Bridging the Gap in United States Primary Care Delivery by Adoption of Telemedicine

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A Thesis Submitted to the Faculty of the Department of Healthcare Administration

CALIFORNIA STATE UNIVERSITY, BAKERSFIELD

In Partial Fulfillment of the Requirements for the

Degree of MASTER OF SCIENCE IN

HEALTH CARE ADMINISTRATION

Spring 2018

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ACKNOWLEDGEMENT

I thank all who in one way or another contributed in the completion of this thesis. First, I give thanks to God for protection and ability to do work.

I give deep thanks to the Professors and lecturers at the Healthcare Administration (HCA) Program, the librarians, and other workers of the faculty. My special and heartily thanks to the director of HCA, Professor B.J Moore who encouraged and directed me. Her challenges brought this work towards a completion. It is with her supervision that this work came into existence. For any faults I take full responsibility.

I would like to thank Rabia Sohail (Masters) for her vital support and assistance during this culminating project. You have placed time and effort to see my project to the finish line and I am grateful for your guidance throughout this process.

I am also so thankful to my fellow students whose challenges, productive critics and ideas helped propel the completion of this project. Furthermore, I am thankful my family who encouraged me and prayed for me throughout the time of my research. This thesis is heartily dedicated to my mother who took the lead to heaven before the completion of this work.

May the Almighty God richly bless all of you.

ABSTRACT

This paper explores ways to bridge the gap in primary care using telemedicine. Shortage in primary care physicians was identified as a major attributor to the widening gap between patient and physicians in primary care. This study explains the importance of primary care by recognizing its role as a gateway to patient care and how deficits at the primary care level affects the general population by reducing the quality of care, decreasing access to care while increasing cost and risk. The researcher details how technology has been a major part of the diagnostic and interventive part of patient care since the discovery of the telephone, explores the evolution of telemedicine by understanding the political timeline and policies/laws that drives the telemedicine industry. By defining telemedicine and building a conceptual framework within the context of study, the researcher explored ways in which the telemedicine can be applied to bridge the gap in primary care. Following the trend on the integration of telemedicine to patient care enables the researcher to identify the advantages and limitations in the use of telemedicine.

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CHAPTER ONE

Introduction

Background of the problem

Technological advancement has had a tremendous effect on medical practice. Medical practice in the United States evolved from a simple system of home remedies and itinerant doctors with little training to a complex, scientific, technological, and bureaucratic system often called the "medical industrial complex". Starr (1982) explains that medicine has grown from being a relatively weak, traditional profession of minor economic significance to become a sprawling system of hospitals, clinics, health plans, insurance companies, and myriad other organizations employing a vast labor force (Starr,1982). Polished by evidence-based practices, medicine has been open to changes brought by the evolution of technology, as evidenced by the acceptance of the 'germ theory' which revolutionized the way diseases were perceived and treated (Starr,1982). Also, in the 1900s with the invention of the telephone, medical practice witnessed a new phase in its timeline where patients could easily reach their physician by phone as opposed to the old ways of having to travel miles for care. The effect of the advent of the telephone went beyond improving communication between patients and their physicians, it also brought unity and homogeneity to the practice of medicine which snow balled into a 'bridge distance'. Physicians could share new ideas, medical discoveries, and patient cases throughout the world via telephones. This had the general effect of an improved medical practice.

Historically, distance has driven change and improvement in medical practice. Improvement in quality, access, cost and risk of care has been the focus of modern day medicine. This improvement came in different forms, including telemedicine. Telemedicine according to American Telemedicine Association is "the use of medical information exchanged from one site to another via electronic communications to improve patients' health status" (American Telemedicine Association Glossary). By

this definition the practice of telemedicine is as old as technology itself. However, the first practice was recognized in the 1940s in Philadelphia when medical records were transferred between two townships through a telephone line marking the world's first electronic medical record transfer (Moore, 1999). After this came the teleradiology system constructed by a Canadian doctor used to transfer radiological images within Montreal, followed by a two-way television setup to transmit information to medical students across the University of Nebraska which at that time lacked doctors to teach, and five years later linked with a state hospital to perform video consultations. Since the invention of video messaging, telemedicine has been used to increase access and quality of care especially in rural areas. The integration of telemedicine in medical practice is needed more now than ever because medicine is now witnessing a shift in paradigm with young doctors going for non- primary care related specialties (Doarn, *et al*., 2014). This shift creates a gap in patient care.

Purpose of Study

The continued decline in the availability of primary healthcare providers has left a gap between care providers and patients. Effects of this gap is felt most in rural areas; without big hospitals and amenities, residents of rural communities are left without healthcare providers. The purpose of the study is to identify best practices in the use of telemedicine to reduce distance.

Usefulness of Study

Some hospital systems like Kaiser Permanente have successfully integrated telemedicine in patient care. Wicklund (2016) noted that according to Bernard J. Tyson CEO of the California-based health network (Kaiser), one of the nation's largest integrated health systems, saw some 110 million people last year, with some 59 million connecting through online portals, virtual visits or the health system's apps. This means that 52% of consultations in 2015 were done via Kaiser's tele-home care program. This achievement was a huge breakthrough for telemedicine in the context of a nationwide

telemedicine implementation. The continued drop in the number of primary care physicians presents an opportunity of a national integration of telemedicine in the continuum of care. As noted by Komet (2001) utilizing telehealth as part of the continuum of care can positively affect these variables. Initial research indicates that patient approval for telehealth is very high.

