Patient Satisfaction and Trust in Telemedicine during the COVID-19 Pandemic

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Table of Contents

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Abstract

Background: Los Angeles County is a hub for COVID-19 cases in the United States. Academic health centers rapidly deployed and leveraged telemedicine to permit uninterrupted care of patients. Telemedicine enjoys high patient satisfaction yet little is known about the level of satisfaction during a crisis and to what extent patient or visit-related factors and trust play when in-person visits are eliminated.

Objective: To examine correlates of patients' satisfaction with a telemedicine visit.

Methods: In this retrospective observational study conducted in our single-institution, urban, academic medical center in Los Angeles, we surveyed internal medicine patients who had completed a telemedicine visit between March 10th and April 17th, 2020 (n=1624). Measures included degree of interpersonal trust in patient-physician relationships using the "Trust in Physician Scale", visit-related concerns, and post-visit recovery. Statistical analysis used descriptive statistics, Spearman rank-order correlation, and linear and ordinal logistic regression.

Results: Of 1,624 telemedicine visits conducted during this period, 368 (22.7%) patients participated in the survey. Across the study, respondents were very satisfied (47.4%) or satisfied (35.3%) with their telemedicine visit. Higher physician trust was associated with higher patient satisfaction (Spearman correlation r=0.51, P<.01). Visit-related factors with significant correlation with trust in physician score were report of telemedicine technical issues (r=-0.16), concerns about privacy (r=-0.19), concerns about cost (r=-0.23), satisfaction with telemedicine convenience (r=0.41), and amount of time spent (r=0.47) (all P<0.01). Visit-related factors associated with patients' satisfaction included fewer technical issues (P<0.01), less concern about privacy (P<0.01) or cost (P=0.02), and successful face to face video (P<0.01). The only patient variable with a significant positive association was income and level of trust in physician (r=0.18, P<.01). Younger age was associated with higher telemedicine satisfaction (P<0.01). Despite high satisfaction and degree of trust, most respondents required in-person evaluation after the telemedicine visit, and only 12 respondents (3.9%) recovered at home without additional telemedicine visits or in-person evaluation at urgent care or emergency room.

Conclusions: Patients' satisfaction with telemedicine during the COVID-19 pandemic is high. Their satisfaction is shaped by the degree of trust in physician and visit-related factors more so than patient factors. This has implications for outpatient practices and the widespread adoption of telemedicine and further research into visit-related factors and the patient-provider connection over telemedicine is needed. Clinical Trial: IRB Approval 7/6/2020 Proposal #HS-20-00479

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Abstract

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Conclusions: Patients' satisfaction with telemedicine during the COVID-19 pandemic is high. Their satisfaction is shaped by the degree of trust in physician and visit-related factors more so than patient factors. This has implications for outpatient practices and the widespread adoption of telemedicine and further research into visit-related factors and the patient-provider connection over telemedicine is needed.

Keywords:
Telemedicine; patient satisfaction; COVID-19; health services research; health policy; health care delivery; physicians; medicine.

Introduction

On June 25, 2020, Los Angeles became the county with the highest number of COVID-19 cases in the United States [1]. By October 27, 2020, there were 302,077 confirmed cases and 7027 deaths due to the novel coronavirus in Los Angeles County [2]. At our Institution, which includes Keck Medical Center and Verdugo Hills Hospital, we have seen a total of 69 deaths and 379 hospital discharges as of November 9, 2020.

To prioritize public health, our academic health center rapidly deployed and leveraged telemedicine in response to the COVID-19 pandemic, permitting uninterrupted care of our patients [3]. We transitioned clinic encounters to telemedicine which is defined here as synchronous video or telephone visits [4]. The Centers for Medicare and Medicaid Services (CMS) allowed Medicare enrollees the same telemedicine benefits that had been extended to Medicare Advantage enrollees in January 2020 and established equivalent reimbursement for video telemedicine visits and traditional in-person visits [5]. In response to these shifts, along with the suspension of most in-person clinical encounters, there was an unprecedented increase in telemedicine utilization [6,7].

