

IS TELEMEDICINE THE FUTURE PRIMARY CARE PHYSICIAN? AN ANALYSIS OF  
PAST, CURRENT, AND FUTURE TRENDS

Presented by: Mary Kvinta

TC 660H  
Plan II Honors Program  
The University of Texas at Austin

Spring 2019

---

Dr. Richard Nauert  
School of Human Ecology, McCombs School of Business  
Supervising Professor

---

Dr. Lance Bertelsen  
Department of English, College of Liberal Arts  
Second Reader

## ABSTRACT

Author: Mary Kvinta

Title: Is Telemedicine the Future Primary Care Physician? An Analysis of Past, Current, and Future Trends

Supervising Professors: Dr. Richard Nauert and Dr. Lance Bertelsen

This thesis offers a new method of analyzing the trends of telemedicine in the past, current, and future states, particularly in relation to primary healthcare settings. This thesis consists of a literature review of various studies, an analysis of current legislation, and suggestions for future improvements of the healthcare system in the United States. The terms surrounding telemedicine will be defined and the history of telemedicine will be explained in order to convey an understanding of the topic and to allow the reader to deduct general conclusions from the thesis. The thesis will focus on the patient perspective, the healthcare provider perspective, and the challenges that these two respective groups of people face in relation to successful implementation of telemedicine. Conclusions from this thesis are applicable in the current age due to the rising cost of healthcare, the healthcare shortage in certain geographic areas, and the increasingly technological presence in the United States and in the world.

### Acknowledgements

I would like to thank Dr. Richard Nauert for teaching me the fundamentals of health policy and for his mentorship and encouragement throughout my thesis topic.

I would like to thank Dr. Lance Bertelsen for his help improving my writing skills and for his mentorship and encouragement throughout my thesis topic.

I would like to thank the Plan II Honors Program for introducing me to a wonderful education and to lifelong friends.

Finally, I would like to thank my parents, William Kvinta Jr. and Anna-Maria Kvinta, for their constant encouragement and for providing me with the opportunity to be where I am.

## Table of Contents:

Abstract.....	2
Chapter 1: Introduction.....	5
Chapter 2: The Patient’s Perspective of Telemedicine.....	15
Chapter 3: The Healthcare Provider’s Perspective of Telemedicine.....	27
Chapter 4: The Economic Challenges of Telemedicine Implementation.....	36
Chapter 5: Business of Telemedicine.....	44
Chapter 6: Future Suggestions on Improving Telemedicine in Primary Care.....	49
Bibliography.....	55

## **Chapter 1: Introduction**

### Background of Telemedicine

According to the Institute of Medicine, telemedicine is defined as “the use of electronic information and communications technologies to provide and support health care when distance separates the participants” (Fathi et al., 2017). Telemedicine, also referred to as telehealth for the purposes of this paper, originated in the year 1905, when a Dutch psychologist used a telephone to monitor and analyze transmissions of cardiac rhythms (Fathi et al., 2017). Telemedicine expanded through several initiatives, including from the National Aeronautics Space Administration (NASA), since healthcare delivery at a distance was needed (Fathi et al., 2017). The Kaiser Foundation International utilized some of these early experimental successes to successfully implement remote monitoring systems aiding rural communities (Fathi et al., 2017). Telemedicine has continued to grow and evolve in the present day. With the growth and evolution of telemedicine, many questions regarding its impact have been raised. The following discussion is an attempt to come to terms with some of the questions telemedicine raises and provide possible solutions in order to examine how telemedicine can be better utilized in primary healthcare settings.

The first section of the thesis examines the history of telemedicine in specialty care and the future of telemedicine in primary care. As the United States has undergone rapid urbanization, a greater need for accessible, affordable healthcare in urban cities has resulted. Additionally, with rising healthcare costs, the goal of affordable healthcare has been a national issue in recent years. This issue has been aided by policy decisions and consumer habits, culminating in confusion for patients and healthcare providers regarding the best treatment options for health.

The second section of the thesis compares the patient perspective with the healthcare provider perspective for telemedicine. Telemedicine has far-reaching implications for both healthcare providers and patients, as it affects reimbursement rates, poses logistical challenges, licensure requirements, and more. Who can offer telemedicine? What types of telemedicine are there currently available to patients? How is telemedicine conducted? These questions will be addressed in the thesis in order for misconceptions regarding telemedicine to be limited and resolved. Examining what factors motivate patients to use telemedicine compared to traditional face-to-face visits and comparing these factors with motivations for healthcare providers to deliver telemedicine will be fundamental to understating the research question.

Next, economic implications of telemedicine and the business of telemedicine will be analyzed in order to understand what currently works from an economic perspective and what policies need improvement in the future. Medicaid, Medicare, private insurance companies, and other payment models will be analyzed in the context of telemedicine to understand how reimbursement rates affect the utilization of telemedicine, specifically telemedicine in primary healthcare settings. Conclusions will be drawn based on state and national telemedicine rules in order to offer suggestions for improving telemedicine legislation in the future. Specifically, the role of the states versus the national government will be a topic of discussion in relation to governing power and decision-making abilities.

Finally, future suggestions for telemedicine will be examined in the context of the increasingly technological American society in order to understand the role of technology in healthcare and to better understand how future healthcare will operate. Furthermore, future recommendations for telemedicine in the context of primary care will be suggested.

### Telemedicine's History and Future in Primary Care

The United States currently suffers from a primary care physician shortage (Phillips, 2018). As a result, the sustainability and success of the healthcare system currently in place is uncertain. Defining primary care can prove challenging, as boundaries of medicine often overlap. However, most health professionals agree that primary care must contain three basic functions. These are: first contact, gatekeeper, and manager (coordinator of care) (Bashshur et al., 2016). "First contact" refers to the primary care medical personnel being the first contact for patients in non-emergency situations. "Gatekeeper" means that the primary care medical personnel should limit access to specialty care to prevent fraud and overuse. "Manager" refers to managing the integration of healthcare and providing a team-centered approach. There is a concept termed the "Triple Aim" in primary medicine that aims to improve population health, enhance the patient experience, and reduce the per capita cost (Bashshur et al., 2016). Telemedicine has come into focus as a way to possibly fulfill the requirements of the triple aim. In a society where expenditures are constantly a topic of discussion, limiting expenditures is of paramount importance to ensure population health and happiness.

Although primary healthcare is not a new concept to most Americans, it is filled with waste and inefficiencies. One way that telemedicine can possibly reduce the deficiencies within primary care is by greater patient engagement (Bashshur et al., 2016). Keeping patients engaged with their health will cause them to be more motivated to attend doctor appointments, take their required medications, and live a healthy lifestyle. Furthermore, patients can also use telemedicine to obtain a greater reliance on information and communication technology (Bashshur et al., 2016). In a world where a technological revolution has changed the global sphere, relying on information and communication technology in the health sector seems

warranted and necessary for the United States to present themselves as a leader on the world stage.

Another way telemedicine can aid primary care and the broader healthcare system is to aid the transition from volume-based payment to value-based payment. This initiative has roots in the United States Department of Health and Human Services, which launched the value-based payment idea in 2010 (Bashshur et al., 2016). Included within value-based care are the aims of greater reliance on health information technology (HIT), healthcare provider incentives for high-value care, team-centered care, and improved coordination of care. From 2014 to 2024, healthcare spending is expected to increase at a rate of 5.8% per year in the United States (Bashshur et al., 2016). This amount equates to approximately 20% of the United States' GDP. With such a large percentage of healthcare spending going towards primary care and more expected in the future, it makes sense that the Triple Aim and the value-based payment system are worthwhile initiatives to ensure a brighter future for future generations.

Policy decisions have guided primary care interventions in the United States. For example, the Affordable Care Act (ACA) in 2010 included provisions to “incentivize patients to access primary care and preventative health services” (Fathi et al., 2017). As a result, cancer screening and annual physicals, as well as reduced out-of-pocket expenditures for primary healthcare services, became the mission of the healthcare system under the ACA. In response to this initiative, the demand for primary care physicians increased in the United States (Fathi et al., 2017). The demand for primary healthcare workers is especially felt in Health Professional Shortage Areas (HPSAs) (Fathi et al., 2017). In HPSAs, patients often have to drive long distances to see advanced healthcare providers, such as physicians. One positive solution to the HPSAs is staffing through nurses locally and physicians remotely. The number of nurses has doubled since 1980 and is now the largest contingency in the United States healthcare workforce



(Fathi et al., 2017). There are an estimated 3.6 million nurses within the United States, including over 200,000 nurse practitioners (Fathi et al., 2017). With more nurses than physicians available to serve in the HPSAs, telehealth provides a tangible solution to the geographical barrier of physician shortage by connecting patient and provider electronically. Nurses must “utilize the breadth of their skills to adapt, adopt, and implement telehealth services as commonly accepted, mainstream methods of care delivery” (Fathi et al., 2017).

In order to analyze the effectiveness of telemedicine in primary care health settings, a literature review was conducted by Bashshur and colleagues. In the review, 35 studies were examined. Approximately 50% of these studies were conducted outside the United States, sample sizes ranged from 100 to 652,537, and the majority of the studies were conducted via surveys (Bashshur et al., 2016). Several of the 35 studies are highlighted below in detail.

Several interesting results emerged from the study described above describing the differences in patient and physician perception of telemedicine. First, the endorsement of shared medical records was equally positive in both patient subgroups (94% compared to 96%) (Ross et al., 2005). The study also found that if patients had a prior history of Internet use, they were more likely to support shared medical records. There was no statistically significant correlation between socioeconomic status of patients or ethnicity of patients in regard to the perception of shared healthcare records (Ross et al., 2005). The difference in endorsement of medical records by patients and physicians, however, was shown to be a key finding in the study. Physicians believed to a greater extent than patients that if patients had access to medical records, problems would likely result. Physicians were also less likely to anticipate benefits to the patients resulting from shared health records. The results of this study indicate that physicians struggle to embrace the perceived benefits of telemedicine in primary healthcare settings to a greater degree than their patient populations. The perceptions of physicians and patients in regard to telemedicine

will be discussed in greater detail later in this paper. Further research is needed in order to understand why physicians' perceptions of telemedicine are worse than that of patients and in order to expand the study to ensure validity and reliability.

Additionally, in a study that examined patient perceptions of virtual video visits (VVs), positive patient perceptions were also mentioned (which adds to the Bashshur data on patient perceptions mentioned above). The primary author of the article states that "our data suggest that initial experiences for patients and clinicians were positive and that, for most encounters, these VVs are just as clinically effective and less expensive for both patient and provider compared with in-person visits" (Donelan et al., 2018). While common fears of digitalized healthcare include distracted, overwhelmed providers and a reduced human connection between patient and provider, this issue was not a primary concern to participants in the VV program (Donelan et al., 2018). These results are likely due to the use of VVs with established patients, who already have an established provider relationship (Donelan et al., 2018). Perhaps some of the hesitation of providers in the Bashshur study stems from fear of a reduced human connection between patient and provider. The study by Donelan and colleagues displays how complicated the issue of telemedicine use is and how it is not universally accepted by providers.