CHAPTER TWO

Review of Literature

The purpose of the literature review is to provide: (a) a conceptual framework; (b) a review of laws and policies within the context of the study; (c) a theoretical framework; and (d) an evaluation of previous studies.

Conceptual Framework

Linked to the problem statement, the conceptual framework "sets the stage" for presentation of the specific research question that drives the investigation being reported (Mcgaghie, Bordage, and Shea, 2001). With the research question in mind, the framework for the research was established through: introduction to telemedicine, introduction of essential roles of primary care physician (PCP), defining "shortage of PCP", understanding the role of present day telemedicine in 'bridging the distance'.

Telemedicine. Telemedicine became a significant part of the health care system long before the world became conscious of what it was or how important it would be in the future. Telemedicine is a combination of two parts "tele", which is a prefix that connotes 'at a distance' as seen with 'telescope', and 'medicine', which means 'the science or practice of the diagnosis, treatment, and prevention of disease' (Merriam-Webster's collegiate dictionary, 2017). Combined, the word Telemedicine's "simple, but serviceable" definition is the use of telecommunication, meaning to diagnose and treat a patient from a distance (Kuszler, 1999). Kuszler's definition of telemedicine fails to acknowledge the complexity of telemedicine in the practical world. Depending on its use, different organizations have a different understanding of telemedicine. The U.S. Department of Commerce/National Institute of Standards and Technology (DOC/NIST) defines telemedicine as, the use of medical information exchanged from one site to another via electronic communications to improve patients' health status (Doarn, *et al*., 2014).

Telemedicine in Bridging the Gap in Primary Care

According to the Centers for Medicare & Medicaid Services (CMS), telemedicine is a two-way, real-time interactive communication between the patient and the physician or practitioner at the distant site. This electronic communication means the use of interactive telecommunications equipment that includes, at a minimum, audio and video equipment (Doarn, *et al*., 2014). The flexibility of telemedicine makes application in different fields of medicine easy and for different reasons. Doarn, *et al.* noted that telemedicine in the Veterans Administration (VA) refers to remote care interactions between patients and providers via closed-circuit television at their nearest Community Based Outpatient Clinics. From these definitions the researcher can conclude that telemedicine is the exchange of medical information, real time, two-way interactive communication, and remote care between patients and providers through electronic or nonelectronic channels or infrastructure with the sole purpose of improving patient care. The importance of telemedicine in patient care dates back to antiquity.

Telemedicine is not a new concept in patient care as its use outdates the term "telemedicine". The concept is used any time medical information is passed from one location to another with an intent to improve patient care. For example, Bushshur *et al.* notes that "…among aboriginal peoples of Australia "message sticks" carried by runners, sometimes more than 70 miles, brought information pertaining to tribal gatherings (friendly and hostile), disease and deaths" (2014). Bushshur *et al.* proposed that transfer of medical information 70 miles served as a preventive measure to warn neighboring communities about plagues or outbreaks. Bashshur, *et. al* (2014) described telemedicine as Medicine ''in absentia'' by highlighting how simple urinalysis was practiced in the17th century common era, were patients sent urine samples to distant physicians who, in turn, provided diagnoses based on uroscopy charts patterned after those used by the ancient Greeks. The concept 'telemedicine' came to light from developments in the manned space-flight program by National Aeronautics and Space Administration (NASA) where

physicians demonstrated that physiological activities of astronauts can be successfully monitored from earth (Zundel, 1996) in the late 1950s (Doarn, *et al*., 2014).

Moore summarized the evolution of telemedicine in 3 generations (See table 2.1). Before the modern era, the most popular way to apply telemedicine was through interactive audio-/video call or communication. The store-and-forward (SAF) stores patient data (digital images, clinical and demographic information) sent by general practitioners (GPs) in an electronic medium for future access by consultants in referral centers to deliver quality healthcare in remote geographic region (Kanthraj and Srinivas, 2007).

Today's telemedicine can be divided into three broad practices that span all fields in medicine: (a) Remote patient monitoring, which is another name for telemonitoring, involves ambulatory management of patients; (b) store-and-forward; and (c) Interactive telemedicine, which allows real time communication between patient and physician (Rouse and Holman, 2016). The flexibility and simplicity of telemedicine as stated above made possible its use in different departments. Telemedical practices like telenursing, telecardiology, teleradiology, telepathology and tele-pharmacy all fall within the context of distant medical practice. With the versatility of telemedicine, one would assume it's potential will be greatly harnessed by today's medical practice to reach its unimaginable goals.

Table 2.1

The evolution of telemedicine in 3 generations:

Generation	
Generation I – Stage 1	Early development, pre-1970. Primarily audio-based and cable television technologies.
Stage 2	The 1970s. Varied technologies. Large government-sponsored projects using satellite and microwave telemedicine in Canada and the US.
Stage 3	The early to mid-1980s, when the use of Telemedicine was simplified by a project carried out by Canadian physicians revealed that the more inexpensive technologies (telephone and black-and-white slow scan television) were most effective.
Generation II	New federal funding and new growth followed by new cutbacks (the early to mid-1990s).
Generation III	Telemedicine today. Simplification. The rise of store-and-Forward.

