

Analyzing the Effect of COVID-19 on Telemedicine and the Virtual Delivery of Healthcare

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction

The healthcare industry is in the midst of a virtual revolution. Although the remote provision of care via telemedicine—more generally referred to as telehealth—in the United States dates back to at least the Civil War, various barriers to adoption have historically limited telemedicine to rural and underserved areas (Bashshur & Shannon, 2009; Hare et al., 2020). Instead, medicine has relied heavily on in-person interactions to diagnose and treat health conditions (Rosen et al., 2020). That is, until the COVID-19 pandemic in 2020, which put an unprecedented strain on U.S. health systems. In particular, efforts to conserve resources, promote social and physical distancing, and mitigate community spread of the disease have hindered medical professionals' ability to see patients (Gooch, 2020). In response, health professionals have accelerated their adoption of telehealth technologies for the remote provision of care. Now, as the pandemic presents an unprecedented opportunity for practitioners to prove the merit of telemedicine, the potential for healthcare delivery to shift into a virtual space looms larger than ever before (Bashshur et al., 2020). This paper leverages Thomas Kuhn's theory of paradigm shift to analyze the uptake of telehealth according to and in terms of the phases of the Kuhn Cycle. The cycle depicts how a new scientific model deviates from, challenges, and eventually replaces a reigning model, and it is crucial to understanding the development of virtual medicine and the future of care. Specifically, this paper addresses the following questions: How has COVID-19 expedited the adoption of telehealth, and how might said adoption lead to a permanent shift in the paradigm for healthcare delivery going forward? To bolster the findings of this paper, the research concludes with a short case study of the adoption of telemedicine by the University of Virginia Health System before, during, and after the pandemic.

Background

Telemedicine and telehealth refer to the remote provision of healthcare services using digital information and telecommunication technologies (Roh, 2008). The World Health Organization distinguishes between the two terms “with the former restricted to service delivery by physicians only, and the latter signifying services provided by health professionals in general,” but now, they are used interchangeably (World Health Organization, 2010). There are three main categories of telehealth services: synchronous, asynchronous, and remote patient monitoring (eVisit, 2020). Synchronous telemedicine is delivered in real-time via two-way telecommunication such as video conferencing and phone consultations. Asynchronous store-and-forward telemedicine refers to the nonconcurrent transmission of medical data, including images, health records, and the like. And lastly, remote patient monitoring entails the use of various medical technologies to monitor a patient’s condition from afar and transmit health data to their provider.

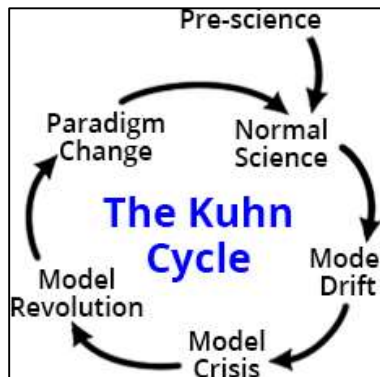
STS Framework

Paradigm Shift Theory

Hailed as one of the most influential philosophers of the twentieth century, American Thomas Kuhn developed the concept of a paradigm shift to describe how new paradigms come to upheave old ones (Bird, 2018). In *The Structure of Scientific Revolutions*, Kuhn (2012) defines paradigms as “universally recognized scientific achievements that for a time provide model problems and solutions to a community of practitioners.” The development of paradigm shifts is summarized by the phases of what is known as the “Kuhn Cycle”: pre-science, normal science, model drift, model crisis, model revolution, and paradigm change, as displayed in Figure 1.

Figure 1

The phases of the Kuhn Cycle (The Kuhn Cycle, n.d.).



