2023

The Impact of Telemedicine on Patient-Provider Communication at a University Student Health Center

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THE IMPACT OF TELEMEDICINE ON PATIENT-PROVIDER COMMUNICATION AT A UNIVERSITY STUDENT HEALTH CENTER

by

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A thesis submitted in partial fulfillment of the requirements
for the Honors Interdisciplinary Thesis Program
in the College of Medicine
and in the Burnett Honors College
at the University of Central Florida
Orlando, Florida

Fall Term, 2023

Thesis Chair: Ann N. Miller Ph.D.

Abstract

Effective patient-provider communication (PPC) involves conveying sufficient information to a patient such that the treatment is agreed upon and implemented accurately. Furthermore, a patient must feel adequately involved in the treatment process. With the advent of the COVID-19 pandemic, many clinical visits were shifted online. Although telemedicine was successful in meeting pandemic-specific goals, such as lowering personal contact, it changes the communicative context. Both patients and providers get less input from body language (nonverbal communication) and rely more on verbal communication. Furthermore, the number of telemedicine visits conducted remains elevated over pre-pandemic levels. Much of what is known about effective PPC is derived from studies in in-person contexts, with little information available in virtual contexts. Given that even occasional lapses in optimal PPC can have severe effects on patient outcomes, it is essential to understand PPC in various settings to optimize patient outcomes in the long run. This study was a secondary data analysis of the UCF Student Health Services Patient Satisfaction Questionnaire. A total of 6645 survey results from January 2021 to November 2022 were analyzed to compare patient perceptions of PPC variables and overall satisfaction with the clinical visit. The results indicated that there was no statistically significant difference in overall satisfaction and PPC variables between telemedicine and in-person visits. However, the results revealed that different PPC variables contributed to overall satisfaction with telemedicine and in-person visits.

Keywords: patient-provider communication, telemedicine, telehealth, COVID-19, patient satisfaction, college

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Introduction

Communication is a crucial component of a patient-provider encounter. Patient-provider communication, or PPC, focuses on the information exchange and style of conveying the information to help patients improve their health. PPC contributes to building a patient-provider rapport and can impact patient outcomes such as treatment adherence and self-efficacy. Much of what is known about effective PPC is derived from studies in in-person contexts. However, with the rise of the COVID-19 pandemic, many visits which would traditionally have been conducted face-to-face were shifted to telemedicine. Relatively little information is available regarding patient-provider communication in telemedicine, especially comparing patient outcomes between face-to-face and telemedicine contexts. This study will analyze secondary data from patient satisfaction surveys to compare patient perceptions of PPC in telemedicine versus in-person visits at a university health center. Additionally, the study will compare overall patient satisfaction with telemedicine versus in-person visits.

Telemedicine

Background

According to the Institute of Medicine (1996), now known as the National Academy of Medicine, telemedicine is defined as the use of electronic communication and resources to improve and support clinical health care when a patient and provider are located at distant sites. Although today telemedicine refers to video conferencing or phone calls, its use began as early as the 1860s during the American Civil War. Medical teams would communicate with doctors about wounded soldiers during the war using a telegraph. In later years, many countries began experimenting with radios for medical consultations. The term "telemedicine" was coined in

1974 by Murphy and Bird, who showed through the use of television and audio-visual circuits in their 1000 patient encounters that medical examination at a distance is feasible (Jagarapu & Savani, 2021). Around the same time (1973-1977), the STARPAHC Program (Space Technology Applied to Rural Papago Advanced Health Care) experimented with connecting rural individuals to physicians at the Indian Health Service hospitals in Arizona (Baldwin, 2020).

Telemedicine versus Telehealth

It is important to note that although the terms "telemedicine" and "telehealth" are sometimes used interchangeably in the literature, telemedicine specifically refers to the use of technology for clinical services such as the diagnosis and treatment of patients and is a subset of telehealth. Telehealth refers to conveying health information to health professionals and patients online. Although telehealth encompasses clinical services, it has a much broader application. This study uses the term *telemedicine* in relation to patient-provider communication because it is a more precise term.

COVID-19 Pandemic

Although telemedicine consults were already utilized in various specialties ranging from primary care to remote trauma management (Nesbitt et al., 2005) prior to the advent of COVID-19, the usage was low compared to in-person visits (Koonin et al., 2020). This situation changed in early 2020 when the World Health Organization declared the COVID-19 outbreak a pandemic. As a result, the CDC advised healthcare facilities across the country to offer virtual clinical services (Koonin et al.). Thousands of facilities were forced to restrict in-patient visits to emergencies, and many healthcare resources were allocated to COVID-19 affected patients.

Telemedicine was a sustainable option conducive to self-quarantine and monitoring patients with COVID-19 (Garfan et al., 2021; Ahern & Lenze, 2022).

A 2022 study analyzing data from a major healthcare plan in southeast Pennsylvania noted that during the pandemic period between March 11, 2020 and October 31, 2020, the average number of weekly telemedicine visits increased from 773 (pre-pandemic) to 45,652 and reached a peak of 76,186, while the number of in-person visits declined (Friedman et al., 2022). Although telemedicine utilization has decreased since the height of the pandemic, it still remains elevated over pre-pandemic levels. (Bestsennyy et al., 2022).

