

The Impact of COVID-19 on Telemedicine

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Abstract:

With the improvement of telecommunication and computer technology, telemedicine has been deployed to meet the clinical needs of patients and providers, primarily in the areas of mental health, chronic disease management, and patient education. Most comprehensive healthcare systems developed infrastructures that have allowed them to provide telemedicine services to their patients for over a decade. Veteran Affairs (VA) Healthcare Systems has been at the forefront of delivering healthcare through telemedicine, but the adoption by patients and providers had been slow until the advent of COVID-19. The aim of this study is to understand the ethnographies of the impact of COVID-19 on telemedicine through the data in a large VA medical center. It also explores the impact of COVID-19 on telemedicine in clinical and social economical dimensions in different specialties and clinical settings.

Introduction

This paper will provide a brief review of telemedicine from its inception to its current state, a comparison of telemedicine before and after COVID-19, the perception and acceptance of telemedicine by patients and providers, and the impact using technology has made in the quality and cost of delivering medical care. Its purpose is to provide an early description of ethnographies of the impact of COVID-19 on telemedicine.

Defining Telemedicine

Telemedicine is an umbrella term that refers to the remote delivery of healthcare and health information. According to the World Health Organization, telemedicine is "delivery of health care services, where patients and providers are separated by distance. Telemedicine allows patients and providers to communicate and exchange information in real time or asynchronously via technology solutions for the diagnosis and treatment of diseases and injuries, research, and evaluation, and for the continuing education of health professionals. Telemedicine can contribute to achieving

universal health coverage by improving patient access to quality, cost-effective, healthcare services wherever they may be. It is particularly valuable for those in remote areas, vulnerable groups, and ageing populations."

Many large healthcare systems in the US have been offering full-service telemedicine networks or systems provide a broad range of remote clinical services in various specialty areas while also continuing medical education and preventive health for over two decades [1]. The VA Health care System, the largest healthcare system in the United States, currently provides the following telemedicine modalities: 1) remote monitoring for chronic disease management, such as physiological measurement(s) recorded by patient at home and sent electronically to their care team to review and monitor for issues that would require a hospital visit, 2) asynchronous telemedicine, such as tele-retinal imaging and tele-dermatology where a technician records an image and uploads it into the medical record for later review by an ophthalmologist or dermatologist, and 3) real-time video conferencing

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between the patient and provider, which is considered a face-to-face visit for billing purposes. Real-time video conferencing is the most used telemedicine modality during COVID-19 for all care that does not require an in-person visit (i.e. procedures, diagnostic tests, such as blood and imaging tests).

The Benefits of Telemedicine

The main benefits of telemedicine becoming a major component of medical care delivery are the ability to address the three significant and persistent problems our healthcare system is currently facing: 1) the high cost of medical care that continue to increase year after year, 2) uneven geographic distribution of medical resources, and 3) inadequate access to medical resources by the under insured population and rural residents [2].

Several studies have found that the telemedicine care model reduced hospital admissions/ readmissions, length of hospital stay, emergency department visits, and mortality rates [1] [3]. Published studies of remote monitoring programs for patients with chronic heart failure have demonstrated the benefits of employing telemedicine in the care of these patients [4] [5] [6] [7]. North-Western Bavaria (Germany) telemedical stroke network published their two-year experience in managing stroke patients in mainly rural regions, showing an improvement in outcomes in Level One hospitals [8]. Telemedicine is also shown to improve clinical outcomes and to result in significant cost savings in the US correctional facilities [9]. In addition, the Veterans Health Administration has estimated that their use of telemedicine saves the system \$6,500 per patient per year, or \$1 billion in 2012, by reducing readmissions, improving chronic disease care, and providing mental health services [10].

Most studies on the benefits of telemedicine have been conducted in patients with mental health and chronic medical conditions such as coronary artery disease, heart failure, diabetes mellitus, and chronic obstructive pulmonary disease (COPD). There are currently no published studies regarding cost savings in care delivered in subspecialties. However,

reviewing the pre-consultation requirements of many subspecialties at Long Beach VA Medical Center reveals that many additional studies are required to be completed prior to a consultation. For example, orthopedic surgery and hand surgery consultations require X-rays; neurology consults require CT or MRI of the brain prior to a consultation for headaches; and cardiology requires electrocardiogram and chest X-ray prior to every consultation. Based on the opinions of several specialists we interviewed, it is highly likely that a percentage of these pre-consultation diagnostic tests and face to face consultation would become unnecessary if a forward triaging synchronized video consultation is conducted. In general, however, most studies of telemedicine cost and utilization are small, and results are inconsistent [3].