According to Kuhn (2012), “pre-science” describes the time before there exists any widely-accepted paradigm for a particular practice and is often “marked by frequent and deep debates over legitimate methods.” Conversely, “normal science” refers to “research firmly based upon one or more past scientific achievements, achievements that some particular scientific community acknowledges for a time as supplying the foundation for its further practice” (Kuhn, 2012). In other words, “normal science” signifies the status quo—how members of a particular discipline or field operate according to the reigning paradigm or model for addressing problems. Over time, issues may arise that the current paradigm is unable to solve. As more of these anomalies—or “violations of expectations”—occur, practitioners question the current paradigm, and a “model drift” begins (Kuhn, 2012). “Model crisis” has been reached when “anomaly [has] lasted so long and penetrated so deep” that the relevant field enters into a state of crisis that “demands large-scale paradigm destruction” (Kuhn, 2012). In response to the crisis, practitioners may investigate other models of understanding to solve their problems, and the reigning paradigm is subject to change. During “model revolution,” practitioners “battle over [the] acceptance” of the new paradigm candidate(s) to replace the old one (Kuhn, 2012). If the new model is accepted, a “paradigm change” is said to occur. This new paradigm then becomes the basis for a new “normal science,” which persists until the cycle begins again.

The Kuhn Cycle and Healthcare Delivery

Although Kuhn initially limited the application of his paradigm shift theory to the natural sciences, nowadays the term “paradigm shift” is used more generally to refer to a significant change in an approach, way of thinking, or model (Bird, 2018; Lombrozo, 2016). Furthermore, such shifts are often identified in a variety of other scientific fields, such as the social and applied sciences—the latter of which includes medicine. This paper characterizes the paradigm shift in healthcare delivery represented by the uptake of telehealth according to and in terms of the phases of the Kuhn Cycle. The analysis begins with the normal science and the longstanding paradigm of in-person care and proceeds to the anomalies that have contributed to a drift away from the reigning model and that have built the foundation for telehealth and virtual care. The remainder of the investigation then focuses on the crisis presented by the COVID-19 pandemic and on how it has necessitated the adoption of telemedicine and has fueled the ongoing virtual revolution in care delivery. The research concludes with a discussion of the potential for virtual care to become part of the reigning paradigm and of what such a shift could mean for healthcare in the future.

Analysis of Healthcare Delivery

Normal Science

The normal science of medicine relies on a paradigm of care delivery that emphasizes the need for in-person, physical contact for a health professional to examine, diagnose, and treat a patient. Said model of care dates back to the earliest forms of medicine and is present throughout the development of the U.S. healthcare system. In the 18th century, anyone who desired to practice medicine could do so, and early physicians would provide their services to patients at their place of practice or at the patient’s home (Niles, 2021). For example, barbers often doubled

as surgeons operating out of their barber shops (Niles, 2021). Later, in the early 19th century, government-run almshouses, poorhouses, and pesthouses operated as places of care for the poor, sick, and vulnerable and served as the basis for the construction of early hospitals (Niles, 2021; Rosen, 1983). Finally, with the standardization of medicine and medical education and the first offerings of health insurance in the early 20th century, modern hospitals emerged and have served as the backbone of the U.S. healthcare system throughout the 20th and 21st century (Niles, 2021).

As the U.S. health system has advanced, one feature that has remained steady throughout the majority of its evolution is the dependence on in-person interactions to administer care. Over time, this reliance on face-to-face interaction in medicine has been further reinforced by the construction of cutting-edge facilities and the training and education of medical personnel (Jaffee, 2020). Consequently, whether it be a house call or a hospital visit, healthcare services have predominantly abided by an in-person paradigm of care delivery throughout history.

Model Drift

Evidence of Drift

Despite the well-established and time-honored tradition of in-person care, physical and temporal distance between providers and patients has hindered the provision of healthcare and has posed a problem unsolved by the reigning paradigm for ages. According to Rashid Bashshur and Gary Shannon (2009) in *History of Telemedicine: Evolution, Context, and Transformation*, alternative solutions to remote care date back to ancient times. During those times in Rome and Greece, those who were sick and unable to visit the temples themselves would send representatives in their place to convey symptoms and receive diagnoses (Bashshur & Shannon, 2009). Meanwhile, villagers in Africa used smoke signals to warn those nearby of the outbreak of disease (Nakajima et al., 2006). Fast forward several millennia, and people continued to

employ similar solutions to address the challenge of distance in medicine. Akin to sending representatives, in the 16th and 17th century, people communicated with physicians via written correspondence and postal services; similar to smoke signals, ships used flags to signal disease to ports and vice versa (Nesbitt & Katz-Bell, 2018). Although none of these solutions leverage electronics or digital information, the various modes of communication represent a primitive form of modern telehealth technologies. Furthermore, these examples reveal the shortcomings of the reigning paradigm and typify the multitude of anomalies that have led patients and practitioners to question the adequacy of face-to-face care and explore substitutes—thereby contributing to model drift.