As adapted from Moore, 1999, pp.247-248.

Primary Care System. Primary care gained worldwide popularity when introduced at the World Health Organization's Alma Ata Declaration at the 1978 International Conference on Primary Healthcare (Bashshur *et.al*., 2016). The declaration concluded that healthcare was a fundamental right and not a privilege. This facilitated a shift away from seeing health only in terms of the absence of disease but instead, defined health as ''a state of complete physical, mental and social wellbeing, and not merely the absence of disease or infirmity" (WHO, 1948, Constitution of WHO: principles). By this declaration, the U.S among other countries agreed to make healthcare a fundamental part of humans right and should be accessible to all. According to WHO (2010), a well-functioning health system responds in a balanced way to a population's needs and expectations by: (a) improving the health status of individuals, families and communities; (b) defending the population against what threatens its health; (c) protecting people against the financial consequences of ill-health; (d) providing equitable access to people-centered care; and (e) making it possible for people to participate in decisions affecting their health and health system. Sadly, this is far from the reality. A well-functioning primary care system offers a healthier population by increasing access to care manned by primary care physicians (PCP).

Rao and Pilot described primary health care (PHC) as the provision of first contact, person-focused, ongoing care over time that meets the health-related needs of people, referring (to hospital) only those problems too uncommon to maintain competence and coordinates care when people receive services at other levels of care (2014). Primary care forms the foundations of patient care and just as a building with faulty foundation risks collapse, a healthcare system with a faulty or ineffective primary care system risks collapse, which would manifest in reduced population health indices. This important duty is left in the hands of PCP. In the hierarchical view, the PCPs are at the bottom of healthcare. As the first contact for patients seeking medical care, PCPs are the primary managers/coordinators of patient care. As managers, PCPs play a vital role in the coordination/integration of the care process within the entire

spectrum of care. Also, PCPs control overcrowding at the top of the healthcare tier (specialist doctors), which makes PCPs the "gatekeeper" of healthcare. Gatekeeping is an important function as it reduces patient overtreatment and overcrowding at the top of the healthcare tier (Bashshur *et.al*., 2016). Before the age of medical specialization, all medical practice was assumed to fall within the primary care domain. All physicians played the role of the primary care physician and there was no hierarchy in medical care. The first four specialties created a federation called the American Board of Medical Specialties (ABMS) in 1933, which encompassed 10 specialties by 1935; the American Board of Internal Medicine (ABIM) was added in 1936. By the 1970s, there were 20 specialties, including primary surgical boards in orthopedics, urology, neurosurgery, plastic surgery, and colorectal surgery (Cassel and Reuben 2011).

It is worthy of note that, Bashshur's list of the essential role of primary care physicians is from a generalized point of view and could be assumed by any primary care provider with little training. While primary care providers include all parties involved in meeting up with primary healthcare needs of patients, The American Academy of Family Physician defined a primary care physician as a specialist in Family Medicine, Internal Medicine, or Pediatrics who provides definitive care to the undifferentiated patient at the point of first contact and takes continuing responsibility for providing the patient's comprehensive care (2016). Primary care provider is a more general term that includes both non-physician (nurses and physician assistance) and physician primary care givers.

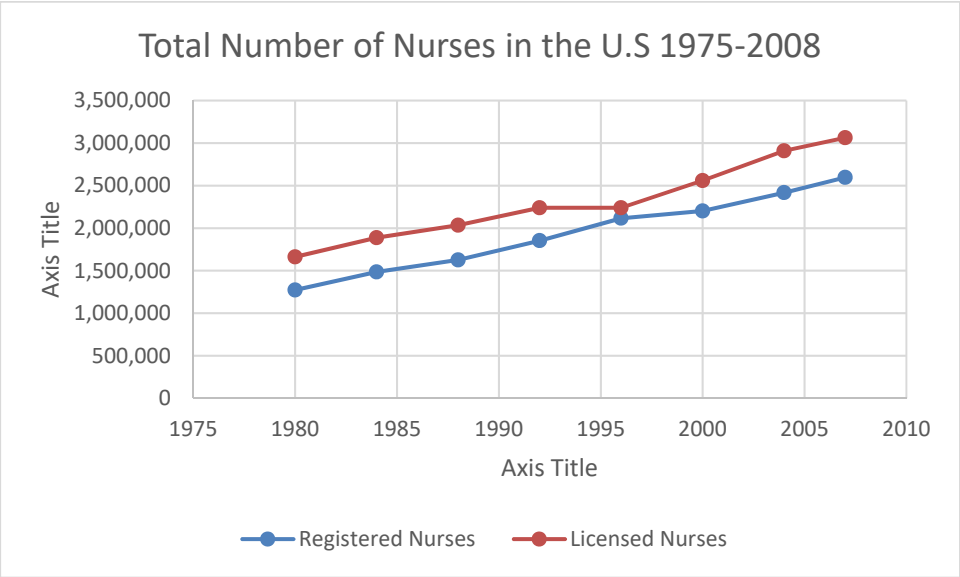

Figure 2.1 as adapted from National Sample Survey of Registered Nurses

The American Medical Association Physician Masterfile (AMA Physician Masterfile) in 2010 highlighted the following subspecialties as primary care physicians as follows: Family Practice, Geriatrics, General Practice, General Internal Medicine, and General Pediatrics (2010). The studies by AMA Physician Masterfile further pointed out that Family practitioners made up the highest percentage of PCPs at 45.3% against 31.1% for General Internists in Medicine (2010).