Another benefit of telemedicine is the reduction of healthcare disparities in areas with limited physician access. Approximately 20% of the United States population resides in rural areas, but only 9% of physicians serve these areas [10]. The National Rural Health Association reports that the patient to primary care physician ratio in rural areas is only 39.8 physicians per 100,000 people, compared to 53.3 physicians per 100,000 in urban areas [11]. Based on the Kaiser commission on Medicaid and the uninsured report, rural residents are less likely to have private health insurance and more likely rely on public programs such as Medicaid [12]. The difficulties in recruiting and retaining physicians are not only due to economic factors such as insurance reimbursement, but also cultural and social differences. Telemedicine can eliminate the burden of travelling for the majority of poor patients in the rural area while bringing access to more specialists for the rural population; it would also expand the patient base for specialty providers in an urban academic center or a large healthcare organization without any physical relocation. Through similar mechanisms, telemedicine can also improve patient compliance and health literacy by expanding opportunities for patient education and prevent emergency room visits and hospitalizations with the assurance of education and treatment adherence.

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Another often overlooked benefit of telemedicine is that it improves the provider's quality of life and job satisfaction due to the possibility of working from home or near home, increases drawing area and patient loads, increases collaboration among colleagues, improves skills and knowledge, and decreases isolation.

Role of Technology in Telemedicine

Improvements in telecommunication and computer technology have laid the foundation for the possibility of technology-based care delivery. Telemedicine in its current form was initially developed by the National Aeronautics and Space Administration's (NASA) scientists for the manned space flight program. It was made possible with the advancement of telecommunication and computer technology in the late 1950's and early 1960's [1]. However, it was not until the 1990's that technology for real-time teleconferencing became available at a reasonable cost which started the rapid expansion of telemedicine programs throughout the country. In the last two decades, due to rapidly advancing technology, telecommunication became faster and more efficient, and many forms of information exchange other than face to face are becoming available without a concomitant increase in cost [1]. Hardware components of telemedicine (a computer or mobile device, audio video equipment, and imaging technology and peripherals) have decreased in size and cost, increased speed and resolution, and become much more widespread among the populace. Broadband internet access, a crucial link for telemedicine, has significantly increased bandwidth and decreased cost in the past decade; this has made it possible for average users to transmit quality audio and video data at a reasonable price. The explosion of high-speed handheld devices and dawning of the 5G network technology provides an even more mature and increasingly mobile infrastructure for the expansion of telemedicine. Federal policies promoting and supporting the development of the National Information Infrastructure (NII) have produced additional impetus for establishing a more robust telemedicine

presence [13]. The maturation of telecommunication and computer technology along with the sophisticated encryption methods to protect privacy, society, and human factors, become the critical second dimension for the expansion of telemedicine.

Human Factors

One of the human factors that significantly influences the effectiveness of telemedicine is its perceived value by organizational leadership, front-line care providers, and patients [14]. The leadership of an organization must provide resources to build an infrastructure with telemedicine as an integral part of care delivered. That includes hardware, a computer network, and software that meets the Health Insurance Portability and Accountability Act of 1996 (HIPPA) requirements and, most importantly, a dedicated team that provides technical and clinical support of a telemedicine practice. In a qualitative study of telemedicine in diabetes management, the authors concluded that consistent success of telemedicine screening platforms for diabetic patients would lead to better treatment results and prevention of disease related complications if telemedicine resources are allocated systematically [15]. Healthcare providers and patients will have to recognize the benefits of this technology-based interaction over the traditional face to face meetings. The important factors that would improve patient satisfaction and hence expanding telemedicine utilization are improved outcomes, ease of use, low cost, improved communication, and decreased travel time [16].

The Barriers

The barriers for telemedicine implementation are physician and facility reimbursement, government regulations, credentialing across hospitals, state licensing, technology infrastructure such as electronic medical records, and patient and provider acceptance [14] [17].