Emergence of Modern Telemedicine

In the United States, the earliest instances of the remote provision of medical care by leveraging electronic technologies transpired in the mid-19th century. Decades after the invention of the electric telegraph in the 1830s, the Union Army used the device to report casualties and coordinate medical resources during the Civil War (Bashshur & Shannon, 2009). By the early 1900s, more advanced technologies, including the telephone and radio, were used for medical consultations and treatment (Nesbitt & Katz-Bell, 2018). From the 1940s to the 1980s, innovation and exploration led to the development of the technology necessary to support what would become telehealth in its current form. In 1948, radiological images were successfully transmitted via telephone between West Chester and Philadelphia, Pennsylvania (Gershon-Cohen & Cooley, 1950). Additionally, in 1959, clinicians at the University of Nebraska recorded the first video communication of medical examinations (Wittson & Benschoter, 1972). Telemedicine gained steam in the 1960s and 70s when the National Aeronautics and Space Administration (NASA) invested in its development to provide healthcare services to astronauts in space

(Nesbitt & Katz-Bell, 2018). During the latter half of the 20th century, the three major types of modern telemedicine—asynchronous store-and-forward, synchronous real-time interaction, and remote patient monitoring—took form, and since then, telehealth has continued to be refined with advancements in technology and healthcare in the 21st century.

Benefits of Telehealth

The benefits of telehealth extend beyond the provision of care at a distance and the greater access to care it entails. Although hospitals have acted as the foundation for U.S. health systems since the early 20th century, for decades cost containment measures and consumer preference for ease and convenience have shifted offerings away from traditional inpatient services in favor of less resource-intensive outpatient services (Niles, 2021). In response, telemedicine has been recognized and praised as an effective method of outpatient care delivery (Niles, 2021). Beyond revealing yet another way in which traditional care delivery fails to meet the evolving needs of key stakeholders, this application highlights some of the potential benefits of telehealth for patients and providers alike: lower costs, greater convenience, and improved continuity and quality of care. Furthermore, in addition to these advantages, telehealth is often cited for its capacity to enhance medical training and education as well as strengthen provider-patient relationships (Roh, 2008). These benefits have been apparent for quite some time and have led many to consider telehealth critical to the future of medicine (Eron, 2010).

Barriers to Adoption

Despite the fact that telehealth has been discussed in the context of revolutionizing the provision of care for decades in the United States, barriers involving various stakeholders have slowed its adoption. The primary stakeholders in the discussion of barriers to telehealth include public and private insurers, state and federal policymakers, healthcare workers, and patients.

With regard to insurers and policymakers, historically the largest barrier to adoption has been the limitations and variability of telemedicine coverage and reimbursement across insurers and states. According to the Centers for Medicare & Medicaid Services (CMS), Medicare reimbursement historically has been limited to those living in designated rural or underserved areas who visit authorized medical facilities to receive remote care from their distant providers (Howden, 2020). Similarly, although telehealth reimbursement is included in all states' Medicaid programs, the extent of reimbursement has varied widely based on modality, type of visit, type of provider, and location of the patient (Center for Connected Healthy Policy, 2020). The same goes for private insurers, who have historically demonstrated disparities in telehealth service coverage and rate of coverage based on many of the same factors (Center for Connected Healthy Policy, 2020). State policymakers have further hindered the adoption of telehealth via inter-state credentialing and licensing regulation as well as strict online prescription laws (Cubanski et al., 2020). Finally, the barriers originating with healthcare workers largely mirror those related to patients and vice versa. Two major barriers appertain to digital infrastructure and digital literacy. On the provider side, integrating new telehealth technology and virtual care into their traditional practice, workflow, and training is expensive and time-consuming (Grady, 2014). Similarly, for patients, access to broadband and telecommunication technologies has been an on-going challenge. Combine these hurdles with other concerns involving privacy, quality of care, awareness, and a general reluctance to change, it is no surprise that telehealth has failed to achieve mass adoption for much of the 21st century (Cubanski et al., 2020). In fact, according to Amwell's 2019 Physician and Consumer Survey, only 22% of physicians and 8% of patients were using telehealth in 2019 (Amwell, 2020).