The pandemic of COVID-19 provides a unique opportunity to assess provider and patient experiences with telemedicine. Historically, telemedicine visits enjoy high patient satisfaction [8] yet this has never been tested during a pandemic when patients have little other choices but to seek remote care.
Most agree that telemedicine plays a vital role in providing continuity of care while keeping patients and providers safe [9]. A recent study from New York-Presbyterian/Weill Cornell Medical Center found that patient satisfaction with a telemedicine visit during the COVID-19 pandemic compared favorably to pre-pandemic in-person visits [10]. The correlations of patient- and visit-related factors, and trust in the provider with overall satisfaction with telemedicine visits have not been studied during the pandemic.

We captured 6 weeks of telemedicine clinic visits with our internal medicine providers from the beginning of the COVID-19 pandemic and sought to determine factors associated with patient satisfaction and what role trust in physician played during this time frame. Prior studies have typically examined trust from the perspective of the physician---how much physicians trust the telehealth platform [11]. We built upon prior studies and surveyed respondents in our practice with telemedicine visits during a health crisis, a time when this was the only option for a visit. We examined whether patient factors, visit associated factors, and the degree of “trust in provider” contributed to a satisfying telemedicine visit. We hypothesized that patient satisfaction with a telemedicine visit would be positively related to ease of utilization of the telemedicine platform, and the degree of trust in the provider.
First, we examined the extent to which “trust in a physician” correlated with a satisfying telemedicine visit for patients during the COVID-19 pandemic. The relationship of trust in a physician to successful telemedicine visits has received little attention [12,13].

Second, we evaluated to what degree patient-related factors correlate with “trust in physician” and satisfaction with the visit. Previous studies have found that patient-related factors have little correlation with satisfying telehealth visits [14].

Third, we evaluated whether visit-related factors such as face-to-face video, technical issues, privacy, or cost concerns were correlated with the degree of “trust in physician.” We also queried whether patients were successful at recovering at home, staying away from urgent care, and emergency rooms, because of their telemedicine visit.

Methods

Keck Medical Center is a large academic medical center located in Los Angeles. Inpatient services are provided at our institution at Keck Medical Center and USC Verdugo Hills Hospital, while outpatient services are provided predominantly at Keck Medical Center Outpatient facilities; both institutions share the same providers. As of October 28, 2020, both facilities had admitted a total of 433 COVID-19 patients.

Data Source

Upon providing informed consent, the respondent was invited to complete a questionnaire provided by electronic survey. To explore the degree to which “Trust in Physician” correlates with satisfaction with telemedicine we used a previously validated measure to assess interpersonal trust in patient-physician relationships with an eleven question ”Trust in Physician Scale” [15]. Responses, made on Likert-type scales, were averaged (potential range: 1–5); higher scores indicated higher levels of trust (scale range 5-55).

Telemedicine visit-related issues and concerns including cost, privacy, convenience, technical issues, and time were assessed using a five-item Likert scale. Responses were averaged (potential range: 1–5); and higher scores indicated higher levels of agreement/satisfaction.

Satisfaction with the telemedicine visit was measured by questions: “I look forward to using telehealth in the future” (yes/no) and a five-item Likert scale “To what extent were you satisfied with your visit.”

Post-visit recovery at home after a telemedicine visit was assessed with the question “Did you recover from your illness?” and the respondent could answer: yes, yes but I required more than one telehealth visit, no I was seen in an urgent care or emergency room, or no I was sent to Keck Medical Evaluation Tent or Evaluation Treatment Center (ETC).

Respondents were also asked several questions about their demographics and health status.

Study Population

We performed a retrospective study of patients aged 18 years and older who had one or more telemedicine visits with a provider in the internal medicine department between March 10th and April 17th, 2020. This timing corresponds with a Keck Medical Center mandate to shift the majority of outpatient care from in-person to telemedicine visits. A total of 1744 patients had an encounter with our internal medicine providers during that time and a link to a survey was successfully emailed to 1624 patients (93%). Data were collected in the fall of 2020. To be eligible to participate, the respondent had to have a telemedicine visit with one of our primary care providers. With a final sample size of 368 responders (22.7%); the attained sample size provided 80% statistical power to detect correlations of 0.14 and higher. The study database in REDCap used the survey feature; all surveys were completed anonymously, and no personal health information or personally identifiable information on survey respondents was collected, in compliance with HIPAA. Non-responders were similar in gender to responders (60.3% female vs 64.4% female) but responders were older than non-responders by an average of 4.5 years (P<0.0001).

