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ORIGINAL RESEARCH

The Implementation of Telemedicine in the COVID-19 Era

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Introduction: During the COVID-19 global pandemic in 2020, social distancing policies called for health care providers to turn to telemedicine platforms for most of their patient encounters. We aimed to better understand the experiences and perspectives of patients and providers who used telemedicine in the primary care setting.

Methods: This study included semi-structured interviews with patients and providers who participated in telemedicine visits during the beginning of the COVID-19 pandemic. Patients (n = 14) were from a rural Maine practice and providers (n = 10) were from practices within 100 miles of a tertiary care center. The interviews were analyzed through inductive coding and applying the constant comparative method.

Results: Both patients and providers expressed general satisfaction with their telemedicine experiences. Patients (64%) and providers (90%) felt “comfortable” with telemedicine. They praised telemedicine for its convenience and recognized the benefit of having a telemedicine option in the future. However, there was a mixed response regarding perceived efficacy of telemedicine and the ability to emotionally connect over virtual platforms. Finally, the participants in this study discussed dissatisfaction with the loss of the “ritual of medicine.”

Discussion: The COVID-19 pandemic posed barriers to health care that parallel existing barriers in rural states. For much of this rural population, the rapid implementation of telemedicine enabled easier access to care. However, the implementation also saw many technological and infrastructural roadblocks.

Conclusions: Understanding the benefits and challenges of telemedicine for patients and providers will be critical in assuring that telemedicine continues to improve access to health care.

Keywords: COVID-19, pandemic, telemedicine, telehealth, primary care

Rapid advancements in technology have dramatically changed how people interact with one another and exchange information. This new frontier includes telemedicine, or the delivery of remote clinical services using telecommunications infrastructure. This practice was previously integrated into specialty care in the form of TeleStroke consultations and other specialty services as an essential resource for geographically isolated facilities. However, telemedicine is utilized less in the primary care setting. In 2020, during the COVID-19 global pandemic, social distancing policies placed a demand on health care providers

to turn to telemedicine platforms for most of their patient encounters.¹

Previous studies have lauded telemedicine as a flexible, convenient, and more affordable solution to barriers in health care access.^{2,3} The existing literature suggests telemedicine offers a safe alternative to in-person visits and yields similar or improved objective health outcomes. A 2015 Cochrane review found no change in all-cause mortality or readmission for patients with heart failure, but slightly improved low-density lipoproteins in patients receiving telemedicine care compared with usual care.⁴ A 2017 metanalysis reported objective improvements in diabetes control measures in patients who were managed with telemedicine technology.⁵ However, the implementation of telemedicine technology also

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comes with concerns from both providers and patients. Previous studies emphasized patient preference for face-to-face connections, feelings of disconnectedness when using telemedicine, and concerns for privacy.³ Provider perspectives focus more on administrative and adaptability concerns, highlighting resistance to change in the medical insurance and policy industries.⁶ The feasibility of implementing telemedicine has also been questioned for its ability to reach patients of all socioeconomic backgrounds and to overcome legal, ethical, and administrative barriers.^{7,8} These concerns have slowed the integration of telemedicine into regular health care delivery.

While the pandemic paused traditional systems for delivering health care, it also catalyzed technological advances in medicine by implementing telemedicine practices. Early in the COVID-19 pandemic, there was rapid expansion of telemedicine policy and additional flexibility for using it in many rural states. This study aimed to better understand how this rapid implementation of telemedicine impacted health care delivery in the rural state of Maine. Understanding this impact on both providers and patients will be critical for addressing the possibility of more permanently implementing telemedicine in our health care system.

METHODS

We interviewed a sample of patients and providers who participated in a video telemedicine appointment between April 1, 2020 and April 31, 2020. Patients were enrolled at a small, private family practice in rural Maine that was 50 miles from the nearest tertiary care center. Providers were recruited from a purposive sample of family medicine practitioners from separate practices within 100 miles of a major city and tertiary care center. All patients and providers were emailed a recruitment letter containing contact information for RB and KB. Verbal consent was obtained, and all interviews were conducted over the phone by RB or KB.

Structured interviews included limited choice responses (Tables 1-3) and open-ended questions on patient perspectives and impressions of telemedicine technology. Other questions covered background information on demographics, prior technology use, and experiences using telemedicine technology during the COVID-19 pandemic.

Interviews were recorded, transcribed verbatim, and imported into MAXQDA (2020) for inductive coding analysis by KB and RB independently. KB and RB then applied the constant comparative method to analyze codes, developing and adjusting codes after each interview. KB and RB individually read all the interviews and identified themes. Then they compared findings for agreement and consolidation where themes overlapped.^{9,10} Interviews were conducted until no new themes were emerging. All authors reviewed and approved the identified themes. The study was approved by the MaineHealth Institutional Review Board.