Model Crisis

Crisis

Although telehealth technology has existed and matured for over a half a century now, the benefits of and need for telemedicine have failed to overcome the barriers to its adoption for much of the 21st century. As Kuhn (2012) notes, however, it is possible for “external conditions . . . to transform a mere anomaly into a source of acute crisis.” For the healthcare industry, the start of the COVID-19 pandemic was the “external condition” necessary to expose the shortcomings inherent to the model of in-person care.

The coronavirus disease 2019 (COVID-19) is a contagious disease caused by a virus known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The outbreak of the disease first occurred in China in 2019 and was declared a pandemic by the World Health Organization (WHO) in March of 2020 (Mayo Foundation for Medical Education and Research, 2020). In response to the pandemic, state governments across the United States enacted stay-at-home orders, and the CMS released recommendations to suspend all non-essential procedures (Centers for Disease Control and Prevention, 2020b; Centers for Medicare & Medicaid Services, 2020). Said actions were taken to reduce the transmission of COVID-19, preserve personal protective equipment, and free up medical personnel, but they were simultaneously disastrous for the healthcare industry. From March to April of 2020, U.S. health systems experienced a 60% decline in the volume of visits to ambulatory care practices, over 1.5 million lost jobs and furloughs, and an estimated 50 billion dollars in lost revenue per month (American Hospital Association, 2020; Gooch, 2020; Thomas et al., 2020). The onset of the pandemic effectively presented medicine with an anomaly so large that healthcare professionals began to question their reliance on the reigning paradigm, thereby sending the in-person model for healthcare delivery into a crisis.

Crisis Response and Emergence of a New Paradigm

In response to the COVID-19 pandemic and the inability to practice medicine in-person, the healthcare industry suddenly became much more receptive to alternative models of care delivery. Almost immediately, medical practitioners began to question the reliability of in-person care and to investigate other solutions—a progression Kuhn (2012) calls “a transition from normal to extraordinary research.” Telemedicine—being a well-developed yet under-utilized technology—was quickly identified as a potential solution.

Thrown into a state of desperation, the healthcare industry and its stakeholders demonstrated they were willing to go to great lengths to enable medical professionals to employ telehealth technologies for the remote provision of care. Integral to said effort was the quick dismantling of many barriers that hindered telehealth adoption for decades. Beyond raising awareness of telemedicine among patients and providers, the need for remote care forced many professionals to overcome their reluctance to change and suspend their concerns regarding quality of care (Bashshur et al., 2020). As for the insurers and policymakers, in March of 2020 the CMS announced that Medicare would cover telemedicine services for patients from any geographic location, would allow a broader range of communication methods, and would include the home as an originating site—changes that caused telehealth encounters among members to skyrocket from 11,000 to 1.3 million per week in less than a month, representing over 40% of Medicare primary care visits in April compared to less than 1% in February (Bosworth et al., 2020; Howden, 2020; Pifer, 2020a). Likewise, many states relaxed restrictions on inter-state licensing and online prescriptions, expanded telehealth coverage in their Medicaid programs, and mandated that insurers demonstrate service and payment parity for telehealth (Cubanski et al., 2020). And where such parity was not mandated, many commercial insurers voluntarily made

said changes (Cubanski et al., 2020). With these alterations, by the summer of 2020, telemedicine established itself as a reliable method of providing care during the pandemic, and national health institutions such as the Centers for Disease Control and Prevention (CDC) had begun to promote telemedicine as a critical solution for providing care in a manner that reduces exposure, preserves personal protective equipment (PPE), and minimizes stress on health systems (Centers for Disease Control and Prevention, 2020a).

Thus, since March of 2020, the added risks of the pandemic have increased the awareness of, availability of, and demand for remote care and simultaneously dismantled several major barriers to the adoption of telehealth. Consequently, telemedicine thrived in 2020. As reported in Amwell's 2020 Physician and Consumer Survey, physician telehealth usage more than tripled to 80% from 2019, and consumer telehealth usage more than doubled to 22% (Amwell, 2020). Additionally, according to an analysis of a patient satisfaction survey from Press Ganey, early pandemic data suggested that patient satisfaction was significantly higher for virtual visits compared to in-person visits (Ramaswamy et al., 2020). With such significant uptake, the potential for medicine to shift into a virtual space had emerged.