Another study, conducted in 2006, examined whether patients embraced paying for an online patient web portal. The study had a relatively narrow scope, consisting of 346 patients in an urban Arizona family medicine practice. A self-administered questionnaire was provided to patients that came into the clinic for a period of one month. Sixty percent of patients confirmed they would pay ten dollars to access a web health portal, while thirty percent of patients confirmed they would pay upwards of fifty dollars to access a web health portal. The findings suggested that some patients were willing to pay a small fee in order to access their primary care physician and obtain prescription refills, view their personal records, and other services (Adler,

2006). This study is too limited in scope to make generalizations from and draw broad conclusions. However, the finding for the study that patients are open to paying for web health portals is promising for the future of primary healthcare in the United States.

In another study analyzed in the literature review by Bashshur and colleagues, a Randomized Control Trial (RCT) was used on 175 patients in the United States. Patients in the control group and intervention group experienced two primary care visits. In the intervention group, the first primary care visit was in-person and the second primary care visit was via telemedicine. The control group had two primary care visits that were both in-person. The following variables were assessed in the study: time spent with the physician, ease of interaction between patient and provider, and personal aspects of the interaction between patient and provider (Bashshur et al., 2016). Both patients and providers were found to show that the visits via telemedicine were comparable to the in-person visits in care quality, and the study suggests that “patients and physicians could benefit if virtual visits were used as an alternative method of accessing primary care treatments” (Bashshur et al., 2016).

While the other studies in the literature review will not be presented in full detail below, some of the important findings that emerged in support of telemedicine in primary healthcare settings are of importance. These include improved patient attendance at doctor appointments for primary care when patients received electronic health monitors, including SMS text messages and telephone calls (Bashshur et al., 2016). These also include a 9% decrease in office visits in a large health system over a two-year period as a result of reliance on the electronic health record and reduced 30-day readmission rates by 30% as a result of telemonitoring (Bashshur et al., 2016). Additionally, the use of telehealth helped prevent and reduce the adverse effects of certain medications (Bashshur et al., 2016). These results demonstrate that telemedicine in primary healthcare settings has far-reaching impacts beyond the immediate present. When patients are

able to reduce adverse effects of certain medications, they end up not falling ill and needing more healthcare assistance. When less healthcare assistance is needed, so are fewer healthcare providers. When fewer healthcare providers are needed, the physician shortage gap is reduced. Thus, a cyclical pattern of reduced health exposure and reduced negative health outcomes is illustrated by these findings.

### Importance of Telemedicine

Telemedicine serves to address many barriers patients and healthcare providers face through the care delivery model. Many of these barriers transcend many different patient populations and are more generally applicable, such as lack of transportation to medical centers, lack of specialty care in close geographic proximity, and not having enough time to take off work for health visits. Some barriers, however, are more specific in nature. One example of a type of specific barrier is agoraphobia, the fear of certain places (Fathi et al., 2017). Agoraphobia is often seen in patients requiring psychiatric help. To break down this barrier, telemedicine helps improve access to psychiatric care for patients who would otherwise be isolated (Fathi et al., 2017). By improving access to psychiatric care for patients who fear going in person to see healthcare providers, more patients can seek medical help and the prevalent mental health issues in the United States have an increased chance of being treated. Patients also might experience less stigmatization by way of mental health treatment if they can experience treatment in the comfort of their own home. Throughout this paper, the importance of telemedicine will be highlighted in greater detail.

### Synchronous and Asynchronous Telehealth: A Comparison

Telehealth can be divided into two subcategories: synchronous and asynchronous telehealth (Fathi et al., 2017). While both synchronous and asynchronous telehealth contain benefits and negative qualities, a comparison of them is necessary in order to understand the

realm of telehealth and ways to improve telehealth in the future. There is not a “one-size-fits-all” approach for telehealth. Rather, synchronous and asynchronous telehealth both are useful for different situations and can even be used in combination with one another for the specific treatment plan of an individual patient.

Synchronous telehealth refers to live, face-to-face interactions between healthcare professionals and patients through the use of audio-video recording(s). The interaction between patient and provider is bi-directional, meaning that communication can be transmitted both to and from both parties involved. In synchronous telehealth, patients check into a clinic, specifically into a video cart in clinic that has a camera with zoom capability. The interaction is also facilitated by a nurse presenter who is specially trained in telehealth as a telepresenter (Fathi et al., 2017). Nurse to patient education is facilitated by synchronous telehealth, and providers in different locations are able to make assessments, diagnoses, and treatment plans with the support of nurse telepresenters (Fathi et al., 2017).

A subset of synchronous telehealth is referred to as eHealth, or mobile health. In this form of synchronous telehealth, healthcare visits occur at the preferred location of the patient, not the provider. Additionally, in mobile health and eHealth, the form of transmission is the patient’s personal computer or mobile phone opposed to the video cart in clinic in traditional synchronous telehealth. One particular application of eHealth or mobile health is urgent care needs, such as psychiatric crises (Fathi et al., 2017). In fact, the prevalence of telehealth in psychiatry is so prevalent that a specific term has been coined for this practice: telepsychiatry.

Asynchronous telehealth refers to contact that is not face-to-face (Fathi et al., 2017). Asynchronous telehealth can either use a store-and-forward approach, where data is collected and sent or viewed at a later date and time, or asynchronous telehealth can be live, where the communication method is text, email, etc. The best analogy researchers point to in order to

highlight the meaning of asynchronous telehealth is radiology. In radiology, providers examine pictures of patients' anatomy and report back to them with the results at a later date and time. Another example of medicine that has applications in asynchronous telehealth is the discipline of dermatology. Dermatologists can view pictures of rashes, skin conditions, etc. on patients and report back with findings at a different time. Asynchronous telehealth applications typically are non-urgent healthcare needs. This is due to the fact that there is not an immediate healthcare response.

## Chapter 2: The Patient's Perspective

If the healthcare industry is compared to a business, the patients are the customers. “Customer service” is a pillar of all successful businesses, and customer feedback is vital to ensuring future business success. That is why in order to analyze and critique the current telemedicine rules and regulations, the patient's perspective and feedback is useful. This chapter of the thesis aims to examine the results of specific research studies that examined the patient perspective of telemedicine in order to provide a baseline of the past and current trends that will direct the future trends in the right direction.

### Analysis of Specific Research Studies on the Patient Perspective

A study conducted by the University of California, Davis from 1996 to 2013 examined the economic and environmental outcomes resulting from the use of telemedicine in outpatient consultations. The study reached the conclusion that telemedicine services saved the approximately 11,000 patients in the study a total of five million miles of travel, which is the equivalent of nine years of travel time, over an eighteen-year period (Dullett et al., 2017). With a mean round-trip travel distance per consultation with a healthcare provider equating to 278 miles, and the mean time savings per consultation equating to 278 minutes, the appeal of telemedicine to patients is clear (Dullett et al., 2017). The cost savings were also substantial when telemedicine was compared to traditional in-person healthcare visits, as the mean cost savings per consultation among participants in the study was \$156.

Another study examined patient satisfaction and healthcare utilization using telemedicine in liver transplant recipients. Study participants included a control group and a telemedicine group that were matched for various variables (e.g. age, time since liver transplant, gender) (Le et al., 2018). The telemedicine group participants were 18 years of age or older, received liver transplants from the UCLA (University of California Los Angeles) Pflieger Liver Institute, and

had at a minimum one telemedicine appointment between the time period of May 2016 and October 2017 (Le et al., 2018). The average age of the study participants was 51 years with a standard deviation of 5.62 years for the telemedicine group and 52 years with a standard deviation of 6.12 years for the control group (Le et al., 2018). Thus, a retrospective study was conducted, and patients filled out three surveys (the patient satisfaction questionnaire, the telemedicine satisfaction questionnaire, and the health utilization questionnaire). The specific type of patient satisfaction questionnaire created was the PSQ-18, a common survey in clinical settings that captured seven specific domains relating to patient satisfaction (Le et al., 2018). These domains are: general satisfaction, technical quality, interpersonal manner, communications, financial aspect, time spent with doctor, and accessibility and convenience (Le et al., 2018). Through study completion, 21 controls and 21 telemedicine patients participated.

The results for the study were interesting and were broken down into three different sections: the results from the PSQ-18, the results from the TSQ (telemedicine satisfaction questionnaire, and the results from the health utilization questionnaire (HUQ). The overall mean PSQ score ( $\pm$  SD) did not differ significantly between the two groups (telemedicine:  $4.0 \pm 0.63$ ; control:  $4.02 \pm 0.69$ ;  $p = 0.89$ ) (Le et al., 2018). I found this initially surprising, but it made sense once the reasoning behind the results was explained. For example, the domain that assessed the financial burden of medical care scored low amongst controls and experimental participants, indicating that patients are likely dissatisfied with the high costs of healthcare in general (Le et al., 2018). Both controls and experimental participants scored high on the interpersonal manner and friendliness of the physician domains, indicating that telemedicine does not inhibit a patients' communication experience (as many critics of telemedicine suggest). A graph is listed below that demonstrates the full summary results of the PSQ-18.



