

Perceptions of Telehealth Among University Primary Care Providers

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Author Note

Katherine M. McKernan is a registered nurse.

She has no known conflict of interest to disclose.

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Abstract

Problem Statement: The onset of the COVID-19 pandemic led to intense challenges for health care providers. Outpatient primary care practices rapidly moved from in-person practice to video-conferencing telehealth appointments. This shift requires study, particularly how this has impacted the lived experience of providers.

Purpose: This project aims to explore primary care provider satisfaction with telehealth in the wake of the COVID-19 pandemic.

Methods: A point-in-time survey was administered to primary care providers at a large university health system. Participants were recruited at a monthly provider meeting and invited to complete an anonymous online survey. Satisfaction with video-conferencing patient visits was explored via Likert scale and write-in responses. Providers highlighted specific complaints, problems, and successes that impacted their practice and patients. Aggregate health data from this organization was also obtained for comparison. Statistical analysis was performed and recommendations made for future practice.

Findings: The provider experience of telehealth was overwhelmingly positive. 85% (n=11) of providers agreed or strongly agreed that telehealth allows them to manage their patients effectively. Lack of physical exam findings was the most commonly cited concern (n=9). 100% (n=13) of providers would like to continue seeing patients via telehealth in the future.

Conclusion: Videoconferencing appointments in university health primary care promote high provider satisfaction. Future policies and innovations should support the use of a telehealth platform.

Keywords: telehealth, provider satisfaction, primary care, university students

Perceptions of Telehealth Among University Primary Care Providers

As a result of the COVID-19 pandemic, many outpatient healthcare services adopted telehealth-based evaluation. This rapid innovation to a new way of treating patients altered the experience of many outpatient providers, as they had to navigate rapid changes. In light of the changing status of the pandemic, including the promotion of widespread vaccination, it is useful to reflect on this provider experience and plan for future practice. This project will address primary care provider perception and satisfaction with video-conferencing telehealth visits.

Background and Significance

Problem Statement

The dramatic epidemiological spread of COVID-19 was unprecedented. In Arizona, there have been more than 1,000,000 reported positive cases of COVID-19 since the pandemic began, and there have been over 20,000 deaths (Arizona Department of Health Services, 2021). Caseloads of this magnitude have been reported nationwide, and in varying patterns globally. All healthcare resources, including university student health systems, have been heavily taxed by this new burden of disease.

Healthcare providers in every setting have experienced a concerning spike in stress and mental illness. For example, in the early phases of the pandemic, personal protective equipment (PPE) was scarce and providers in all settings faced difficult choices about how to protect themselves (Shreffler et al., 2020). This lack of equipment led to distress. Uncertainty about how to treat, advise and test patients with COVID-19 was also a significant and ongoing stressor. Overall, depression and anxiety scores were noted to be high in many healthcare provider

populations around the world, not just in those working in COVID-19 intensive care units (ICUs) (Shreffler et al., 2020). Emotional exhaustion and burnout are additional risks for healthcare providers during and after a pandemic. Studies completed after the SARS outbreak, for example, demonstrated 30.4% of healthcare providers who had direct patient contact still experienced burnout one to two years afterward (Preti et al., 2020). Given the increased likelihood of stress and burnout in healthcare providers during the pandemic, understanding their experience is of high importance.

To mitigate the COVID-19 pandemic, the United States (US) Centers for Disease Control and Prevention (CDC) recommended reducing the number of in-person healthcare visits as much as possible (CDC, 2020). Telehealth was identified as the primary means to accomplish this goal (CDC, 2020). The Centers for Medicare and Medicaid services (CMS) issued waivers allowing telehealth to be reimbursable for patients on their insurance plans (CMS, 2021). This initial waiver was expanded, allowing for greater provider flexibility, in February 2021, well after the initial waves of infection (CMS, 2021). This points toward the popularity and sustainability of telehealth in the later stages of the pandemic, and into the future.

Momentum to continue telehealth outpatient visits is driven by high levels of patient satisfaction. Ramaswamy et al. (2020) found that in the COVID-19 era, patient satisfaction was higher with virtual visits than with face to face visits. Patients cited the convenience and accessibility of telehealth visits as a highly positive feature (Sood et al., 2018). Multiple studies have also demonstrated that telehealth visits reduce costs (Ramaswamy et al., 2020; Sood et al., 2018; Donaghy et al., 2019). Overall, telehealth is viewed positively by patients, though its surge in use was driven by necessity.

Providers also report positive experiences with telehealth services. While both patients and providers may express a degree of satisfaction with telehealth evaluation, providers may have more reservations than their patients. An assessment of a Family Medicine practice demonstrated that while 94% of patients strongly agreed that they enjoyed telehealth visits, only 64% of their physicians strongly agreed (Volcy et al., 2021). Previously identified provider concerns include the ability to deliver difficult news and the ability to perform a physical exam (Donaghy et al., 2019; Miner et al., 2020). In a study of diabetes management in the primary care setting, providers demonstrated overall satisfaction with the move to a videoconferencing platform (Sood et al., 2018). They also expressed general uncertainty about implementing such a drastic change, had questions regarding the logistics, and worried about patient satisfaction (Sood et al., 2018). Finally, primary care providers reported the greatest difficulty in clinical decision making while using telehealth (Garcia-Huidobro et al., 2020). This literature highlights that primary care providers in particular have a unique perspective on this new platform.

Telehealth offers a promising alternative for some outpatient visits. It has the potential to reduce stress on both patients and providers. This benefit will exist after the highly limiting social restrictions of the COVID-19 era. Yet, providers have concerns about this new platform and face the risk of burnout after a pandemic. Identifying the gaps in provider experience will inform the quality improvement process that will follow to restructure health systems.

Purpose and Rationale

This problem was chosen because of the widespread effects that COVID-19 has had on the healthcare environment. The added stress to medical providers and drastic changes in care delivery that have become hallmarks of this pandemic require study and evaluation. While many

patients and providers are satisfied with telehealth as a means of patient care, the short and long term effects of this platform have yet to be fully identified. An important outcome governing telehealth's future success is the experience and opinions of primary care providers.

Telehealth has been widely used in university health systems during the pandemic. Students generally have access to computer technology and the internet. This population is also vulnerable, as many students are managing their health and wellness for the first time as adults. The general providers for this population face many challenges in supporting their students from a virtual platform, as well as opportunities for improvement and growth.

Internal Evidence

The organization where this project was focused serves a large state university. The university website lists 17 family practice/ general providers who serve students across four campuses in a metro area (Arizona State University, 2020). Providers on these campuses offer in-clinic visits from 8am-5pm each week day. They also made available virtual videoconferencing appointments from 8am-7pm each weekday and from 12pm-4pm Saturday and Sunday during the pandemic (Arizona State University, 2020). In this way, students had significant flexibility and access to providers in the setting of their choice. Likewise, this core group of providers worked extended hours and on weekends to accommodate these changes.

Soft data from those nurses and providers working directly with students indicate both positive and negative reactions to the addition of telehealth to their role. One provider stated that she enjoyed the added flexibility to work more from home (J. Swanson, personal communication, March 9, 2021). She also stated, however, that sensitive personal issues seen over telehealth can be difficult to manage (J. Swanson, personal communication, March 9, 2021).

Improving provider satisfaction, maximizing efficiency and addressing sensitive issues are all important issues, and studying these provider perspectives in more detail can lead to improved outcomes.

PICOT Question

Data from the student health organization and the literature has led to the clinically relevant PICOT question: In primary care providers for university students (P), what are perceptions (O) surrounding the widespread use of telehealth (I), compared to standard care pre-pandemic (C), one and a half years after the onset of the COVID-19 pandemic (T).

Evidence Synthesis

Search Strategy

The databases used to research this PICOT question are: PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL) and the Cochrane library. Search terms included *provider satisfaction*, *primary care*, *telehealth* and *university students*. These terms were expanded with synonyms, combined with Boolean phrase connectors and searched. Results were limited to those published in the last five years and English language. One of the largest challenges encountered in the search is that when all terms were used, the criteria was too restrictive and no results were found in any database. There were no existing studies integrating all of these concepts. Therefore, the *university students* term was left out, to obtain data reflective of all primary care settings.