Statistical Analysis

Descriptive statistics were used to summarize visit-related concerns, patient characteristics, and satisfaction with the telemedicine visit. Variables were summarized as frequency and percentages for categorical variables and median and inter-quartile ranges (IQR) for continuous variables.

The association of the Likert-scale satisfaction item with trust in physician was evaluated with a Spearman rank-order correlation. The median (IQR) Trust in Physician score is presented by level of patient satisfaction.

Patient and visit-related factors found in the analysis to be associated with the Trust in Physician score were included as independent variables to obtain an estimate and test of the adjusted association of trust with satisfaction with the telemedicine encounter.

Results

Preliminary Analysis

A link to a survey was emailed to 1624 patients with 368 respondents. The characteristics of the sample (N = 368) are described in Table 1. The sample was primarily female and white with a mean age of 55.8 years (SD 16.0 years). Respondents generally evaluated their current health as fair to good.

Table 1: Patient characteristics

	N (Responding)	N (%)	Median (IQR)
Age (years)	365		57 (43, 68)
Hispanic	366	96 (26.2)	
Race	348		
White		262 (70.0)	
Black or African American		25 (7.2)	
American Indian or Alaskan Native		7 (2.0)	
East Asian		28 (8.1)	
Southeast Asian		14 (4.0)	
Asian Indian		3 (0.9)	
Native Hawaiian or Pacific Islander		3 (0.9)	
Some other race		32 (9.2)	
Female	364	239 (66.0)	
Education	364		
Less than high school		10 (2.8)	
High school degree or equivalent		14 (3.9)	
Some college but not degree		67 (18.4)	
Bachelor's degree		109 (30.0)	
Graduate degree		164 (45.1)	
Current Health	365		
Excellent		46 (12.6)	
Good		196 (53.7)	
Fair		98 (26.9)	
Poor		25 (6.9)	
Income	364		
$0-$19,999		29 (8.0)	
$20,000-$39,999		17 (4.7)	
$40,000-$59,999		22 (6.0)	
$60,000-$79,999		37 (10.1)	
$80,000-$99,999		24 (6.6)	
$100,000-$119,999		21 (5.6)	
$120,000-$139,999		21 (5.6)	
$140,000-$159,999		21 (5.6)	
$160,000-$179,999		11 (3.0)	
$180,000-$199,999		13 (3.6)	
$200,000 or more		78 (21.4)	
Prefer not to answer		70 (19.2)	

Across the study, respondents were very satisfied (47.4%) or satisfied (35.3%) with their telemedicine visit, and 77% reported that they "look forward to using telehealth in the future". Table 2 describes the visit characteristics of the sample. Respondents tended not to worry about privacy or the cost of the telemedicine visit. Face to face video rather than telephone alone was preferred by the majority of respondents with 67.7% strongly agreeing/agreeing it was important. Almost one-third of patients (31.3% n= 114) had technical issues during the visit, yet 63 of them resolved during the telemedicine visit. The most common problem, occurring in 34.6% (n=38) respondents, was "video not working." Notably, despite technical challenges, the convenience of telehealth was supported by 55.7% of patients' who strongly agreed and 32.8% who agreed the telehealth visit was convenient. There was high satisfaction among our respondents with the amount of time spent and 90.1% (n=327) strongly agreed or agreed that the amount of time spent with the provider was adequate. Patients' did not appear to have privacy concerns with 28.8% strongly disagreeing and

40% disagreeing that they were “concerned about privacy.” Almost half, 45.6%, received a new prescription as a result of the visit.