RESULTS

Patient and provider demographics are reported in Table 1. Short answer responses are reported in Table 2 and Table 3. Among patients, 64% felt comfortable using telemedicine, and 93% believed telemedicine was more convenient than an in-person visit. Providers and patients agreed that with access to telemedicine appointments, patients would visit their doctor's office and emergency room less often, and they would increase their ability to follow-up for chronic conditions. Themes are presented below and summarized in Table 4.

Convenience

Many patients expressed interest in accessing telemedicine appointments when inclement weather may otherwise impede their ability to attend an in-person appointment. Similarly, one patient whose health impaired his/her physical mobility was grateful for the opportunity to participate in a telemedicine appointment from home. In contrast, one patient suggested that taking the call from home inhibited their ability to fully engage as they were distracted by tasks they needed to complete around the house.

All providers endorsed the notion that telemedicine "reduced the logistical lift" (Provider 1) for patients; however, they presented a mixed perspective regarding their own convenience. Many providers appreciated the ability to reschedule an appointment if patient or provider schedules were interrupted. They emphasized that because the patient was not physically waiting in the office, they could more feasibly reschedule without causing tremendous burden to either party. Other providers described the increased burden of trying to communicate with

patients through telemedicine platforms without proper technological support or infrastructure.

Perceived efficacy

Regarding routine annual physical exams, patients were concerned that telemedicine would not allow the provider to obtain accurate information, including vital signs. However, providers seemed more optimistic that data integration from wearable technology could inform routine wellness checks. Even when providers attempted to examine a physical finding over telemedicine, patients were skeptical of the provider's ability to fully evaluate their chief concern. This skepticism was reflected in both patient and provider beliefs that telemedicine availability would negligibly impact patient visits to the emergency department or urgent care facilities. For these more emergent matters, patients and providers felt an in-person visit would be necessary. Providers and patients agreed that telemedicine offers a useful alternative for appointments such as follow-up appointments for chronic conditions or preliminary intake appointments. However, they believe that dermatologic, musculoskeletal, and complex multi-problem visits may be better suited for in-person visits. While many aspects of the physical exam are lacking in telemedicine appointments, providers felt the patient's emotional presentation was emphasized. For certain types of visits with lower priority than the physical exam, providers and patients must weigh the convenience and accessibility of telemedicine appointments against the potential for medical error.

Alterations in the ritual of medicine

Even though most patients felt they received adequate medical care, many described "something missing" (Patient 4) from their telemedicine appointment. Patients often struggled to describe this intangible shortcoming. Many patients in this study felt as though they received appropriate medical care during their telemedicine visit. However, they still highlighted that they would like the option for in-person visits with their provider in the future. Additionally, patients were unable to pinpoint precisely what they felt was missing from their visit. One patient explicitly commented that while certain parts of the physical exam could be done virtually, the physical exam has become part of the "routine" when you go to the doctor (Patient 3).

Emotional connection

In general, providers and patients were pleased with the focused nature of telemedicine visits. To some degree, telemedicine interactions allowed providers to feel more engaged with patients during their meeting without the distraction of updating the electronic medical record. Many providers also highlighted that telemedicine visits were more reminiscent of a "home visit" in that they were able to get a "glimpse of the patient's home environment" (Provider 1). This insight can be critical for getting an accurate view of the patient's social well-being as well as a real-time view of their medical cabinet during a medicine reconciliation. However, providers also found that technological barriers significantly hindered the ability to connect with a patient. One provider highlighted the inability to interpret verbal cues, particularly when the connection was interrupted. On the other hand, during the COVID-19 pandemic, wearing a mask provides a different kind of physical barrier to interpreting non-verbal cues. Providers appreciated the ability to see a patient's face without a mask in a telemedicine visit as opposed to an in-person visit requiring masks. Importantly, even the providers who identified these barriers to connection were optimistic about future applications for telemedicine in their own offices. Many providers also predicted fewer technical barriers in the future with improved support and more regular integration which would enhance emotional connection.

Most patients felt adequate emotional connection with their provider during their telemedicine visit. Notably, one patient who was not comfortable with receiving serious news over telemedicine commented, "It is not just about eye contact, it's body language and subtle things that make human communication much warmer. This is hard to capture over telehealth" (Patient 12).