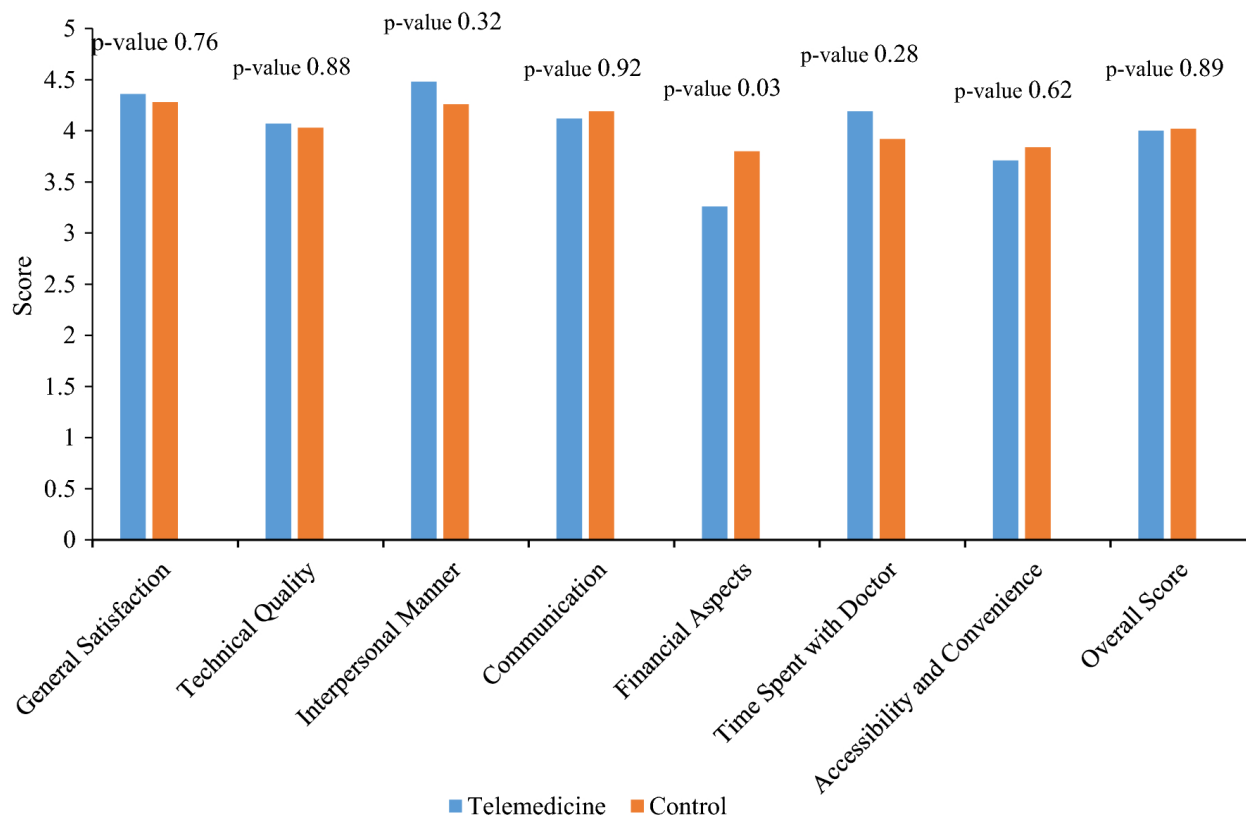


Figure 1: Comparing mean scores of the Patient Satisfaction Questionnaire-18 (PSQ-18)

In order to analyze the HUQ between the two groups in the study, a one-way ANOVA test was performed (Le et al., 2018). The mean score for each question of the HUQ was higher for the telemedicine group compared to the control group, with significant  $p$ -values for five out of nine (56%) questions in the questionnaire (Figure 2) (Le et al., 2018). The telemedicine group had the highest satisfaction for the variable of saved travel time. The telemedicine group also benefitted significantly when compared to the control group when the following were considered: less time off of work in order to attend follow-ups less time spent waiting for their provider, and less frequently having to request a family member, friend, or caregiver to take time off from work to assist them to their follow-up appointments (Le et al., 2018). The full results of the HUQ analysis are displayed below in Figure 2.

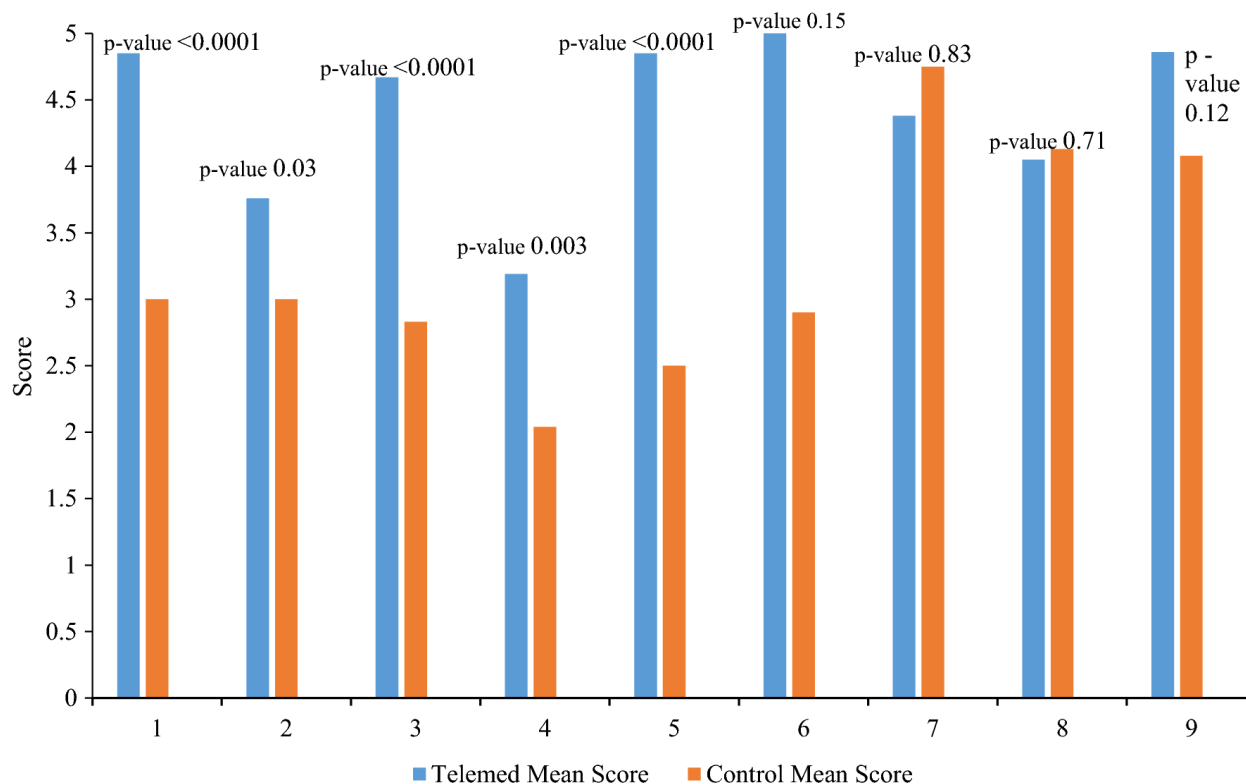


Figure 2: Comparing mean scores of the Healthcare Utilization Questionnaire (HUQ)

Finally, the telemedicine satisfaction questionnaire, otherwise known as the TSQ, was used in order to understand patient's overall satisfaction with telemedicine according to various parameters. Participants ranked their answers to various questions on a scale of 1, indicating they do not agree, to five, indicating strong agreement. Among the questions asked were:

- 1.) I can easily talk to my healthcare provider.
- 2.) I can hear my healthcare provider clearly.
- 3.) My healthcare provider is able to understand my healthcare condition.
- 4.) I can see my healthcare provider as if we met in person
- 5.) I do not need assistance while using the system.
- 6.) I feel comfortable communicating with my healthcare provider.
- 7.) I think the healthcare provided through telemedicine is consistent.

- 8.) I obtain better access to healthcare services by use of telemedicine.
- 9.) Telemedicine saves me time traveling to a hospital or clinic.
- 10.) I do not receive adequate attention.
- 11.) Telemedicine provides for my healthcare need.
- 12.) I find telemedicine an acceptable way to receive healthcare services.
- 13.) I will use telemedicine services again.
- 14.) Overall, I am satisfied with the quality of services via telemedicine.

As indicated by the questions above, the questionnaire broke telemedicine into various patient-focused sections. The questionnaire was used as a tool to enable information regarding what patients view as most important when they seek telemedicine services. The results of the study indicated that patients unanimously were content with the attentiveness received during their visits with the physician via telemedicine, referred to as TSQ item 10 above (Le et al., 2018). This is evident by the fact that the mean numerical response to every question (1-14) on the TSQ was at or above a 4.0 (Le et al., 2018).

The question with the highest numerical response was the saved travel time, with a score of  $4.62 \pm 1.06$  (Le et al., 2018). This indicates valuable information going forward on the quest of improving telemedicine, since we now have preliminary evidence to suggest that saving travel time (and perhaps time in general) is the most important factor to patients when receiving telemedicine treatment. This result should be incorporated into future telemedicine action plans and should be a driving force for patient education. Saving time is also an important factor to consider when examining whether to prioritize synchronous vs. asynchronous telemedicine care to patients regularly. Since the study was published in 2018, these results are recent and promising. However, more research is needed to better understand if physicians and other

healthcare providers have a similar view of saving time as the most important factor in telemedicine.

The lowest mean score extracted from the questions in the TSQ was question 5, regarding whether patients required assistance with the telemedicine system. This “highlights the importance of thoroughly orienting patients prior to the first telemedicine appointment” (Le et al., 2018). Without proper patient education on how to use the telemedicine interface, it is difficult for patients to feel comfortable enough to use telemedicine effectively. Therefore, a priority of physicians, legislators, and community members should be to incorporate patient education for telemedicine in an effective manner.

If utilized in the right patient population, telemedicine has the potential to significantly improve clinic flow, to reduce wait times, and to save cost for patients (Le et al., 2018). As a result, further investigation in a variety of clinical settings is warranted in order to optimize healthcare utilization in the United States. The study found that busy, high-patient-volume clinics across the United States should strongly consider providing telemedicine services in order to reduce clinic wait times and to provide more flexible scheduling for patients (Le et al., 2018).

Another study examined whether patients thought that their asthma could be treated effectively through the avenue of telemedicine (Portnoy et al., 2016). In the study, the specific type of telemedicine used was the InTouch Lite Remote Presence Solution (RPS) (InTouch Health, Goleta, California) at the patient end and a Dell Laptop running InTouch CS, version 20.31, software at the health care professional end (Portnoy et al., 2016). This specific telemedicine software system allows the health care professional to see and hear a patient in real-time and “to pan and zoom a wide-angle camera located on the front of the RPS so that the patient can be tracked” (Portnoy et al., 2016). The software also allows the health care professional to activate a digital stethoscope located on the RPS in order to listen to heart and

lung sounds. The healthcare provider can also activate an s-video feed connected to a digital otoscope in order to examine a patient's ears and nose (Portnoy et al., 2016). Finally, a high-resolution camera is used to examine the throat and skin (Portnoy et al., 2016). The various cameras associated with the system allow for the healthcare provider to take pictures of the patient at various time points. The following figure (figure 3) below is included in order to better understand the software of telemedicine in this particular study.



Figure 3: Health care professional interface for telemedicine showing examinations of the oral cavity, examination of the tympanic membrane, and auscultation of a patient with a digital stethoscope (Portnoy et al., 2016).

Patients in the study with asthma were divided into two groups. In one group, the patients were seen via telemedicine where a telepresenter in the room was either a nurse or respiratory therapist who was authorized to conduct telemedicine (Portnoy et al., 2016). In the second group, the patients were seen via traditional in-person visits with their healthcare provider. Both patient

groups were seen three times during the study: at the first visit, after a time period of 30 days, and after six months had passed since the first visit (Portnoy et al., 2016). The patients that were seen via telemedicine professionals were asked to fill out a satisfaction survey that asked questions about their experience. According to the findings of the survey, “most patients strongly agreed that it was easy to see and hear the health care professional and that they could understand the instructions. They also had a sense that the health care professional cared and that they could ask questions” (Portnoy et al, 2016). Generally, distance traveled by the telemedicine patients was short. Several patients, however, had to travel a longer distance to get to the telemedicine clinic. Most patients stated they would recommend telemedicine to other family members in the future (Portnoy et al, 2016).