Discussion

Model Revolution

As previously stated, despite telemedicine's having been around for decades, it was not until the COVID-19 pandemic rendered remote solutions a necessity that such technology experienced widespread adoption and that the potential of virtual care delivery was recognized. As Kuhn (2012) notes, such lack of anticipation of a new model is common: "Often a new paradigm emerges, at least in embryo, before a crisis has developed" but "in the absence of crisis those anticipations [of said paradigm are] ignored." More than ever before, the paradigm of

virtual care is receiving serious consideration, and the actions taken now may determine whether or not virtual care will establish itself as a permanent part of healthcare delivery going forward.

Even with recent gains in telehealth prevalence, there is no guarantee that telemedicine adoption and utilization will continue throughout the remainder of the pandemic or after it is over. Many of the actions taken to dismantle barriers to virtual care are temporary, and it is unknown whether or not they will return post-pandemic. Some temporarily-removed barriers—those regarding reimbursement, coverage, and inter-state licensing—are integral to telehealth adoption, and their renewal could be catastrophic to virtual care’s long-term success. Meanwhile, if not reinstated, others such as the present relaxation of HIPAA laws may actually hurt virtual care’s adoption due to a shared concern among patients and providers for privacy and security. Moreover, while the pandemic has dealt with some of the barriers to telehealth, others remain largely unaddressed, including those regarding digital infrastructure, telehealth training, integration into practice, and more. These problems are a major reason why some medical practitioners may be skeptical of the future of telemedicine in their practice.

The potential to revert to the pre-pandemic status quo is not lost on proponents of virtual care, though. For many professionals in the medical field, the pandemic presents an unprecedented opportunity to prove the merit of telehealth and move medicine into a virtual space (Bashshur et al., 2020). According to Bashshur et al. (2020) in the journal of *Telemedicine and E-Health*, there is much to be learned from telemedicine during the pandemic that could shape the future success of telehealth and virtual care. Already, telehealth during the pandemic has demonstrated the following regarding its barriers: that a “sizeable proportion of outpatient visits” can be accomplished virtually without compromising quality of care; that the basic digital infrastructure exists; that healthcare professionals can learn and integrate quickly; and that

government regulation can be relaxed (Bashshur et al., 2020). Furthermore, as the authors note, the mass adoption of telemedicine in response to the pandemic is like “a natural experiment,” the results of which can and should be analyzed to support “policy, design of optimal systems, and clinical decision making” (Bashshur et al., 2020). In an article from the *Journal of Telemedicine and Telecare*, Thomas et al. (2020) goes beyond reflecting on the current state of telehealth and outlines several key requirements to sustaining its growth. According to the authors, if telemedicine is to flourish after the pandemic, all stakeholders must be involved (Thomas et al., 2020). University curricula and professional resources must be updated to support the training of health professionals in telehealth. Government legislation is necessary to change telehealth coverage provided by public and private insurers and expand inter-state licensing. Health systems must invest in the technology and standardization necessary to enhance interoperability and security, while governments invest in broadband internet coverage and related technologies for the public. Medical practices must fully integrate telehealth into their workflow. And lastly, consumers must actively advocate for telemedicine. Thus, by building upon the lessons learned during the pandemic, the healthcare industry may actually complete the revolution and make virtual care a permanent fixture in healthcare delivery going forward.

Paradigm Change and Normal Science

The following question remains: What would such a paradigm change in healthcare delivery mean for the future of normal science in medicine? Critics of paradigm shift’s application to models for healthcare delivery might point out that it is naïve to suggest or believe that virtual care is capable of replacing entirely the practice of in-person medicine. And they would be right. While telehealth technologies and virtual care have shown great promise for the likes of office visits, out-patient care, and non-emergent care, it has not proven as effective for