Feasibility

The providers and patients offered invaluable insights into the benefits and drawbacks to telemedicine implementation. A few participants raised important concerns about the feasibility of implementation. One concern raised by providers and patients was accessibility. Subjects reported several barriers to telemedicine delivery, including hardware capacity, broadband access, and technology proficiency. The providers and patients pointed to limitations in access to computers or smartphones among the lower socioeconomic

population as well as limited access to broadband internet in the more remote corners of the rural state. In Maine, an estimated 91.9% of the population has access to broadband 100mbps or faster. However, populations without this access tend to also be the most geographically isolated.¹¹ According to the 2019 Pew Research Center reports, an additional 17% of the adults nationally who do not have broadband access at home have access to a smartphone.¹² As telemedicine becomes more widely integrated into the health care delivery system, this marginalized portion of our population must not be left behind.

Future directions

Regardless of overall experience, every patient and provider interviewed offered thoughts and insights on future applications for telemedicine. For example, both patients and providers suggested that telemedicine might offer a useful platform for group

visits. One provider outlined a plan for implementing a diabetes management group, in which the provider would offer medical and lifestyle insights to a group of patients with similar disease experiences. This group would offer a convenient platform to engage with patients with shared experiences. Additionally, many providers were intrigued by the concept of joint provider-team meetings that would facilitate integrated treatment plans. These meetings, which could occur before and during patient appointments, would allow the team to better and more efficiently address an individual patient's goals of care. Finally, many patients suggested that most "follow-up" appointments could be well-managed or even improved by telemedicine technology. One patient reported a positive experience reviewing a recent x-ray with the provider over screen-sharing. The patient appreciated that the provider could explain the image findings while also saving him the time and effort of traveling to the office.

Table 1. Patient and Provider Demographics

	Patients (n = 14)	Providers (n = 10)
Age, mean (range), y	65.6 (26-78)	44.5 (31-58)
Female, No. (%)	8 (57)	5 (50)
Male, No. (%)	6 (43)	5 (50)
Race, No. (%)		
White	14 (100)	NA
Insurance, No. (%)		
Medicaid/Medicare	10 (71)	NA
Private	4 (29)	NA
Highest education, No. (%)		
Bachelor's degree or higher	13 (93)	NA
Some college or associate's degree	1 (7)	NA
Employment status, No. (%)		
Retired	8 (57)	NA
Part-time	1 (7)	NA
Full-time	5 (36)	NA

Abbreviation: NA, not applicable.

Table 2. Patient Survey Results

	No. (%)
Prior telehealth visit	
Yes	1 (7)
Location during visit	
Home	14 (100)
Device used for visit	
Phone	5 (36)
Tablet	3 (21)
Computer	6 (43)
Comfort with telehealth	
Not comfortable	1 (7)
"I managed"	4 (29)
Very comfortable	9 (64)
Required assistance with setting up call	1 (7)
Telemedicine was more convenient than an in-person visit	13 (93)
Open to discussion of serious news over telehealth	11 (79)
If telemedicine appointments were more regularly available, it would...	
Decrease the number of times I visit my doctor's office.	11 (79)
Decrease the number of times I need to visit an urgent care facility or emergency room.	8 (57)
Increase my ability to follow-up for my chronic conditions.	11 (79)

Table 3. Provider Survey Results

	No. (%)
Comfort with Telehealth	
Not comfortable	None
"I managed"	1 (10)
Very comfortable	9 (90)
Platform used	
Zoom	7 (70)
Doxy.me	2 (20)
EMR integrated	1 (10)
If telemedicine appointments were more regularly available, it would...	
Decrease the number of times a patient comes into the office.	7 (70)
Decrease the number of times a patient needs to visit an urgent care facility or emergency room.	6 (60)
Increase a patient's ability to follow-up for chronic conditions.	10 (100)