The reason for including the asthma study in this section of the thesis is twofold. First, the study highlights patients’ perceptions of telemedicine when travelling to a telemedicine site and clarifies the way telemedicine is conducted. Second, the study articulates some of the technological details of telemedicine software and pictorially illustrates a telemedicine patient visit in a meaningful way to the audience. The favorable results of telemedicine according to the study on patients with asthma provides positive preliminary evidence that telemedicine can work for people with chronic medical conditions as effectively as in-person healthcare visits.

#### School Children’s View of Telehealth

The number of children in school settings on any given day in the United States comprises a significant percentage of the United States population. While certain medical ailments undoubtedly require an office visit with a nurse or physician (e.g. setting a broken bone or treating severe and acute conditions), a variety of common ailments can be treated remotely. Treatment of common ailments, such as influenza and upper respiratory infections, are

appropriate for telehealth settings. The use of telehealth to treat these conditions might also reduce the rate of spread to other school children.

Fortunately, school nurses are trained to triage complaints appropriately. This reduces the potential for overuse of healthcare services, which is a common concern, given the easy access to care that telehealth offers (Zettler, 2018). The school nurse helps promote seamless communication with the physician during virtual visits, serves as the gatekeeper of students' personal health information, and operates as the principal interface between parents, students, pediatricians, and teachers on school health matters (Zettler, 2018).

An examination of children's perception of telehealth and the benefits it provides was examined through a case study experimental design at a Catholic elementary school named "Morning Star Catholic School" (Zettler, 2018). The study involved a student contracting scabies and her use of telehealth in the nurses' office to treat it through an initial consultation. In the study, the student's name was Rita. The school nurse, Peggy, decided to access a pediatrician via CareConnect to get a diagnosis for the rash Rita presented with after Peggy verified that Rita's mom had provided consent for the school to use telehealth (Zettler, 2018). CareConnect was accessed via the tablet computer in the nurse clinic. The following is a report of Peggy and Rita's interaction with CareConnect (Zettler, 2018):

As they entered the virtual waiting room, Peggy saw that Patricia Solo-Josephson, a pediatrician at Nemours, was available and selected her to conduct Rita's telehealth consultation. Moments later, the three were connected via live videoconference. Once launched, the application displayed a split screen: Rita could see herself on the monitor, along with Peggy and the pediatrician. Peggy says that she has yet to find a child who doesn't get a kick out of "being on TV," and Rita was no exception. She giggled and pointed with great delight when she saw herself on screen.

The response of Rita to the telehealth technology is promising since she reacted positively. Seeing herself on television and interacting with the healthcare provider in a technological setting shows her positive perception of the technology. As the younger

generations become increasingly comfortable with technological platforms, the results from this single case study will be more generally applicable and reliable. The current research on pediatric patient's perceptions of telemedicine are limited, however, and more research must be done to expand the current knowledge on this topic.

The study concluded that the school's use of telehealth "prevented a more extensive outbreak of scabies and reduced the amount of suffering that the affected children experienced. In the end, it limited the spread of infection to just four children, all from the same classroom" (Zettler, 2018). From a population health perspective, the use of telehealth prevents the spread of disease and prevents people from negative health outcomes. This is particularly useful in crowded school environments, where the rate of spread is fast and often uncontrollable. This study has health applications in primary care urban areas, where people with contagious illnesses such as influenza have high pass-through rates in clinic waiting rooms. If those infected with contagious health ailments are isolated through telehealth compared to in-person visits, the rate of spread across populations will be limited and significantly reduced. With fewer people contacting diseases, the general health of populations will increase and the health expenditures nationwide will decrease, both desirable aims in the current healthcare system. Furthermore, when negative health outcomes are prevented or limited, patients have a more positive perception of telemedicine.

#### Telemedicine Perception in Patients that Lack a Primary Care Provider

In the U.S., approximately 25 % of patients do not have a primary care provider or do not have complete access to one (Polinski et al., 2016). According to a 2014 survey, 81% of physicians described themselves as overextended or at full patient capacity, with no time to take on more patients (Polinski et al., 2016). This highlights the time constraints affecting the healthcare system (and patient experience) in a negative manner. Additionally, patients find that



work and personal responsibilities compete with finding convenient care (Polinski et al., 2016). Many health systems and providers have partnered with CVS Minute Clinics in order to offer medical care that supports and augments regular provider care during times when the providers themselves are unavailable (Polinski et al., 2016). The hope is that emerging technologies (such as telehealth) may further facilitate access to care when regular providers are not available. By facilitating access to care on a regular basis, telehealth technologies will hopefully improve the patient experience as well as the provider experience, resulting in greater healthcare satisfaction and lower healthcare costs from chronic conditions.

A study was conducted in CVS Minute Clinics, a service used for people that generally lack a primary care healthcare provider (Polinski et al., 2016). The study design was a cross-sectional patient satisfaction survey, and patients 18 years of age and older were recruited for the study between January-September 2014. All patients reported high satisfaction with their telehealth experience. Specifically, “convenience and perceived quality of care were important to patients, suggesting that telehealth may facilitate access to care” (Polinski et al., 2016). This study further confirms that there is a need for telehealth providers in the absence of routine primary care physicians. This study also confirms the earlier findings mentioned in prior research studies that patients have an overall positive perception of telemedicine services, and that convenience and saving time are important factors in their decision to use telemedicine.

The studies included thus far have positive general conclusions in common that allow for a clear understanding of telemedicine in a variety of patient settings. Across both primary care settings (as in the CVS study), as well as specialty care settings (as in the asthma and liver transplant studies), telemedicine was found to be positively perceived by patients. Since telemedicine has recently transitioned into the primary care setting and continues to expand, these results indicate that the expansion should be positively perceived by patients. The

complexities of telemedicine are often confusing to people outside the discipline as well as to people writing the legislation for telemedicine. A solution to the complexity of telemedicine is to weigh convenience and time efficiency at a greater degree than other variables.

### **Chapter 3: The Healthcare Provider's Perspective**

Healthcare providers' acceptance of telemedicine in primary care is an important factor in the success of telemedicine in primary healthcare settings. Without the support of healthcare providers, telemedicine would not survive. The following chapter aims to examine what the perceptions of telemedicine are among providers, what aspects of telemedicine need to be improved upon, and what the future for telemedicine in primary care likely holds. Furthermore, nurse practitioners and physicians' perceptions regarding telemedicine will be compared to highlight the diversity of the healthcare field and to provide new insights.

#### American College of Physicians Recommendations

In 2015, the American College of Physicians (ACP) released telemedicine position statements and recommendations. The ACP is a non-profit organization that contains over 150,000 national members (Daniel & Sulmasy, 2015). After the American Medical Association, the ACP is the second-largest physician group in the United States (Daniel & Sulmasy, 2015). While not representative of all physicians' beliefs, the ACP recommendations are included in this paper to illustrate the overall consensus of healthcare providers regarding telemedicine. What follows is a careful analysis of recommendations by the ACP (Daniel & Sulmasy, 2015).

The ACP believes that telemedicine is most beneficial when used between a patient and provider with an established relationship (Daniel & Sulmasy, 2015). If no previous relationship has been established, the recommendation is to consult with a provider familiar with the patient's medical history. Potential problems arise with this recommendation, however. Patients might not have a primary care doctor they routinely see, and doctors might not be able to easily contact one another to share medical histories of patients. The emergence of "ready-clinics" in grocery stores, in shopping centers, etc. has limited the necessity of patients seeing a routine care provider. With the launch of Electronic Health Records (EHRs), transcribed patient notes are

more easily accessible, but potential complications remain since not all providers use EHRs and not all patients remember the names of prior healthcare providers in order to request medical histories. While this recommendation by the ACP has good intentions in strengthening the communicative bond between patient and provider, it fails to acknowledge the complications mentioned above.

The American College of Physicians also leaves a great deal of responsibility up to the providers regarding telemedicine use in healthcare settings. Providers must make sure their malpractice insurance has telemedicine coverage provisions, providers must make sure their licensure covers the state line boundaries, providers must ensure a secure internet connection, and providers must make sure that their patients have access to the appropriate technology necessary to conduct telemedicine (Daniel & Sulmasy, 2015). With so much responsibility left up to providers, national standards fail to exist. With autonomy comes independence, but at what cost to the patient? Patients and providers deserve more protections with fewer risks. If telemedicine is not done correctly, severe consequences such as a loss of trust with patients and loss of medical reputation can result.

The ACP acknowledges some of the current pitfalls regarding telemedicine. One ACP guideline goes as far as to claim, “*there is a need to develop evidence-based guidelines and clinical guidance for physicians and other clinicians on appropriate use of telemedicine to improve patient outcomes*” (Daniel & Sulmasy, 2015). It appears that providers are willing to accept telemedicine and incorporate it into their daily patient-care routines, but only under the provision that they have less personal responsibility for conducting telemedicine. Without national guidelines, how are providers able to successfully ensure that the proper safety techniques are being followed? If the risks are too high in the minds of providers, what incentives do they have to expand telemedicine services? Unless national guidelines for

physicians and other clinicians are implemented in the near future, it is unlikely that telemedicine can expand to sustainable levels without drastic consequences. Healthcare providers need to worry about treating complex medical conditions; they should not worry about whether they will be part of a lawsuit for having a faulty Internet connection during patient asynchronous or synchronous communications.

The American College of Physicians also feels that telemedicine services should be used only as an “intermittent alternative to a patient's primary care physician when necessary to meet the patient's immediate acute care needs” (Daniel & Sulmasy, 2015). The hesitation by the ACP to fully embrace telemedicine is understandable given the lack of guidelines that inform healthcare workers. However, once again, the providers’ perspective is that they are hesitant to fully embrace telemedicine. The recommendation contains highly ambiguous language. What exactly are “acute care needs?” What is intermittent in the context of patient care? It is difficult to define these terms since so much of healthcare follows an individual, patient-centered health model. With a large percentage of the population only seeing primary care physicians once or twice per year, does this mean that patients alternate each year between telemedicine visits and in-person visits? If so, the burden of scheduling care lies largely with the patient.

#### Medical Staff Interest in Telemedicine

Medical staff must be interested in pursuing telemedicine if telemedicine is to expand successfully in the future. Nurse practitioners, physician assistants, and other mid-level healthcare providers are largely occupying an increasing sector of the healthcare industry, particularly in primary care (Saigi-Rubio et al., 2016). Thus, their opinions on telemedicine are increasingly important and must be considered for the purposes of this paper.

