual scheduling grid] still hasn't been finished for the heart failure clinic. And we wanted the in-person one, the VVC one, and the telephone one, or at least two different ones. And those still aren't set up. I just checked with a person and they said they basically have just given up because they're not getting support to do that so we're just working around how we're doing it. So we can write a note and indicate that it's telephone or VVC, but we still have no grid, no workable grid to be able to track and keep up those appointments, which is really frustrating. And that causes confusion for patients because they don't see that it's a video or a telephone visit and then they might still think it's in-person so sometimes they come in by mistake." (C8)*

So, the second major turning point occurred in July 2020, when the three different clinic grids became available for most of cardiology. However, respondents cited that the new three-grid system was initially confusing, as the schedulers often did not check every grid for availability, so the double or triple-booking of patients in different modalities with the same provider became an issue.

3.2.3. Modes of care delivery

Respondents cited the telephone as the most common modality used for patient visits during the early part of COVID-19. Particularly during the first months of the outbreak, video platforms were overloaded because of the sheer volume of people using them. Respondents noted that most patients preferred to use the telephone since they did not want their provider to see their home; did not have the proper equipment (internet, email address, and/or computer, smartphone or tablet) to conduct a video visit; or found the technology too difficult to navigate. On the other hand, providers described the benefits of video over phone, since they could see the patient, assess non-verbal cues, and observe the patient's living environment. Respondents also noted that as the VAMC has a large catchment area, telemedicine is especially ideal for those patients who normally would have to travel large distances for their face-to-face appointments.

As the first approved video modality by VA to connect with patients in their home, VVC was the video platform most used by providers. However, respondents cited various issues with VVC. First, VVC initially could only be used by patients who had an email address where the appointment link was to be sent, but the scheduling system *"makes it hard to find out where the [VVC] video link is" (C1)* and sometimes more than one link was sent, so patients and providers often ended up being on different appointment links. In contrast, Doximity appointment links could be sent via text message or clinicians could simply call iPhone users via FaceTime at the time of their appointment. Patients who had an iPhone or iPad also had to download the VVC app ahead of their scheduled visit, as the appointment link would not open on an Apple device. Second, VVC was not initially as user-friendly as other available video-conferencing platforms, and providers reported spending 10–15 min of the 30-min appointment walking patients through the process to get them connected to VVC. As a result, most reverted to phone appointments. However, three respondents noted that phone visits were counted at one-third of a "productivity credit" as a video or face-to-face visit in the early days of the pandemic, even though VA followed Medicare's reimbursement structure where video and telephone visits were equal to in-person visits. In some cases, respondents reported that the perceived decreased productivity credits may have resulted in providers being reassigned to other duties:

> *"Even if we were on the phone with a patient for 30 minutes, you only got a third of the credit that you would have if you saw a patient in-person. And that was a big deal because I would have to make three times as many phone calls in a day to show that I was doing the same amount of work … so that was a big issue … and we got reassigned temporarily for the screening tents, because they felt that we had the time." (C4)*

In accordance with our quantitative findings, clinicians reported that they were starting to see more patients face-to-face in June 2020, when the VAMC re-expanded in-person services. However, respondents also noted that both providers and patients enjoyed virtual care and would prefer to continue providing telemedicine services after the pandemic:

> *"We're never going to back to the way things were. I don't think the patients will let us. Patients enjoy this type of care. I'm just finding that certain patients are now requesting monthly appointments and I feel they need to, because they are running into trouble with heart failure … but in-between that time, we can do VVC appointments for them … So, no one will go back to pre-COVID era, ever." (C3)*

4. Discussion

The field of cardiology has been using telemedicine technologies for

many years, although it was historically used to consult with specialty physicians and monitor medical devices.[8] The COVID-19 pandemic, however, required an abrupt shift from the use of telemedicine technology in a limited capacity to an almost complete transition to virtual care. Our study's quantitative and qualitative results show that the use of telemedicine in cardiology clinics rapidly increased at the onset of COVID-19 in March 2020, and that its use continued to increase until June 2020, when in-person services were re-expanded. Cardiology providers noted that their pre-pandemic experience with providing virtual care using CVT, informal staff trainings, and staff champions facilitated the rapid expansion of telemedicine. The use of telemedicine then increased again during the 2020–2021 flu season (November 2020–March 2021), when there was a second surge of COVID-19 hospitalizations. These findings suggest that the ability to rapidly transition from in-person to virtual visits can potentially assist with the continuity of care and management of chronic disease during infectious outbreaks and other major disasters that obstruct traditional care models. Indeed, the VA has demonstrated its ability to provide care and services via telemedicine during Hurricane Sandy (2012),[22] and Hurricanes Harvey, Irma, and Maria (2017).[23–25]

Notwithstanding the historical precedence of telemedicine use in VA, there were some challenges to the expansion of telemedicine services during the initial period of the pandemic. Most providers from this study noted the lack of technical and scheduling support and the delay in the creation of telemedicine scheduling grids were major barriers to the rapid transition to virtual care. For telemedicine to be successful in the long-term, healthcare facilities need to streamline scheduling systems for virtual appointments, hire additional staff whose role is dedicated to scheduling and supporting telemedicine visits, provide additional and recurring trainings for scheduling staff on the various virtual systems, and increase the cohesion of providers and administrators.

