Special Topic

Trends and Challenges of Telehealth in an Academic Institution: The Unforeseen Benefits of the COVID-19 Global Pandemic

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Abstract

The COVID-19 pandemic has necessitated a reorganization of healthcare delivery, shedding light on the many unrealized advantages telehealth has to offer. In addition to facilitating social distancing, minimizing the risk of pathogen exposure, and preserving healthcare resources, there are many benefits of utilizing this platform that can extend beyond the current pandemic, which will change the way healthcare is delivered for generations to come. With the rapid expansion of telehealth, we present data from our high-volume academic institution's telehealth efforts, with a more focused analysis of plastic surgery. Although state legislation regarding telehealth varies greatly, we discuss challenges such as legal issues, logistical constraints, privacy concerns, and billing. We also discuss various advantages and the future direction of telehealth not only for plastic surgery but also its general utilization for the future of medicine in the United States.

Over the past 25 years, the potential benefits of telehealth have been widely discussed. It has been suggested that remote care could decrease the number of unnecessary visits to the hospital, prevent loss of productivity due to missed work and the need to travel, and improve access to care.[1] Among surgical subspecialties, faster evaluation, diagnosis, and intervention; fewer operative cancellations; and reduced postoperative anxiety were observed when telehealth was provided.[2,3]

The COVID-19 pandemic has necessitated a reorganization of healthcare delivery. This restructuring has shed light on some unrealized advantages telehealth may offer, such as increasing new patient flow, expanding a practice's patient base, generating additional income for the practice, expanding access, improving workflows, increasing patient satisfaction and cutting down patient cost.[4] With governmental agencies temporarily loosening restrictive regulations, now is the time to devise effective

telehealth systems. This will not only be essential to sustain patient care during this crisis but can also be utilized during normal times after the pandemic has passed.

The rapid increase of telehealth for us occurred as a result of the enforced pandemic shutdowns placed on

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in-person clinic visits. This article will discuss current trends and the experience with telehealth at our large academic institution, with a focused analysis of plastic surgery. Our analysis of the presented data is limited, and we rather focused our efforts on interpretation of these data, opportunities, and challenges that may arise while trying to implement a structured telehealth practice.

METHODS

The University of Texas Southwestern (UTSW) Medical Center is the largest medical organization in north Texas, with 15,714 employees and 2,746 faculty as of fall 2019. Approximately 3 million outpatient visits are performed each year.

As the prevalence of COVID-19 increased in the United States, UTSW implemented a variety of measures, including urgent expansion of telehealth capabilities. Patients across most specialties had an option to reschedule or book new appointments virtually. These virtual care encounters have been live video consultations with UTSW physicians or nurses and are performed through the BlueJeans (Mountain View, CA, USA) application. This secure video conferencing service is fully integrated with Epic through context-aware linking, allowing for the patient to utilize their "MyChart" account and the clinicians to have an integrated video within Epic. The consultations were from the practitioner's desktop workstation in the clinic or on laptop or desktop computers at home, with patients at home utilizing their cell phone, desktop, laptop, or tablet to access the BlueJeans app. On this app, providers have the ability to video-dial in a chaperone or other family members who remain present during the virtual care encounter. Additionally, within the platform, UTSW has disabled the ability to record visits in alignment with how in-person visits are handled at the hospital and in our clinics.

The following data have been collected across 33 clinical sites and 279 departments within the UTSW administrative system with no patient identifiers. These data are organized in a Microsoft Power BI report developed by the Office of Health System Affairs, Health System Strategy office at UTSW. Age, type of visit, no-show rates, and geographic distance of the patient's residence from UTSW for telehealth and in-person ambulatory scheduled encounters from January 1, 2020, through April 30, 2020, which were available to the UTSW community, were gathered and analyzed. No named personal patient information was generated from this report. As such, institutional review board approval was not obtained, but the study was conducted in accordance with the standards of good clinical practice and the principles of the Declaration of Helsinki. For the plastic surgery analysis, ambulatory scheduled encounters from April 1, 2019, through mid-May 2020 were utilized. Research visits, deceased patients, test patients, UTSW medical students, and patients without an active MyChart have been excluded.

RESULTS

UTSW telehealth visits began as a small pilot in May 2019, with organization-wide deployment on March 18, 2020. From January 1, 2020, through April 30, 2020, across all the sites, 41,823 total telehealth appointments were scheduled, of which 25,197 were completed (Figure 1A). As the stay-at-home order in Dallas County started on March 15, 2020, the number of virtual visits jumped from 190 from in the first half of March to 6876 in the second half of the month (Figure 1B). In April 2020, 34,706 telehealth visits were scheduled and 25,197 completed. This compared with April 2019, at which time, 233,342 in-person clinic visits were scheduled and 153,636 completed, showing a higher ratio of completed to scheduled. There was a 5189% increase in telehealth visits from February to March.