The financial barrier which includes insurance reimbursement and parity laws remain the largest barrier to implementing telemedicine services [10]. Multiple restrictions posed by Medicare prior to COVID-19 limited the acceptance of

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telemedicine by physicians and healthcare organizations in the US. One such restriction was that telemedicine service could only be available to patients in rural regions. Another was that the telemedicine visits had to be conducted in a pre-specified area that was not in a patient's home. Restrictions like these limited the access to and utility of telemedicine as well as increased the cost of care. Also, Medicaid policies and parity laws vary in each state. One study showed that Medicare telemedicine encounters and professional fee expenditures grew sharply following changes in state Medicaid and commercial payer policy in Illinois and Michigan. Meanwhile, the Medicare telemedicine utilization growth in surrounding states in the same period showed no discernible pattern [18].

Currently, most state regulations require that consulting physicians have a practicing license in the patient's state [19]. Since medical licensure is granted at the state level, this poses a problem for physicians using telemedicine across state lines [17]. In some states, the licensure restriction of certain specialists providing telemedicine care to patients requiring the provider have admitting privileges at the patients' local hospitals further limits the access to the scarce subspecialists.

On the other hand, within the VA Healthcare system, there is a capitation healthcare delivery model with a small component of insurance reimbursement and no licensure limitation of practicing medicine within the system. Thus, the use of telemedicine care delivery has been relatively successful. In 2018, the VA formalized a goal for the "Expansion of Telemedicine Services into the Home and Other Non-VA Settings". In that announcement, rolling targets were set for when primary care, outpatient mental health, and specialty care areas providers and nurses had to become capable of offering appointments via telemedicine services to the patient's home or mobile device. The final target date of September 30, 2021 was set for all providers to become telemedicine capable. To support their goal, VA 1) created a rule and the President signed into law a provision allowing providers to care for patients across state

lines within the United States, 2) modernized intranet infrastructure, 3) improved their telemedicine platform VA Video Connect (VVC), 4) provided equipment, and 5) simplified training for providers. Additionally, a national help line was bolstered for Veterans to request assistance.

However, in addition to the financial and policy barriers, human factors also play a role in the acceptance of a nontraditional technology-based provider-patient interaction. Based on patient and physician feedback, there is a tendency for patients to be attached to face to face meetings with their care providers, and physicians to be afraid of venturing out of their comfort zone to embrace the new technology, new care models, and potential new issues with delivering care and getting reimbursed. Despite the touted potential for telemedicine, prior to COVID-19, the only consistent utilization of remote technology was in the mental health specialty [20].

The Impact of COVID-19

With the development of many teleconferencing technologies and the ubiquity of smart phones, the public is well equipped to embrace telemedicine as the main modality of accessing care. The COVID-19 pandemic became the perfect storm to usher telemedicine to the center stage of every level of medical care in each specialty.

Cultural Acceptance

The advent of COVID-19 severely compromised traditional care delivery models. The comfort of face-to-face human interaction became a cause of fear of contracting a potentially deadly virus. Another form of care delivery had to be established and, in many instances, urgently. Telemedicine became the only viable and perceived safe modality of face-to-face care for every medical specialty, even in the most procedurally oriented specialties such as orthopedic surgery, plastic surgery and head and neck surgery. Patients can be evaluated visually and verbally via telemedicine to decide whether their condition is urgent enough to risk an in-person visit with a provider or if there is a need to be admitted to a hospital for

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possible urgent or emergency treatment or procedures. The telemedicine appointment became a preferred modality for most patients and physicians in all subspecialties. Based on preliminary conversations with physicians and surgeons in various specialties, patients are usually comfortable with delaying an elective procedure after a telemedicine visit with their surgeons and being assured of no significant negative outcome being likely due to the delay.

Another cultural shift that was already in progress especially at the VA Healthcare Systems was from provider-centered care to patient-centered care. Based on Medicare rules, telemedicine encounters had to be patient-initiated. With new modifications due to the COVID-19 pandemic, patients can now get most of the nonprocedural care at home with much more flexible and available access to physicians. These changes further shifted the center of care to patients from the traditional physician centered, office-based care model.

Financial Impact of COVID-19

Medicare took the lead to remove the existing barriers; hence, many insurance companies are following suit to loosen the reimbursement criteria for telemedicine visits as detailed in the next paragraph. Many independent practice associations (IPA) further incentivize patients to use telemedicine care by waiving patient copays for telemedicine visits.