the likes of in-patient care, emergency care, and visits requiring closer physical examination (Centers for Disease Control and Prevention, 2020a). But just as there are serious healthcare problems that can be solved by an in-person model for care delivery and not by a virtual one, this paper—the past anomalies and the COVID-19 pandemic depicted herein—demonstrates that the reverse was, is, and may continue to be true. The point is that neither model is capable of guiding healthcare delivery alone. Consequently, the paradigm change that may result from this virtual revolution is not from an old paradigm to a completely different new one, but rather from one to a hybrid of the two. The share of medicine delivered virtually has the potential to grow with advancements in science and technology, changes in consumer preference, and improvements in digital ecosystems. Forecasts for the future of care delivery support this shift. According to an EY survey of the healthcare industry in 2020, over 60% providers and consumers expect virtual care to be integrated into hospitals in the next 10 years, and in response, 81% of providers plan to accelerate their adoption of digital technologies (McBride, 2020). Thus, evidence would suggest that virtual care is here to stay. With said hybrid paradigm, a new normal science of medicine may emerge that leverages in-person and virtual care in-tandem to expand access, lower costs, and improve quality of care in the healthcare industry.

Counter-Arguments

This paper argues that healthcare delivery is in the midst of a paradigm shift and that the COVID-19 pandemic has been critical to the realization of telehealth and the virtual model of care to come. There are, however, counter-arguments to such assertions. First, some may disagree with the significance attributed to the pandemic and instead maintain that such a shift to virtual care was and is bound to happen regardless. While it is true that experts have been anticipating telehealth for decades, various barriers—behavioral, technical, institutional, and the

like—have hindered adoption and allowed the healthcare industry to treat remote care problems as exceptions rather than the norm. The pandemic effectively elevated the problems that remote care posed to traditional healthcare delivery from a mere anomaly—small enough to be ignored by practitioners—to a crisis impossible to ignore. It has proven integral to showing what telemedicine is capable of, changing stakeholder perception of what it takes to deliver care virtually, and achieving mass adoption—arguably triggering decades-worth of progress in a matter of weeks (Pifer, 2020b).

A second criticism of this paper—and the more serious of the two—might be that the described shift to a hybrid model of care does not constitute a significant enough change to be labeled a paradigm shift. First, it is important to note that, although Thomas Kuhn originally discussed paradigm shifts in the context of the natural sciences, the theory’s application has since been expanded to social and applied sciences; with said expansion, what constitutes a paradigm shift appears to have become more fluid. Secondly—and more importantly—to make such a criticism would be to underestimate how divergent virtual care delivery is from the age-old tradition of in-person care and how much integration of such a model would change the way patients and providers experience healthcare. But it is normal for some people to have their doubts. As Kuhn (2012) states, although “To outsiders they may . . . seem normal parts of the developmental process . . . [Scientific revolutions] need seem revolutionary only to those whose paradigms are affected by them.”

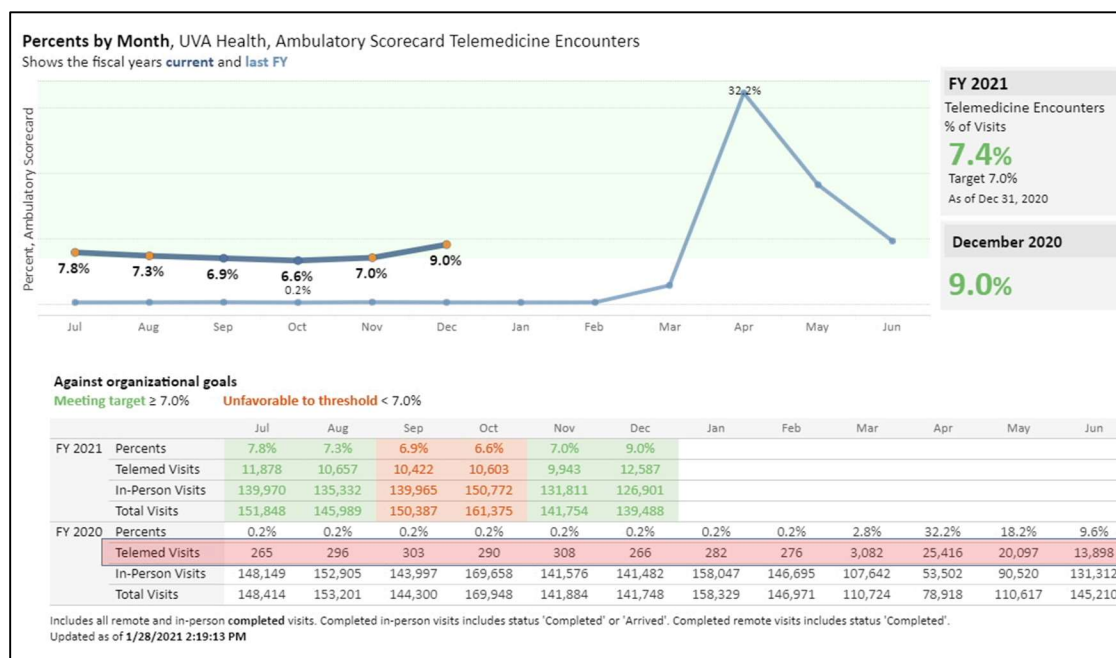
A Case Study of the Adoption of Telemedicine by the UVA Health System