There was a wide spread of ages represented (Figure 2A), and the distribution of ages changed by month (Figure 2B). The percentage of new patients seen
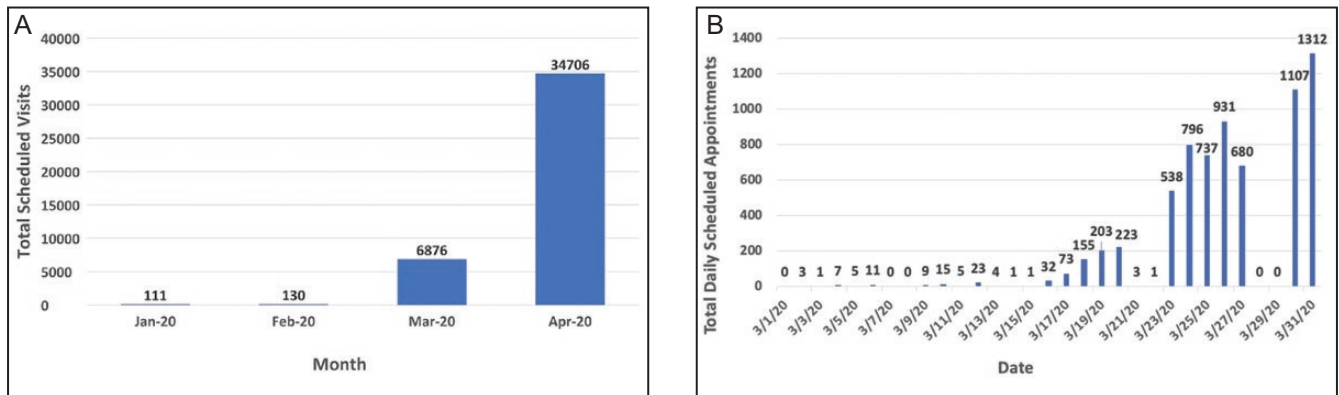

Figure 1. (A) Total count of scheduled telehealth appointments and (B) total count of scheduled telehealth appointments in March 2020 by day.
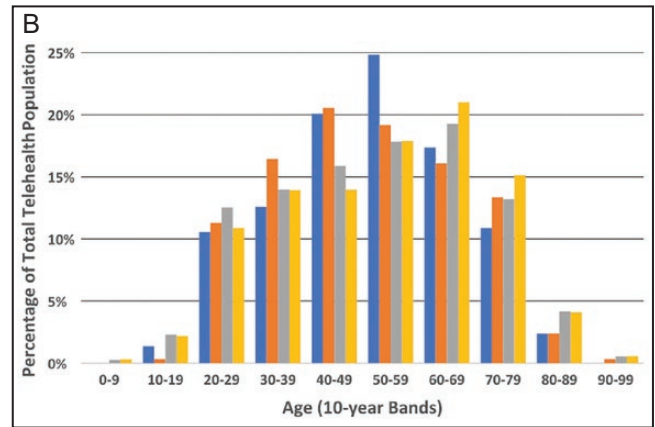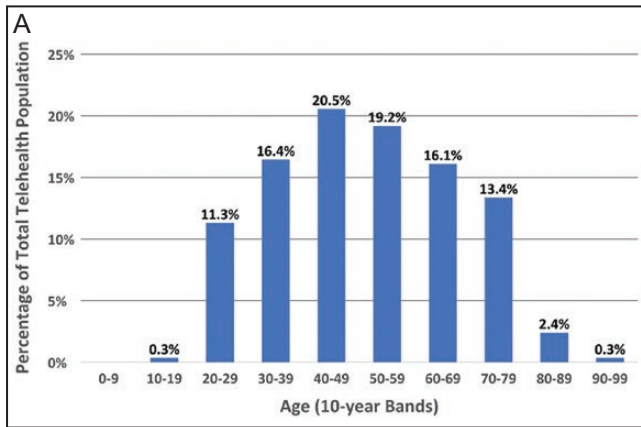
Figure 2. (A) Average telehealth appointment age distribution and (B) change in age distribution by month for January (blue), February (orange), March (gray), and April (yellow).
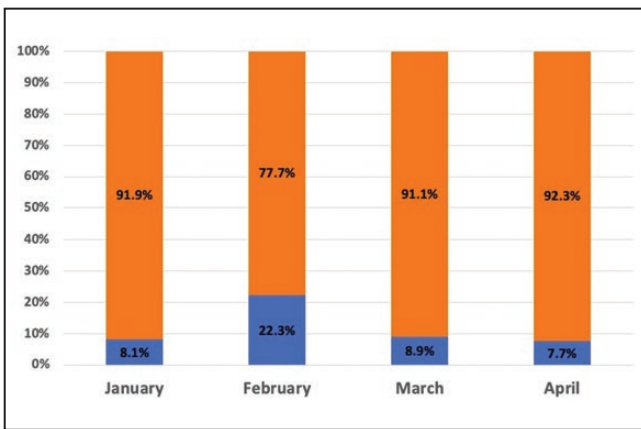
Figure 3. Telephone (blue) vs virtual care encounters (orange) by month.
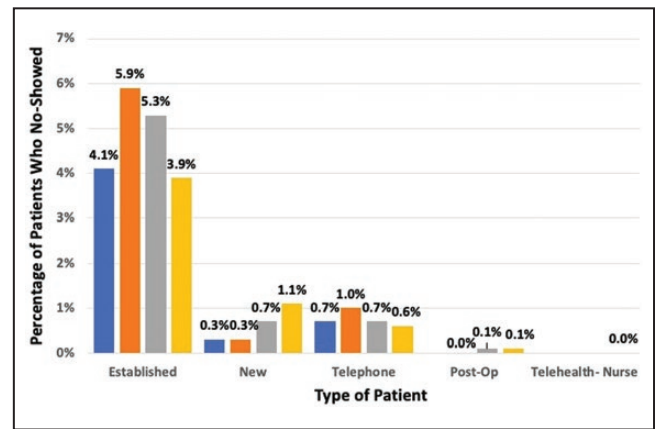
Figure 4. No-show rate by type of patient for January (blue), February (orange), March (gray), and April (yellow).