Another unique aspect of this search was a large difference in study type and quality between studies authored before and after the COVID-19 pandemic. To better understand the data from these separate periods, the search was performed twice, once with the above terms and

again including *covid-19* but without limiting to *provider satisfaction*. In PubMed, the search that used *provider satisfaction* yielded 37 results and that for COVID-19-related studies yielded 46 results. Applying the same search strategies in CINAHL produced far fewer results. The first search yielded 2 results, and the search focusing on COVID-19 yielded seven results. The search was expanded using Boolean phrases and excluding the COVID-19 terms. This search yielded 98 results. To search the Cochrane library, *telehealth* was the only term used. Using this method 15 results were obtained from Cochrane library.

All abstracts from the above searches were reviewed for inclusion and exclusion criteria. Inclusion criteria included: provider perspectives regarding telehealth, provider-patient interaction on an outpatient basis, and synchronous communication. Exclusion criteria included: the study only of patient perspectives, telehealth used only between providers, only asynchronous communication and other specialty practice only. Upon critical appraisal of the literature, 10 articles meeting the above specifications were selected to guide this project.

Critical Appraisal and Synthesis of Evidence

There was significant heterogeneity in the types of studies examining provider satisfaction with telehealth. The 10 identified studies included four cross-sectional analyses, two mixed methods studies, two descriptive exploratory analyses, one retrospective cohort study and one systematic review. The levels of evidence ranged from three, a retrospective cohort study, to six, individual qualitative studies (see Appendix A, Table A3). This type of evidence is appropriate to address a question focused on lived experience. The majority of studies were based in the United States, and several in the UK and Canada. While several studies reported

patient satisfaction with telehealth, only the study arms based on provider satisfaction were utilized in project design.

Qualitative analysis of provider experience of telehealth revealed several key commonalities and themes. Overall, providers were concerned about how well technology will function and whether patients are satisfied with the experience (See Appendix A, Table A2). Other commonalities found include the difficulty of initiating new treatments or establishing bonds with new patients. Quantitative studies indicated that provider satisfaction was high with telemedicine, greater than 90% in three included studies (see Appendix A, Table A1). The motivators and inhibitors to practice varied, as studies did not often query the same concepts. Several studies polled providers about specific complaints and the use of telehealth regarding patient condition and demographics (see Appendix A, Table A3). Overall, the state of the literature leaves room for further study, particularly with the recent spread of telehealth engagement.

Theoretical Framework

Social-cognitive motivational theory provides a framework for this project. Specifically, Ajzen's Theory of Planned Behavior (TPB) lends insight as to how provider attitudes and influences ultimately effect behavior (see Appendix B, Figure 1). This theory focuses on three specific behavioral determinants, namely existing attitudes, subjective norms, and perceived behavioral control (Ajzen, 1991). Each of these three determinants were incorporated into the design of the project. The theory states that an individual's existing attitudes about a behavior or change are determined by their understanding of the consequences of that change (Ajzen, 1991). For example, in the case of increased use of telehealth, a perceived consequence for providers

might be more time working from home. The second influence described by the theory is the effect of social influence, such as how a behavior is viewed by others.

The final influence on intention and behavior according to TPB is the perceived difficulty or feasibility of making a change (Ajzen, 1991). If it is perceived that an organization is providing all the necessary technology and training to effectively use telehealth, for example, this would influence providers' intentions. This third determinant can have a direct effect on intentions like those previously mentioned, but can also have a direct effect on behavior engagement. Each of these three determinants were incorporated into the design of the project. A survey inquired about the direct effects of telehealth on practice and how these affect daily experience. It inquired about perceived barriers and facilitators to high-quality care with telehealth, including structural and organizational factors. All of these inquiries incorporate the TPB and will provide the organization with information about the attitudes and behavioral modifiers affecting their staff.

Implementation Framework

A Quality Improvement (QI) framework most effectively addresses this clinical problem. There is a current lack of understanding about the provider experience of telehealth, both at an organizational level and within the published literature. There were few studies analyzing this experience prior to the pandemic. Thus, a model that focuses on analyzing and understanding current practice first is a useful guide. The QI framework chosen for this project is the FADE model. The FADE model consists of multiple stages including: focus, analyze, develop and execute (Duke University, 2021). The focus portion of this model consists of identifying a clinical problem and defining it well. The analyze step in the process, which can be viewed more

fully within the FADE model (see Appendix B, Figure 2), will move to internal data collection and gaining an improved understanding of the clinical issue. Retrospective chart review and a survey of the organization's primary care providers were completed in this step. This information was synthesized to provide an in-depth analysis of current baseline practice and point toward future telehealth policy. The execute portion of this model was turned back to the host organization, with substantive data and recommendations.

Methods

Ethical considerations and human subject protection

This project received approval from the Arizona State University Institutional Review Board (IRB) on August 15th, 2021. A Social Behavioral Protocol application was used and it was considered in expedited review. Survey participants received a full consent statement prior to electing to participate. A secure online platform was used to collect survey data. All participants remained anonymous and no IP address information was retained. The organizational health data obtained was aggregated and contained no personally identifying patient information.

Description of population and setting

This project was carried out in a large university health system. The organization serves a student population of more than 90,000 at multiple campus locations in one large metro area. There are 15-20 providers across locations who provide primary care services (Arizona State University, 2021). These providers transitioned to a mix of telehealth and face-to-face visits during the COVID-19 pandemic, with many offering extended hours and weekend visits during that time. The primary care providers for this university health system comprise the target

population for this project.

System changes to be achieved

At the time of this project, telehealth policy within the organization is shifting in response to the prevalence of COVID-19 infection in the community. Changes to this policy will continue into the future and will need to be evidence-based. Quality improvement of telehealth practice is essential to provide quality care. A policy that optimizes healthcare providers' confidence and clinical judgement while reducing burnout will benefit all parts of the system. Finally, a detailed gap analysis is valuable to both the organization and the healthcare community in general.

Project Description and Timeline

Literature review for this project was initiated in Fall 2020. Based on this review, and in collaboration with a stakeholder at the organization, a gap analysis that explores the experience of telehealth was chosen. Survey development, planning and IRB approval occurred in Summer 2021. In August, 2021 chart review data was obtained and recruitment of survey participants began. The survey was opened and distributed via email after giving a brief description and recruitment presentation at a team provider meeting within the organization. The survey was available for one month and a second reminder email was distributed before it closed. In Fall 2021 synthesis of data was completed, with final development and dissemination in Spring 2022.

Instrumentation, Data Collection, and Data Analysis Plan

Provider Experience Survey

A provider survey was developed for the purposes of this project based on examples from the literature and incorporation of the unique needs of the time. There were no existing validated tools to assess provider perceptions of telehealth since the COVID-19 pandemic. A Veteran's

Administration (VA) telehealth study provided an example of a thorough survey that addressed primary care providers and telehealth (Samples, 2020). The setting of that study was quite different, however, and did not reflect changes that have occurred as a result of the COVID-19 pandemic. A second survey was referenced from a similar project via a collegiate health conference (Richards, 2021, June). Along with data collected from the literature search, these samples helped guide the development of a survey appropriate for this project (see Appendix B).

Outcomes were focused on the existing attitudes and perceived behavioral control experienced by providers. Brief demographic information was collected, namely the provider's degree, percentage of telehealth use and years of practice. Their comfort evaluating specific conditions via telehealth was explored. Specific barriers or challenges to telehealth were polled. Other questions address the overall effectiveness and efficiency of telehealth in their organization. The final theme polled providers on their vision for the future, including their desire to continue telehealth work and to have further continuing education on its use. All surveys are completed anonymously online via the Qualtrics® platform. All data was stored in a secure cloud which was password protected.