Described as an "intervention generated inequality," eHealth further exacerbated existing health literacy disparities and reinforced differences during the COVID-19 pandemic. The increasing use of telemedicine raises new concerns (i.e., increased distrust in healthcare services due to past experiences and distance) that require providers to modify their approach to communication (Price & Simpson, 2022). This is perhaps not surprising, given that individuals, including providers, with a more sophisticated understanding of technology tend to have increased gains from the use of telemedicine (Neter & Brainin, 2012).

Telemedicine and Patient Satisfaction

With the advent of advanced and convenient technologies, notably smartphones, tablets, and smartwatches, patients have been able to access healthcare readily at their fingertips (Jagarapu & Savani, 2021). However, distance and practitioner shortages still remain an issue. According to the Health Resources and Services Administration (n.d.), more than 35,000 practitioners are needed across primary care, dental care, and mental health services. Also, 20% of the United States population lives in rural locations (United States Census Bureau, 2023). Hence, telemedicine is particularly salient for connecting patients living in rural locations to

providers. These patients may travel great distances to access health care resources either due to the lack of proper resources or misconceptions that an urban facility would provide greater care than those in their communities. The introduction of telemedicine in some rural communities has been accompanied by an increase in the perception of the quality of health care, and satisfaction with the technology was rated highly by both rural providers and patients (Nesbitt et al., 2005).

Most studies found that patients generally expressed high levels of satisfaction with telemedicine visits. Telemedicine provides a promising solution to the lack of access to healthcare, distance, and misconceptions about available resources, but there are discrepancies in patient satisfaction and preference in comparison to in-person visits. A recent systematic review (Shah & Badawy, 2021) noted that telemedicine and in-person visits were comparable with an equal preference for either modality. Studies in agreement with this conclusion added that patients trusted the medical information they received during the telemedicine visits, and physicians were satisfied with the quality of the videoconferencing experience (Martin-Khan et al., 2015). Many studies analyzing primary care telemedicine visits found that a majority of patients are overall satisfied with their visits due to convenience (less time, cost, and resources), continuity of care without delay, quick scheduling, use of video over voice only, or if their health and symptoms improved. The provider's behavior, such as listening to the patient's concerns, thoroughly discussing the patient's medical history, allowing patients to ask questions, and providing sufficient information, also contributed to patient satisfaction. Patients who already had an established rapport with their provider had higher levels of satisfaction versus those who were meeting a provider for the first time (Pogorzelska et al., 2023). Providers feel that they are able to connect with the patient's family members and view the housing situation to gain more insight into their patient's lifestyle and support system, which is not possible in in-person visits.

This can guide providers when offering treatment options suitable for their patients' needs. In most telemedicine appointments, patients have their medications readily available to discuss with their providers, leading to better medication reconciliation and treatment adherence. Furthermore, providers feel more comfortable asking their patients to schedule virtual follow-up appointments, and the number of cancelations/no-shows is significantly lower due to its convenience (Gomez et al., 2021).

However, other studies have recorded that patient satisfaction was lower for online patient-provider communication compared to offline PPC, and concerns about effective communication restrict the widespread acceptance of telemedicine (Cao et al., 2022). In fact, many patients who embraced telemedicine during the COVID-19 pandemic out of necessity, when given a choice, preferred in-person visits over telemedicine (Predmore et al., 2021).

Furthermore, satisfaction may differ based on a patient's presenting symptoms. Take, for example, a patient who describes symptoms of a sore throat to his or her primary care provider. In an in-person visit, the provider can examine the patient's lymph nodes to check for swelling, and a strep test can be immediately administered to make a differential diagnosis. In telemedicine, the provider would primarily rely on the patients' descriptions of their symptoms, and testing or imaging would not be available during the visit. Also, information such as vital signs would not be accessible unless a patient has access to the instruments needed to measure them.

This is an important consideration for primary care telemedicine visits, where physical examination and vital signs play a key role in diagnosing a patient who presents with symptoms such as chest pain, respiratory complaints, abdominal pain, skin rashes, etc. Without these, the primary care provided is limited. This is often a concern for patients and providers in a

telemedicine context. A study investigating the perspectives of older patients found that 39.5% of the participants felt that telemedicine care was worse than in-person care. They were worried about receiving inaccurate diagnoses due to the lack of a physical examination and felt that in-person visits offered higher quality of care since the provider may identify health problems that the patient was unaware of. Also, many preferred to have their lab work, imaging, and testing done at once during an in-person visit. These patients were satisfied with telemedicine as an "interim solution" during the COVID-19 pandemic for routine visits that did not require a physical examination or for follow-ups (Bhatia et al., 2022). Without a physical exam, providers are more likely to overprescribe antibiotics as a precautionary measure (Gomez et al., 2021).