increased from 0.77% in February to 14.2% in March to 16.7% in April. The percentages of appointment completions (72.4% vs 71.5%), cancellations (20.1% vs 21.1%), and no-shows (5.6% vs 5.4%) did not greatly differ between new and established patients.

From January through April 2020, 3313 (7.9%) of the scheduled appointments were telephone visits, and 38,510 (92.1%) were virtual care encounters, which included both audio and video (Figure 3).

A no-show is defined as a patient failing to appear for his or her scheduled visit without prior notification of cancellation. Figure 4 illustrates the no-show rate by month since January. Figure 5 illustrates the percentage of no-shows for each 5-year age band on average and by month.

Patients from 43 states and Puerto Rico have been seen via telehealth. Figure 6 illustrates the percentage of scheduled visits by distance of patients' residence to UTSW.

The UTSW Department of Plastic Surgery faculty consists of 17 plastic surgeons across UTSW and affiliate hospitals as well as 3 podiatrists/wound care specialists,

exclusive of our pediatric practice. Five of 10 plastic surgeons at the main UTSW outpatient facility elected to participate in telehealth routinely after April 1 until the shutdown of elective clinic visits in Texas was lifted in mid-May. A total 195 non-wound care plastic surgery telehealth patient visits were completed. A total 54 visits were for breast cancer reconstruction, 49 for cosmetic related, 44 for hand surgery, and the remaining 48 visits were for other reasons, such as gender-affirming, reconstructive body, and migraine surgery. Based on the plastic surgery scheduling team, 60% of the patients who the surgeons deemed appropriate to participate in telehealth elected to do so. Of the 40% of patients who declined telehealth services, reasons for this decision included lack of comfort and familiarity with the technology, concerns over privacy and confidentiality, and the preference to schedule an in-person office visit when available. A total of 145 wound care telehealth consults were completed during the same time period. This was part of a separate wound care center
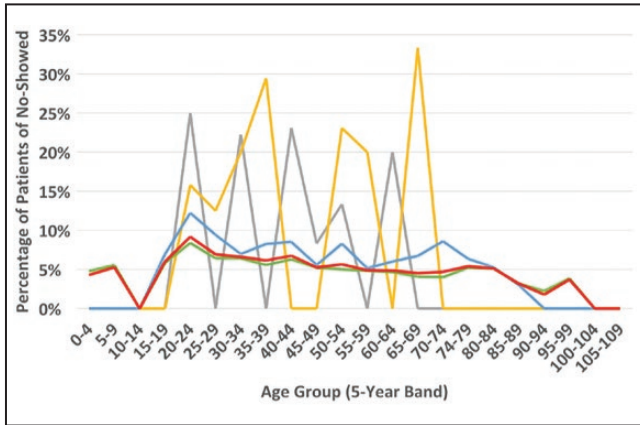
Figure 5. No-show rate by age for January (gray), February (yellow), March (blue), April (green), and on average (red).
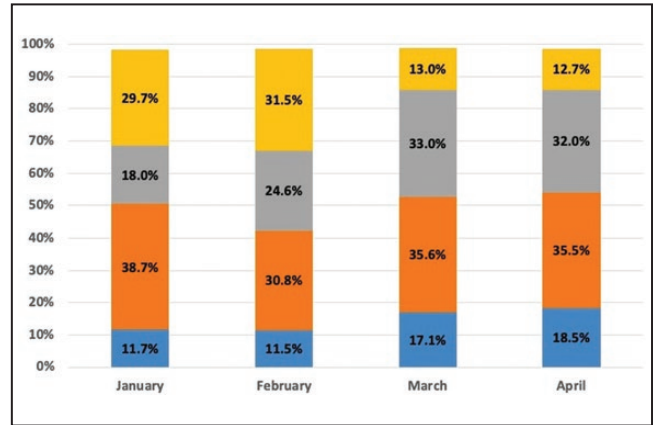
Figure 6. Percentage of scheduled visits by geographical distance from University of Texas Southwestern, with 0 to 10 miles in blue, 10 to 25 miles in orange, 25 to 50 miles in gray, and 50+ miles in yellow. The percentages do not add up to 100% because there were patients for which geographical location data was not captured.