Retrospective Chart Review Data Analysis

Several key outcomes were valuated through statistical analysis of past telehealth use. Information collected was the total number of telehealth visits, the number of providers participating in care, the number of telehealth visits conducted for initial complaints, the number of telehealth visits that required face-to-face follow-up, and the 10 most common ICD-10 codes recorded for telehealth patients. This information was obtained via a retrospective chart review and no identifying information was recorded. Rather, data was aggregate from 8/20/2020 to

5/1/2021. This data was stored on the personal computer of the project implementer which is password protected.

Data Analysis

Descriptive statistics were used to analyze both chart review and survey data.

Funding/ Budget

No funding was received for this project. Qualtrics® and secure cloud storage access are provided by the university.

Results

Outcomes

Demographics

There were 13 primary care providers (PCPs) who completed the online survey. Ten of the respondents were nurse practitioners (76.9%) and three were physicians (23.1%). The majority of PCPs were experienced, with nine (69.2%) having more than 10 years of clinical experience in their current role. One (7.7%) had five to nine years of experience and three (23.1%) had two to five years of experience. No participants had less than two years of experience as PCPs. Most participants conducted greater than 10 telehealth visits per week. Five (38.4%) PCPs indicated they had more than 20 telehealth visits per week, seven (53.8%) indicated they had 10-20 telehealth visits per week and one (7.7%) indicated they had less than five telehealth visits per week.

Survey Results

Comfort with telehealth was rated very highly for this group of PCPs. Five (38.4%) respondents strongly agreed that they were comfortable evaluating patients with telehealth, while

seven (53.8%) respondents agreed and only 1 (7.7%) indicated neither agree nor disagree.

Importantly, no providers disagreed with the statement. PCPs also felt that telehealth allowed them to manage their patient's health effectively, with six (46.1%) indicating they strongly agree, five (38.4%) indicating they agree and two (15.3%) indicating neither agree nor disagree. When asked if telehealth made it easier to manage the stress of the COVID-19 pandemic, seven (53.8%) strongly agreed, five agreed and one (7.7%) neither agreed/ nor disagreed. Three (23%) of PCPs indicated they would like additional training specific to telehealth evaluation, while six (46.1%) said they did not want additional training and five (38.4%) were undecided.

Respondents were asked to rate the utility of telehealth to evaluate specific types of visits and patient complaints. First, they were surveyed about specific conditions at their initial presentation. PCPs were comfortable with the evaluation of UTI via telehealth (38.4% strongly agree, 61.5% agree), followed by upper respiratory infection (38.4% strongly agree, 53.8% agree), and sexually transmitted illness (15.38% strongly agree, 69.23% agree) (See appendix C, figure C1). At the initial presentation, PCPs rated their comfort with the annual wellness exam (30.7% strongly disagree, 53.8% disagree) followed by dermatology evaluations (23% strongly disagree, 38.4% disagree), as the lowest when performed via telehealth. For follow up visits, respondents rated their comfort with telehealth highest for ADHD (69.2% strongly agree, 30.7% agree) and depression/ anxiety (69.2% strongly agree, 23% agree).

The survey asked respondents to rate and describe the limitations of telehealth in their practice. The most commonly cited limitation was a lack of physical exam findings (n=9, 69.2%) (See appendix C, figure C2). Other frequently selected limitations were lack of vital signs (n=6, 46.1%), reduced ability to assess non-verbal cues (n=5, 38.4%), discussion of a sensitive topic

(n=4, 30.7%), and seeing a patient new to the organization (n=4, 30.7%). Four respondents (30.7%) also reported that they had no significant concerns about these potential limitations. Nine PCPs reported that technological issues disrupt their ability to provide care occasionally, one (7.6%) reported this occurred frequently and three (23.1%) reported this occurred rarely.

PCPs were surveyed about their vision for the use of telehealth in the future. All 13 PCPs (100%) said they want to continue seeing patients via telehealth. Five (38.4%) would like to see the use of telehealth expanded in their organization, seven (53.8%) were happy with their current proportion of telehealth visits. None wanted to see fewer telehealth visits in the future. When asked about organizational efficiency, nine (69.2%) PCPs strongly agreed that their organization functioned more efficiently when telehealth appointments were used, three somewhat agreed and one (7.6%) somewhat disagreed. Finally, all respondents thought the university student population was well suited for the use of telehealth in primary care. Five (38.4%) strongly agreed and eight (61.5%) agreed that their patient population is a good fit for the platform.

Some PCPs responded to an optional prompt asking if they had any other opinions to share that were not reflected in the survey. Five respondents wrote in free text responses. A sentiment analysis of this text revealed two very positive responses, one positive response, one mixed emotions and one negative. One PCP wrote, *“the role of telehealth has been essential during COVID and it has also allowed us to engage with students we may not have typically seen before. In some cases telehealth allowed for an important perspective related to patient situations which is not readily available in the clinic setting”*. Other responses focused on special cases that should never be seen via telehealth, such as an initial ADHD evaluation.

Organizational Aggregate Data

Retrospective audit indicated that between August 20th 2020 and May 1st 2021, this organization conducted 9230 videoconference telehealth visits and 6887 (74.6%) of these visits were for patients new to the practice. Acute pharyngitis, exposure to COVID-19, COVID-19, cough, fever, anxiety, ADHD, dysuria, STI screening and viral URI were the most common ICD-10 codes for all telehealth visits during this time. There were 268 encounters where a patient seen via telehealth was brought in for a face-to-face appointment on the same day.

Impact of the project:

Patient

This DNP project has significant indirect effects on patients. While patients were not the population under study, they are greatly affected by telehealth policies. There is a high demand among patients for continued telehealth services (Ramaswamy et al., 2020; Sood et al., 2018). This project points to the long-term support of telehealth by providers, which may in turn lead to extended and expanded telehealth offerings. The university student population is unique among patient groups, and is simultaneously vulnerable, intelligent, and well connected. Providers feel this population is well suited to telehealth, which points to improved care for their distinctive needs.

Provider

PCPs at this organization were impacted by this project in several ways. First, they were acknowledged as important agents in their patients' care and encouraged that their opinion is important. This was validated as an important measure by a recent study, examining the effects of COVID-19 on the healthcare provider workforce (Sinsky et al., 2021). Feeling valued by an employer was noted as a factor influencing healthcare workers to remain at their jobs, despite

years of stress related to the pandemic (Sinsky, 2021). Second, the results of the survey demonstrate that on many points related to telehealth, there is agreement among many PCPs. This is unifying and empowering, giving PCPs the opportunity to express group opinions to enact system and policy change.

System

This healthcare system has been through significant waves of change since the onset of the COVID-19 pandemic. Many of these changes have been reactionary by nature. This project gives the organization an opportunity to have improved data about telehealth and the opportunity to make informed modifications to practice in the future. By considering needed changes through the lens of QI, and having substantial analytics to refer to, they can better execute future changes to telehealth (Duke University, 2021). This data allows system management to optimize both patient and provider satisfaction. A study of the outcomes of stress on healthcare providers demonstrated that 31.4% of physicians and 28.9% of advanced practice practitioners planned to reduce their work hours within one year (Sinsky, 2021). They also found that 23.8% of physicians and 33.0% of advanced practice providers plan to leave their current jobs in the next two years (Sinsky, 2021). As a result of shortages and provider burnout, healthcare systems are facing significant challenges in staffing that may worsen with time. By taking the time to acknowledge provider opinions and adjust to them, this healthcare system has taken significant steps toward mitigating these staff losses. At the time of this writing, the organization continues to offer telehealth appointments 5 days a week, from 8am to 5pm.

Policy

There are system-wide and legislative policy implications for this project. Changes to telehealth policies, such as removing its use altogether or expanding the number of providers performing these visits, have been discussed. Telehealth use is also significantly impacted by state and federal policy. There are regulations surrounding providing care across state lines, for example, that are federally mandated and can vary greatly from state to state (Health Resources and Services Organization, 2022). Any provider or system that wants to expand the use of telehealth must be mindful of these policies. Reimbursement for services is another crucial aspect of telehealth policy. Medicare and Medicaid, along with many private insurance companies, must continue to reimburse providers fairly for telehealth visits, in order for it to remain a viable option into the future.