These findings are consistent with other studies, which found that most patients prefer telemedicine appointments for straightforward issues, chronic disease management, reviewing test results, and renewing prescriptions (Gomez et al., 2021). Examples include Type 1 diabetes check-ups. These visits require little physical examination but involve a great deal of data sharing about glucose levels, HbA1c levels, the insulin pump, and carb counting. Similarly, hypertension rechecks allow for remote data transmission of blood pressure measurements and other lifestyle information, such as diet and physical activity (J. Schaus, personal communication, November 27, 2023). Hence, certain aspects of primary care can be done equally well in telemedicine as in an in-person visit, and patients prefer to have the option to choose between the two modalities according to their situation (Bhatia et al., 2022).

Specialties that heavily rely on physical examination, such as cardiology, neurology, and pulmonology, may prefer in-person visits compared to psychiatry, which primarily relies on verbal communication (Kichloo et al., 2020). In fact, there was a 7418% increase in claim counts for telemedicine visits with a mental or behavioral health diagnosis category during the

pandemic period—the largest increase among the clinical categories (Friedman et al., 2022). In February 2021, 50% of all psychiatry visits were virtual (Bestsennyy et al., 2022). Even in psychiatry, however, certain nonverbal cues about the patient's condition, such as posture, fidgeting, and repetitive motor mannerisms, are typically not observable in telemedicine.

Future of Telemedicine

Telemedicine is a spectrum with low tech to high tech options. Over the last decade there have been many advances that are making primary care and specialized care more accessible. For example, Tyto is a multifunctional pediatric tele-examination device that uses wireless communication and other attachments to function as a stethoscope, otoscope, and tongue depressor (McDaniel et al., 2019). Other devices, such as a wearable tele-echography robot system, allow doctors to complete diagnostic steps while a patient is transported to the hospital. This can help save patients' lives during emergencies such as internal bleeding (Ito et al., 2011). Companies such as VSee have developed kits with tools to take vitals, EKG, ultrasound, measure blood glucose, evaluate skin lesions, and test pulmonary function (Telemedicine Kits, Carts, & Devices, 2023). In the future, patients can be trained to use these devices so that providers receive accurate medical information. Furthermore, smartphone apps can be used to monitor patients with abdominal pain. In such situations, a provider at a distant site self-palpates using a smartphone. The app then calibrates both the provider's and patient's phones. As the patient mimics the self-palpation, the app provides feedback regarding how hard to press, guiding the patient through the palpation process, ensuring proper repetition, and giving the provider results (Myers et al., 2017).

As telemedicine technology continues to advance rapidly, NASA recently sent holographs of physicians to the International Space Station (Garcia, 2022). With improved resolution, holography along with the technology described above could be the closest alternative to in-person visits.

Given its convenience and other benefits, telemedicine is here to stay. It is important to mitigate or improve the differences found between this modality and traditional face-to-face encounters to provide patients with the best outcomes.

<center>Patient-Provider Communication</center>

Patient-provider communication (PPC) significantly contributes to building a patient-provider relationship/rapport and patient satisfaction. PPC focuses on the information exchange and style of conveying the information to help patients improve their health. It serves as a form of social support that can influence a patient's health status and self-efficacy (Kaplan et al., 1989). Overall, better PPC increases treatment compliance, information understanding, trust when exchanging information, and patient outcomes such as perceptions of health status and, ultimately, physiological health. Even occasional lapses in optimal PPC can have serious effects on patient outcomes (McLafferty et al., 2006).

Although PPC includes nonverbal behaviors such as body position, postural changes, facial expressions, eye contact, affirmative gestures, hand gestures, etc. (Collins et al., 2011), this study addresses only verbal communication due to limitations of the survey items in the secondary data analysis.

Patients seek physicians who take time and put in effort to understand them as a person (McLafferty et al., 2006). Effective PPC includes conveying sufficient information to the patient such that the treatment is agreed upon and implemented accurately. Furthermore, a patient must

feel adequately involved in the treatment process (Kaplan et al., 1989). A literature review

conducted by McCormack et al. (2011) defined four aspects of information exchange: (1)

exploring knowledge, needs, and preferences of the patient, (2) sharing information, (3)

providing patients with resources, and (4) facilitating understanding and usage of the information

presented. Failure to educate patients about their condition, failure to ask whether the patients

had questions, inadequate explanations, or use of terminology they did not understand (medical

jargon) have all been shown to result in patients not referring their physicians to others, poor

treatment compliance, and dissatisfaction (McLafferty et al.).

Several variables are commonly used to operationalize PPC: patient-provider talk turn

ratios, patient involvement, patient information-seeking behavior, shared decision making,

physicians checking patients' understanding, and so on. Although this is not a comprehensive list

of PPC variables, a central theme among them is the patient's understanding of the information

presented to them. The UCF Student Health Services data on which this study will be based

includes items tapping both specific aspects of provider communication (provider listening,

taking time with the patient, answering questions, giving good advice and treatment) and

provider friendliness. It also includes an item on self-perceived understanding of diagnosis and

treatment and overall satisfaction with the visit. I will consider literature about each of these

areas in turn.