but with participation of the wound surgeons from the Department of Plastic Surgery. Prior to the COVID-19-related shutdowns, no telehealth consults were performed in the Department of Plastic Surgery.

DISCUSSION

On March 11, 2020, the World Health Organization announced that the COVID-19 outbreak was a pandemic, with 1.47 million cases in the United States as of May 16, 2020. Since then, numerous outpatient clinic visits across the country have been cancelled and many replaced with a new framework of telehealth for delivery of care.

Besides an effective tool for social distancing, telehealth can minimize possible exposure of healthcare professionals, essential staff, and other patients to potential pathogens.[2] Furthermore, as it has become apparent that many non-urgent conditions can be managed from home,[3,5] telehealth offers the opportunity to care for patients remotely, minimizing the risk of patient exposure to pathogens that may exist in the clinical setting. Additionally, not only is the preservation of healthcare resources useful during a pandemic but in any disaster setting or decrease in hospital capacity; diverting patients to telehealth either temporarily or on a permanent basis can increase the efficiency of onsite healthcare delivery. This practice may also improve the transition of care for discharged patients from clinic to home setting, resulting in decreased complications, fewer readmissions, and increased patient satisfaction.[6] Finally, the ability to perform telehealth provides the opportunity to deliver care in cases of environmental hardships that restrict or prevent travel, such as severe weather.

Virtual health can be beneficial to more individuals than treating physicians and nurses. For example, presurgical evaluation can be performed by anesthesiology providers or pharmacists to discuss patient medications. In all instances, this will lessen patient exposure and travel time prior to surgery, which, in turn, can save days lost by taking time away from work and home life. Telehealth can also be utilized as an educational tool for trainees as well as increase participation of educational programs in the community.

Our data showed a significant increase in the number of telehealth consults for all UTSW clinics beginning mid-March 2020. Although the Department of Health and Human Services declared a national public health emergency on January 31, 2020, the risk to the public was still deemed low. The first positive case of COVID-19 in the Dallas-Fort Worth area was not confirmed until March 9, 2020. By March 18, UTSW clinical processes had been rapidly restructured, including the expansion of telehealth services.

The significant increase in telehealth visits correlated with the statewide cancellation of elective clinic visits and official launch of campus-wide telehealth on March 18, 2020, which resulted in an immediate massive increase in virtual visits.

The majority of telehealth patients have been between 30 and 79 years old. Pediatric patients younger than 19 years and elderly patients older than 79 years made up only 7.4% of patients. It is important to note that UTSW's pediatric practice is limited and the majority of pediatric patients present to the UTSW affiliate, Children's Health, which was not involved in the telehealth efforts. As the COVID-19 pandemic progressed, there was a shift in age

distribution such that elderly populations comprised a greater proportion of telehealth patients as time passed (ages 60-79 years, Figure 3). This finding aligns with the increasing prevalence of many chronic conditions with age[7] yet possibly the developing comfort of the older generation with electronic mediums.

Telehealth utilization began to decline in UTSW patients 80+ years old, who represent only 4.8% of the telehealth population (Figure 2). This may be due to unfamiliarity and lack of comfort with electronic devices or cognitive decline. Although younger patients may be more familiar with the involved technology, they also represent a smaller proportion of patients seen via telehealth (Figure 2). As teenagers and young adults tend to suffer from accidents more often than chronic conditions, perhaps they have less need for immediate telehealth services.