Medicare is incentivizing physicians by lifting many strict rules as following: 1) A waiver temporarily eliminates the requirement that only patients in rural areas are eligible for telemedicine. Patients can receive telemedicine services in non-rural areas. 2) The waiver temporarily eliminates the requirement that the originating site must be a physician's office or other authorized healthcare facility and allows Medicare to pay for telemedicine services when beneficiaries are in their homes or any setting of care. 3) The Office of Civil Rights will exercise its enforcement discretion and will not impose penalties for noncompliance with the regulatory requirements under the HIPAA Rules against covered healthcare providers in

connection with the good faith provision of telemedicine during the COVID-19 nationwide public health emergency. 4) A covered healthcare provider that wants to use audio or video communication technology to provide telemedicine to patients during the COVID-19 nationwide public health emergency can use any non-public facing remote communication product that is available to communicate with patients. The waiver allows use of telephones that have audio and video capabilities (e.g. most smartphones).

When COVID-19 became a pandemic in the United States, VA Long Beach Healthcare System immediately identified the increased role telemedicine would play in providing safe, non-urgent clinical care. A technical support team was put in place, and appointments were converted from on-site to virtual (either telemedicine or telephone). The initial focus was on primary care and mental health appointments. Lessons learned were then applied to increasing telemedicine in specialty care. The primary barriers were provider and patient buy-in. Initially, many providers were hesitant to rely on an unknown process, were not technologically savvy, and found it intimidating to shift their treatment paradigm to a virtual world. Similarly, some patients preferred phone calls or did not have a device they could use for a video visit. However, based on calls made during the first weekend of March 2020 to convert future primary care and mental health appointments, over 50% of Veterans agreed to and were able to convert to telemedicine. More recent conversion rates have been up to 80%, based on self-report from the test callers. By the end of July 2020, 26.4% of Long Beach Veterans had completed at least one telemedicine visit, as compared to 2.7% in February 2020.

Clinical Consideration

A byproduct of the COVID-19 pandemic on medical care is that the utilization of the emergency rooms and physicians' offices is significantly reduced. The effects on the quality of care due to the delay of diagnosis or treatment should be studied. The concern is that this would lead to a surge of complications from chronic

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medical conditions that are not followed up closely and delayed diagnosis of early stage cancers due to the fear of COVID-19 infection.

As more care is delivered by telemedicine, the number of diagnostic procedures is significantly reduced due to the access of equipment being limited in a remote site or patients' homes. Whether this would achieve medical care cost savings by eliminating many unnecessary

tests without increasing missed diagnosis has yet to be studied.

At VA Long Beach Healthcare System, the telemedicine visits have doubled every six months since the beginning of 2018. However, since the COVID-19 pandemic the number of telemedicine visits increased over 26 times in the second quarter of 2020 compared with the same period in 2019. (Figure 1)