Active Listening

Research strongly indicates that a major concern of patients is that their providers do not

listen to them during the visit. Listening is a complex concept critical to communication and the

patient-provider relationship (Boudreau et al., 2009). Defined as, "complete attention to what a

person is saying, listening carefully while showing interest and not interrupting," active listening requires concentration on word choice and is the highest level of listening (Jahromi et al., 2016). It is a key skill for healthcare professionals. Providers are advised to give patients their undivided attention to convey empathy and concern for their patients' conditions (Berman & Chutka, 2016). Active listening brings forth clinically relevant information, giving providers a deeper understanding of patients' stories, with the result that they can more effectively diagnose and treat the patient. Careful listening to a patient's word choice can also reveal information about their beliefs and preferences. Furthermore, for many patients, having a provider who listens is a "part of the healing process." (Boudreau et al.). Research also suggests that listening in silence (without interruptions) promotes a patient's independence over their health rather than taking the provider's suggestions without a full understanding (purpose and reason) of the treatment plan (Gray et al., 2016). Furthermore, listening and speaking skills are associated with patient outcomes including disease risk (Nouri & Rudd, 2015).

Poor listening skills, such as distraction during the conversation, can misdirect the provider when diagnosing or treating a patient as they would have missed key details, leading to gaps in their understanding. Patients may also sense a lack of concern, impacting further patient-provider communication and hindering a strong patient-provider relationship (Boudreau et al., 2009).

Time Spent with Patient

Patients are generally aware of the time constraints in a clinical setting; however, the time spent with patients is important and can impact their perceptions of the provider. Patients often leave a clinical encounter feeling they have been rushed and that their provider did not take

enough time to discuss their health concerns (Kvrgic et al., 2018). Less time spent with a patient would mean the provider had less time to discuss the patient's concerns, listen to their story, gather relevant information, and address the patient's needs. This can lead to poor communication as the discussions are not thorough, negatively impacting the patient-provider relationship (Drossman et al., 2021). Conversely, more time spent and longer visits allow for more detailed discussions and increases patient participation (asking questions, seeking information, etc.). Overall, patients who wished the provider spent additional time had lower satisfaction (Dugdale et al., 1999).

Patients have reported feeling rushed by the provider during telemedicine visits and having less autonomy during the visit (Gordon et al., 2020). Studies have shown that telemedicine visits are generally shorter with fewer problems discussed and less information exchanged (McKinstry et al., 2010). Additionally, benefits of in-person visits are the ability to allocate a set time and receive full attention. Patients have set expectations of how long an in-person visit would last. However, these expectations are not necessarily met in telemedicine visits (McKinstry et al., 2009). Trying to save time, patients may omit information that might be critical to their diagnosis. Furthermore, the "externally imposed schedules" made at remote sites could cause providers to hurry from one visit to another, impacting the communication that takes place in telemedicine. (Gordon et al.).

Answering Patient's Questions

Shared Decision Making (SDM) is an important component of effective communication and patient-centered communication, involving a patient's active participation in developing their treatment plan. Shared decision making includes information sharing, physicians asking

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open-ended questions to gather information, patients expressing their opinions, and asking for information (Agha et al., 2009). The goal is to improve a patient's ability to manage his or her health and reduce symptom burden. One aspect of SDM is whether or not the provider answers the patient's questions (Bodegård et al., 2021). Patients expect thorough responses from their physicians and perceive a physician's competence and concern for their conditions based on this. When their questions are ignored, patients feel that a provider lacks concern for their condition and may leave a visit unsatisfied (Tallman et al., 2007).

Several studies have noted differences in patients' ability to ask questions and participate in decision making during telemedicine visits. Due to the distance between patients and providers in telemedicine visits, patients have reported feeling uncomfortable asking questions, voicing their concerns, and often found it difficult to interject (Gordon et al., 2020). Research suggests telemedicine visits are more physician-centered with patients taking on a passive role and participating less in the clinical discussion (Agha et al., 2009).

Provider Giving Advice

Advice giving is a form of patient-centered communication, and receiving advice from a provider can impact extrinsic behavior and patient outcomes (Gemmell & DiClemente, 2009). For example, a study analyzing the impact of receiving physician advice on exercising behavior noted that participants who received advice significantly increased their duration of exercise each week. Overall, there was a greater increase in participants exercising after receiving advice than in the group that did not receive any advice, demonstrating the effectiveness of advice in a clinical setting (Lewis & Lynch, 1993). Patients are typically receptive to advice and perceive physicians who offer it as caring/empathetic, which leads to greater trust and patient

understanding (Tallman et al., 2007). Little to no research is available about advice-giving in telemedicine visits, however.

Provider Friendliness

Provider friendliness is one of the five elements of provider interpersonal communication style that can influence how a patient perceives the information and comprehends it. This may even impact patient outcomes more than the quantity of information provided during a visit. Friendliness involves treating patients in a courteous manner and making them feel welcome (Stewart et al., 1999). Patients strongly desire friendly and approachable physicians with whom they can communicate (Uhas et al., 2008). Information from an unfriendly provider may lead to mistrust and poor health outcomes. A friendly provider is able to convey empathy to their patients effectively. Unfortunately, some studies suggest there are often disparities between how well a provider thinks they communicate and a patient's expectations/experiences. One study found that the physician's self-assessed empathy and a patient's perceptions of the physician's empathy were actually negatively correlated (Katsari et al., 2020). There is limited literature analyzing this aspect of PPC in the context of telemedicine. However, one of the few studies addressing the topic reported that provider empathy did not differ between telemedicine and in-person visits (Cheshire et al., 2021).