The essential role of PCPs in the integration of care shows that although PCPs are at the bottom of the hierarchy chain, without PCPs the health system would not be effectively functional. Patient care at the level of the primary care, is of utmost importance. The World Health Report (WHR) of 2008 noted that primary health care (PHC) should still be the foundation of effective health systems (2008)

Number of primary care and specialty physicians per 100,000 population: United States, 2002-2012

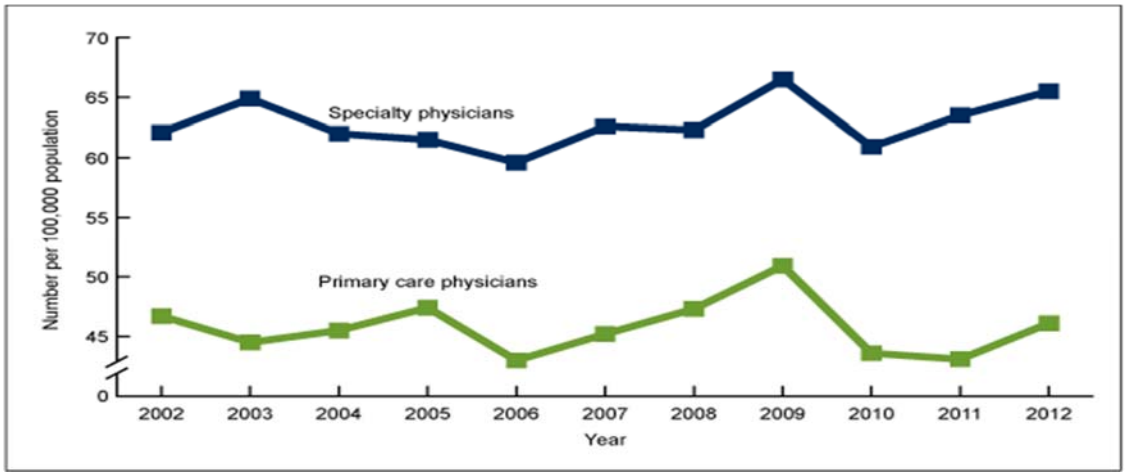

Figure 2.2 as adapted from CDC/NCHS, National Ambulatory Medical Care Survey (NAMCS) and NAMCS, Electronic Health Records Survey https://www.cdc.gov/nchs/products/databriefs/db151.htm

PHC is also the best approach to achieving universal health coverage and a fundamental requirement for achieving the Sustainable Development Goals: 1) End poverty in all its forms everywhere; End hunger, achieve food security and improved nutrition, and promote sustainable agriculture; Ensure healthy lives and promote wellbeing for all at all ages; Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all; Achieve gender equality and empower all women and girls; Ensure availability and sustainable management of water and sanitation for all; Ensure access to affordable, reliable, sustainable and modern energy for all; Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all; Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation; Reduce inequality within and among countries; Make cities and human settlements inclusive, safe, resilient and sustainable; Ensure sustainable consumption and production patterns; Take urgent action to combat climate change and its impacts (taking note of agreements made by the UNFCCC forum); Conserve and sustainably use the oceans, seas and marine resources for sustainable development; Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage

forests, combat desertification and halt and reverse land degradation, and halt biodiversity loss; Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels; Strengthen the means of implementation and revitalize the global partnership for sustainable development (Mash, Almeida, Wong, Kumar, and von Pressentin, 2015).

Shortage of Primary Care Physicians. The U.S primary care system is in a quandary, faced with the continued decline in PCPs. A Report from the American College of Physicians in 2006 explained that primary care, the backbone of the nation's health care system, is at grave risk of collapse due to a dysfunctional financing and delivery system. Kaiser Family Foundation (2017) employed Redi-Data, Inc, a private data base company, to conduct a survey aimed at estimating the total number of registered physicians in the U.S.