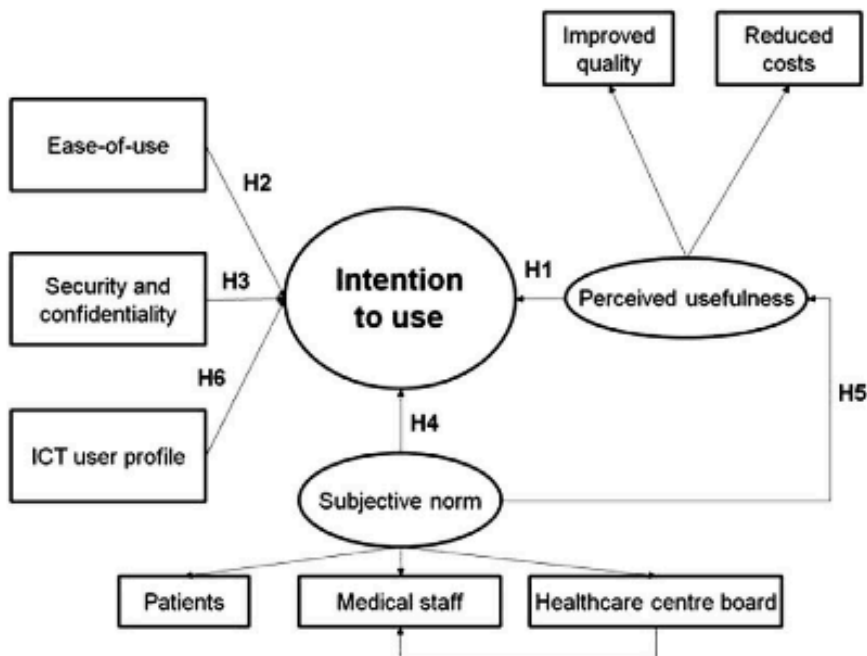
Licensing issues exist for nurse practitioners regarding telemedicine. Nurse practitioners are typically licensed only in the state in which they practice medicine (Saigi-Rubio et al., 2016).

With the expansion of telemedicine technology, however, nurse practitioners can assess patients “remotely and in a variety of settings, and could include patients located across state borders, making this single state license (one license for every state in which an advanced practice registered nurse practices) uneconomical for practitioners or employers” (Daniel & Sulmasy, 2015). Medical staff interest in telemedicine will expand only with the resolution of licensure issues due to fears of lawsuits, medical malpractice claims, and lack of insurance coverage.

Compared to physicians, nurse practitioners have already started mediating licensing issues. Attempts to restructure the license process for nurse practitioners who practice across state lines are making progress. The APRN Compact was proposed by the National Council of State Boards of Nursing (NCSBN), and it allows advanced practice registered nurses (APRN), including certified nurse practitioners, to hold one multistate license with a privilege to practice in other compact states (Saigi-Rubio et al., 2016). This is a promising advancement for the future of telemedicine in primary care health settings. The NCSBN has taken a position on telemedicine expansion that benefits both patients and providers and does not leave the challenging logistical aspects of telemedicine solely with the provider. The ACP might attempt to pass a similar legislation in the future to further streamline telemedicine use among physicians.

Medical staff interest in telemedicine abroad was examined as a case study in order to gain insights into how the United States might improve telemedicine (Daniel & Sulmasy, 2015). Three hundred and ninety-eight medical professionals in Spain were surveyed. Eighty seven percent of subjects were classified as primary care physicians. The subjects were selected via random sample, 73 percent of the subjects were women, the mean age was under 40 years, and the mean length in medical practice was thirteen years. The limitations of the study include that it was conducted in Spain, where the healthcare system is different from that of the United States. Spain has a non-profit style healthcare system run primarily by the government (Asch,

2015). However, the variables measured in the study apply globally to telemedicine use and are more psychological in nature since they include perceptions of various factors. For these reasons, the study is included in this paper.



**Figure 1.** Model, hypotheses tested and outer weights diagram (mean). Model and Hypotheses, where we considered that the medical staff's intention to use telemedicine depended on three major groups of variables: (a) the physician's perception of telemedicine; (b) the subjective norm; (c) the physician's relationship with ICTs as a user in his or her personal life.

Figure One (Asch, 2015) demonstrates the various hypotheses in the study. The figure is included to better display the connections between the various variables. Six factors are included to comprise six hypotheses. These are labeled H1 through H6. The hypotheses all relate to the central circle, intention to use, to demonstrate that the determinants directly affect the healthcare provider and their willingness to adopt telemedicine in healthcare practices.

## Figure 2: Hypotheses and Results

Study Hypothesis	Result
H1.1. The perception of improved quality has an influence on the physician's intention to use telemedicine.	Rejected
H1.2. The perception of reduced costs associated with clinical practice has an influence on the physician's intention to use telemedicine.	Accepted
H2. The perceived ease-of-use of ICTs in clinical practice has an influence on the physician's intention to use telemedicine.	Rejected
H3. The perception of information security and confidentiality offered by telemedicine use has an influence on the physician's intention to use telemedicine.	Accepted
H4.1. The patients have an influence on the physician's intention to use telemedicine.	Accepted
H4.2. The medical staff has an influence on the physician's intention to use telemedicine.	Accepted
H4.3. The incentives offered by the healthcare centre's board of directors with regard to telemedicine use has an influence on the physician's intention to use telemedicine.	Rejected
H4.4. The existence of public incentives to use telemedicine exerts a moderating effect on the medical staff's interest in using telemedicine.	Rejected
H5.1. If the physician perceives that the patients value telemedicine positively, a moderating effect is exerted on the way in which the physician perceives that telemedicine improves the quality of his or her clinical practice.	Accepted
H5.2. If the physician perceives that the patients value telemedicine positively, a moderating effect is exerted on the way in which the physician perceives that telemedicine reduces the costs associated with his or her clinical practice.	Accepted
H5.3. If the physician perceives that the medical staff values telemedicine positively, a moderating effect is exerted on the way in which the physician perceives that telemedicine improves the quality of his or her clinical practice.	Accepted
H5.4. If the physician perceives that the medical staff values telemedicine positively, a moderating effect is exerted on the way in which the physician perceives that telemedicine reduces the costs associated with his or her clinical practice.	Accepted
H5.5. If the physician perceives that the healthcare center's board of directors values telemedicine positively, a moderating effect is exerted on the way in which the physician perceives that telemedicine improves the quality of his or her clinical practice.	Rejected
H5.6. If the physician perceives that the healthcare center's board of directors values telemedicine positively, a moderating effect is exerted on the way in which the physician perceives that telemedicine reduces the costs associated with his or her clinical practice.	Accepted
H6. The ICT user profile of the physician – as an individual, in his or her personal life – has an influence on the intention to use telemedicine.	Rejected

Figure Two (Asch, 2015) demonstrates the various study hypotheses (one through six) tested by the researchers. Hypotheses are broken down into several subsections. Figure Two displays the generalized results of the study, further explained below.

The results of the case study were that telemedicine provided significant benefits. Over half of survey participants indicated their view that telemedicine reduces healthcare costs and improves the quality of clinical practice (Asch, 2015). Additionally, the majority of survey participants did not see information and communication technology (ICT) of telemedicine as a negative obstacle. Rather, they felt the technological and safety concerns of telemedicine were capable of being understood by healthcare providers to lead to successful outcomes (Asch, 2015). This is surprising, as most participants acknowledged that they did not use much ICT currently in their medical practices or personal lives. The participants were quoted as saying they



were “not particularly innovative” (Asch, 2015). These results suggest that physicians want to embrace ICT, but perhaps lack the experience to successfully implement ICT in the workplace.

Several findings emerged from the study. A ninety-five percent confidence interval was assumed for this study, so results were significant if p values were under 0.05 (Asch, 2015). First, two factors were shown to impact telemedicine use the most compared to other factors. One factor was the significant relationship between perceived usefulness in reducing costs associated with clinical practice ( $p=0.02$ ) and telemedicine (Asch, 2015). The other factor was medical staff interest in using telemedicine ( $p=0.091$ ) (Asch, 2015). Telemedicine reducing costs is not surprising. A review of the ACP’s position paper in the *Annals of Internal Medicine* found that clinician-patient time is shorter, as it requires “less chitchat that is hard to avoid in face-to-face-interactions” (Fathi et al., 2017). Furthermore, there is no need to check in at a desk or devote space to waiting rooms (which can occupy over half of the medical space). There is also no need to clean, heat, cool, or paint rooms. In fact, there is no need for large healthcare practices for primary care at all if telemedicine takes the place of traditional healthcare business models.

Other important factors in willingness to adopt telemedicine included perception of medical information security and confidentiality ( $p=0.017$ ) and patients’ disposition towards telemedicine ( $p=0.084$ ) (Asch, 2015). Perceived usefulness of improving quality and perceived ease of use of ICTs in clinical practice were both variables found to be statistically insignificant. Reasons for improving quality being a statistically insignificant variable might include the fact that perception of quality is already high. However, this result should be concerning to the medical community since improving quality is one of the selling points of telemedicine. The same is true for the perceived ease of use of ICTs in clinical practice. This demonstrates that more work needs to be done on improving the communication between patients and providers on ICTs.

The study results recognize the importance of policies written on telemedicine including social and professional determinants. Further research is needed in order to compare the results found in this study with other studies by physicians worldwide, particularly in the United States. A comparative study of public and private sectors could also prove useful. Additionally, further research is needed to illustrate the impact on patient outcomes if the social and professional determinants are put in place. Since patient outcomes are a vital component of the healthcare industry, this is extremely important. No conflicts of interest were found in this study, (Asch 2015) and future studies must keep potential conflicts of interest in mind during study design.

An interesting result of the survey was the vast influence providers feel by patients. Seventy five percent of medical professionals surveyed believed influence exerted by patients was high (Asch, 2015). The board of directors of the hospital that employed the physicians also played a large role in influencing their opinions (Asch, 2015). This was interesting since it highlights the influence of other people on providers. The healthcare industry is a service industry at its core, so I suppose it makes sense that the customers are the patients and the shareholders are the board of directors. The business model of health, however, is not as recognized in public viewpoints and often forgotten by consumers.

Several conclusions emerge from the above findings in this chapter. First, licensure issues remain one of the largest obstacles to telemedicine use among providers. My recommendation would be to pass legislation that allows for telemedicine to cross state lines without punishing providers with marked increases in insurance coverage. Another problem is the uncertainty felt by providers regarding embracing new technology. There has not been enough training to make providers feel comfortable, and since there is not a national standard to follow, providers do not have a place to go for guidance or support. Thus, my recommendation is to set national standards for how to securely conduct telemedicine, have trainings on this topic, and have evaluations of

providers to ensure that the safety of patients is being upheld. Lastly, I propose meetings with representatives from several countries as a place to share what is working well in different locations. While the United States is just now emerging into primary healthcare in telemedicine, other countries (such as Spain) have been using this technology for years. By exchanging information, telemedicine use can be improved, and risks can be minimized. If these recommendations are put into action, telemedicine has the potential to successfully replace and improve the traditional primary care of the past.

## **Chapter 4: The Economic Challenges of Telemedicine Implementation**

Economic principles guide businesses in growing successfully. In the context of telemedicine, growing successfully depends significantly on reimbursement rates, legislative policy provisions, and third-party payments. This section of the thesis will examine these areas in order to understand the current state and national economic challenges of telemedicine implementation.