Table 4. Themes

Theme	Description	Quotes
Convenience	Telemedicine appointments eased the logistical burdens of in-office visits, including reduced wait time, no transportation needs, and simplicity of scheduling.	<p>"I was able to step away from my work briefly for my telemedicine visit without having to drive anywhere or wait in the doctor's office (Patient 5).</p> <p>"It [telemedicine] reduces the logistical lift for patients and improves patient access to care" (Provider 1).</p>
Perceived efficacy	The physical exam, which can be limited in telemedicine, plays a key role in certain medical appointments. However, telemedicine offers a useful alternative for follow-up and consultation appointments that do not require a physical exam.	<p>"Physical exam--nothing replaces that. I miss being able to get hands on the patient" (Provider 2).</p> <p>"It [telemedicine visit] feels like a 'home visit' and I get to see a glimpse of their home environment...patients will walk their smartphone with me over to their medicine cabinet to show me what is in the cabinet or their fridge" (Provider 1).</p>
Alterations in the ritual of medicine	Telemedicine breaks away from the traditional routine of an in-office visit including rooming by a medical assistant and the clinical environment.	<p>"Since A1c testing for diabetes is done in person, I might as well just be there. I prefer the physical exam and vitals to be done in person. It isn't that I'd rather have this done in person, it's rather that these things are part of the routine when I go into the office for something. I just don't know how reliable the home tech is" (Patient 3).</p> <p>"...there are always things that need to be done at home, and I feel less present than when I am in person" (Patient 3).</p>
Emotional connection	The ability of a patient and provider to feel emotionally connected depends more on a preexisting relationship than on the mode of communication.	<p>"During my telemedicine visit, I felt very connected to him [physician], but it was because I already knew him. I feel just as connected to him as in person" (Patient 11).</p> <p>"There is no pressure to do anything else except to talk to the patient about what is going on. There is so much to do with the in-person exams from box clicking...you sort of forget about the human connection because you are so focused on all the other things. In many ways just sitting and talking to somebody is really refreshing" (Provider 2).</p>

DISCUSSION

In Maine, as in other rural areas, geography and climate can pose significant barriers to health care access. Telemedicine offers a unique solution to the geographical and climate-based barriers to health care. In this study, providers and patients emphasized the value of telemedicine options for many of their more routine medical visits. While patients expressed concern regarding the validity of the physical exam part of their visit, providers were optimistic about future technological advances that could fill in the gaps. With further practice, patients, providers, and other medical professionals may be able to triage the types of visits that require in-person interaction versus those that can be carried out using telemedicine platforms.

Furthermore, due to the more conversation-based interactions and focused nature of a telemedicine visit, virtual appointments appear to emphasize the patient's emotional presentation and mental health history, which are critical to many primary care visits. This rapport is not only essential in addressing various mental health needs, but also in establishing trust between patients and providers. Existing relationships between providers and patients allowed patients to feel supported and connected during their visits and willing to receive serious news remotely. Patient comfort and connection with their provider seemed to hinge more on the nature of their relationship than the medium through which they were communicating. Establishing patient and provider rapport through these virtual platforms will be critical to the future success of telemedicine implementation.

Notably, many patients reported feeling unfulfilled by telemedicine visits as compared to office visits. Previous studies have assessed the significance of conventions in primary care visits—the introductions, the collection of vitals, and the interactions with the physical space—in a patient's experience of a visit.^{13,14} With the emerging telemedicine visits, which occupy a virtual rather than physical space, there is risk of losing the occupational rituals and their intrinsic impact on patient experience. As we continue to assess the role that telemedicine will play in our health care system, we will need to recreate the familiarity and formality of these office visit rituals through a telecommunications platform.

Study limitations

While this study offers important insights into the potential future applications for telemedicine in rural areas, it also has several limitations. The sample of patients and providers represents a homogenous population based on age, race, and insurance coverage. However, these features are also characteristic of the population in Maine. As a state, the average age in Maine is much higher than the national average, and Maine's population is 94.4% white.¹⁵ Similarly, while this study represents an older population of patients, these patients, in the United States, are least likely to use the internet.¹² For this reason, this population should be most critically surveyed for their perspectives on the implementation of telemedicine. Furthermore, the patient demographics included in this study accurately represent the demographics of the practice from which the patients were selected: 65% are older than 51 years, 99% are white, and 35% are insured by Medicare or Medicaid. Additionally, our sampling method could have introduced volunteer bias as patients who were willing to participate more likely had successful video call experiences. For example, while the providers reported occasional technological delays or issues with connection, only one of the selected patients reported an issue with technology.

CONCLUSIONS

The COVID-19 pandemic catalyzed the implementation of telemedicine in the primary care setting. This study served as a pilot in presenting the perspectives of patients and providers who have engaged in telemedicine during the pandemic and their thoughts for further implementation of telemedicine in the future. Providers and patients raised concerns about the lack of physical examination available through telecommunication platforms. However, both patients and providers praised telemedicine for the convenience of access and the ability to create emotional connections in appointments in which the physical exam is perhaps less critical. While the rapid implementation of telemedicine in this rural state impeded the ability of practices to streamline the administrative and technological aspects of this remote care, providers have reported improved quality of visits with increased experience. Future studies should address the more logistical aspects of telemedicine implementation, including technological software, hardware, and integration into electronic medical

records. Finally, telemedicine will likely continue to have a place in the delivery of health care, and this study provides useful information to assist in better understanding the benefits and challenges of telemedicine for patients and providers. This understanding will be critical in assuring that telemedicine implementation continues to break down obstacles to health care access and avoid creating new barriers.

Conflicts of Interest: None

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