Telemedicine programs have been shown to reduce hospitalizations and mortality in patients with heart failure,[26–28] and remove barriers to care, especially for those in remote locations.[9,29] Our quantitative findings demonstrated that non-Hispanic African American patients and those without other non-VA health insurance were found to be less likely to use telemedicine for cardiology visits. Previous research has shown that racial/ethnic minorities have higher rates of cardiovascular diseases and related risk factors, are more likely to lack private health insurance, have limited access to care,[30] and are at higher risk for COVID-19 infection and severe disease.[31] It should also be noted that racial/ethnic minorities and those in non-urban and tribal areas tend to experience the "digital divide"; that is, they are more likely to have limited access to the internet or technologies necessary for telemedicine, such as camera-enabled devices.[32–34] As a response to these challenges, VA enacted various consultation services to facilitate virtual care to patients; for example, VA offers cellular-enabled iPads to qualifying Veterans.[29] In addition, VA implemented a help desk and a VVC test site, which assists patients with troubleshooting technical problems and allows patients to test their microphones and speakers in preparation for a video appointment, respectively.[35] In this study, none of the respondents reported referring their patients to the iPad program, and only a few mentioned utilizing the consultation service, likely because it was a new program at the time of the interviews. To increase telemedicine use among the most underserved populations and potentially bridge the digital divide gap, clinical teams should be encouraged to enroll their eligible patients into available resource programs.

Despite the aforementioned advantages, it should be noted that telemedicine may not be appropriate for all patients receiving specialty care. Study respondents stated that their patients seemed to prefer telephone over video, due to lack of equipment or video bandwidth and challenges with the VVC platform. However, clinicians underscored the value of video visits compared to telephone, as they could see non-verbal cues and their patients' living situation. In addition, Veterans with higher health risk factors were less likely to use telemedicine for cardiology visits, which is consistent with another VA study that reported a higher patient preference for in-person visits than video visits among those with multiple comorbidities.[29] Participating physicians and pharmacists in this study also reported that they switched medications to those that needed to be monitored less often and pushed back lab work schedules to reduce the frequency of visits to the clinic. Another study similarly found that the ordering of cardiology-specific diagnostic testing and medications decreased with video and telephone visits during COVID-19.[36] The delay of in-person care and extensive long-term use of telemedicine thus may have a negative impact on clinical outcomes and hinder patient satisfaction.[36,37] If telemedicine is to expand within cardiology and other specialty fields, further mechanisms need to be implemented to determine if face-to-face or telemedicine visits are best for individual patient encounters.

Limitations. The study has limitations. First, the study was conducted at one VA site, which serves Veterans living in a predominantly urban area, and even though CBOCs serve rural Veterans, generalizations to clinics more fully situated in highly rural communities is limited. In addition, our qualitative sample size of eight respondents may not be representative of all four cardiology clinics. However, our recruitment strategy allowed us to interview different types of providers from each of the cardiology clinics. Since this study is based on one site that is urban and diverse, the racial/ethnic distribution of this specific VAMC is not representative of all VA users nationwide. Lastly, although our results suggest that use of telemedicine in cardiology is likely to stay beyond COVID-19, it is too early to tell how telemedicine will be integrated with the traditional face-to-face care model in the near future.

5. Conclusions

This study utilized a mixed-methods approach to comprehensively understand how telemedicine was adopted at the onset of the COVID-19 pandemic. The findings suggest that once mutable barriers were addressed, the Division of Cardiology was successfully able to expand its telemedicine efforts during COVID-19. While telemedicine use has recently decreased in the VAMC's cardiology clinics, many providers believe that medicine has changed for the better and expressed the desire to continue virtual care post COVID-19. Beyond the pandemic, a hybrid of virtual and face-to-face care might be feasible and likely beneficial for both healthcare providers and patients in specialty care, where follow-ups, remote-monitoring, or medication management are frequent and essential to supporting care continuity.