Patient Knowledge

Research has also revealed significant discrepancies between how much a provider thinks a patient understands and how much a patient truly understands during the visit (Olson & Windish, 2010). A majority of patients leave a visit with poor or inaccurate memory of the medical information discussed (Kessels, 2003). Research recommends that providers use a

universal precaution approach by assuming all patients are prone to

misunderstanding/miscommunication to improve communication clarity (Price & Simpson,

2022). Such practices include reducing the use of jargon, using the teach-back method, and

maintaining an appropriate information load (Coleman, 2020). Evidence about the association

between PPC in telecommunication contexts and patient understanding is limited. Early research

indicates that patients in telemedicine visits requested more repetition of information compared

to in-person visits, suggesting there were differences in the clarity of patient-provider verbal

communication (Agha et al., 2009).

Patient Satisfaction

Patient satisfaction is a patient's subjective perception of the quality of care they received

during a healthcare experience. Considering that patient-provider communication is a significant

portion of a visit, it is not surprising that patient satisfaction is associated with PPC. Providing

positive patient-centered care (listening, clear explanations, active discussions, definitive

diagnosis, and advice to promote health) is a predictor of patient satisfaction, improved symptom

burden, and patient enablement (Little et al., 2001). The higher the patient satisfaction, the better

the overall PPC, and the more likely a patient will return for care and comply with medical

advice (Kaplan et al., 1989). The patient's overall satisfaction, in turn, plays a key role in

physical health and building a successful patient-provider relationship (Jiang, 2019).

College Students

College students are in a period of transitioning into an independent lifestyle, including

healthcare. Previously accompanied by their parents during healthcare visits, college students

find themselves for the first time responsible for completing paperwork, reporting medical

history, and obtaining medical information on their own. A study analyzing patient-provider communication effectiveness at a student health center revealed six themes that students found most important: (1) clarity (the ability to explain information in simple terms), (2) instruction, (3) listening (active listening over inactive was preferred as students felt respected), (4) friendliness (personable nature rather than condescending), (5) providing immediate feedback, and (6) professionalism (formal and seeking student's permission before taking action) (Adu Gyamfi, 2022). Having a regular provider and the ease/comfort of communicating with this provider have the most significant influences on college students' health decisions.

Although 70% of college students use the Internet to search for health information, before the COVID-19 pandemic, the majority of college students had never contacted a healthcare provider over the Internet (KHademian et al., 2020; Stellefson et al., 2011). Most lacked knowledge of the telemedicine format of healthcare visits and of online university resources, compounding existing medical issues the students were experiencing during the pandemic (Burns et al., 2020). Thus, students, like the larger population, are experiencing significant changes in traditional patient-provider communication. A 2022 study on 101 college students reported that students were equally satisfied with telepsychiatry visits as in-person visits, but few other studies have analyzed college student satisfaction and PPC variables in relation to telemedicine (Michaels et al., 2022).

In light of this literature, the study poses the following research questions to analyze the impact of telemedicine on PPC in a university healthcare setting.

RQ1: How do a) patient-reported evaluations of provider communication, b) patient self-reported knowledge, c) patient perceptions of provider friendliness, and d) patient satisfaction differ between telemedicine and in-person visits?

RQ2: Do these associations vary among medical specialties?

Method

This study is a secondary data analysis of responses from the Patient Satisfaction

Questionnaire sent by the University of Central Florida Student Health Services (SHS) between

January 29, 2021 and November 17, 2022. Every Tuesday, Qualtrics survey links are sent via

email to patients who were seen by the UCF SHS within the last week. Once sent, the link

remains active permanently, allowing patients to complete it at any time. The survey consists of

46 questions, and those relevant to this study are displayed in Table 1. The first question asks

what were the major services patients received during their visit to the student health center. The

second question asks the patient to rate each of the provider communication variables: provider's

listening skills, time spent understanding the patient's concerns, answering patient's questions,

advice-giving, friendliness, and patient's understanding. The third question assesses overall

patient satisfaction with the visit as a single-item measure. Each of these items is on a scale of

poor, fair, good, and great. This scale will be converted to a 4-point numerical scale. The average

score for each of the PPC variables and overall satisfaction will be compared between

telemedicine and in-person visits. The responses to these questions will be categorized based on

specialty for further analysis using Table 1.

Table 1

Items From Patient Satisfaction Questionnaire Used in Current Analysis

Q6 - Which area provided the majority of your services?

Gold (Sports Medicine & Primary Care)
Physical Therapy
Gynecology
Dental Clinic
Green (Primary Care I)
Blue (Primary Care II)
Behavioral Health (Psychiatry & Substance Use Disorder Services)
Don't remember
Other
College of Medicine clinic
Victim Services
Immunizations
Allergy Clinic
International Health
Dietitian
Downtown UnionWest clinic
Telehealth Visit
COVID Resources (Nurse Line, Vaccine, Testing)

Q22 - How would you rate your experience with our Provider staff?