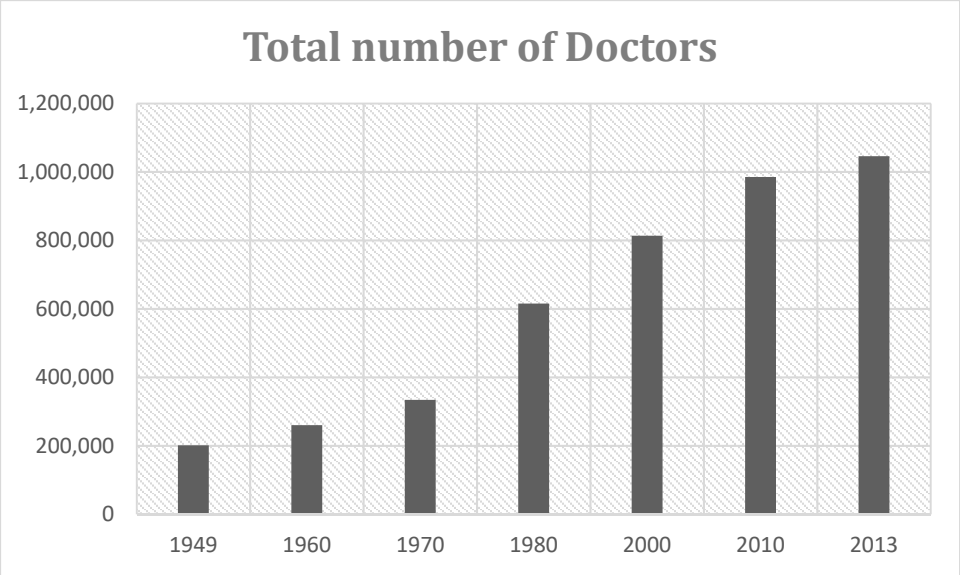

Figure 2.3 as adapted from US Department of Health and Human Services. (n.d.). Total number of doctors of medicine in the U.S. from 1949 to 2013*. In *Statista - The Statistics Portal*. Retrieved December 4, 2017, from https://stabi.grow-net.de/statistics/186260/total-doctors-of-medicine-in-the-us-since-1949/.

The results of the study which included currently active conventional medical practitioners, allopathic physicians (MDs) and osteopathic physicians (DOs) were as follows: (a) total number of

physicians, 923,308; (b) specialist physicians, 479,346; (c) 443,960. These results look promising showing a closing gap between specialist doctors and PCPs, however, there are many factors that could put the validity of the results in question.

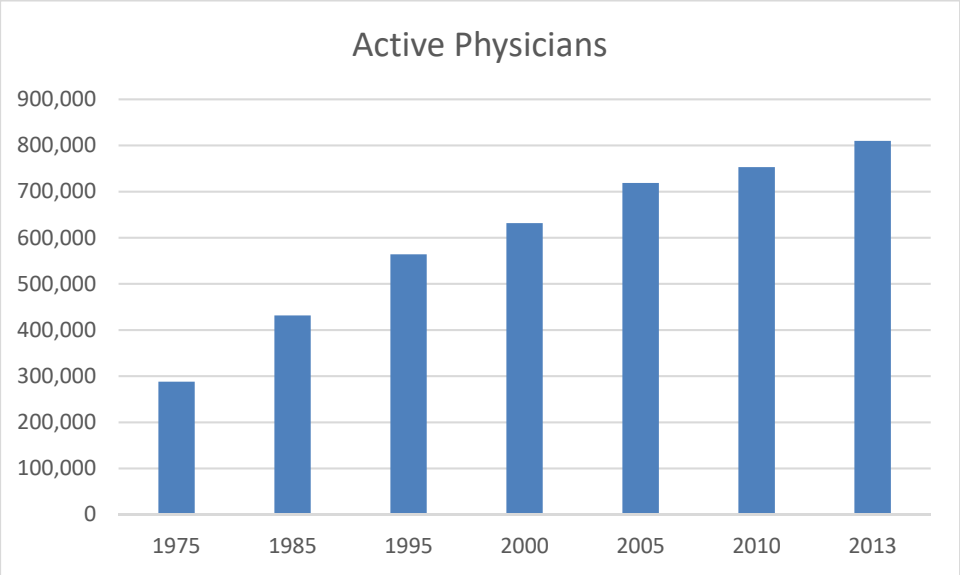

Figure 2.4 total number of active physicians as adapted from Kaiser Family Foundation. (n.d.). Number of active physicians in the U.S. in 2017, by specialty area. In *Statista - The Statistics Portal*. Retrieved December 4, 2017, from https://stabi.grow-net.de/statistics/209424/us-number-of-active-physicians-by-specialty-area/.

A 2010 study carried out by AMA Physician Masterfile showed that the total number of PCPs in the US in 2010 was 246,090. The research which was commissioned by the Agency for Healthcare Research and Quality considered only working primary care physicians, that is to say, those within the subspecialties who were currently practicing as PCPs in 2010. The study concluded that, out of the 624,434 physicians in the United States that spend the majority of their time in direct patient care, slightly less than one-third (39%) are specialists in specialties that serve primary care (AMA Physician Masterfile, 2010).