The transformation of care delivery within the University of Virginia (UVA) Health System since 2019 exemplifies on a small scale the virtual revolution occurring throughout the U.S. healthcare industry. According to Dr. Karen Rheuban—pediatric cardiologist, former

president of the American Telemedicine Association, and director of the UVA Center for Telehealth—telemedicine efforts at UVA began in earnest when she and colleague Lieutenant Colonel Eugene Sullivan founded the UVA Center for Telehealth in 1996—a time when few knew of the existence of telemedicine and there were limited technology, policy, and guidance in place to support its adoption and implementation (personal communication, March 24, 2021). With minimal reimbursement available, in the beginning the telehealth program relied heavily on federal grants to provide limited facility-based virtual services primarily to rural and underserved areas (K. Rheuban, personal communication, March 24, 2021). Over the next two decades, she and her colleagues at the Center for Telehealth worked hard to mobilize health professionals, policymakers, and technologists to achieve the digital infrastructure, partnerships, legislation, and stakeholder buy-in necessary to promote telehealth in the state of Virginia and beyond (K. Rheuban, personal communication, March 24, 2021; UVA TmedTech, 2016). Despite the many breakthroughs in telehealth since 1996, however, before March of 2020, the health system relied nearly exclusively on in-person interactions to administer direct-to-consumer care. In fact, from July 2019 to February 2020, less than 1% of over 1.2 million Epic-documented ambulatory visits conducted by UVA Health were done so via telemedicine (e.g., video or telephone), according to Figure 2.

Figure 2

UVA Health System telemedicine dashboard for ambulatory visits since 2019 (UVA Health System, 2021)



With the onset of the COVID-19 pandemic, however, the grip of the reigning paradigm on the UVA Health System weakened suddenly and dramatically. In response to the pandemic, Virginia Governor Ralph Northam declared a public health emergency; in doing so, he restricted gatherings, closed non-essential businesses and schools, and directed health systems to postpone all elective surgeries and procedures (Yarmosky, 2020a; Yarmosky, 2020b). Said actions were taken to mitigate transmission of the disease, preserve PPE, and alleviate stress on healthcare workers, but they simultaneously had detrimental effects on the UVA Health System. An article from the UVA Health System Newsroom details its impact from March to April of 2020: “. . . hundreds of inpatient beds have been regularly unoccupied, surgeries have declined by 70%, and clinic visits have been reduced by 90%. The result has been a fall in revenue from clinical care and related services that is producing a deficit of \$85 million a month” (Swensen, 2020).

In response to this crisis, UVA Health practitioners immediately turned to telemedicine for the remote provision of care. According to Figure 2, only weeks later, nearly 1/3 of the

almost 80,000 Epic-documented ambulatory visits conducted in April 2020 by UVA Health were virtual. In fact, some individual clinics, such as the University Physicians of Charlottesville Primary Care clinic, saw nearly 75% of their patients via telemedicine that month (University Physicians of Charlottesville, 2021). According to Dr. Ira Helenius—medical director of University Medical Associates, co-physician head of the primary care service line for the UVA Medical Center, and one of the leads of UVA Health’s telemedicine efforts since the start of the pandemic—there were a number of key factors in making such a dramatic change possible (personal communication, March 5, 2021). First, the pandemic created an unignorable need and desperation for telehealth services. Each day, there were thousands of patients needing to be seen and hundreds of doctors that had nothing to do. As Dr. Helenius explained, under these dire circumstances, “Everyone realized [telemedicine] has to happen.” Then, when barriers regarding the likes of insurance coverage and HIPAA compliance were relaxed, “it opened the floodgates” (I. Helenius, personal communication, March 5, 2021). As Dr. Rheuban elaborated, the move by policymakers to expand coverage to include the home as an originating site was particularly significant for enabling direct-to-consumer care (personal communication, March 24, 2021). According to her, “[UVA] couldn’t have done it without the favorable public policies.” Thanks to these changes, by April of 2020, providers and patients were much more willing to conduct visits virtually.