### Medicare Reimbursement Telehealth Provisions:

One major factor that affects the implementation of telemedicine is governmental reimbursement rates. Governmental aid's impact on telemedicine has evolved throughout time. On August 5<sup>th</sup>, 1977, Medicare Reimbursement for Telehealth Services was enacted by Congress through legislation contained within section 4206 of the Balanced Budget Act of 1977 (Frilling, 2017). Changes were made in the year 2000 to expand on the definition of telemedicine and include new provisions. For example, payment provisions were stipulated, and Medicare was now allowed to make payment for a limited number of Part B services when "furnished by a physician or eligible non-physician practitioner to an eligible Part B Medicare beneficiary via a telecommunication system" (Frilling, 2017). One important aspect of the legislation to note is that the definition of telehealth services was limited to interactions between providers and patients that could have been face-to-face and in-person but instead were administered through telecommunications systems. Medicare-covered telemedicine services include consultations, office visits, office-based psychiatry visits, and any additional service specified when furnished via a telecommunications system (Frilling, 2017). This is a notable provision since it highlights the limited scope the government placed on communications to focus on in-person visits.

One of the reasons for the economic modifications by the government in relation to telemedicine legislation was the indisputable evidence of the positive benefits of telemedicine.

When adding telehealth services to Part B of Medicare, the government noted several positive results from telemedicine. Many of these results are mentioned previously in the paper in earlier chapters. The government highlighted the reduced rates of adverse health complications, a reduction in hospital readmission rates, decreased pain or other quantifiable symptoms, and improved recovery time when looking at the many benefits of telemedicine (Frilling, 2017).

In 2003, the federal government expanded telehealth coverage by adding several services under the umbrella term of telehealth. The Centers for Medicaid and Medicare (CMS) added end-stage-renal-disease (ESRD) coverage for nephrology services. Medicare added monthly ESRD services in order to reduce the burden of patients and providers. Included in this change of legislation was that services furnished in the physician capitation payment were “similar to existing telehealth services for consultation and office visits and would enable Medicare beneficiaries to receive nephrology care in their communities, avoiding the hardship and financial burden of making multiple long-distance trips to receive their nephrology monitoring and follow-up care” (Frilling, 2017). For many years, patients undergoing end-stage-renal disease treatment were unable to receive telemedicine treatment in the comforts of their own home or at an independent dialysis facility. However, in 2017, CMS added more flexibility to the telehealth delivery sites for dialysis and made it easier for patients to access this treatment (Frilling, 2017). More needs to be done in the future to ensure more widespread, equitable treatment for all undergoing dialysis in telehealth settings. The addition of services and provisions made by the CMS in recent years, however, is a promising indication that more can be done in the future to solve the issue of accessibility and convenience to patients and health providers.

One interesting aspect of the legislation implemented through the Public Health Service Act, section 332a is the requirement that the telehealth originating site must be located in an area

that has been designated as a rural health professional shortage area or that the originating site must be a county that is not a metropolitan statistical area (Frilling, 2017). Furthermore, the site's classification must be annually updated in order to ensure accuracy. Another important aspect to note regarding Medicare and Medicaid's requirements is that the distant site does not face the same requirements as the originating site regarding geographical regulations. In contrast, the distant site (where telehealth communications are being sent) can be an urban or rural area for telehealth communications.

Payment of telemedicine services through Medicare is well-described in legislation. Payment rules and guidelines are explained under the Medicare Physician Fee Schedule (Frilling, 2017). The billing practitioner or physician must make an addendum through a payment modifier that the health service being billed for was carried out through telehealth. The payment amount billed for the service is no different than if Medicare were to receive the payment amount through a more traditional method, such as an in-person face-to-face visit between a patient and provider. Rules of payment differ between synchronous and asynchronous telemedicine, terms explained earlier in this paper in Chapter 1. For example, the continental United States is restricted by real-time telehealth communications for reimbursement through Medicare. An exception is made for Alaska and Hawaii, where Medicare accepts payment for telehealth services utilized by means of "store-and-forward" technologies. The only provision required in store-and-forward technological utilization by Medicare reimbursement is that the healthcare provider attach an explanatory note where they explain that asynchronous telehealth services were used instead of synchronous telehealth services due to geographic limitations (Frilling, 2017). Since asynchronous telehealth has had successful results in Alaska and Hawaii with Medicare reimbursement, I am left wondering why the continental United States does not have the same privileges granted to its patients and providers. The literature explaining this question is

limited at best, and leaves much to interpretation. Possibly of concern by the federal government is the misuse or overuse of telehealth services in non-emergency situations, since typically synchronous telehealth, which is currently eligible for Medicare reimbursement, is utilized primarily for more urgent concerns compared to asynchronous telehealth, which is currently not eligible for Medicare reimbursement, and is utilized primarily for non-emergency concerns.

The definition of telemedicine that Medicare and Medicaid use requires there to be audio and visual components (Frilling, 2017). This means that there must be two-way, real-time communication present in order for reimbursement by governmental agencies to healthcare providers. Currently, telephones, facsimile machines, and electronic mail systems do not meet the criteria for audio and visual communications (even though telephones now have evolved to smartphones capable of audio and visual elements). In 2017 it was estimated that 194 million Americans, which is equivalent to two-thirds of the United States population, use a smartphone daily for various life events, including to manage their health (Frilling, 2017).

Medicare and Medicaid, as described above, currently allow for telehealth services as long as certain requirements are met. More must be done in the future to bring these services to primary health care. If Medicare and Medicaid do not properly reimburse patients seeking primary care, it will be difficult for the increasingly elderly population of today's society to embrace telehealth. Although it is evident that the federal government is adopting to the current technological trends of the current decade, they are adopting to the current technological standards at a slower pace than ideal. Smartphones must be recognized as an appropriate telecommunications device, both asynchronous and synchronous telemedicine must be recognized, and services covered by telemedicine must continue to expand in the future along with telecommunication trends. The government's reluctance to fully embrace telemedicine reimbursement is understandable due to concerns regarding waste, misuse, red tape, and

inefficient legislative processes. However, the success of telemedicine in primary care health settings might just depend on the future legislative power of the federal government. Until the federal government expands the current status of telehealth, I am reluctant to suggest that telehealth in primary care health settings is a permanent solution to the healthcare problems the United States currently faces.

#### Medicaid Telehealth Provisions and Pitfalls:

Medicaid currently leaves a great deal of responsibility concerning telemedicine up to the states instead of the federal government. As indicated on their national website, “states have the option and flexibility to determine whether (or not) to cover telemedicine; what types of telemedicine to cover; where in the state it can be covered; how it is provided/covered; what types of telemedicine practitioners/providers may be covered/reimbursed, as long as such practitioners/providers are "recognized" and qualified according to Medicaid statute/regulation; and how much to reimburse for telemedicine services, as long as such payments do not exceed Federal Upper Limits”(Medicaid.gov, 2019). An important disclaimer Medicaid puts on its website is that not all of the requirements for Medicaid coverage apply to telecommunication services. For example, comparability, state-wideness, and freedom of choice, which are general Medicaid coverage requirements, do not apply in relation to telemedicine.

Similar to the licensing of physicians putting a lot of power on the states to govern telemedicine, Medicaid outlines detailed procedures for states to follow should they choose to implement telemedicine in their jurisdiction. Among these policies is the provision that states can submit a request to the national government and Medicaid should they wish to follow different reimbursement requirements than face-to-face traditional health visits (Medicaid.gov, 2019). Thus, while Medicare requires that reimbursement rates for telehealth services be equal to traditional, non-telehealth visits, Medicaid does not have this same requirement. This leaves a



great burden on the healthcare providers since they are not guaranteed a set level of payment reimbursement for telehealth services under Medicaid. The ramifications of this provision could include less Medicaid patients being offered telehealth services due to health provider apprehension of being paid equitable and in due course by the federal government.

Not only are states left more power for telehealth services when Medicaid reimbursement is involved, but they are also required to outline which providers are eligible to practice telemedicine for Medicaid reimbursement, if any at all. States are also required to submit a letter to the federal government describing which telehealth services they will cover, where geographically telehealth services will be allowed, how telehealth services will be provided, and many other answers to questions pertaining to telehealth services (Medicaid.gov, 2019). While leaving the power up to the states for Medicaid reimbursement certainly has the advantages of better representing local constituents, allowing for more state flexibility and freedom, and paying more attention to local communities, leaving power up to the states raises troubling concerns.

For instance, if one state is allowed to use Medicaid reimbursement for rural areas only, while another state is less restricted and can use Medicaid reimbursement for all visits including primary care, patients might become confused what their states offer. Navigating the healthcare system is already confusing enough for patients without the added pressures of specific state Medicaid reimbursement regulations. Furthermore, it might become too difficult for patients on Medicaid to seek out telehealth service providers that will receive proper reimbursement. If patients are rejected by numerous healthcare providers, or if they must commute long distances in order to meet with a suitable telehealth healthcare provider, patients might give up on telecommunications and return to traditional face-to-face healthcare visits. Some of the many benefits of telehealth are reduced cost and reduced inefficiency, as well as increased access to patients. If the federal government does not standardize Medicaid reimbursement rates and allow

for more access to these services, a large population of people will not be served properly and some of the issues telehealth intended to combat regarding limited access and cheaper healthcare will be stifled. The federal government will end up spending more for healthcare reimbursement rates in traditional healthcare settings than they would if telehealth was expanded universally in Medicaid patients.

Furthermore, telehealth is underutilized by safety-net providers, including Federally Qualified Health Centers (FQHCs) due to various logistical, organizational, and policy barriers (Uscher-Pines & Mehrotra, 2019). The Office of the Assistant Secretary for Planning and Evaluation (ASPE) commissioned the RAND Corporation (a nonprofit, nonpartisan research organization that develops solutions to policy challenges to make communities healthier and more prosperous) to investigate ways Medicaid policy influences telemedicine usage. The RAND Corporation conducted discussions from June to August 2018 via telephone with representatives from seven states overseeing Medicaid programs as well as nineteen FQHCs (Uscher-Pines & Mehrotra, 2019). Discussions were thorough and included aspects of telemedicine such as “how telehealth services are structured, barriers and facilitators of telehealth, and how Medicaid policy influences telehealth implementation” (Uscher-Pines & Mehrotra, 2019).

Telehealth policies across the seven states were examined in the study in order to elucidate what is currently working and what can be improved in the future. Of the seven states’ policies, four of the Medicaid programs reimbursed for store-and-forward telehealth, while two reimbursed for remote patient monitoring (Uscher-Pines & Mehrotra, 2019). Two programs restricted the specialties reimbursed by telehealth and three programs required that telepresenters (healthcare professionals) be present at the originating site (Uscher-Pines & Mehrotra, 2019).

Conclusions of the study were profound, as they displayed important pitfalls within the current state Medicaid programs. Among concerns raised by patients were that there was a lack of clarity when understanding their state Medicaid policy's coverage for various services, insufficient reimbursement, and confusion around the requirements to hold the title of telepresenter (Uscher-Pines & Mehrotra, 2019). Other barriers identified by the RAND Corporation included a shortage of specialists available to provide services to patients in FQHCs, infrastructure and billing issues, licensing challenges (Uscher-Pines & Mehrotra, 2019). An interesting point to note is that the RAND Corporation concluded that many of these challenges could be solved if reimbursement rates by state Medicaid programs was improved.