Availability of primary care physicians and percentage of primary care physicians working with physician assistants or nurse practitioners, by urbanicity of physician's office location: United States, 2012

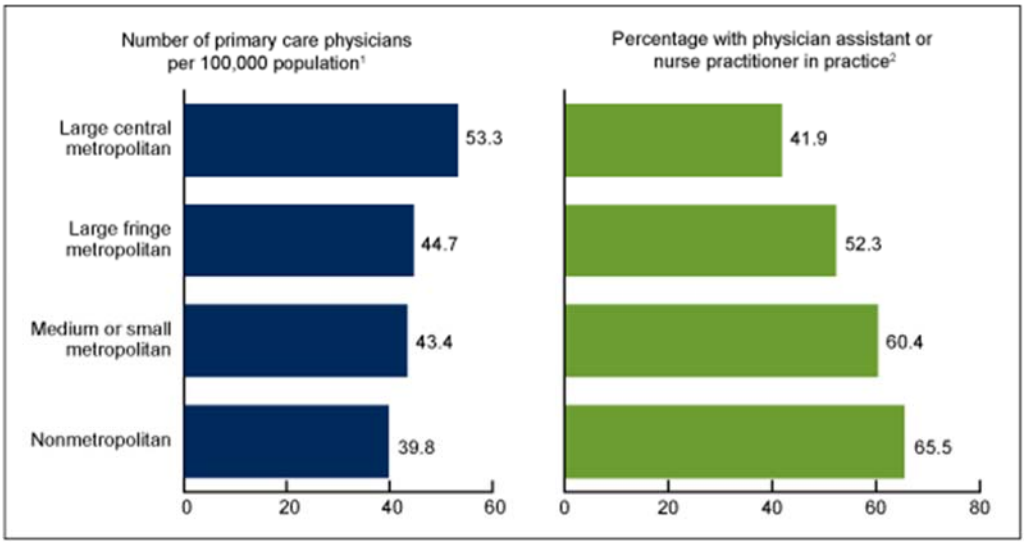

Figure 2.5 as adapted from CDC/NCHS, National Ambulatory Medical Care Survey, Electronic Health Records Survey.

From the definition of PCPs, there was no clear distinction between specialist doctors and PCPs. For example, there could be some family health physician who are into tertiary care, also not all pediatricians are primary health givers as the definition suggests. Schimpff (2014) argued that only 30% of all physicians practice primary care (compared to about 70% in most other developed countries and about 70% in the United States fifty years ago) and this percentage is shrinking at a steady rate. Trend analysis carried out in 2012 by CDC and National Ambulatory Medical Care Survey (NAMCS) revealed that, although there has been a close gap between the two domains of physicians, the supply of specialists consistently exceeded the supply of primary care physicians. The ratio of primary care physicians to specialists in 2012 was 0.70 and had remained stable from 2002 to 2012 (figure 2.6). To understand the request question, the researcher elaborates on other healthcare indices that could be contributing factors to the growing shortage in the supply of PCPs.

Between 1987 and 2007 the population of the United States grew 24 percent, from 242 million people to 302 million people. In the same period, the number of physicians trained in the U.S. grew by only 8% (O'Reilly, 2010). The serving population outnumbers the physicians with the ratio of 3:1. Becker's Hospital Review in 2014 showed that the United States has fewer physician per capita than many other developed countries ranking 25th with a physician per capita of 2.5/100,000. Fewer physicians ultimately result in fewer PCPs. A study by Petterson et al. revealed that, in 2008, estimated that there were 2,237 visits per primary care physician yearly. The United States had 1 practicing primary care physician for every 1,475 persons (O'Reilly, 2010).

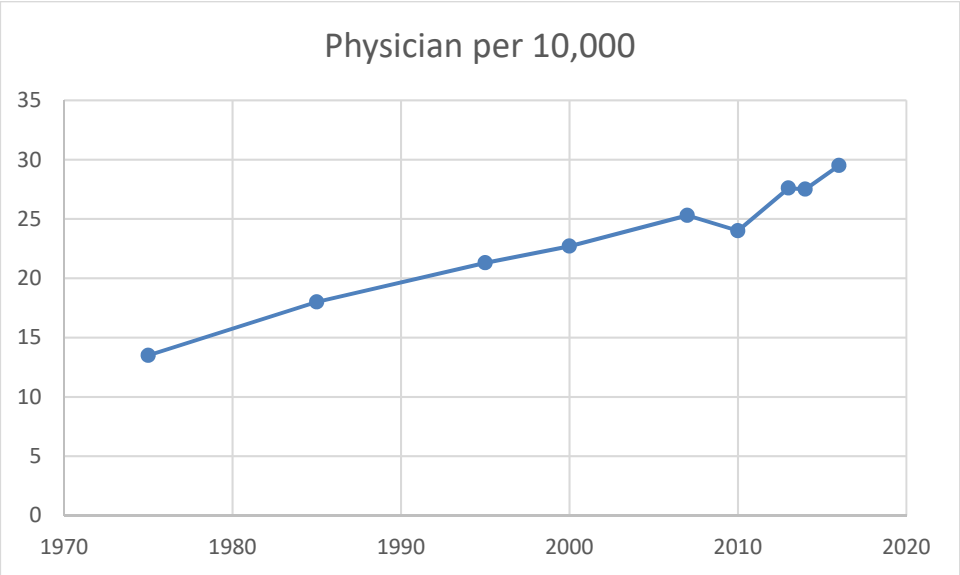

Figure 2.6 as adapted from AMA; DHH1970-2013; U.S National Census 2016 https://www.fsmb.org/Media/Default/PDF/Census/2016census.pdf

There is a growing concern over the future of primary care in America, below is a list of factors that contributes to the increasing demand for primary care: Growing demand for primary care: (a) population living with chronic disease. Forty-five percent of the U.S. population has a chronic medical condition and about half of these, 60 million people, have multiple chronic conditions (American College of Physicians, 2006). Wu and Green (2005) projected that within 10 years, an estimated 150 million

Americans will have at least one chronic condition; (b) By the year 2030, one fifth of Americans will be above the age of 65, with an increasing proportion above age 85 (American College of Physicians, 2006); (c) US. Department of Health and Human Services argued that if current utilization patterns continue, it is expected that by 2020, almost 40 percent of a physician's time will be spent treating the aging population (2003).