The current pandemic has led to reports of fewer hospital visits for urgent and emergent conditions. Many hospitals have reported a roughly 50% decrease in emergency room visits.[8] A study published in the American College of Cardiology in April 2020 reported a 38% drop in patients being treated for myocardial infarction.[9] As the prevalence of these conditions has not decreased, it is thought that patients may be avoiding medical care out of fear of COVID-19 exposure should they go to the hospital. Thus, patients are leaving themselves susceptible to significant morbidity and mortality from other diseases. Increasing telehealth efforts, such as those at UTSW, can allow providers to screen patients who are older or hesitant to visit the hospital. This provides susceptible populations with appropriate care of any comorbidities, preventing unfavorable outcomes that may have occurred had they avoided medical attention. As phased re-openings begin across the country, ambulatory volumes at our institution have returned to levels seen prior to the lockdowns enacted as a result of COVID-19. UTSW is consistently witnessing a conversion rate from tele-visits to in-person visits of 25% per week. This conversion rate has been consistent for approximately 2 months since resuming in-person care for ambulatory visits. These statistics complement those reported by Hwang et al, who also found a 25% conversion rate to formal in-person consultations among new patients initially seen via Skype in their cosmetic oculoplastic practices.[4]

Additionally, the expansion of telehealth services at our institution has allowed providers to see an increasing number of new patients. The percentage of new patients increased by 22-fold from February to April 2020. Whether this is due to the relaxed regulations at the state and federal levels, increased provider comfort with the technology, or increased patient awareness of the available platform, the data show that telehealth may be utilized not only to care for established patients but as a resource for bringing in new patients to our institution.

For this paper, we chose not analyze cancellation rates, because there may have been several compounding factors complicating the data, namely provider workflows. For example, because telephone visits were not previously billable, the cancellation could have been done to prevent a backend charge. The data are most likely not a result of patients simply cancelling their appointments and are therefore difficult to validate.

The age distribution, type of visit, and no-show rate of patients in plastic surgery who participated in telehealth were similar to the UTSW total patient population, with 27.7% of total patients seeking breast reconstruction, 25.3% cosmetic consults, and 22.6% hand surgery. Additionally, there was a wide distribution of types of visits conducted: 41.0% were for new patients, 31.8% for established patients, and 24.6% involved postoperative care (Figure 7B). One would consider most fields and several types of visits in plastic surgery being amenable to telehealth. For example, remote visits would be a great option as a second visit following an in-person visit or for long-term postoperative check-ups.

Challenges and Future Direction

Although the COVID-19 pandemic has necessitated a rapid increase in the utilization of telehealth, there are still many barriers preventing its widespread utilization. Although many regulatory agencies are working to develop best practice guidelines for the use of these services, the legal system currently lags behind the available technology.[10] The following discussion stems from regulations in the state of Texas, which may be applicable to other states.

Liability and Malpractice

Similar to in-person care, malpractice claims can be brought against a physician for a telehealth encounter. For in-person encounters, most states allow claims to be made in the state where the patient received care or where the provider's office is located. Telehealth, however, may expand the possible states in which a case may be tried.[11] Because the statute of limitations or cap on non-economic damages may differ by state, this may result in "forum shopping" on the patient's part.[11]