## Chapter 5: Business of Telemedicine

Telehealth is a rapidly growing industry in the business sector. The telehealth market is projected to reach 19.5 billion dollars by the year 2015 (Elliott & Shih, 2019). Direct to consumer telemedicine is defined by the following characteristics: seamless connectivity, mobile technology, individual choice, and proximity. Seamless connectivity refers to telehealth access on demand, mobile technology refers to online scheduling and remote monitoring, individual choice refers to providing patients with autonomy and freedom to choose the optimal services, and proximity refers to immediate access to providers (Elliott & Shih, 2019). In this section of the paper the different companies leading the growth of telemedicine will be reviewed and analyzed in order to demonstrate if telemedicine can continue to grow in primary healthcare settings through the current business options.

### An Overview of Teladoc

One of the major companies at the center of the telemedicine industry is Teladoc, which naturally has both advantages and disadvantages to patients and healthcare providers. Teladoc is the United States leader in telemedicine (Barkholz, 2017). Over 20 million members are subscribed to Teladoc, with more expected in the future (Barkholz, 2017). The ease of use patients experience with Teladoc is one of the primary reasons for its success. Patients initiate a Teladoc visit by going online and creating an online account (Uscher-Pines & Mehrotra, 2014). Patients call the Teladoc call center or visit the website online and are connected to a board-certified physician licensed within the patient's state within a time period of seven minutes (Barkholz, 2017), which is a drastic improvement from the twenty to twenty-five-minute wait time patients experienced in the year 2014 (Uscher-Pines & Mehrotra, 2014). Physicians respond to Teladoc requests 365 days per year, 24 hours per day (Uscher-Pines & Mehrotra, 2014). The quick response time to patients is one of the reasons Teladoc has risen as a national company.

Potential issues with Teladoc, however, include the fact that patients do not list their symptoms in the initial online call request. As a result, no screening questions are provided to the patient that determine the urgency of the health complaint (Uscher-Pines & Mehrotra, 2014). Without determining the urgency of the health complaint, it is likely that patients will not be triaged appropriately and therefore treated in the order of most urgent to least urgent medical issues. While the seven-minute response time is relatively fast, more needs to be done in the future to prioritize patients with more severe medical complications.

A study was conducted to assess the leading reasons for Teladoc Visits by children and adults from April 2012-February 2013 (Uscher-Pines & Mehrotra, 2014). The top listed conditions included acute respiratory illnesses, urinary tract infections and urinary symptoms, skin problems, abdominal pain, vomiting, and diarrhea, back and joint problems, influenza and general viral illnesses, general advice, counseling, and refills, eye problems, and ear infections (Uscher-Pines & Mehrotra, 2014). As most of the conditions listed above are classified under primary care, the study demonstrated positive results for the future of Teladoc in treating primary care health conditions and alleviating the current primary healthcare shortage in the United States.

The cost of Teladoc is set up for primary care and specialty care visits. The estimated cost of primary care visits conducted through Teladoc is \$45, while the estimated specialty care visit cost conducted through Teladoc is \$75 (Barkholz, 2017). It is highly likely, according to multiple analysis, that the cost of Teladoc services is less expensive for payers in the healthcare system when compared to visits to the emergency department and visits to physicians' offices (Uscher-Pines & Mehrotra, 2014). The low cost of Teladoc means that more people can successfully use Teladoc as an alternative to traditional treatment options. Another way cost is perceived is by saved time. For example, Teladoc was shown to likely aid the demographic of

people who had difficulty securing time off work in order to receive healthcare (Uscher-Pines & Mehrotra, 2014).

Telemedicine companies such as Teladoc have clashed with states in recent years over their authority to operate under state guidelines. In 2017, for example, Teladoc won the right to operate more broadly in the state of Texas (Barkholz, 2017). The discussion between Teladoc and the state of Texas lasted an estimated six years and cost an estimated thirteen million dollars (Barkholz, 2017). One obstacle for expanding telemedicine in primary health care settings is the current legislative barriers of states. While Texas has granted more authority to Teladoc, there are still many provisions of telemedicine that must be amended and expanded in the current legislature of states before telemedicine can grow rapidly.

Another potential problem with Teladoc is that not enough research has been done on the benefits of Teladoc in lower-income, rural communities. Numerous studies have revealed that the patient demographic attracted to Teladoc and other services like it consists of affluent, technologically-savvy patients (Uscher-Pines & Mehrotra, 2014). In general, this patient population predominantly lives in areas where access to healthcare providers is not a daily burden (there is not usually a geographical barrier present in this patient population). In areas where there is a healthcare shortage, however, patient populations are likely at socioeconomic disadvantages and less technologically savvy. These results indicate that while society is becoming increasingly urbanized and the divide between the upper and lower classes grows, getting enough resources to rural, lower socioeconomic area in order for them to access services such as Teladoc is crucial. Patient education, technological call centers, and free or affordable community trainings on how to use Teladoc might be useful solutions to the current urbanization problems communities face. As societies increasingly become urbanized, perhaps the appeal of using telehealth will increase since people will want to avoid traffic and time off work in major

cities. Primary healthcare cannot be served by telehealth effectively until patients all understand how Teladoc and other eHealth services work, regardless of their geographical location.

### Private Insurance Companies

Private insurance companies embody a great deal of power in the telehealth sector. Parity legislation, which refers to the state or condition of being equal, especially regarding status or pay, is a major factor in the private insurance companies' coverage of telehealth services. Parity legislation is complicated across the United States, as different states have different legislation. For example, thirty-four states and the District of Columbia have parity legislation that mandates private insurance companies' reimbursement of telehealth services (Harvey et al., 2018). The extent of this reimbursement varies across states, making it difficult on patients to understand whether their telehealth services will be covered under various insurance plans.

Furthermore, state laws affecting reimbursement vary considerably based on "whether a patient has public or private insurance, how the telehealth service was provided, what are considered allowable service locations for coverage purposes, and the extent to which reimbursement for telehealth services mirrors that for an in-office visit (known as parity)" (Zettler, 2018). The lack of standardization across states with regard to private insurance company reimbursement has been and continues to be a barrier for patients and providers.

A study was conducted using national representative data from the 2010-2015 Truven® Market Scan Commercial Claims dataset in order to examine similarities and differences between states which have parity legislation for telehealth services and states that do not (Harvey et al., 2018). The study was performed in order to analyze whether having parity legislation in one's state led to greater utilization of telehealth services and increased patient health coverage. The findings of the study were that states with parity reimbursement legislation for telehealth had increased patient utilization rates for telehealth services (Harvey et al., 2018). Results also were

promising for the positive relationship between increased telehealth utilization and more private insurance coverage for services (Harvey et al., 2018). These results demonstrate that private insurance coverage is an important factor in patients' decision to seek out telehealth services. Thus, as more private insurance companies cover primary healthcare services, patients are increasingly likely to seek out primary care telehealth treatments.



## **Future Suggestions on Improving Telemedicine in Primary Care**

Telemedicine has many positive attributes, such as expanding healthcare coverage (including to underserved and underrepresented communities), facilitating the communication between patients and healthcare providers, and allowing patients and providers more options in healthcare treatment plans. Telemedicine also, however, has negative attributes. These negative attributes include: lack of reimbursement, safety questions, lack of patient and provider education, lack of uniformity, concerns of fraud and abuse. In order to navigate the complex topic of expanding access of telemedicine in primary care health settings, we must look forward to the next century and remark on improvements to the current status quo. What follows is a discussion on the ways telemedicine can and should be improved in the future. While many aspects of the following discussion are recommendations, the discussion will hopefully summarize some main findings and common themes of the paper thus far.

### The Role of Chronic Disease(s) in the Future of Telemedicine

Chronic diseases are currently the largest burden facing nations globally. Chronic diseases are expected to contribute the most to disability-adjusted life years (DALYS) through the year 2020 (Grustam et al., 2018). According to many predictions of future health outcomes, patients are often not empowered to detect, treat, and manage their chronic disease(s) (Grustam et al., 2018). Additionally, the majority of patients affected by a chronic disease are affected by two or more chronic diseases, which is known as comorbidity (Grustam et al., 2018). The Centers for Disease Control and Prevention (CDC, 2016) estimated that 25% of Americans have multiple chronic diseases with statistics reaching 75% in the geriatric population over age 65. As a direct result of the commonality for patients to have multiple diagnoses, “future telehealth applications will need to be versatile in addressing multiple acute and chronic patient problems.

In other words, there needs to be increased patient personalization that is tailored to their specific comorbidities” (Shelton & Reimer, 2018).

In the United States, over 70% of deaths are associated with chronic diseases and approximately 75% of annual health care expenses are attributed to people with chronic conditions (Dinesen et al., 2016). The global presence of chronic diseases is evident when the European Union is included, since in the European Union it is estimated that chronic illnesses contribute to 87% of all deaths (Dinesen et al., 2016). The high prevalence of chronic diseases has caused the healthcare systems in many countries, including the United States, to face a shortage of qualified healthcare providers. The recent trends from communicable disease to chronic disease has illustrated the importance of ensuring that telemedicine services are available in a fast, efficient, and effective manner to populations worldwide.

One of the leading causes of death in the United States that can be attributed to chronic disease is heart failure. Telemonitoring has the capability to help reduce the current burden of heart failure, since it “supports timely detection and slower disease progression” (Grustam et al., 2018). In 2010, telemonitoring was defined as “the transmission of physiologic data, such as an electrocardiogram (ECG), blood pressure, weight, respiratory rate, and other information, such as selfcare, education, lifestyle modification and medicine administration, using... technology like broadband, satellite, wireless or Bluetooth” (Grustam et al., 2018). This is one example of the way that telemedicine use, which encompasses telemonitoring, can aid in the reduction of chronic disease. More research is needed in order to better understand the connection between telehealth services and chronic diseases. The connection between these two topics will be vital in understanding telemedicine’s role in primary healthcare settings, since many primary care treatments are aimed at reducing the risk of chronic disease(s).

### Suggestions for Telemedicine Reimbursement Improvements

A study was conducted analyzing the contributing factors for lack of telemedicine reimbursement. The following is a list of the major reasons for not billing for services delivered via telemedicine (as well as the frequencies of appearance): no Medicaid reimbursement (33%), major payers do not pay (32.4%), practice in urban area (19.3%), services are bundled through contracts (17.4%), could not get support from my organization (4.7%), too risky for penalties for fraud and abuse (4.7%), and other (43.9%) (Antoniotti et al., 2014). The study above summarizes many of the issues already discussed but adds weights to certain factors via percentages. An analysis of the factors listed above demonstrates that there is not an easy solution to expanding telemedicine/telehealth reimbursement. Medicaid and major payers (which likely refers to insurance companies and other third parties) constitute over 60% of the reason for lack of reimbursement. This indicates that those areas should receive the greatest priority and urgency from people tasked with improving telemedicine use in healthcare settings. Medicare will currently reimburse for face to face interactions and store and forward applications (e.g. remote ECG application), but there is no nationally accepted reimbursement standard for private payers (Grustam et al., 2018).