Few physicians are going into primary care. There is an increased decline in the willingness to pursue a career in primary care by fresh medical graduates, Garibaldi, Popkave and Bylsma explained that only 27 percent planned to practice general internal medicine compared to 54 percent in 1998 (2005) and from 1997 to 2005, the number of U.S. medical graduates entering family medicine residencies dropped by 50% (American College of Physicians, 2008). These are the main subspecialties engaged in primary care system, a decline is directly related to a decline in PCPs.

Uneven distribution of primary care. In addition to an emerging physician shortage, there is a long-standing maldistribution of physicians in the United States, with fewer doctors practicing in rural and inner-city areas. The Health Services and Resources Administration (HRSA) currently designates over 6,200 Health Professional Shortage Areas (HPSAs) for primary care nationwide, in which over 65 million people live. Sixty-seven percent of HPSAs are in non-urban areas. The ratio of primary care providers to patients in these areas is less than one per 2,000 (Florence and Hawkins, 2011).

The lack of primary care in most departments. For example, mental health patients get the least benefits out of the primary care system. The World Health Organization has called integrating mental health services into primary care the most viable way of closing the treatment gap for untreated mental illnesses, characterizing primary care for mental health as affordable and an investment that can bring important benefits (2008).

Lastly, the Affordable Care Act makes a concerted effort to strengthen the nation's primary care foundation through the use of enhanced reimbursement rates for providers and innovative delivery models such as patient-centered medical homes. When combined with the significant coverage expansion initiatives in the Affordable Care Act, successful implementation of the law improves access to care for millions of Americans, encourage accountability and greater organization among health care providers, and begin to slow the growth in health care costs by introducing new rewards for practitioners delivering high value, patient-centered care (Davis, Abrams, and Stremikis, 2011).

The American Academy of Family Physicians (AAFP) projects a shortage of 149,000 physicians by 2020, while the Health Resources and Services Administration (HRSA) projects a shortage of 65,560 primary care physicians by 2020 (Worth, 2010). This is nither the first nor only prediction pertaining to the challenges of the primary care system.

Conclusion. The researcher concludes that the continued decline in the supply of primary care physician would create a hole in patient care. The healthcare stakeholders will have to look for ways to close the gap or face an inevitable collapse of the most essential part of any health care system- primary care. Through this study the researcher aims to explore how a well-coordinated telemedical system will bridge this distance.

Telemedicine in 'bridging the distance'. With healthcare reform rapidly shifting the nation's healthcare paradigm, putting a larger emphasis on healthcare outcomes and incentivizing primary and preventative medicine, the telemedicine industry is well positioned to vastly improve provider/patient collaboration while reducing the cost of care. Telemedicine has been identified as a method of alleviating the physician shortage because of the unique ability to increase provider utilization rate, provide access in rural areas, and widen the pool of available specialists (Alattar, 2015). Telemedicine has over the years proved that has what it takes to bridge the gap in patient access created by shortage of

primary care physicians. In chapter four the researcher will elaborate of the key issues that hindered the growth of telemedicine and highlight the properties on the modern-day telemedicine that keeps promoting its use against odds.

Political View

The role of government in the growth of telemedicine is; organizations that influence/govern the adoption/practice of telemedicine, and the relationship with the external environment. The federal government is the largest single payer of health care in the United States, accounting for more than a quarter of all U.S. spending on health care (Troy, 2015). Having this much stake in the industry gives the federal government some hold and control over the healthcare in general. The federal government, through government agencies develop laws and policies that help control the healthcare market. Quite a number of non-governmental organizations(NGO) have struggled to maintain autonomy by countering government policies that opposes the organizational goals and aims. The American Medical Association (AMA) is one such association that has over time, fought for an independent healthcare system against a government that wants the oppose. The history of telemedicine goes the same way as that of medicine, with one group pushing for implementation of policies and laws that favors its expansion and implementation, on the other hand, another group that wants the opposite. The political views of telemedicine follow the same trends as that of medicine in the 1950s. Telemedicine is at the cross roads between “what is” and “what will be” with two groups those who are willing to accept change versus those who cling on to the traditional medical ways. Directly or indirectly, the federal/state reforms and policies shapes the healthcare market and ultimately the telemedicine industry. Jacobson and Wang (2015) argued that the future of telemedicine is dependent on reimbursement and regulatory policies both at the federal and state level. However, policy makers have historically been slow to embrace telemedicine or a change in the paradox.