Additionally, some institutions have elected not to allow significant out-of-state telehealth visits due to issues with their malpractice carrier across a large number of potential new jurisdictions. Fortunately, at our institution, the malpractice plan relaxed in-state requirements in alignment with relaxed telehealth rules at the state and federal levels.
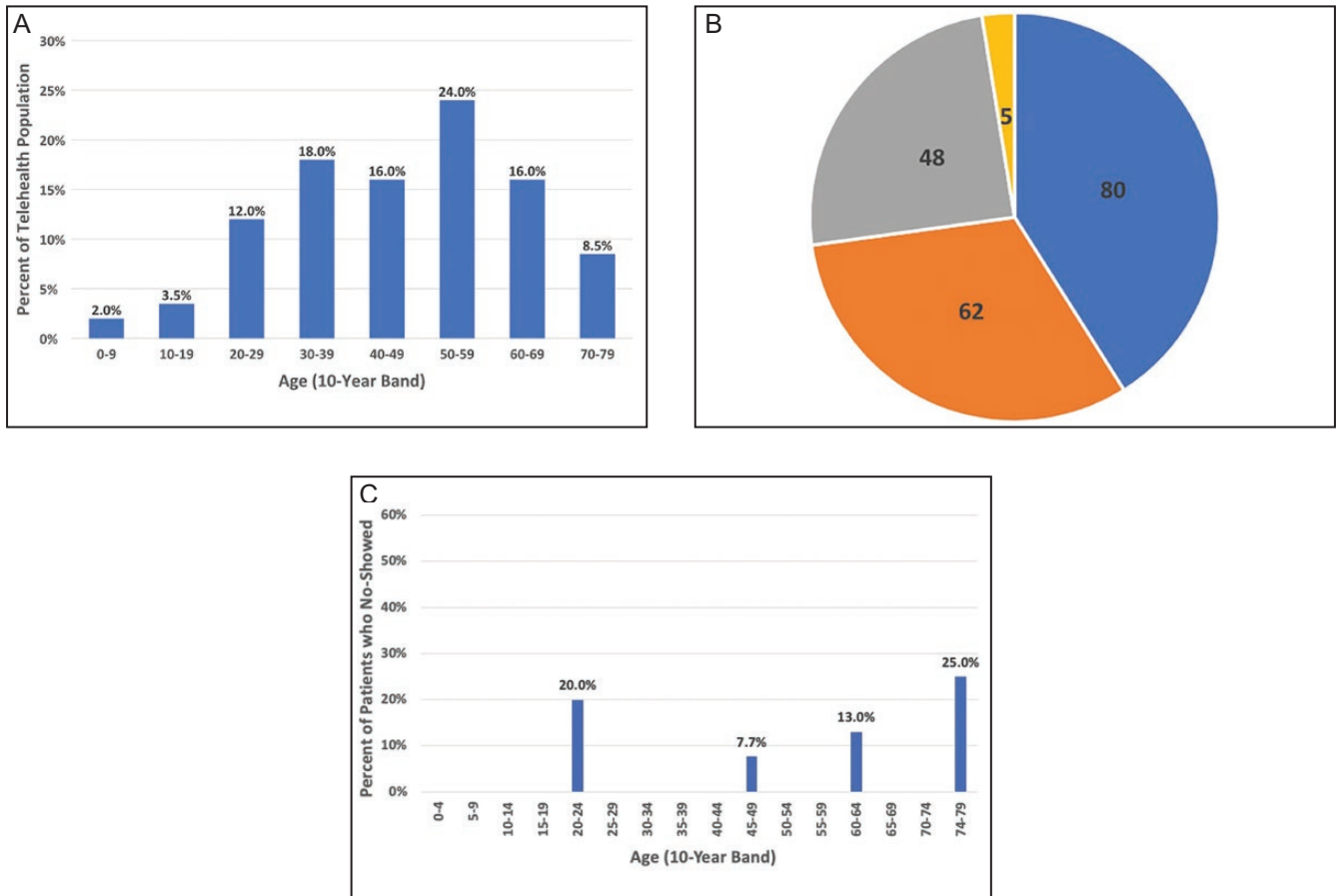
Figure 7. Plastic surgery analysis for the month of April. (A) Age distribution for scheduled visits. (B) Distribution of type of scheduled visit by virtual care of a new patient (new), virtual care of an established patient (orange), virtual care for a postoperative visit (gray), and a telephone visit (yellow). (C) No-show rate by age.

However, it is unclear whether this loosening will remain in place once the pandemic has subsided.

Interstate Licensing

The Texas Medical Board offers a limited out-of-state telemedicine license, allowing an out-of-state physician to interpret diagnostic testing for a Texas physician or follow-up with a patient whose care was mostly rendered in another state.[12] In response to COVID-19, the Texas Medical Board is expediting these temporary licenses for out-of-state physicians. It is unclear whether these new policies will remain in place post-pandemic.

Payment for Service

With the public health emergency, telehealth visits received universal payment at parity with in-person visits across all commercial payors, and Medicare began reimbursing for telehealth visits completed while the patient was in their home. Prior to the COVID-19 pandemic, there were state-level statutes that guided reimbursement for telehealth visits where the patient had to be seen in a designated rural health facility. The federal government has taken the lead in easing restrictions for telehealth during this public health emergency. Given the actions by the federal government and significant investment that organizations have made in providing telehealth services during this time, we are hopeful that telehealth will continue to be reimbursed at all levels that are at parity with in-person visits.

Regarding plastic surgery, patients can pay via credit card either over the phone or the designed electronic platform. The option to offer reduced or even no cosmetic consultation fees is an individual decision to be made by the provider. Some may see this flexibility as an opportunity to attract new patients. Others may view the option of a free consult as a potential disadvantage; there may be a risk of attracting cosmetic surgery "window-shoppers" who have little to no intention of undergoing any procedures.