Table 2: Visit characteristics

	N (Responding)	N (%)	Median (IQR)
Used video with your telehealth visit	367	284 (77.4)	
Did you experience significant technical issues before or during your visit?	365		
Yes		51 (14.0)	
Yes, but it was resolved during telehealth visit		63 (17.3)	
No		251 (69.0)	
What sort of technical issues did you have?	110		
Sound was not working		13 (11.8)	
Video was not working		38 (34.5)	
I was able to connect, but via different telehealth sources		32 (39.1)	
Other issues		27 (24.6)	
The telehealth visit was convenient	366		5 (4, 5)
Strongly disagree		7 (1.9)	
Disagree		11 (3.0)	
Neither agree nor disagree		24 (6.6)	
Agree		120 (32.8)	
Strongly agree		204 (55.7)	
The amount of time spent was adequate	363		5 (4, 5)
Strongly disagree		5 (1.4)	
Disagree		9 (2.5)	
Neither agree nor disagree		22 (6.1)	
Agree		134 (36.9)	
Strongly agree		193 (53.2)	
I was concerned about privacy	365		2 (1, 3)
Strongly disagree		105 (28.8)	
Disagree		146 (40.0)	
Neither agree nor disagree		63 (17.3)	
Agree		28 (7.7)	
Strongly agree		23 (6.3)	
Having face to face video was important	359		4 (3, 5)
Strongly disagree		7 (2.0)	
Disagree		22 (6.1)	
Neither agree nor disagree		87 (24.2)	
Agree		108 (30.1)	
Strongly agree		135 (37.6)	
I was worried how much my telehealth visit would cost	363		2 (2, 3)
Strongly disagree		83 (22.9)	
Disagree		114 (31.4)	
Neither agree nor disagree		112 (30.9)	
Agree		36 (9.9)	
Strongly agree		18 (4.5)	
Received new prescription (yes)	366	167 (45.6)	

I look forward to using telehealth in the future	361	279 (77.3)
To what extent were you satisfied with your visit	365	
Very unsatisfied		10 (2.7)
Unsatisfied		14 (3.8)
Neutral		39 (10.7)
Satisfied		129 (35.3)
Very satisfied		173 (47.4)
Did you recover from your illness?	312	
Yes		12 (3.9)
Yes, but I required more than one telehealth visit		12 (3.9)
No, I was seen in an urgent care clinic/ER		70 (22.4)
No, I was sent to Keck Medical evaluation tent or ETC		218 (69.9)

A summary of results from respondents to the 11 point “trust in physician” scale appears in Table 3. Respondents overwhelmingly agreed they “trust my doctor’s judgments about my medical care” and that their doctor “is a real expert in taking care of medical problems.” Likewise, respondents strongly disagreed with the statements “I sometimes worry that my doctor may not keep the information we discuss totally private” and “I feel my doctor doesn’t do everything he/she should for my medical care.”

Table 3: Trust in Physician

	N (Responding)	N (%)	Median (IQR)
I doubt my doctor really cares about me as a person	366		1 (1, 2)
Strongly disagree		202 (55.2)	
Disagree		104 (28.4)	
Neither agree nor disagree		40 (10.9)	
Agree		8 (2.2)	
Strongly agree		12 (3.3)	
My doctor is usually considerate of my needs and puts them first	365		5 (4, 5)
Strongly disagree		7 (1.9)	
Disagree		4 (1.1)	
Neither agree nor disagree		32 (8.8)	
Agree		131 (35.9)	
Strongly agree		191 (52.3)	
I trust my doctor so much I always try to follow his/her advice	365		4 (4, 5)
Strongly disagree		6 (1.6)	
Disagree		2 (0.5)	
Neither agree nor disagree		33 (9.0)	
Agree		152 (41.6)	
Strongly agree		172 (47.1)	
If my doctor tells me something is so, then it must be true	363		4 (3, 4)
Strongly disagree		8 (2.2)	
Disagree		23 (6.3)	
Neither agree nor disagree		117 (32.2)	
Agree		153 (42.2)	
Strongly agree		62 (17.1)	
I sometime distrust my doctor's opinion and would like a second one	362		2 (2, 3)
Strongly disagree		82 (22.7)	
Disagree		152 (42.0)	
Neither agree nor disagree		85 (23.5)	
Agree		35 (9.7)	
Strongly agree		8 (2.2)	
I trust my doctor's judgements about my medical care	362		4 (4, 5)
Strongly disagree		5 (1.4)	
Disagree		3 (0.8)	
Neither agree nor disagree		25 (6.9)	
Agree		167 (46.1)	
Strongly agree		162 (44.8)	
I feel my doctor doesn't do everything he/she should for my medical care	363		2 (1, 2)
Strongly disagree		148 (40.7)	
Disagree		137 (37.7)	