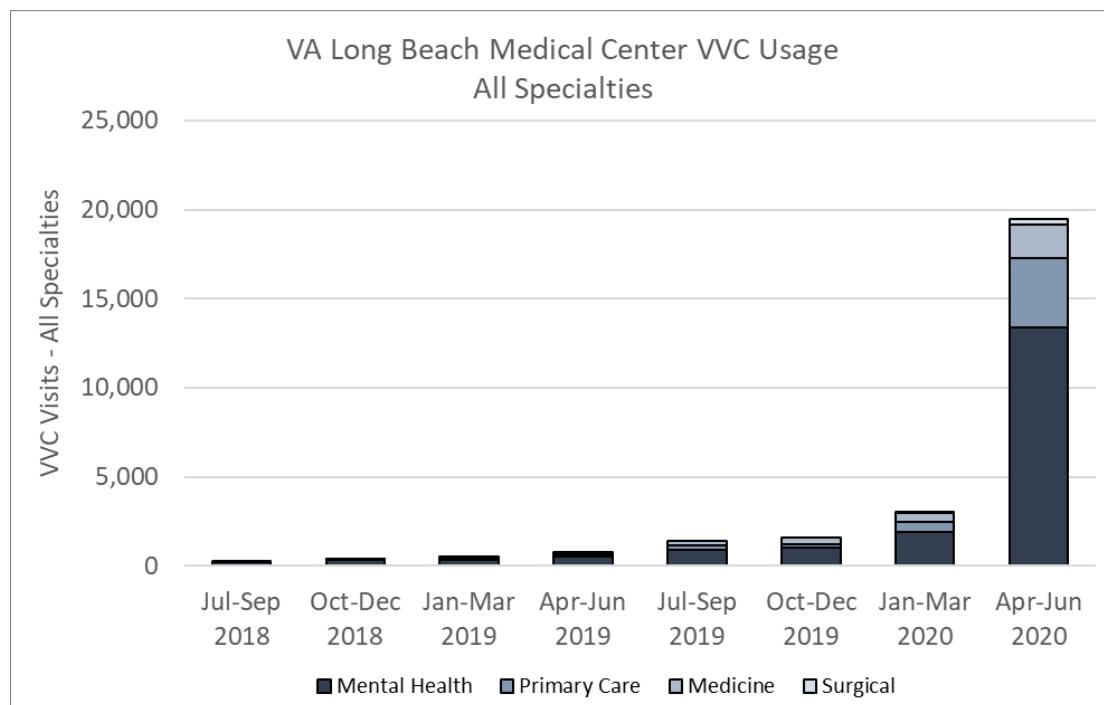


Figure 1: VA Long Beach Medical Center Telehealth to Home Visits. Telehealth to home (VVC) visits showed marked increase across VA Long Beach specialties in the quarter following the outbreak of COVID-19, April to June 2020. Most of the increase occurred in Mental Health and Primary Care, but Medicine and Surgical specialties also showed nominal increases in VVC visits.

Based on the utilization data and physician feedback, primary care, mental health, and specialties without many diagnostic procedures have incorporated telemedicine as a significant part of their practice now with better cultural acceptance and less financial barrier. However, telemedicine may not become a significant component of care modality in procedure heavy specialties.

The specialties that had started telemedicine services prior to COVID-19 saw a greater increase in the number of telemedicine encounters after the COVID-19 pandemic began. (Figure 1) While several specialties including Cardiology, Dermatology, General Surgery, Gynecology, and Urology, started their telemedicine services only after the COVID-19 pandemic,

the meaningful use of telemedicine in these specialties is yet to be determined. The specialties that are procedure oriented, such as Orthopedic Surgery, Ophthalmology and Otolaryngology, so far have not shown any significant use of telemedicine. The providers' explanations were that telemedicine would only eliminate a small percentage of face to face visits by offering assurance, and/or an empiric treatment, or a referral to another more appropriate specialties. However, most patients would need a follow-up in the office for an in-depth examination using diagnostic equipment that is not feasible with a telemedicine visit, after a preliminary telemedicine consultation.

VA Long Beach Medical Center Surgery Healthcare Group has rolled out

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phased reopening guidelines in May 2020. (Table 1) A community-based head and neck surgery clinic in a major Healthcare

Maintenance Organization in Southern California also published their post COVID-19 scheduling guidelines. (Table 2)

Table 1: Reopen Guidelines for Outpatient Clinic Encounters

	% On-site	% VVC	% Phone
Phase 1	30%	50%	20%
Phase 2	50%	40%	10%
Phase 3	*70%	20%	10%
Phase 4 (New Normal)	*70%	20%	10%

**Please note that if Telemedicine can be safely and optimally delivered for more than the allotted %, then providers and departments are encouraged to maximize safety measures by using telemedicine services to continue to minimize crowding and unnecessary exposure.*

Table 2: Scheduling Guidelines for Otolaryngology Clinic

Schedule a telemedicine consults for the following conditions Dizziness Tinnitus Hearing loss, Not sudden onset Nasal congestion Postnasal drainage Globus sensation Follow up with test results	Schedule a face to face visit for the following conditions Earaches/ ear infection Sudden hearing loss Sinus infection failed initial antibiotic treatment Nose bleeds Difficulty swallowing Hoarse voice Mass in head and neck.
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Conclusion

As devastating as the impact of COVID-19 has been all over the world, it is believed to be a positive influence of the utilization and acceptance of telemedicine by both patients and providers, even in the most unlikely and highly specialized private practice settings. Whether the newfound popularity of telemedicine will regress after COVID-19 becomes a memory in the rearview mirror, only time will tell. However, patients and physicians, healthcare institutions, and our society now have firsthand knowledge of what works and what does not regarding telemedicine. Based on the current institutional plans for the post-COVID-19 new normal, telemedicine seems to have become a permanent part of healthcare delivery in all specialties across VA. When used appropriately, telemedicine will accelerate the movement of patient centered care, improve patient access while enabling a better lifestyle for healthcare providers, and decrease healthcare cost while maintaining quality of care.

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Citation: Katelyn S. Ge & Laura A.Held, (2020), "The Impact of COVID-19 on Telemedicine", *Arch Health Sci;* 4(1): 1-8.

DOI: 10.31829/2641-7456/ahs2020-4(1)-144

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