Sustainability

This project is part of the cyclical FADE framework, which is intended to be repeated as many times as necessary (Duke University, 2021). After evaluating the results of this iteration of the cycle, the organization can continue to use this information to inform future changes. The survey developed for this project was designed to fit this organization's unique needs and has been provided to them. In this way, staff can re-administer this survey to judge how provider opinions and satisfaction have changed regarding telehealth. With this tool the organization is better able to engage in the QI process.

Discussion

Telehealth has become part of the fabric of primary care, and this project illumines how PCPs view this change. Overall, this organization should feel confident that its PCPs view this new technology positively. Regardless of the state of communicable disease, participants want to

engage patients via telehealth in the future. PCPs highlighted the efficiency and flexibility of telehealth and emphasized that they could still provide quality care for patients on a video conferencing platform.

Comparison to other Literature

The findings of this project significantly expand the literature on provider satisfaction and telehealth. Many studies reported that provider satisfaction was lower than that of patients concerning telehealth (Barkai et al., 2021; Donaghy et al., 2019; Thiyagarajan et al., 2020; Volcy et al., 2021). Only 64% of providers strongly agreed that they enjoyed telehealth visits in one study (Volcy et al., 2021). This project's uniformity and positivity of provider attitudes toward telehealth pushes the literature forward. In many studies, providers intended to continue telehealth in more than 90% of cases, but in this project, 100% of providers indicated they would continue with telehealth care. . There are several possible explanations for these differences. First, the survey was administered in August and September 2021. By this period, PCPs had had ample opportunities to practice telehealth and resolve any uncertainty that existed at the start of the pandemic. This project indicates that with increased time to adjust to the practice of telehealth, provider satisfaction increases.

Another explanation for any differences is the distinctive patient population served by the organization. There were no studies specifically examining providers, telehealth, and university health in the literature search. As indicated by providers in this project, university students are uniquely well suited to telehealth practice. Providers caring for them may encounter higher health literacy, improved understanding of technology, Wi-Fi access, and close proximity to their

practice. All of these factors may cause PCPs in this organization to have higher satisfaction with telehealth than those in other practices.

Limitations and Challenges

This project was impacted by a variety of challenges. With regard to aggregate data collection, the information was limited to what had been previously collected by the organization. There were several measures that were desired to add depth to survey responses that were not available. For example, information about the efficiency and timing of appointments and how many visits were performed from home would have added to a fuller picture of telehealth function. Another data collection limitation came from the survey question regarding technological challenges. This question was keyed to request a write-in response if technological issues were encountered frequently or very frequently. Unfortunately, the majority of respondents (n=9, 69.2%) indicated they encountered these challenges occasionally. They were not prompted to explain what these challenges were, however. This left the organization with an indication of a problem, but not an explanation of what this problem might be.

A significant limitation of this project is the fact that the survey used had no established validity or reliability. This survey was developed using existing literature and peer review but has not been proven to accurately reflect the opinions of PCPs. Finally, while provider satisfaction is essential and related to quality healthcare, it is not a substitute for other patient safety and quality measures. The ultimate goal of this project is to improve patient care, but there was no investigation of how telehealth may positively or negatively impact patient outcomes. Some of this information is implied by PCPs identifying limitations or indicating they can

manage care effectively, but this connection would be much stronger if patient safety data were also studied.

Recommendations

PCPs in this organization were divided over whether they wanted additional training specific to telehealth. One possible next step for this organization is to offer optional training materials for those staff members who want to learn more about telehealth best practice. The American Board of Telehealth (ABT) offers a certificate program that would allow a group of providers to learn the most up-to-date evidence (ABT, 2022). The Teleprimary Primary Care Certificate Program is a self-paced online course that also provides continuing education hours (ABT, 2022). By making staff participation optional, PCPs could feel supported in their new role without experiencing unwanted stress.

Another important next step for the organization is to address the limitations of telehealth highlighted by participants. Lack of physical exam, for example, was cited by nine PCPs as a significant concern. While a traditional exam may not be possible, these providers can be educated that the American Telehealth Association (ATA) addresses this in their practice guidelines (ATA, 2015). They advise that a physical exam be documented for all video visits and that a provider should lead a patient through a thorough self-exam of all relevant systems (ATA, 2015). Hopefully, by exploring this guideline, PCPs can feel more confident evaluating the patient in a virtual environment. Even with knowledge of this guideline, PCPs will encounter patients where a more in-depth exam is needed. PCPs should be sure of their organizational policies in this case and feel confident about where to direct patients who need to be seen in person.

The ATA guideline also recommends using accessory devices from home whenever possible (ATA, 2015). This would address the second most commonly cited concern in telehealth practice, a lack of vital signs. Patients may take their own temperature, for example, to give PCPs more information about their condition. These types of at-home devices can range from a simple thermometer to an at-home blood pressure reader, pulse oximeter, or Holter monitor. If there are established patients that prefer to be seen virtually, practices can validate these devices and allow them to be used by the patient and communicated with the provider. There is a growing and innovative market for at-home accessories that can provide healthcare teams with real-time patient health information. This organization should monitor this technology carefully and weigh the possibility of future investments in at-home devices.

Seeing a patient new to the organization was also highlighted by some PCPs as a concern. This is significant, as 74.6% of all telehealth visits were with patients who had no established care with the organization. In his testimony before the U.S. Senate on the state of telehealth, Dr. Sterling N. Ransone Jr. spoke on behalf of the American Academy of Family Physicians and made recommendations for the future of the telehealth platform (Ransone, 2021). One of his points of emphasis was that telehealth should not be utilized in such a way that it might "undermine the basic principles of the medical home, increase fragmentation of care, and lead to the patient receiving suboptimal care" (Ransone, 2021, p.5). While the high number of new patients is most likely related to the large student population this organization cares for, it should still be a point of concern that telehealth services do not become preferred for convenience alone. The organization was able to bring in many new patients using telehealth. In the future, an emphasis can be placed on follow-up with these patients. It would be beneficial to both the

practice and its patients to have continued engagement after an initial encounter. With the use of email reminders and health portal messages, for example, the organization could remind students who have established care of what their practice offers, with the goal of centralizing and streamlining primary care.

More study of the impact of telehealth is still needed, especially following the initial waves of the COVID-19 pandemic. Comprehensive study of the impacts on both patients and providers is underway and necessary. A valid and reliable tool for assessing provider experience of telehealth would be a positive step in allowing practices to measure its effect on their providers. Evaluations of provider satisfaction exist, but none reflect the recent sweeping changes to outpatient care.

Primary care covers a considerable breadth of patient conditions. Telehealth use in primary care needs to be scrutinized, perhaps more so than in many other specialty areas, because primary care encounters are so diverse. As a result, it is useful to understand which patient complaints are well suited to the platform and which are not. Future policies can focus on how to schedule and plan for patients presenting with specific complaints. With the data obtained in this project, the organization can plan future innovations to telehealth practice with confidence.