Neither agree nor disagree		44 (12.1)	
Agree		24 (6.6)	
Strongly agree		10 (2.8)	
I trust my doctor to put my medical needs above all other considerations when treating my medical conditions	362		4 (4, 50
Strongly disagree		4 (1.1)	
Disagree		8 (2.2)	
Neither agree nor disagree		47 (13.0)	
Agree		151 (41.7)	
Strongly agree		152 (42.0)	
My doctor is a real expert in taking care of medical problems	363		4 (4, 5)
Strongly disagree		3 (0.8)	
Disagree		4 (1.1)	
Neither agree nor disagree		51 (14.0)	
Agree		154 (42.2)	
Strongly agree		151 (41.6)	
I trust my doctor to let me know if a mistake was made about my treatment	362		4 (4, 5)
Strongly disagree		4 (1.1)	
Disagree		8 (2.2)	
Neither agree nor disagree		54 (14.9)	
Agree		158 (43.7)	
Strongly agree		138 (38.1)	
I sometimes worry that my doctor may not keep the information we discuss totally private	365		1 (1, 2)
Strongly disagree		199 (54.5)	
Disagree		115 (31.5)	
Neither agree nor disagree		47 (12.9)	
Agree		3 (0.8)	
Strongly agree		1 (0.3)	
Physician Trust total score [a]	345		46 (42, 51)

[a] *Physician trust generated by the sum of 11 items from the physician trust survey. Total scale possible = 55; mean (SD) = 45 (6.5)*

Trust in physician and satisfaction with telemedicine visit

Higher physician trust was associated with higher patient satisfaction with the telemedicine visit. Results of the Spearman correlation indicated that there was a significant positive association between the degree of patients' trust in physician ("trust their doctor's judgment", "try to follow their doctor's advice", and "believe their doctor was considerate of their needs and put them first") and satisfaction with their telemedicine visit (r=0.51, *P*<.0001).

Patient factors and trust in physician

Overall, patient variables (including age, level of education, and current health status) were not significantly correlated with level of trust in their physician. There was, however, a significant positive association between income and level of trust in physician (r=0.18, *P*<.01).

Patient factors and satisfaction with telemedicine visit

Generally, patient factors were not associated with patient satisfaction with their telemedicine visit. Age was the only significant factor associated with satisfaction, with a younger median (interquartile range, IQR) age of 54 (42, 64) in those who were very satisfied compared to median (IQR) age 60 (50, 69) in those who were unsatisfied or neutral (likelihood ratio *P*<0.01 with ordinal logistic regression).

Visit-related factors and trust in physician

In contrast to patient factors, several visit-related factors showed a significant correlation with Trust in Physician score (Table 4). Respondents who did not have technical issues (r=-0.16, *P*<0.01), concerns about privacy (r=-0.19, *P*<0.01), or concerns about the cost (r=-0.23, *P*<0.01) had a higher degree of trust in their physician. Those who agreed with face to face was important (r=0.23, *P*<0.01), like the convenience (r=0.41, *P*<0.01) and were satisfied with the amount of time spent (r=0.47, *P*<0.01) also showed a higher degree of trust in their physician.