Provider listened to me
Took enough time with me
I understood my diagnosis and/or treatment plan
Answered questions and explained what I wanted to know
Gave good advice and treatment
Friendliness

Q46 - Overall, how was your visit?

Poor
Fair
Good
Great

Results

Between January 29, 2021 and November 17, 2022, 7229 survey responses were recorded. Upon cleaning the data, 584 survey responses were omitted because respondents completed fewer than 4 of the 6 questions addressing provider communication variables, did not indicate which service areas they received care from, or did not finish the survey. Therefore, 6645 survey responses were analyzed. The results are organized according to the research question.

Of the patients that responded to the survey, 90.8% (n=6034) were students, 7.8% (n=515) were employees, and 1.4% (n=96) reported other. Furthermore, of the students, 14% (n=931) were freshmen, 14.2% (n=941) were sophomores, 19.7% (n=1307) were juniors, 21.9% (n=1452) were seniors, 20.9% (n=1387) were graduate students, and 0.03% (n=2) did not report their school year. As a result of the survey structure, among those who selected the option to report their school year, some (n=14) selected that they were not students. 7.8% (n=517) of the visits were telemedicine.

Descriptive statistics for providers are presented in Table 2.

Table 2

Descriptive Statistics of Provider Communication and Overall Satisfaction Ratings

	Telehealth or In-person	*N*	Mean	Std. Deviation
Provider listened to me	Telehealth	514	3.84	0.51
	In-person	5797	3.83	0.51
Took enough time with me	Telehealth	512	3.84	0.51
	In-person	5815	3.82	0.52
I understood my diagnosis and/or treatment plan	Telehealth	507	3.83	0.52
	In-person	5542	3.82	0.51
Answered questions and explained what I wanted to know	Telehealth	510	3.83	0.55
	In-person	5737	3.83	0.52
Gave good advice and treatment	Telehealth	510	3.80	0.58
	In-person	5726	3.81	0.55
Friendliness	Telehealth	513	3.85	0.49
	In-person	5822	3.84	0.51
Overall, how was your visit?	Telehealth	517	3.71	0.63
	In-person	5839	3.75	0.56

Research Questions

Research question 1 asked how patient-reported evaluations of provider communication, self-reported knowledge, provider friendliness, and satisfaction differ between telemedicine and in-person visits. To examine this question, a series of independent sample *t*-tests were run with each one of the provider communication items as a dependent variable. Levene's test indicated that equal variance could be assumed for all variables. Of the 6645 survey responses included,

6356 had a response for the overall satisfaction item. An independent samples *t*-test was run with these patient responses to compare overall satisfaction in telehealth versus in-person visits (see Table 3). Levene's test indicated that equal variance could not be assumed for the overall satisfaction variable, so the adjusted value was used. Results are presented in Table 3.

Table 3

Independent Samples T-test

	df	t	p
Provider listened to me	6309	0.44	0.661
Took enough time with me	6325	0.82	0.415
I understood my diagnosis and/or treatment plan	6047	0.35	0.728
Answered questions and explained what I wanted to know	6245	-0.030	0.976
Gave good advice and treatment	6234	-0.22	0.824
Friendliness	6333	0.53	0.597
Overall, how was your visit?	588.953	-1.56	0.121

The results indicate that there were no statistically significant differences in patient responses to provider communication variables and overall satisfaction in telemedicine and in-person visits.

Research question 2 asked how the patient-reported evaluations of provider communication, self-knowledge, provider friendliness, and overall satisfaction in telemedicine

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and in-person visits varied by medical specialty. In the dataset, only behavioral health had a sufficiently large sample size to test research question 2. Therefore, a series of independent sample T-tests were run. Levene's test indicated that equal variance could be assumed for all variables except "provider took enough time with me" and "I understood my diagnosis and/or treatment plan," so adjusted values are presented for those variables. As indicated in Table 4, no differences emerged in behavioral health visits between face-to-face and telemedicine visits with respect to communication variables.

Table 4

Behavioral Health (Psychiatry and Substance Use Disorder Services)

	df	t	p
Provider listened to me	339	-0.87	0.388
Took enough time with me	336.532	1.04	0.299
I understood my diagnosis and/or treatment plan	338.965	1.37	0.171
Answered questions and explained what I wanted to know	340	0.64	0.524
Gave good advice and treatment	339	0.16	0.872
Friendliness	339	0.23	0.819

Post Hoc Analyses

Two post hoc regression analyses were run, one for telehealth and one for in-person patients, to analyze the influence of each provider communication variable on overall patient satisfaction. The six provider communication variables were entered as predictor variables, and

the overall patient satisfaction was the outcome variable. Both analyses were statistically significant (telemedicine: adjusted *R-square* = 0.58, $p < 0.001$; in-person: adjusted *R-square* = 0.50, $p < 0.001$). Results for the influence of specific communication variables are provided in the tables below.