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Declaration of competing interest

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

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References

1 American Academy of Family Physicians. *What's the Difference between Telemedicine and Telehealth?*; 2020. https://www.aafp.org/news/media-center/kits/telemedicine-and-telehealth.html. Accessed April 26, 2021.
2 Kenealy TW, Parsons MJ, et al. Telecare for diabetes, CHF or COPD: effect on quality of life, hospital use and costs. A randomised controlled trial and qualitative evaluation. *PLoS One*. 2015;10(3), e0116188. https://doi.org/10.1371/journal.pone.0116188.
3 Marcin JP, Rimsza ME, Moskowitz WB. The use of telemedicine to address access and physician workforce shortages. *Pediatrics*. 2015;136(1):202–209. https://doi.org/10.1542/peds.2015-1253.
4 Cherry J. *Using Telehealth to Improve Continuity of Care*. Patient Safety and Quality Healthcare; 2010. https://www.psqh.com/analysis/using-telehealth-to-improve-continuity-of-care/. Accessed April 26, 2021.
5 Nundy S, Dick JJ, Chou CH, Nocon RS, Chin MH, Peek ME. Mobile phone diabetes project led to improved glycemic control and net savings for Chicago plan participants. *Health Aff(Millwood)*. 2014;33(2):265–272. https://doi.org/10.1377/hlthaff.2013.0589.
6 Kvedar J, Coye MJ, Everett W. Connected health: a review of technologies and strategies to improve patient care with telemedicine and telehealth. *Health Aff (Millwod)*. 2014;33(2):194–199. https://doi.org/10.1377/hlthaff.2013.0992.
7 Vasilopoulou M, Papaioannou AI, et al. Home-based maintenance tele-rehabilitation reduces the risk for acute exacerbations of COPD, hospitalisations and emergency department visits. *Eur Respir J*. 2017;49(5), 1602129. https://doi.org/10.1183/13993003.02129-2016.
8 Rangachari P, Mushiana SS, Herbert K. A narrative review of factors historically influencing telehealth use across six medical specialties in the United States. *Int J Environ Res Publ Health*. 2021;18(9):4995. https://doi.org/10.3390/ijerph18094995.
9 Soliman AM. Telemedicine in the cardiovascular world: ready for the future? *Methodist Debakey Cardiovasc J*. 2020;16(4):283–290. https://doi.org/10.14797/mdcj-16-4-283.
10 U.S. Department of Veterans Affairs. Veterans health administration. https://www.va.gov/health/aboutvha.asp#:~:text=The%20Veterans%20Health%20Administration%20(VHA,Veterans%20enrolled%20in%20the%20VA. Updated April 23, 2021. Accessed April 29, 2021.
11 Centers for Disease Control and Prevention. Coronavirus disease 2019 (COVID-19): people with certain medical conditions. https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-with-medical-conditions.html. Updated December 29, 2020. Accessed April 29, 2021..
12 Fisher M. Cardiovascular disease and cardiovascular outcomes in COVID-19. *Practical Diabetes*. 2020;37(5):191–193. https://doi.org/10.1002/pdi.2294.
13 Bae S, Kim SR, Kim MN, Shim WJ, Park SM. Impact of cardiovascular disease and risk factors on fatal outcomes in patients with COVID-19 according to age: a systematic review and meta-analysis [published online ahead of print, 2020 Dec 17]. *Heart*. 2020. https://doi.org/10.1136/heartjnl-2020-317901.
14 Los Angeles Times. Tracking the coronavirus in California. https://www.latimes.com/projects/california-coronavirus-cases-tracking-outbreak/. Updated November 3, 2021. Accessed November 4, 2021..
15 Der-Martirosian C, Wyte-Lake T, et al. Implementation of telehealth services at the VA during COVID-19. *JMIR Form Res*. 2021;5(9), e29429. https://doi.org/10.2196/29429.
16 Van Dyk L. A review of telehealth service implementation frameworks. *Int J Environ Res Publ Health*. 2014;11(2):1279–1298. https://doi.org/10.3390/ijerph110201279.
17 U.S. Department of Veterans Affairs. Risk adjustment. http://vaww.herc.research.va.gov/include/page.asp?id=risk-adjustment#goes-into-nosos. Updated March 16, 2016. Accessed June 11, 2021..
18 Guest G, Namey E, Chen M. A simple method to assess and report thematic saturation in qualitative research. *PLoS One*. 2020;15(5), e0232076. https://doi.org/10.1371/journal.pone.0232076.
19 Gale R, Wu J, et al. Comparison of rapid vs in-depth qualitative analytic methods from a process evaluation of academic detailing in the Veterans Health Administration. *Implement Sci*. 2019;14(1):11. https://doi.org/10.1186/s13012-019-0853-y.