Table 4: Correlations of visit-related factors with the Trust in Physician score

	N (Responding, %)	Median (IQR) Physician Trust	Correlation Coefficient [a]	P-value
Did you experience significant technical issues before or during your visit?	345		-0.16	0.002
Yes	49 (14.0)	47 (43, 52)		
Yes, but it was resolved during telehealth visit	58 (17.0)	46 (41, 51)		
No	238 (69.0)	43 (38, 47)		
The telehealth visit was convenient	344		0.41	<0.0001
Strongly disagree	7 (2.0)	34 (29, 42)		
Disagree	9 (2.3)	41 (37, 43)		
Neither agree nor disagree	20 (5.8)	42 (36, 45)		
Agree	112 (32.5)	44 (41, 47)		
Strongly agree	196 (57.0)	49 (44, 53)		
The amount of time spent was adequate	344		0.47	<0.0001
Strongly disagree	5 (1.5)	29 (29, 33)		
Disagree	7 (2.0)	40 (37, 41)		
Neither agree nor disagree	20 (5.8)	42 (37, 49)		
Agree	128 (37.2)	44 (41, 47)		
Strongly agree	184 (53.5)	49 (45, 53)		
I was concerned about privacy	343		-0.19	0.0003
Strongly disagree	98 (28.6)	49 (44, 53)		
Disagree	137 (40.0)	45 (42, 50)		
Neither agree nor disagree	60 (17.5)	45 (40, 50)		
Agree	26 (7.6)	45 (41, 52)		
Strongly agree	22 (6.4)	45 (39, 51)		
Having face to face video was important	338		0.23	<0.0001
Strongly disagree	6 (1.7)	43 (34, 53)		
Disagree	20 (6.0)	43 (40, 48)		
Neither agree nor disagree	80 (24.0)	45 (40, 50)		
Agree	104 (30.8)	45 (42, 51)		
Strongly agree	128 (38.0)	48 (44, 53)		
I was worried about how much telehealth would cost	343		-0.23	<0.0001
Strongly disagree	80 (23.3)	49 (44, 53)		
Disagree	108 (31.5)	46 (42, 52)		
Neither agree nor disagree	105 (30.6)	45 (41, 510		
Agree	33 (9.6)	43 (40, 48)		
Strongly agree	17 (5.0)	43 (39, 47)		

[a]P-value obtained by Spearman rank order correlation for ordinal variable. Median of physician trust score

reported by levels of each categorical variable.

Visit-related factors and patient satisfaction with telemedicine visit
All our visit-related factors were associated with patient satisfaction with their telemedicine visit Fewer technical issues (P<0.01), acknowledging the convenience (P<0.01), appreciating the amount of time spent (P<0.01), fewer concerns about privacy (P<0.01) and cost (P=0.02), and successful face to face video (P<0.01) were all significantly associated with a satisfying telemedicine visit.

Recovery
Most respondents required another evaluation after the telemedicine visit, either by a second telemedicine visit or an in-person evaluation. Of the 312 patients who answered, “did you recover from your illness” 69.9 % (n=218) were sent to our medical evaluation tent or evaluation treatment center for further evaluation. Only 12 patients (3.9%) recovered at home without additional telemedicine visits or in-person evaluation and 22.4% were sent to outside urgent care or emergency room.

Discussion

The pandemic of COVID-19 poses unique challenges to health care delivery especially for those in primary care. Patient fear surrounding COVID-19 has disrupted the normative expectations that patients have toward their doctors (and vice versa), creating more complex trust relationships. Prior studies have found when it comes to specialist referral for telemedicine that trust and confidence in one’s primary care provider are crucial ingredients for creating a satisfying experience [16].

Additionally, the pandemic provides a unique opportunity to study telemedicine visits and factors affecting satisfaction. Before this historic period, studying telemedicine satisfaction would have posed a self-selection bias which the pandemic mostly eliminated due to institutional and patient health precautions early on.

Patient trust in their physician and a telemedicine service and their willingness to rely on such a health service for care during a pandemic has not previously been described. Researchers have given little attention to which factors contribute to trust in a telemedicine visit [12] a unique situation made more difficult during the pandemic. A previously reported study on the use of telehealth visits for anticoagulation management found trust in the technology, trust in healthcare professionals, and trust in the treatment affect trust in the telemedicine service [17]. Recent suggestions have been proposed for fostering human connection during telemedicine visits such as being “present”, listen, and respond with empathy [18]. Empirical evidence in this area is sparse and achieving greater clarity about factors contributing to a satisfying and successful telemedicine visit would help practitioners better anticipate patients’ informational and emotional needs.