As displayed in Figure 2, 2020 telehealth services at UVA declined from their peak at the beginning of the pandemic to hover consistently in the 6.5-10% range for all ambulatory visits. For some, such a decline might serve as a reminder of the potential for barriers to return and for medicine to revert to its traditional, pre-pandemic model of care. While the return of some barriers such as stricter HIPAA compliance are necessary for security’s sake and actually benefit

patients and providers, the return of others related to insurance coverage and stakeholder interest would be detrimental to the success of telehealth (I. Helenius, personal communication, March 5, 2021; K. Rheuban, personal communication, March 24, 2021). As Dr. Rheuban explained, “If we can’t be paid to provide [telemedicine] services, it’s hard to get people engaged to adopt [virtual] models of care” (personal communication, March 24, 2021). That being said, the pandemic has provided key stakeholders with valuable evidence to support future decision-making and policy-making that could cement the presence of virtual care in the industry (K. Rheuban, personal communication, March 24, 2021). Consequently, many are optimistic about the future of telehealth in the delivery of care at UVA. The health system has already set a target for at least 7.5% of all ambulatory visits to be conducted via telemedicine for the remainder of the pandemic and afterward (I. Helenius, personal communication, March 5, 2021). Additionally, starting in the summer of 2021, Dr. Helenius will head a strategic committee on telemedicine development at UVA that aims to continue integrating the direct-to-consumer telemedicine that has emerged during the pandemic into their provision of care (personal communication, March 5, 2021). Going forward, Dr. Helenius (personal communication, March 5, 2021) and Dr. Rheuban (personal communication, March 24, 2021) both expect that UVA will use a hybrid model for care delivery that relies on telemedicine for certain visits and in-person interaction for others. Although there are some services that cannot be done virtually, they believe that a mix of telehealth and in-person care will help to lower costs, to improve access, and to keep patients at the center of their care.

The role that the pandemic has played in accelerating the adoption and integration of telehealth by the UVA Health System cannot be overstated. Historically, achieving change across the entire medical center is extremely difficult (I. Helenius, personal communication,

March 5, 2021). The pandemic forced all of the necessary resources and personnel—compliance, IT, training, providers, and more—to come together and address the problem of care delivery head-on and in a short amount of time. According to Dr. Helenius, with the “red tape slowness” gone, “there were things [they] completed in one meeting that would have taken six months pre-COVID” (personal communication, March 5, 2021). The adoption of telemedicine in response to COVID-19 has proven just how nimble and adaptable medicine can be when faced with new challenges. Some concerns for virtual care persist: namely, those related to public policy, digital infrastructure, and the potential for telemedicine to exacerbate disparities in healthcare access for underserved populations (I. Helenius, personal communication, March 5, 2021; K. Rheuban, personal communication, March 24, 2021). Nevertheless, leadership at the UVA strongly believes that the pandemic has changed medicine and has done so for the better.

Conclusion

For ages the challenge of providing care at a distance has tormented medicine and remained largely unresolved. A promising alternative to the traditional in-person model for care delivery emerged with the development of telehealth technologies in the mid-20th century; however, telemedicine failed to achieve widespread adoption well into the 21st century. That is, until the COVID-19 pandemic in 2020, which drastically limited the ability of the U.S. health systems to provide care in-person. Since the beginning of the pandemic, desperation and necessity have led to the temporary removal of many barriers to telemedicine and to near universal acceptance among stakeholders. Now, the potential for healthcare delivery to shift into a virtual space looms larger than ever before, but it is far from guaranteed. The healthcare industry must build upon the lessons learned and the progress achieved during the pandemic. If they do so successfully, a new hybrid model for care delivery that relies on both in-person and virtual care together may emerge and transform healthcare forever.

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