20 Taylor B, Henshall C, Kenyon S, Litchfield I, Greenfield S. Can rapid approaches to qualitative analysis deliver timely, valid findings to clinical leaders? A mixed methods study comparing rapid and thematic analysis. *BMJ Open*. 2018;8(10), e019993. https://doi.org/10.1136/bmjopen-2017-019993.
21 U.S. Department of Veterans Affairs. *VA Video Connect Expands Veterans' Access to Health Care*; 2018. https://www.va.gov/opa/pressrel/pressrelease.cfm?id=4045. Accessed March 30, 2021.
22 Der-Martirosian C, Griffin AR, Chu K, Dobalian A. Telehealth at the US department of Veterans Affairs after Hurricane Sandy. *J Telemed Telecare*. 2019;25(5):310–317. https://doi.org/10.1177/1357633X17751005.
23 Der-Martirosian C, Chu K, Dobalian A. Use of telehealth to improve access to care at the United States department of Veterans Affairs during the 2017 Atlantic Hurricane season [published online ahead of print, 2020 Apr 13]. *Disaster Med Public Health Prep*. 2020:1–5. https://doi.org/10.1017/dmp.2020.88.
24 Der-Martirosian C, Heyworth L, Chu K, Mudoh Y, Dobalian A. Patient characteristics of VA telehealth users during Hurricane Harvey. *J Prim Care Community Health*. 2020. https://doi.org/10.1177/2150132720931715.
25 VHA Innovation Ecosystem. *LEAF: VA Innovation Supports Natural Disaster Efforts to Deliver Care Faster*; 2017. https://medium.com/vainnovation/leaf-va-innovation-supports-vas-natural-disaster-efforts-to-deliver-care-faster-1468c347dda6. Accessed May 20, 2021.
26 O'Connor M, Asdornwised U, et al. Using telehealth to reduce all-cause 30-day hospital readmissions among heart failure patients receiving skilled home health services. *Appl Clin Inf*. 2016;7(2):238–247. https://doi.org/10.4338/ACI-2015-11-SOA-0157.
27 Bashi N, Karunanithi M, Fatehi F, Ding H, Walters D. Remote monitoring of patients with heart failure: an overview of systematic reviews. *J Med Internet Res*. 2017;19(1), e18. https://doi.org/10.2196/jmir.6571.
28 Clark RA. Telehealth in the elderly with chronic heart failure: what is the evidence? *Stud Health Technol Inf*. 2018;246:18–23. PMID: 29507256.
29 Slightam C, Grego AJ, et al. Patient perceptions of video visits using Veterans Affairs telehealth tablets: survey study. *J Med Internet Res*. 2020;22(4), e15682. https://doi.org/10.2196/15682.
30 American Heart Association. *Fact Sheet: CVD Health Disparities. From Policy to Action: addressing Racial and Ethnic Disparities at the Ground-level*; 2009. https://www.heart.org/idc/groups/heart-public/@wcm/@adv/documents/downloadable/ucm_301731.pdf. Accessed April 29, 2021.
31 Sze S, Pan D, et al. Ethnicity and clinical outcomes in COVID-19: a systematic review and meta-analysis. *EClinicalMedicine*. 2020;29, 100630. https://doi.org/10.1016/j.eclinm.2020.100630.
32 Perrin A, Turner E. *Smartphones Help Blacks, Hispanics Bridge Some – But Not All – Digital Gaps with Whites*; 2019. https://www.pewresearch.org/fact-tank/2019/08/20/smartphones-help-blacks-hispanics-bridge-some-but-not-all-digital-gaps-with-whites/. Accessed May 15, 2021.
33 Padala KP, Wilson KB, Gauss CH, Stovall JD, Padala PR. VA video connect for clinical care in older adults in a rural state during the COVID-19 pandemic: cross-sectional study. *J Med Internet Res*. 2020;22(9), e21561. https://doi.org/10.2196/21561.
34 Federal Communications Commission. *Inquiry Concerning Deployment of Advanced Telecommunications Capability to all Americans in a Reasonable and Timely Fashion: Fourteenth Broadband Deployment Report*; 2021. https://docs.fcc.gov/public/attachments/FCC-21-18A1.pdf. Accessed May 9, 2021.
35 U.S. Department of Veterans Affairs. VA video connect: real-time access to your VA care team through VA video connect. https://mobile.va.gov/app/va-video-connect Updated May 6, 2021. Accessed May 6, 2021.
36 Yuan N, Pevnick JM, et al. Patient use and clinical practice patterns of remote cardiology clinic visits in the era of COVID-19. *JAMA Netw Open*. 2021;4(4), e214157. https://doi.org/10.1001/jamanetworkopen.2021.4157.
37 Singh A, Mountjoy N, et al. Patient perspectives with telehealth visits in cardiology during COVID-19: online patient survey study. *JMIR Cardio*. 2021;5(1), e25074. https://doi.org/10.2196/25074.