Informed Consent

Informed consent obligations are generally the same as those required for in-person treatment, and clinicians should adhere to the same standards of traditional office encounters.[4] Following standard-of-care practices required by federal and state laws should avoid any missteps. It is important to note that informed consent laws vary between states; some require written consent and others allow verbal consent. Providers must be knowledgeable of their state's regulations to remain compliant.

Health Insurance Portability and Accounting Act/Privacy Concerns

There is a lack of control over the collection, utilization, and sharing of data collected by telehealth systems. For example, smartphone apps tracking medical history and personal health measures have been found to share information with third parties.[13] Furthermore, there is a risk of unauthorized access and security breaches during the collection, transmission, and storage of personal health information.[14] Additionally, smart devices, such as Amazon's Alexa, may collect and store conversations during a telemedicine encounter and therefore may need to be turned off or unplugged to prevent such recordings.

The Health Insurance Portability and Accounting Act requires identifiable health information be encrypted.[15] However, this only applies to covered entities (ie, health care providers and insurers, not patients).[14] Furthermore, the Food and Drug Administration regulates medical devices but not consumer-facing devices or apps. Several advocates argue that to protect patient privacy and build trust in these systems, a comprehensive federal regulatory network for telehealth must be established.[16]

Currently, due to the expansion of telehealth services necessitated by the COVID-19 outbreak, the US Health and Human Services Office for Civil Rights will not penalize physicians for Health Insurance Portability and Accounting Act non-compliance so long as they are acting in the patient's best interest when providing care through communication technologies such as FaceTime or Skype. Providers, however, should not use public-facing applications such as Facebook Live or TikTok.[17] Once the pandemic passes, the exemptions will surely be removed or modified. For providers who wish to continue utilizing telehealth, it will be their responsibility to choose a secure platform.

Visual examination of the body is far more prevalent in certain services such as plastic surgery and breast oncological surgery. Our department follows the same privacy rules for telehealth as for in-person exams. For example, the BlueJeans app allows physicians to video-dial a chaperone on their cell phone, tablet, laptop, or desktop. Based on the available understanding of the role of the chaperone in plastic surgery examination of the body, our legal team has recommended the utilization of chaperones during video visits. The patient is asked to be in a private location, which is confirmed and documented, and asked to mute the video and change into a gown or robe prior to visual exam. The sequence is carefully coordinated so that the patient is not vulnerable being naked and alone in the virtual exam environment with the provider and without a chaperone. UTSW has also taken the approach of disabling the ability to record visits within the telehealth platform. Although we are exploring opportunities to allow for high-resolution snapshot images to be taken during a visit, with patient consent, we have not yet implemented this into our current practice.

Online Prescribing

The validity of a prescription issued through telemedicine is subject to the same state and federal scrutiny as one prescribed in person.[12]

Regarding prescribing controlled substances, the Department of Justice Drug Enforcement Agency announced on March 17, 2020, that physicians may prescribe scheduled II-V controlled substances through telemedicine without an in-person evaluation for the duration of the COVID-19 emergency so long as certain conditions are met.[18] As the Texas Administrative Code prohibits the treatment of chronic pain with scheduled drugs through telemedicine, it remains to be seen whether these current waivers may reshape future policies.

The Practitioner-Patient Relationship

If the practitioner communicates with a patient via synchronous audiovisual interaction or asynchronous store and forward technology, the physician-patient relationship is established. This includes clinically relevant photos or videos, the patient's medical records, or any other form of audiovisual telecommunication technology that allows the practitioners to comply with standard of care.[19] Due to the coronavirus pandemic, the governor of Texas has also approved the Texas Medical Board's request to temporarily allow audio-only encounters to establish a physician-patient relationship.

In utilizing these new resources to extend patient care beyond the traditional in-person setting, the practitioner-patient relationship will inevitably be affected. Tuckson et al argue that these tools will provide a large amount of new data, changing provider workflow and interpersonal boundaries.[20] Although new models of care may emerge,

physicians' fundamental ethical responsibility to treat patients to the best of their ability will remain.

The Physical Exam

Traditionally, the physical exam has been touted as the gold standard of diagnostic medicine. Telehealth inherently challenges this notion, because the physical nature of many conventional clinical tests are simply not possible to perform.[21]

New technologies may aid in clinical data acquisition and interpretation. There are now direct-to-consumer devices that can be employed to remotely perform certain parts of the clinical exam. For example, electronic stethoscopes, tele-opthalmoscopes, and video-otoscopes have several features unavailable to traditional instruments, such as sound amplification, image magnification, high-resolution recording, and playback.[21-24] Furthermore, many smartphone apps and direct-to-consumer accessories may be utilized for diagnostic purposes and tracking of patient performance, including monitoring activity and heart rate, performing EKGs, conducting cardiac ultrasounds, measuring blood oxygen levels, evaluating pulmonary function, and taking breathalyzer measurements.[21]