Table 5

Telemedicine-Predictor Variables of Overall Satisfaction

	Beta	*t*	*p*
Provider listened to me	0.206	3.00	0.003
Took enough time with me	0.009	0.14	0.893
I understood my diagnosis and/or treatment plan	0.098	1.73	0.084
Answered questions and explained what I wanted to know	0.053	0.68	0.498
Gave good advice and treatment	0.383	5.26	<0.001
Friendliness	0.071	1.55	0.122

Table 6

In-Person-Predictor Variables of Overall Satisfaction

	Beta	*t*	*p*
Provider listened to me	0.181	9.19	<0.001
Took enough time with me	0.095	5.26	<0.001
I understood my diagnosis and/or treatment plan	0.049	2.91	0.004
Answered questions and explained what I wanted to know	0.090	4.17	<0.001
Gave good advice and treatment	0.287	13.94	<0.001
Friendliness	0.075	4.84	<0.001

As indicated, the most important contributor to overall satisfaction in telehealth was whether the patient perceived that the provider gave good advice/treatment and the provider listened. For in-person visits, all provider communication variables significantly contributed to overall satisfaction.

Discussion

During the COVID-19 pandemic, many hospitals enforced telemedicine visits to prevent the spread of infection in accordance with CDC guidelines. Therefore, patients had little choice over the use and format of telemedicine. Findings about patient satisfaction with this change have been mixed, and little research has analyzed how patient perceptions of communication varies between telemedicine and in-person contexts.

The results of this study indicate that provider communication was rated highly in both telemedicine and in-person visits with no statistically significant difference between the two modalities. Furthermore, overall satisfaction between the two modalities did not significantly differ. At the outset, these findings may seem surprising, and they are in disagreement with some previous research (Cao et al., 2022). However, some contributing factors may be the time range of survey responses analyzed and educational background of respondents.

The patients were college students and employees with a more advanced educational background compared to the average U.S. patient population. This is especially true for students in health-related courses who would have a better understanding of the clinical discussion, facilitating the discussion-making process and perceptions of provider communication (Kühn et al., 2022). As the years in college increases, students in these courses would have increased medical knowledge, further improving communication. Regardless of coursework, a student in a higher year may have more experience obtaining health information from the Student Health Services and navigating the healthcare process. Another aspect to consider is how well a patient knows his or her provider. If a patient has seen the provider and especially in an in-person visit, then this could influence how they perceives the provider's communication.

Furthermore, growing up with tablets, laptops, and smartphones, college students are likely to be more familiar with the use of technology and resolving any technical difficulties that arise. Even proper use of microphones and webcams (camera angle, quality, etc.) can improve communication. Therefore, college students may have a strong understanding of how to use the technology and feel more comfortable communicating via an online platform. This familiarity and knowledge could reduce the perceived differences between telemedicine and in-person visits. Additionally, the COVID-19 pandemic started in March 2020, giving patients and providers time to adapt to the technological requirements by the time these data were collected. Future research should consider the influence of age, level of health literacy, and socioeconomic factors when comparing patient-provider communication and patient satisfaction in telemedicine and in-person contexts.

It is important for a clinic or healthcare institution to know what factors contribute to overall satisfaction in order to prioritize communication and provide patients with proper care. This study found differences in the provider communication variables that significantly influenced overall patient satisfaction. In in-person visits, all variables contributed to overall satisfaction. In telemedicine visits, only items asking whether the provider listened to the patient and gave good advice were related to overall satisfaction with the visit. Telemedicine visits have reduced nonverbal communication cues and time constraints that could have contributed to this difference. The communication variable "provider listened to me" focuses on the history taking aspect of the visit, which can be accomplished just as well in telemedicine as in face-to-face visits. Patients may expect this aspect of communication to be better than others such as "friendliness," which requires a combination of positive speech and body language, making this a key determinant in a patient's overall satisfaction with the telemedicine visit. Also,

telemedicine visits often have time limits imposed by the medical institution or the videoconferencing platform. A provider discusses the patient's medical history at the beginning and allow for questions during or towards the end of an appointment. There may not be sufficient time to answer all the questions thoroughly given the time constraints. The UCF Student Health Services used Zoom for the visits, which had a fixed time limit. Hence, it is the provider's responsibility to guide the discussion to complete within the allotted time frame. This is typically not a limitation in in-person visits when a provider has more time to discuss concerns, and patients can ask last-minute questions. Thus, it is possible that only the variables "provider listened to me" and "gave good advice and treatment" significantly contribute to overall satisfaction because they are highly verbal communication-dependent and meet patients' expectations with respect to communication in a telemedicine context. This emphasizes the need for providers who are conducting telemedicine visits to focus on ways to demonstrate listening and give their patients valuable advice. If patients understand the telemedicine context to be different, providers should recognize the more direct and efficient approach that patients anticipate as being a part of the telemedicine experience.

In 2020 at the beginning of the COVID-19 pandemic, there were a total of 16000 telemedicine visits at the UCF Student Health Services. In 2021, there were 9000, and 2022, there were 2800 visits. Although the Student Health Services still offers a virtual option for primary care, there has been a great drop in the number of telemedicine visits. A majority of the telemedicine visits still conducted are for behavioral health (J. Schaus, personal communication, November 27, 2023). Primary care and other specialties, such as obstetrics/gynecology, cardiology, and ENT, heavily rely on physical examination for treatment. When given the choice, patients are more likely choose in-person visits. In such cases, the use of smartphones,

telemonitoring apps, remote patient monitoring devices, and medical imaging may help facilitate communication, but gaps will remain. Hence, communication and satisfaction among various medical specialties requires further study.