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Appendix A
Evaluation and Synthesis Tables

Table A1

Evaluation Table for Quantitative Studies

Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
Miner et al., 2020, Clinician TM perspectives during the covid-19 pandemic. Country: US. Funding: No specific grant. Bias: No biased associations.	None explicitly stated. Theory of Caregiving Dynamics	Quantitative: Cross-sectional study	N=220 No demographics of race or gender, but providers have 13 years of experience, 60% practice outpatient.	IV: various, including details of practice, experience and personality of clinicians. DV: beliefs about TM. TM: video and audio online platform for patient visits	Online survey distributed to large physician group, agreement and disagreement rated with -5-+5, this is the same for personality trait ranking. Survey developed from qualitative interviews, validity and reliability not mentioned.	Many! Non-normal distribution. Pearson’s chi squared, Mann-Whitney, Kruskal-Wallace. Multivariate: Odds ratio, 95% confidence ratio, p value.	91% plan to continue to offer TM services after pandemic. For 95% CI: Association between desire to continue TM and quality of care (p=.002), ease of physical exam (p=.045), preference for virtual or in-person meetings (p=.024), view that adaptability is important (p=.044).	Level V. PICOT: HCP personality, values and beliefs can affect TM practice. Strength: timely and looks at similar research question (PICOT) in similar population. Weakness: analysis not as helpful, does not explain all variables on survey. No process described for survey development

Key: **A1C** – glycated hemoglobin blood test; **C-PR**- clinician patient relationship; **CI**- confidence interval; **COI**- conflict of interest; **DM** – diabetes mellitus; **DV**-dependent variable; **DS**- data bases searched; **FM**- family medicine; **HCP** – health care providers; **HTN**- hypertension; **IM**- internal medicine; **IR**- Interrater reliability; **IRB**- Internal review board; **IV**- independent variable; **n**- number of participants; **PC**- setting; **PCP**- primary care provider; **PTS**- patient satisfaction; **RCT** – randomized control trial; **SD** – standard deviation; **SR**- systematic review; **TM**- telemedicine; **UK**- United Kingdom; **US**- United States; **VC**- video consultation

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Evaluation Table for Quantitative Studies

Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
Sood et al., 2018, TM consultation for patients with DM, Funding: Research grant from the VA association. Country: US Bias: No COI.	None stated. Maybe theory of symptom management or caregiving dynamics.	Mixed methods. Cluster RCT and descriptive exploratory qualitative. RCT: patients with DM at VA randomized to in-person or TM. Purpose: to understand the effect of TM vs. usual care on A1C in diabetic patients and the HCP perspective of providing this care.	RCT: n=283 Control demographics: age=61 A1C=9.4 Setting: Endocrine specialty clinic Intervention demographics: age=61 A1C=10.0 Setting: Several outpatient clinics Qualitative: n=22 preintervention interviews,	IV: team of HCPs sees patient via TM vs. usual care. DV: A1C, other health metrics Qualitative: what are provider opinions of the TM intervention?	RCT: A1C, BP, Self-rated health scale, diabetes treatment satisfaction questionnaire Qualitative: semi-structured interviews, questions provided in appendix for review and reproducibility. Validity and reliability not known.	Descriptive statistics, chi square tests and unpaired and paired t-tests, mean SD and a p value of <0.05 was considered statistically significant. Qualitative: Interviews conducted by one person, codes and themes independently verified by multiple researchers.	RCT: no statistically different difference in A1C between intervention and control. Identified themes: Changes in referral process, Communication, Alignment of role and training, Patient focused care, Patient care/compliance with care plan, and Patient satisfaction with diabetes care.	Level II/ Level VI PICOT: Speaks to overall efficacy of TM and some provider perspectives. Patient have high satisfaction with TM. Strength: High level of evidence for this topic. Weakness: Application to outpatient practice limited because patients were still in healthcare setting for TM. Assesses how a team can gather to coordinate care, not one patient at home and one HCP. Do not like interview questions for HCPs.

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			n=8 postintervention interviews. Not clear which HCPs participated in which interview.					Harm: none, no difference found b/w groups. Patient reports were largely positive.
Alexander et al., 2020, Use and Content of Primary Care Office-Based vs Telemedicine Care Visits During the COVID-19 Pandemic in the US Funding: unknown	Research question: Is there a quantifiable association between the coronavirus disease 2019 (COVID-19) pandemic and the volume, type, and content of	Cross-sectional analysis Used Strengthening the Reporting of Observational Studies in Epidemiology reporting guidelines	N=122.4 million, huge sample, data from entire US Setting: primary care visits in either office, hospital or telehealth Demographics: analyzed if patients were white or black	DV: setting of PC visits, content of PC visits including blood pressure, cholesterol checks, starting new medication IV: changes brought by coronavirus	Analyzed data from the National Disease and Therapeutic Index, a national audit of outpatient practice, data collected from 4000 physicians each quarter	Descriptive statistics. 95% CI, P<.05 is significant	Geographic: TM use lowest in Midwest, highest in Pacific. It was not associated with disease burden in the area. Blood pressure checks decreased by almost 50%, cholesterol assessments	Level V PICOT: relevant, not in provider satisfaction but in understanding how primary care has changed, which will in turn affect their experience Strengths: nationwide sample, looking directly at primary care and TM

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Evaluation Table for Quantitative Studies

Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
Country: US Bias: multiple authors also work for IQVIA, a healthcare technology company, this COI was reviewed by IRB and approved	primary care encounters in the US?						decreased by 35%. Middle-aged and insured patients most likely to adopt TM, no evidence of racial disparity between white and black Americans and TM use	Weaknesses: possible COI Harms: none, retrospective analysis
Garcia-Huidobro et al., 2020, System-Wide Accelerated Implementation of Telemedicine in Response to COVID-19,	Report on the accelerated implementation of TM, compare PTS between TM and in-person visits, and report HCP perceptions.	Convergent parallel mixed methods design Quantitative: quasi-experimental design Qualitative: descriptive exploratory, phenomenologic	Setting: large private health network in Chile Sample: can afford private care, demographics very similar across groups except	IV: seen via TM DV: two group Concurrent: in-person visits during same period Retrospective: in-person visits from 2019	Data from review of electronic health records, surveys sent to patients and HCPs after visits. In-person survey: Cronbach a: .96 Telehealth survey: .86	Quantitative: chi-squared, wilcox mann whitney. Qualitative: bivariate logistic regressions, adjusted odds ration, 95%	92.8% of HCPs satisfied with TM, 61.8% said clinical skills are challenged somewhat or a lot, females felt more challenged, no correlation to experience. Out of all specialties,	Level III, Level VI PICOT: Highly relevant. HCP are satisfied, yet report challenges. Are they satisfied only because its spring 2020? Primary care has more diagnostic challenges with TM.

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Evaluation Table for Quantitative Studies

Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
Funding: unknown Country: Santiago, Chile Bias: none			insurance, 61% female, 23% pediatrics, twice as many patients have private insurance in the TM group N= 263 physicians, many patients	TM visit: via zoom, costs \$50	Qualitative: open-ended interview questions that are coded by 2 independent researchers using content analysis. 20% recoded and compared with 96.4% coding agreement	CI, P<.05 significant	primary care and pediatrics were most likely to report problems with the diagnostic process. Challenges with the modality of service were most common	Strengths: large study and n, mixed methods provides a full picture Weaknesses: different country
Thiyagarajan et al., 2020, Exploring patients' and clinicians' experiences of video consultations in primary care: a systematic scoping review	Lack of current understanding/ research on topic	Design: SR Purpose: report on experiences of PCPs and patients with video TM in primary care	N: 7 DS: MEDLINE, Cochrane Central Register of Controlled Trials, Cochrane Effective Practice and Organization of Care Group (EPOC),	IV: TM DV1: patient experience DV2: provider experience	Varied, qualitative, quantitative and mixed methods reviews are included	Narrative synthesis using the guidance of Joanna Briggs Institute	DV1: 94-99% of patients very satisfied, offers convenience and access, women liked it more DV2: 88% of providers think TM improved prognosis, 89% clinical decision making can be	Level I/Level V PICOT: Mixed review of different types of studies, relevant. Synthesis of different studies over 8 years Strengths: SR Weaknesses: not many studies included, lots

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Evaluation Table for Quantitative Studies

Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
Funding: National Institute for Health Research, UK Bias: none Country: worldwide			PubMed, EMBASE and CINAHL, and Web of Science Inclusion Criteria: use of two-way video TM in PC, patient and/or PCP experience Exclusion Criteria: consults between HCPs, asynchronous communication				accomplished, satisfaction lessened when new treatments initiated	of diversity among studies
Volcy et al., Assessment of Patient and Provider Satisfaction With the Change to	None explicitly stated. Theory of Caregiving Dynamics	Survey/ cross sectional study	N patients: 223 N providers: 72 Settings is one hospital group with majority underserved	DV1: perceptions of providers on TM DV2: perceptions of patients on TM	Patient survey: 3 ?s, administered by provider but recorded anonymously Provider survey: administered in	Descriptive statistics, fisher's exact test	Patients: No impact on perceptions based on gender, age or perceived health Provider: 50% faculty strongly	LOE: V For picot: all viewed positively, PTS> provider Strengths: point in time survey of