There are certain aspects of the physical exam, however, that we are not yet able to reproduce virtually. For example, no technology is commercially available to remotely palpate a patient.[25] Furthermore, certain opponents argue that the value of the physical exam comes with finding the unexpected.[26] If a visit is conducted by telephone, observations are limited to verbal communication and qualitative descriptions by the patient. Some surgeons, especially in the aesthetic field, also rely on assessment of a patient's body language when evaluating their mental ability to undergo a procedure. Telephone appointments may not provide enough feedback for the surgeon and patient to establish a physician-patient relationship. Video, on the other hand, may be a more appropriate platform when deciding on the delicate relationship between a patient's mental status and their degree of preoperative understanding and postoperative satisfaction.

Telehealth may provide unique benefits to plastic surgery such as ease of access and patient privacy for cosmetic postoperative checks. Additionally, many initial consults for cosmetic patients can be conducted through these platforms, and out-of-town patients would benefit from the reduced travel. While this may serve as the only visit prior to surgery, for others it would be a screening tool.

Booking and agreement for surgeries occurred in our department in certain cases without the need to see a new patient prior to the day of surgery, although only when both surgeon and patient felt comfortable with this plan.

Examples of these surgeries included nerve decompression for migraines, transgender mastectomies, breast reduction, and cosmetic body contouring. In some cases, the patient was asked to obtain preoperative photos with our in-department photographers. This still avoided an unnecessary in-person visit with the surgeon, decreasing patient exposure and improving availability for other patients. Of course, a full physical examination and documentation was needed on the morning of surgery. Although the legal and insurance requirements to see the patient in-person prior to surgery have been lifted, such decisions are very dependent on the comfort and experience of the surgeon, and many cosmetic surgeons may choose to see the patient in the office prior to any surgery.

Another important aspect of some plastic surgery procedures is the need for topographic distance measurement and tissues compliance. For example, cosmetic breast augmentation and post-mastectomy expander placement require measurements of breast base diameter. Current home technology has been developed with the aid of artificial intelligence over the past several months (Crisalix Company, Lausanne, Switzerland) to accomplish this. The patient's cell phone is utilized to take multiple photos at home, and an advanced software computes the accurate measurements by constructing a 3-dimensional (3D) patient model in seconds. The surgeon can utilize this simulated 3D model for discussion with the patient during the telehealth visit as well as adjust body parts to simulated 3D before and after images during the consultation.

Advocates of telehealth also note the importance of creating a satisfactory patient experience. Many small details ultimately guide a patient's perception of an encounter, and therefore it is important to create a telehealth environment that establishes empathy and rapport with patients.[27] One of the most important factors that facilitates a strong physician-patient relationship is attentiveness. Even during telephone visits, when a patient may not be able to see the provider, they may still able to tell if the provider seems distracted or unfocused. Maintaining professional integrity when providing video conferencing, especially when the physician is home, is important. Boundaries can be crossed, for example, when the patient or physician is able to view the other party at home in non-formal attire. Background noise from other family members or television on a physician's video feed can instill privacy concerns for the patient. When utilizing telemedicine technology, therefore, a physician must strive to minimize distraction and maximize personal connection to optimally exchange information with the patient.[27]

There is also a psychologic component of wanting to interact with a patient face-to-face out of fear a physician may miss something if they are unable to physically touch or see the patient as well. Although video conferencing may visually aid in assessments, physicians must develop

a new set of skills to determine when a patient can be evaluated and treated via telehealth or when appropriate care can only be delivered through physical interaction.

CONCLUSIONS

While current governmental restrictions are aimed at slowing the spread of COVID-19, healthcare providers have been forced to find alternative strategies to effectively interact with patients. Telehealth has provided the means to sustain the health system during this pandemic.[5]

It is shortsighted, however, to think that the expansion of this technology will be limited to handling the current crisis.[5] Although plenty of uncertainty exists over the state of our healthcare system post-pandemic, this medium will remain a useful tool for providing prompt medical care that transcends geographic and socioeconomic barriers. It can be integrated with traditional in-person care to enhance the practitioner-physician relationship and improve patient outcomes. There is increasing congressional interest in developing appropriate long-term regulations, and patients certainly will continue demanding these services regardless of any pushback from payers. Active involvement on the part of providers and institutions with the legislating bodies and payers in negotiations is paramount. As the utilization of telehealth has never been as expansive as it is in this moment, now is the time to extrapolate data to create evidence-based guidelines for the future, because this is a generational opportunity.

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