Asking patients about their overall satisfaction with a visit will prompt responses based on their feeling at the time and circumstances of the visit. A possible contributing factor to the similar and high satisfaction ratings among "telehealth" and in-person visits is that many patients were content with any option to receive care during the COVID-19 pandemic. In primary care, which heavily relies on physical examination, a more important question to ask for comparison might be how confident a patient was that they received an accurate diagnosis. This question permits a better understanding of the differences between telemedicine and in-person visits not based on external factors and is important for the improvement of care provided.

The communication variable "provider listened to me" is related to how well the provider listened to and discussed the patient's medical history. However, it is not necessarily related to the patient outcomes. In general, effective patient-provider communication is associated with improved patient outcomes, such as emotional health, reduced symptoms, pain control, and improvement of health condition. The quality of PPC when discussing a patient's history and treatment plan influences patient health outcomes. Patients should be encouraged to take an active role in the consultation, and physicians should provide emotional support, show empathy, explain medications and side effects, respond to patients' questions, and involve them in the decision-making process (Stewart, 1995). A systematic review found that improved self-management, adherence to the treatment plan, and increased self-efficacy were associated with higher perceived quality of PPC in Type 2 diabetes patients (Peimani et al., 2020). These

associations are also applicable to the telemedicine context (Effendi et al., 2023). Further research requires comparing telemedicine and in-person visits and analyzing how differences in patient-provider communication between the two modalities affect patient outcomes.

Limitations

First, due to the structure of the questionnaire, "telehealth" was listed separately as one of the specialties. This means that it cannot be said with certainty that all telemedicine visits were identified in the data set. That is, students might have selected the specialization at a more central element of their visit on the survey item responses than telehealth. Behavioral health was the only specialty in which it was feasible to compare the results of telemedicine to in-person visits. There were no statistically significant differences in provider communication variables between telemedicine and in-person contexts. Considering the nature of behavioral health visits, it mostly relies on verbal communication in order to understand and treat a patient and does not require vital signs, although physical examination may be required for certain visits. This makes telemedicine conducive for mental health related visits.

Second, the questionnaire links sent to patients remain open indefinitely. It is unlikely that the survey will be completed months or years after the visit. However, if this were to occur, it could affect the accuracy of responses since one's ability to recall details of the clinical encounter would decline over time.

The responses analyzed in this study were submitted between January 29, 2021 and November 17, 2022, around the height of the COVID-19 pandemic and after. The "telehealth" responses were majorly concentrated in the first half of 2021. Many people were just beginning to be vaccinated during this time and institutions were following social distancing guidelines. In

future studies, it would be beneficial to compare patient perceptions of provider communication and satisfaction in telemedicine in the pre-pandemic period, during the COVID-19 pandemic, and after the pandemic. This longitudinal analysis would provide deeper insight into the initial concerns with telemedicine, improvements, how patient perceptions of provider communication have evolved over time, and advancements that can optimize the telemedicine experience.

Conclusion

Telemedicine provides many patients with convenient access to medical expertise. Providing flexible and personalized care for patients, it will continue to be integrated into the future of healthcare. It also proves valuable in situations like rural medicine, where care cannot be immediately delivered. Telemedicine care is a preferable option than having no medical care. Given that there are areas of the United States with physician shortages, telemedicine is serving the needs of people and expanding access to healthcare. It also allows for triaging so that patients in rural locations would not need to travel long distances for minor health problems that can be resolved over a virtual visit.

The COVID-19 pandemic catalyzed the use of telemedicine. Although, initially, insurance coverage for telemedicine appointments was restricted, it has expanded since the pandemic. It is important that Medicare and insurance companies continue to cover telemedicine consultations. A portion of patients still opt for telemedicine visits as it reduces travel time, wait time, and is cost-effective if they live far from the healthcare institution. Furthermore, patients and providers have gained experience with telemedicine, increasing their comfort with the process. Results of this study revealed that overall patients were equally satisfied with telemedicine and in-person visits and provides promise for increased use of telemedicine for certain types of visits. In behavioral health visits, there were no significant differences in provider communication ratings. This could be due to the nature of the specialty, which primarily relies on verbal communication. This information is useful for healthcare institutions and providers to provide timely care.

However, patients revealed significant differences between the two visit types when it came to which elements of communication contributed to their satisfaction, suggesting that patient have different expectations when they attend a telemedicine versus in-person visit. Specifically, in telemedicine, a provider giving good advice and listening to a patient were key to satisfaction over elements such as friendliness and spending sufficient time. Based on these results, telemedicine providers in a university health center would be well advised to devote their efforts to these elements of communication.

Understanding how telemedicine impacts communication and the factors that influence satisfaction is valuable information for patients and families. Knowing that telemedicine is comparable to in-person visits can help patients feel more confident in opting for telemedicine visits for timely care or when they are unable to travel to meet the provider. Similarly, providers can be more aware of what a patient is looking for to improve communication and provide the best care possible.

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