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Telehealth From In-Person Visits at an Academic Safety Net Institution During the COVID-19 Pandemic, Funding: None Bias: None Country: US			patients, divided into FM and IM arms Demographics: for providers included faculty and residents of every year For patients: majority African American and female	IV1: change to TM	various ways both anonymous and not		agrees with “comfortable”, only 21, 25,35% of residents strongly agree, not statistically significant difference	provider experience, COVID taken into account Weaknesses: different teams of providers interviewed in different ways, mix of phone and video TM, small sample of providers, patient populations not representative, both patients and providers may have felt pressured to say positive responses
Samples, 2020, Provider Perceptions of Telemedicine Video Visits to Home in a	None explicitly stated. Theory of Caregiving Dynamics	Cross-sectional study Purpose: to understand PCP opinions of video TM, more	N: 49 PCPs Setting: Seattle Veterans Affairs Primary Care clinic	IV: implementation of video TM in primary care DV: PCP opinion of best practices and	Online multiple choice survey with Likert-style scales. Survey/ scale developed by VA medical residents	Descriptive statistics	Most desired populations/ visit types: geographical distant, home-bound, frequent hospitalization,	Level V PICOT: highly relevant, gets into specific complaints and types of visits which is rare and valuable

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Evaluation Table for Quantitative Studies

Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
Veteran Population Country: US Funding: Veterans Affairs Bias: no financial COI		is known about patient perspectives. Pre-COVID-19	staff, online survey Demographics: includes MD, NP and pharmacist, only 3 reported experience with video TM prior to using at VA	likelihood to use	with a VA grant, reliability not given		diabetes, HTN, tobacco use Least likely to want TM for: homeless, new patients, rashes/ musculoskeletal problems, annual wellness visit	Strengths: includes NPs in sample, provides survey used Weaknesses: limited statistical analysis, good info but pre-COVID-19
(Stamenova et al., 2020) Uptake and patient and provider communication modality preferences of virtual visits in primary care: a	None explicitly stated. Increased access to same day care will benefit patients.	Retrospective observational study Purpose: to determine if virtual primary care visits are acceptable to patients and providers	N: 194 PCPs Setting: PCPs from 5 Ontario health regions, outpatient practice Demographics: mean age 44, 69% women	# cancelled visits # of issues with TM including tech, advised follow up. Reasons for initiating TM visit.	Retrospective review of large pilot TM program, additional patient satisfaction survey	Descriptive and nonparametric tests	Most visits incomplete due to tech issues, PCPs initiate most often to discuss lab results and existing conditions. Preference for asynchronous over video.	Level III PICOT: addresses specific challenges of telehealth for providers, what types of appointments are more feasible

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Evaluation Table for Quantitative Studies

Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
retrospective cohort study in Canada Country: Canada Funding: Canadian Ministry of Health Bias: no competing interests							Most TM visits do not require in person follow up.	

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Table A2

Evaluation Table for Qualitative Studies

Citation	Theory/ Conceptual Framework	Design/ Method/ Sampling (Grounded Theory, phenomenology, Narrative...)	Sample/Setting (describe)	Major Variables/ Research Questions/ Definitions	Measurement / Instrumentati on (focus group, 1:1, open- ended survey)	Data Analysis	Findings/ Themes	Level/Quality of Evidence; Decision for practice/ application to practice/ Generalization
Donaghy et al., 2019. Accountability, Acceptance and Challenges of Video Consulting. Country: UK. Funding: Government research grant. Bias: No conflicts of interest, may be biased to support VC as the government had planned to spend money on it.	None mentioned. Theory- generating research. Themes emerge and used to make observations / hypotheses.	Descriptive exploratory. Phenomenologic, purpose is to explore both patient and provider views around VCs, in primary care follow up.	n patients=21 11 male Ages 24-66 n HCP=13 8 male Ages 29-60 No ethnicity reported. Setting: 6 GPs in Scotland but VCs.	How can VCs be used for follow up consultations in GP? VC: virtual check-in between patient and provider conducted via video conference	1:1 telephone and in person semi- structured interviews. Recorded and transcribed. IR: identified themes are cross checked by multiple researchers.	Qualitative content analysis. Braun and Clark method, no set theory. Coding frame not prespecified. Inductive approach, themes first identified by those who do not know the literature. Themes revised in iterative process.	1) Access to remote consultation 2) Visual element of VC: improved ability to identify non-verbal cues 3) Experience of a VC: did tech work and would you do it again 4) C-PR: importance of a previous C-PR	LOE: VI VC harder with no prior C-PR, everyone likes improved access. Relevant to population and pictot. Strengths: relatively large sample size for qualitative study. Weaknesses: focus only on follow-up visits, not others. Feasibility: highly relevant to clinical practice.
Randhawa et al., 2018, An exploration of the attitudes and views of	Themes emerge, address lack of literature	Descriptive exploratory Phenomenologic	N=12 PCPs Demographics: 6 female, 6 male, age range	What are the views of PCPs on benefits, problems and cost-	1:1 semi- structured interviews using pilot tested topic	NVIVO technology used to analyze verbatim recordings,	Technology: concern patients wont be ale to use it, it will be poor quality,	LOE: VI Relevance: highly relevant, explores PCP perceptions in depth

Key: **A1C** – glycated hemoglobin blood test; **C-PR**- clinician patient relationship; **CI**- confidence interval; **COI**- conflict of interest; **DM** – diabetes mellitus; **DV**-dependent variable; **DS**- data bases searched; **FM**- family medicine; **HCP** – health care providers; **HTN**- hypertension; **IM**- internal medicine; **IR**- Interrater reliability; **IRB**- Internal review board; **IV**- independent variable; **n**- number of participants; **PC**- setting; **PCP**- primary care provider; **PTS**- patient satisfaction; **RCT** – randomized control trial; **SD** – standard deviation; **SR**- systematic review; **TM**- telemedicine; **UK**- United Kingdom; **US**- United States; **VC**- video consultation

<p>general practitioners on the use of video consultations in a primary healthcare setting: a qualitative pilot study Country: UK Funding: None Bias: No COI</p>		<p>Purpose: uncover PCP attitudes and perceptions of video-based TM</p>	<p>30-54, range of experience 1-30 years. No ethnicity reported. Setting: in person, private office setting, London</p>	<p>effectiveness of video TM? VC: purposefully left with vague definition</p>	<p>guide, snowballing convenience sample IR: Themes identified by one researcher and verified by a second</p>	<p>thematic framework approach, constant comparison</p>	<p>Utility: good for skin rash, no physical assessment so limited Practicality: mixed opinions on time saving, could spend more time by seeing via TM and then in person</p>	<p>Strengths: Weaknesses:</p>
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Key: **A1C** – glycated hemoglobin blood test; **C-PR**- clinician patient relationship; **CI**- confidence interval; **COI**- conflict of interest; **DM** – diabetes mellitus; **DV**-dependent variable; **DS**- data bases searched; **FM**- family medicine; **HCP** – health care providers; **HTN**- hypertension; **IM**- internal medicine; **IR**- Interrater reliability; **IRB**- Internal review board; **IV**- independent variable; **n**- number of participants; **PC**- setting; **PCP**- primary care provider; **PTS**- patient satisfaction; **RCT** – randomized control trial; **SD** – standard deviation; **SR**- systematic review; **TM**- telemedicine; **UK**- United Kingdom; **US**- United States; **VC**- video consultation