This study provides insights into patients’ reasons for a satisfying telemedicine visit. Using our patients’ experience during the COVID-19 pandemic, we found that trust in physician, as assessed using the eleven question “Trust in Physician” scale, was correlated with higher patient satisfaction in telemedicine visits. Patients who trust their doctor and try to follow his/her advice, trust their doctor’s judgment about medical care, believe their doctor will let them know if a mistake was made about their treatment, as examples, were more likely to be satisfied with a telemedicine visit and wanted to use the platform again. This suggests an important role in provider engagement, fostering human connection, and strengthening the patient-physician attachment. Higher physician trust was positively correlated with greater patient satisfaction with telemedicine.

Furthermore, trust in factors related to the visit including privacy, cost, convenience, and amount of time was associated with both higher satisfaction and higher trust in physician. Our findings suggest the use of video-enabled platforms, ease of use, and perhaps information technology support to ensure a smooth telemedicine visit result not only in higher patient satisfaction but in higher trust in physician.

While the study group was largely white, high-income, and well-educated, our study did not find evidence that patient-related factors play a significant role in trust in physician or the likelihood of a satisfying telemedicine visit. Only patient income was positively associated with the level of trust; this association has been previously reported for in-person care, where lower physician trust is seen with lower income [19]. In our study, higher-income correlated with a higher level of trust in physician and was associated with patient satisfaction with telemedicine. In contrast to prior studies showing younger patients, perhaps due to higher eHealth literacy, have higher acceptance of the telemedicine platform [20] we did not find that to be the case. Additionally, Ramaswamy et al. found that compared to in-person visits, patient-related factors contributing to lower satisfaction of telemedicine visits during COVID-19 were younger age, female gender, and new visit type.

Our study indicated that despite high satisfaction and level of trust in provider, the majority of patients sought in-person care after their telemedicine visit. While trusting patients are more likely to be satisfied and adhere to recommendations [21], the profound uncertainties created by the pandemic of COVID-19 suggested that increased vulnerability outweighed the strength and resilience of trust in the provider and contributed to the lack of assurance that telemedicine can outperform or replace the value of in-person visits. Before the COVID-19 pandemic, studies have shown telemedicine to improve access to medical care and reduce travel and costs for patients while maintaining the quality of care in chronic conditions such as diabetes [22]. Potential benefits for decreasing hospitalization have been reported with anticoagulation management [23]. A 2015 Cochrane review found the use of telemedicine in the management of heart failure appears to lead to similar health outcomes as face-to-face or telephone care and can improve the control of blood glucose in those with diabetes [24]. A 2018 review, however, of telemental health, telerehabilitation, and teleconsultation support our findings that it is unclear whether the use of telehealth services reduces the use of other services, duplicates services, or improves access to beneficial services [25]. Our study contributes to the lack of certainty that telemedicine can reduce the use of in-person services, especially during a pandemic despite a high level of patient satisfaction and trust.

This study has several limitations. First, this is a retrospective study with no comparison to in-person visit satisfaction during the same period, as our patients were not provided an in-person option. Second, the use of a web-based survey prevents us from recruiting patients without an email address (7%) potentially leading to bias toward respondents with higher digital literacy. Third, respondents were significantly older than our non-responders (55.8 years vs 51.3 years $p<0.0001$) though our findings did not support age as a factor correlated with satisfaction with telemedicine visits or trust in physician. Lastly, our study population was less ethnically and racially diverse than the overall United States population; we were unable to adequately capture the experiences of underrepresented minorities and underserved communities.

In conclusion, the present study suggests the majority of patients are satisfied with telemedicine visits during the COVID-19 pandemic and that trust in physician correlates favorably with patient satisfaction. Trust and satisfaction are shaped by many visit-related factors including convenience, time spent, and video-enabled encounters rather than specific patient factors. Our study supports the use of telemedicine as a new form of health care delivery even in times of uncertainty. Further studies examining patient-physician relationships over telemedicine visits may provide a better understanding of factors contributing to patients' trust in their physicians.

Conflicts of Interest

The authors have no conflict of interest disclosures related to this work.

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