Medicaid must be standardized to some degree in order to eliminate the confusing terms of its current relationship with telemedicine reimbursement and its lack of defining fundamentally important terms in the telemedicine coverage agreement (such as HPSAs, otherwise known as Health Professional Shortage Areas). Telemedicine use cannot be expanded if people using Medicaid are still confused what types of telemedicine exist, what their differences constitute, and which health settings they are allowed in. While the purpose of the limitations set forth by Medicaid legislation were likely intended to prevent fraud and abuse of the system, the rules must be updated to better suit the 21<sup>st</sup> centuries and future generations. The

United States is becoming an increasingly technological society, and the younger generations are used to information being processed in quick ways and results being achieved rapidly. The younger generations are not going to be supportive of a policy that is not in real time or does not allow for flexibility of services received based on the severity of the health outcome or based on one's specific geographical area.

The mention of fear of penalties from fraud and abuse in the study findings released above signals that fraud and abuse is once again central to the discussion of telemedicine expansion. As noted earlier in the paper, healthcare providers are nervous regarding not possessing the current licensure requirements to lawfully conduct telemedicine. In addition, security features and protecting patients' private healthcare information are important aspects of telemedicine. Perhaps one way of solving the licensure requirement issue is to expand state reciprocity agreements or have national licensures for telemedicine-specific services.

#### Driving the Future of Telemedicine

In the *Journal of Nursing Informatics*, telehealth barriers, applications, and future use by nurse practitioners were examined. As Dinesen et al. (2016) outlined, there are eight key elements that will soon be driving the future of telemedicine:

1. Personalization of the delivery of health care
2. Matching certain patients with corresponding technologies
3. Efficient use of data; including a secure interface between the patient and provider
4. More opportunities for patient education
5. New communities of clinical practice
6. Care models and business models adapted for sustainability of telemedicine initiatives
7. Increased scientific research converged with evidence-based practice
8. Forward-thinking research approaches within telemedicine (Dinesen et al., 2016)

These eight driving factors are comprehensive and diverse. They depict an overall theme of facilitating the connection between patient and provider, ensuring patients have the proper education and training to successfully participate in telemedicine. They also point to a forward-thinking research approach that is vital for success of any new policy or business plan. As the world continues to evolve around us and our current legislation, rules, and ideology begin to morph into a new system of beliefs, so must the field of telemedicine. While cellphones are a commonplace item now in most households within the United States, no one could have predicted their vast presence a century before. The unpredictability of the future is important to consider in regard to the healthcare system. If the United States opts to adopt a universal healthcare system similar to many of its Western nation counterparts, many of the current recommendations for telemedicine improvement would need to be modified.

According to the *Journal of Nursing Informatics*, “the primary solution to the increased utilization of telemedicine applications will be supported by strong research-based evidence that telehealth applications are both sustainable and scalable” (Dinesen et al., 2016). The future of telehealth technology expansion is undoubtedly on the rise and will reach a point where embracement by the current health care system is inevitable. The current healthcare system must embrace telemedicine technology in order to safeguard advancement of enhanced patient outcomes, cost, and quality of life (Dinesen et al., 2016).

### Conclusion

The current healthcare system in the United States is rapidly evolving, and it must keep pace with constant innovation. Telemedicine can undoubtedly aid in the improvement in the current healthcare system from both a patient and provider perspective. In response to the thesis question of whether the future primary care physician is a physician that utilizes telemedicine, I would say this is a likely option. However, this option can only maintain success and be a leader on the global stage if certain measures are put into place. These measures include: more United States federal and state governmental accountability for the healthcare of its people, more national standards, more patient education, and increasingly streamlined technological solutions. The days of traditional patient and provider interactions are fading, and it is time for the United States to follow the lead of other Western nations in fully embracing telemedicine.

## Bibliography

- Adler, K. G. (2006). Web portals in primary care: an evaluation of patient readiness and willingness to pay for online services. *Journal of medical Internet research*, 8(4), e26.
- Antoniotti, N. M., Drude, K. P., & Rowe, N. (2014). Private payer telehealth reimbursement in the United States. *Telemedicine and e-Health*, 20(6), 539-543.
- Asch, D. A. (2015). The hidden economics of telemedicine. *Annals of Internal Medicine*, 163(10), 801-802. doi:10.7326/M15-1416
- Balestra, M. (2018). Telehealth and legal implications for nurse practitioners. *The Journal for Nurse Practitioners*, 14(1), 33-39. doi:10.1016/j.nurpra.2017.10.003
- Bashshur, R. L., Howell, J. D., Krupinski, E. A., Harms, K. M., Bashshur, N., & Doarn, C. R. (2016). The Empirical Foundations of Telemedicine Interventions in Primary Care. *Telemedicine journal and e-health: the official journal of the American Telemedicine Association*, 22(5), 342-75.
- Barkholz, D. (2017). Jefferson Health talking with Teladoc to facilitate post-op visits. Retrieved from <https://www.modernhealthcare.com/article/20170606/NEWS/170609935/jefferson-health-talking-with-teladoc-to-facilitate-post-op-visits>
- Daniel, H., & Sulmasy, L. S. (2015). Policy recommendations to guide the use of telemedicine in primary care settings: an American College of Physicians position paper. *Annals of Internal Medicine*, 163(10), 787-789. doi:10.7326/M15-0498
- Dinesen B, Nonnecke B, Lindeman D, Toft E, Kidholm K, Jethwani K, Young HM, Spindler H, Oestergaard CU, Southard JA, Gutierrez M, Anderson N, Albert NM, Han JJ, Nesbitt T. (2016). Personalized telehealth in the future: a global research agenda. *Journal of Medical Internet Research*, 18(3). Retrieved from <https://www.jmir.org/2016/3/e53/>

- Donelan, K., Barreto, E. A., Sosson, S., Michael, C., Estrada, J. J., Cohen, A. B., ... & Schwamm, L. H. (2019). Patient and Clinician Experiences with Telehealth for Patient Follow-up Care. *The American journal of managed care*, 25(1), 40-44
- Dullet, N. W., Geraghty, E. M., Kaufman, T., Kisse, J. L., King, J., Dharmar, M., ... & Marcin, J. P. (2017). Impact of a university-based outpatient telemedicine program on time savings, travel costs, and environmental pollutants. *Value in Health*, 20(4), 542-546.
- Elliott, T., & Shih, J. (2019). Direct to Consumer Telemedicine. *Current allergy and asthma reports*, 19(1), 1.
- Fathi, J. T., Modin, H. E., & Scott, J. D. (2017). Nurses Advancing Telehealth Services in the Era of Healthcare Reform. *OJIN: The Online Journal of Issues in Nursing*, 22(2).
- Frilling, S. (2017). Medicare Telehealth Services and Nephrology: Policies for Eligibility and Payment. *Advances in Chronic Kidney Disease*, 24(1), 46-50. doi: 10.1053/j.ackd.2016.11.003.
- Grustam, A. S., Vrijhoef, H. J., Poulidikis, V., Koymans, R., & Severens, J. L. (2018). Extending the Business-to-Business (B2B) model towards a Business-to-Consumer (B2C) model for Telemonitoring Patients with Chronic Heart Failure. *Journal of Business Models*, 6(3), 106-129.
- Harvey, J. B., Valenta, S., Simpson, K., Lyles, M., & McElligott, J. (2018). Utilization of outpatient Telehealth services in parity and nonparity states 2010–2015. *Telemedicine and e-Health*.
- Le, L. B., Rahal, H. K., Viramontes, M. R., Meneses, K. G., Dong, T. S., & Saab, S. (2018). Patient Satisfaction and Healthcare Utilization Using Telemedicine in Liver Transplant Recipients. *Digestive diseases and sciences*, 1-8.



- Phillips, J., Edwards-Johnson, J., & Wendling, A. (2018). US federal policies should better support the primary care physician workforce. *Family medicine, 50*(1), 7-9.
- Polinski, J. M., Barker, T., Gagliano, N., Sussman, A., Brennan, T. A., & Shrank, W. H. (2016). Patients' satisfaction with and preference for telehealth visits. *Journal of general internal medicine, 31*(3), 269-275.
- Portnoy, J. M., Waller, M., De Lurgio, S., & Dinakar, C. (2016). Telemedicine is as effective as in-person visits for patients with asthma. *Annals of Allergy, Asthma & Immunology, 117*(3), 241-245.
- Ross, S. E., Todd, J., Moore, L. A., Beaty, B. L., Wittevrongel, L., & Lin, C. T. (2005). Expectations of patients and physicians regarding patient-accessible medical records. *Journal of medical Internet research, 7*(2), e13.
- Saigi-Rubió, F., Jiménez-Zarco, A., & Torrent-Sellens, J. (2016). Determinants of the Intention to Use Telemedicine: Evidence from Primary Care Physicians. *International Journal of Technology Assessment in Health Care, 32*(1-2), 29-36.  
doi:10.1017/S0266462316000015
- Shelton, A., & Reimer, N. (2018). Telehealth Wound Applications: Barriers, Solutions, and Future Use by Nurse Practitioners. *On-Line Journal of Nursing Informatics, 22*(2).
- Telemedicine. (2016). *Medicaid.gov*. Retrieved from  
<https://www.medicaid.gov/medicaid/benefits/telemed/index.html>
- Uscher-Pines, L., & Mehrotra, A. (2014). Analysis of Teladoc use seems to indicate expanded access to care for patients without prior connection to a provider. *Health Affairs, 33*(2), 258-264.

- Valdivieso, B., García-Sempere, A., Sanfélix-Gimeno, G., Faubel, R., Librero, J., Soriano, E., & Peiró, S. (2018). The effect of telehealth, telephone support or usual care on quality of life, mortality and healthcare utilization in elderly high-risk patients with multiple chronic conditions. A prospective study. *Medicina clinica*, *151*(8), 308-314.
- Zettler-Greeley, C. M. (2018). How Telehealth Stopped A Contagious Outbreak at a School. *Health Affairs*, *37*(12), 2092-2095.

### Biography of Mary Kvinta

I am a senior graduating in May 2019 with a B.A. degree in Plan II Honors and a B.S. degree in Public Health with a Nutrition concentration. I am in the process of applying to Physician Assistant School. I am a Resident Assistant at the University of Texas-Austin, and have been a Teaching Assistant for Anatomy and a Health Policy Intern at the Texas Capitol with the office of Senator Eddie Lucio Jr. I studied abroad at Oxford University with the University of Texas Oxford English Summer Program in 2015. My interests include swimming, kayaking, travelling, reading, photography, and spending time with my family and friends.