Table A3

Synthesis Table

Author	Miner et al.	Alexander et al.	Garcia-Huidobro et al.	Volcy et al.	Stamenova et al.	Randhawa et al.	Donaghy et al.	Samples et al.	Thiyagarajan et al.	Sood et al.
Year	2020	2020	2020	2021	2020	2018	2019	2020	2020	2018
Design/Level of Evidence:	CSS/5	CSS/5	MMS (quasi-experimental & DEQ)/ 6	CSS/ 5	RO/ 3	DEQ/ 6	DEQ/ 6	CSS/ 5	SR of quantitative and qualitative/ 3	MMS(RCT & DEQ) /6
COVID-19 specific	X	X	X	X						
Study Characteristics										
Demographics										
Analysis of racial disparities		X								
Years in practice	13 years					Range 1-30 years				
Previously used TM	12%							6%		
Setting:	Variable, 60% outpatient, US	National data set, US	Variable, Santiago, Chile	Family Medicine/ Internal medicine, US	Variable, Worldwide	Outpatient general practice, UK	Outpatient general practice, UK	VA Primary Care, US	Worldwide, primary care focused	Outpatient specialty clinic
Sample Size/ # of Studies Included	220 providers	122.4 million patients	263 physicians	72 providers	32 studies	12 PCPs	13 PCPs	49 PCPs	7 studies	30 providers
Measurement Tools	Provider survey	Retrospective review	EHR & Surveys /SSI	Provider survey	SR	SSI	SSI	Provider survey	SR video TM in primary care	SSI
IV – Interventions										
TM use during pandemic	X	X		X						
TM use pre-pandemic								X	X	
Disease spread					X					
DV/ Outcomes										

Key: CG - control group; CSS- cross-sectional study; DEQ- descriptive exploratory qualitative; DV- dependent variables; EG – experimental group; HER- electronic health record; IV- independent variables; MMS – mixed method study; PCP- primary care providers; RCT – randomized control trial; SR - systematic review; SSI- semi-structured interview; UK- United Kingdom; * - statistically significant with p -value ≤ 0.05 ; ≠ - not statistically significant.

Author	Miner et al.	Alexander et al.	Garcia-Huidobro et al.	Volcy et al.	Stamenova et al.	Randhawa et al.	Donaghy et al.	Samples et al.	Thiyagarajan et al.	Sood et al.
Want TM after pandemic	*91%			≠ but 62% of faculty strongly agree						
Satisfied with TM			X 92.8%				X	X >90%	*	
Gender influences experience			* female more challenged							
Have a preference for online meetings	*									
Physical exam preference	*								*	
Maintain quality of care	*									
Patient ease of use	*							*		
Working at the office vs home	≠									
Describes effects on patients/ primary care		*	*	*					*	
Experience makes more likely to use TM			≠	≠, higher % experienced were more comfortable, not significant						
TM makes diagnostics more difficult			* This was found for generalists						X	
Identified specific complaints where TM useful			*				X	*		
Themes										
Influenced by patient satisfaction			X				X			X

Key: CG - control group; CSS- cross-sectional study; DEQ- descriptive exploratory qualitative; DV- dependent variables; EG – experimental group; HER- electronic health record; IV- independent variables; MMS – mixed method study; PCP- primary care providers; RCT – randomized control trial; SR - systematic review; SSI- semi-structured interview; UK- United Kingdom; * - statistically significant with p -value ≤ 0.05 ; ≠ - not statistically significant.

Technological problems make them less likely to use			X				X	X		
Initiating new treatment is difficult							X	X <10% said they would use TM for new patient	X	
Pre-pandemic policies can slow adoption of new technology					X					
TM can help reduce volume in crowded settings					X					
Preference for video over phone TM							X		X	

Key: CG - control group; CSS- cross-sectional study; DEQ- descriptive exploratory qualitative; DV- dependent variables; EG – experimental group; HER- electronic health record; IV- independent variables; MMS – mixed method study; PCP- primary care providers; RCT – randomized control trial; SR - systematic review; SSI- semi-structured interview; UK- United Kingdom; * - statistically significant with p -value ≤ 0.05 ; # - not statistically significant.

Appendix B

Provider Telehealth Survey

This survey is designed for healthcare providers with Arizona State University Health Services who provided telehealth visits to their patients after the onset of the COVID-19 pandemic. In this survey, telehealth refers to a visit in which a patient is engaged in a two way, video and audio conference with a provider.

I am a:

- NP
- MD/DO
- Other: _____

How long have you been a healthcare provider in this role?

- < 2 years
- 2-5 years
- 5-10 years
- >10 years

During an average week, approximately how many telehealth appointments will you hold?

- <5
- 5-10
- 10-20
- >20

Please indicate your agreement with the following statement, in relation to each chief complaint listed below:

I would be comfortable evaluating a patient with this complaint via telehealth at their initial presentation:

(Participants will be able to choose: strongly agree, agree, disagree, strongly disagree for each)

Annual wellness exam

ADD/ADHD

Depression/ Anxiety

Dermatology

STI complaint

Upper respiratory infection

Urinary tract infection

Other complaint you would like to mention: _____

Please indicate your agreement with the following statement, in relation to each chief complaint listed below:

I would be comfortable evaluating a patient with this complaint via telehealth for a related follow-up visit:

(Participants will be able to choose: strongly agree, agree, disagree, strongly disagree for each)

Annual wellness exam

ADD/ADHD

Depression/ Anxiety

Dermatology

STI complaint

Upper respiratory infection

Urinary tract infection

Other complaint you would like to mention: _____

Which of the following potential problems or limitations of telehealth have been a cause of concern for you in your practice?

(Participants will select all that apply)

Lack of physical exam findings

Lack of vital signs

Reduced ability to assess non-verbal cues

Discussion of a sensitive topic

Initiation of a new treatment

Seeing a patient new to the organization

Problems with insurance coverage

Writing prescriptions

Other, please specify: _____

I have not had significant concerns

How often have technological issues disrupted your ability to provide care via telehealth:

- Very Frequently
- Frequently
- Occasionally
- Rarely
- Very Rarely
- Never

For those who answer “very frequently” or “frequently”:

Please describe any factors you have identified that disrupt the technological function of telehealth visits. In particular, indicate if these issues were related to the student’s use of technology or some other factor: _____

The current EHR makes it easy to record the content of telehealth patient visits

- Agree
- Disagree. If disagree, why? _____

Compared to face-to-face appointments, do you spend more time on average with telehealth visits?

- Yes, I spend more time on telehealth visits
- No, the amount of time for a visit is the same
- No, I spend more time on face-to-face visits

Do you prefer performing telehealth appointments from the office or from home?

- I prefer working from home
- I prefer working from the office
- I have no preference

Please indicate your agreement with the following statement:

I am comfortable evaluating my patients via telehealth.

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

Do you wish you had additional training specific to treating and evaluating patients via telehealth?

- Yes
- No

Please indicate your agreement with the following statement:

In my opinion, the population I care for is a good fit for telehealth utilization.

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

Please indicate your agreement with the following statement:

Telehealth made it easier for me to manage the stress of the COVID-19 pandemic.

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

Please indicate your agreement with the following statement:

Telehealth allowed me to manage my patients' health effectively.

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

Please indicate your agreement with the following statement:

My organization functions more efficiently when telehealth appointments are used.

- Strongly Agree
- Agree

- Undecided
- Disagree
- Strongly Disagree
- Unknown, I was not part of the organization before the start of widespread telehealth use.

Would you like to continue seeing patients via telehealth in the future?

- Yes.
 - If answer is yes: would you like to see the use of telehealth expanded in your organization?
 - Yes, I would like to see more patients via telehealth
 - I am happy with the current proportion of telehealth visits in my practice
 - No, I would like to see fewer patients via telehealth
- No. If no, please indicate why? _____

Is there anything else about your experience of using telehealth as a provider that you would like share? Are there any specific ways that your organization can better support you in your role as a telehealth provider? _____

Appendix C

Figure C1. Graphical representation of survey responses to questions related to specific patient complaints

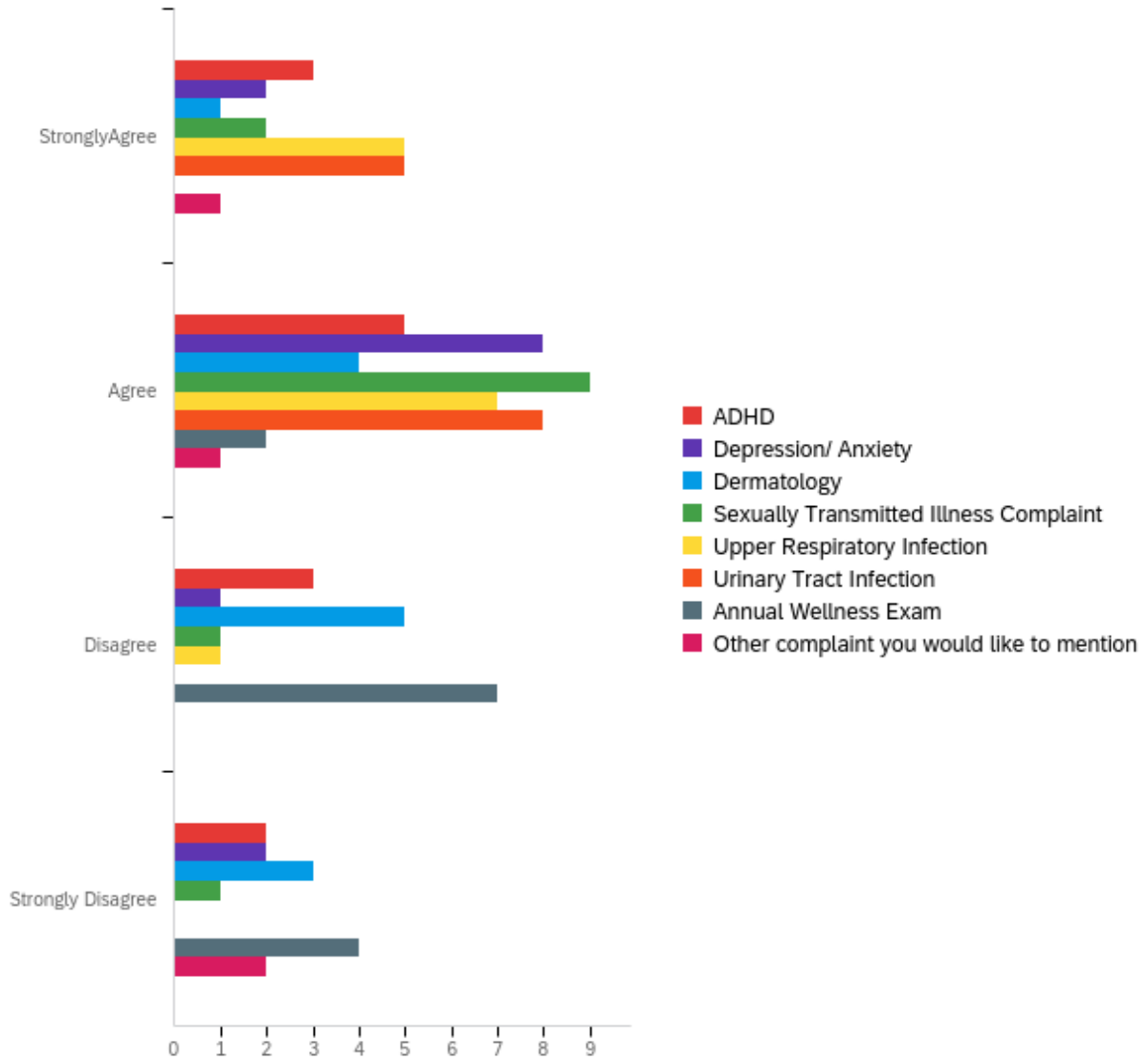


Figure D1: Please indicate your agreement with the following statement, in relation to each chief complaint listed below: I would be comfortable evaluating a patient with this complaint via telehealth at their initial presentation.

Figure C2. Label this figure and move up.

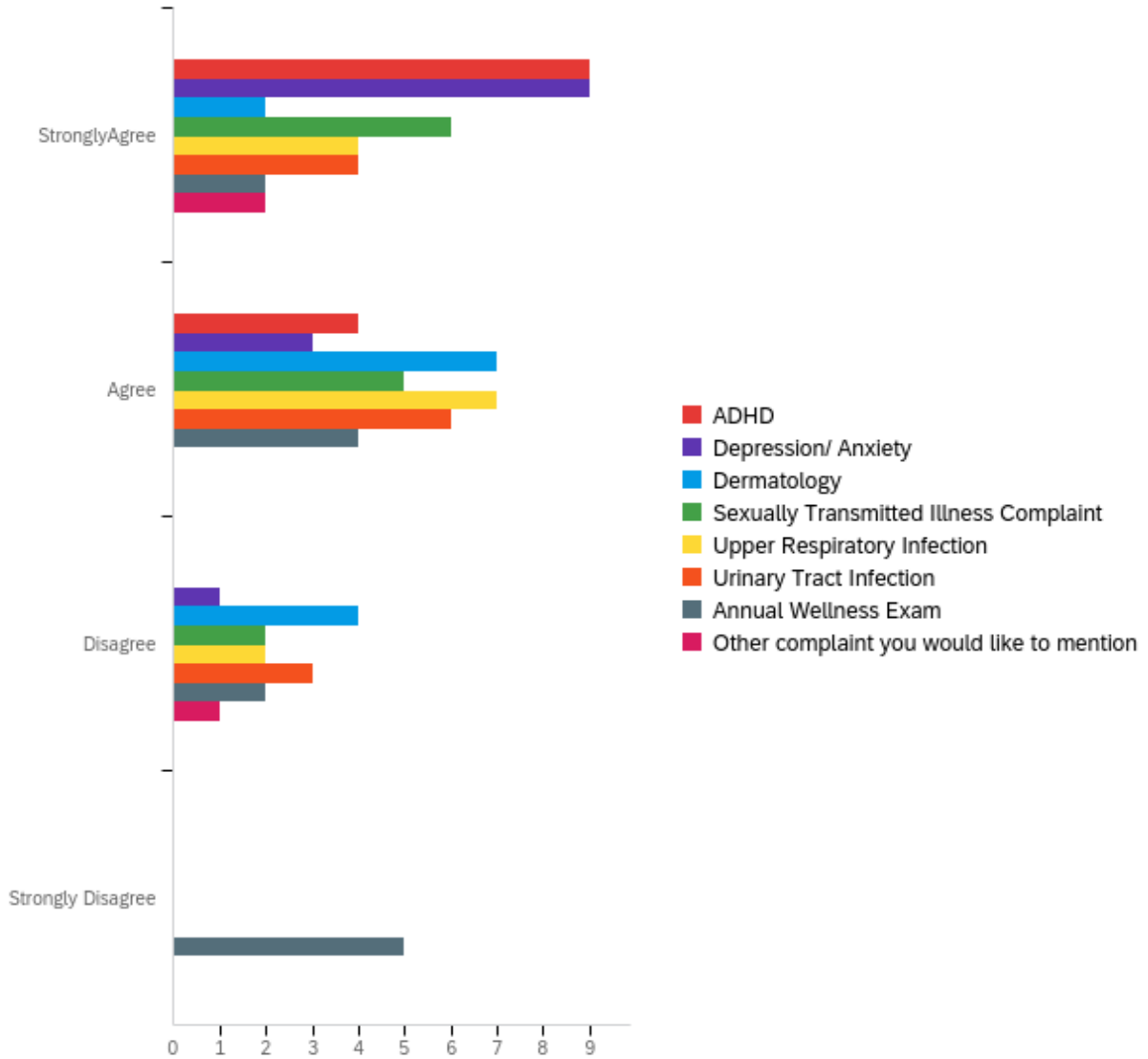


Figure D2: Please indicate your agreement with the following statement, in relation to each chief complaint listed below: I would be comfortable evaluating a patient with this complaint via telehealth for a related follow-up visit.