Political Timeline. In 1970s, the first recorded telemedical program was sponsored by federal government agencies; the National Aeronautics and Space Administration (NASA) and the Lockheed Company (Field). The project, called STARPAHC project (Space Technology Applied to Rural Papago Advanced Health Care) was managed and evaluated by the US Indian Health Service, and evaluated by the Papago Nation. STARPAHC demonstrated the feasibility of a consortium of public and private partners working together to provide medical care to remote populations via telecommunication (Freiburger, Holcomb and Piper, 2007). Funded by both public and private sector, STARPAHC was the first purposeful, organized usage of telemedicine and most significantly was recognized. Freiburger, Holcomb and Piper (2007) notes that STARPAHC project represented the 'first generation' of telemedicine, a generation which has been said to be unsuccessful because the projects were not sustained due to the fact that telemedicine was not widely adopted for health-care delivery. Although the project lasted for about 2years, Bashshur (1980) summarized the significance of the program as follows: (a) NASA and the Indian Health Service demonstrated the organizational and technological capacity to provide medical care to remote populations (b) the approach to the design and implementation of this mode of care delivery was effective and holds promise for other situations; (c) the efficacy of remote telemetry and non-physician medical personnel in the provision of medical care was demonstrated; (d) the cooperation and advance planning on the part of all the participants in the project can serve as a model for others. In the early 1990s century, telemedicine was on the spotlight again with U.S. Vice President Al Gore identifying telemedicine as a key component of the National Information Infrastructure (NII) in 1992 (Doarn, 2014). Vice President Al Gore was the serving vice president of the federation during the Clinton administration (1993 to 2001).

Clinton Administration (1993-2001). Telemedicine gained considerable attention in the political world during the Clinton Administration, attention which could be attributed to the proposed

Clinton healthcare reform and U.S. Vice President Al Gore's unique interest in technology and telehealth. The reform proposed a universal healthcare insurance system that would insure coverage for all Americans to get quality healthcare. This was in line with the aim of telemedicine at that time. The National Information Infrastructure (NII) was a product of the High-Performance Computing Act of 1991, an Act pioneered by then Senator Al Gore, also called the 'Gore bill'. The essence of the National Information Infrastructure lies in being; a diverse array of high-level information services, provided in an environment of pervasive computing and computer communications (Katz, Scherlis, Squires, 1997). These services enable users to locate, manage, share information of all kinds, conduct commerce, and automate a wide range of business and governmental processes across all sectors. NII gained popularity in March 1995, Vice President Al Gore requested the U.S. Department of Health and Human Services (DHHS) to lead the interagency effort to address and resolve major policy issues involved in the NII and the health sector. With the DHHS chairing the NII, the Office for the Advancement of Telehealth was established in 1995 with an objective to communicate and coordinate cross-federal activities related to telemedicine. The Office for the Advancement of Telehealth (OAT) was formed by the combined effort of four government agencies (a) Joint Working Group on Telehealth (JWGT) formally known as Health Information Application Working Group (HIAWG), (b) DHHS's Office of Rural Health Policy, (c) Health Resources and Services Administration (HRSA), and (d) NII (Doarn, *et. al.*, 2014). OAT promotes the use of telehealth technologies for health care delivery, education, and health information services. Funded by the federal government, limitations hindering the activities of OAT at that time were limited, easy access telecommunication and internet service. These problems were mainly limited to rural area who were projected to be the most benefactors of telehealth. This lead to the development and passage of the Telecommunications Act of 1996.

Telemedicine in Bridging the Gap in Primary Care

In 1996, an Advisory Committee on Telecommunications and Healthcare ("FCC Advisory Committee") was established by the Federal Communications Commission (FCC) to provide advice to the Commission on telemedicine, specifically relating to the rural telemedicine provisions of the Telecommunications Act of 1996 (Kearney, 1997). The 1996 Act encourages federal and state communications commissioners to support the expansion of telemedicine to rural areas. The Act, by encouraging both public and private organizations to work together in providing a cost effective, sustainable telecommunication service including internet to these areas, promotes the spread of telehealth. Jones (1997) argued that the Telecommunications Act of 1996 and the FCC's Universal Service Rules implementing the health care provisions of the Act have taken a conservative view of the potential of the national information infrastructure (NII) to promote community and individual health. By the end of Clinton Administration, telemedicine had gained popularity. By 1997, there were over 150 telemedicine projects currently being conducted in over 40 states involving some 5000 patients (Jones,1997) via a combined effort of both public and private industries. However, at this time telemedicine was still at its experimental phase. Jones argued that these projects are probing the extent to which telemedicine can in fact increase access to health care and reduce the costs of delivering it. According to the report by the Telemedicine Report (1997), almost 75% of these telemedicine projects are sponsored by urban or university-based medical centers seeking to serve their surrounding rural community primary health care providers. This popularity promoted the formation of the American Telemedicine Association.

The American Telemedicine Association (ATA) was established in 1993 as a nonprofit organization to bring together groups from medicine, academia, technology and telecommunications companies, e-health, m-health, medical societies, government, and others to overcome barriers to the advancement of telemedicine (Krupinski, Antoniotti, and Bernard, 2013). A key activity of the

Association is to educate government and the public about telemedicine in order to validate its role as an essential component in the delivery of modern medical care by creating the basis for assuring uniform quality in the delivery of remote healthcare services, particularly via the efforts of the Standards and Guidelines Committee (Krupinski, and Bernard, 2014). ATA tracks and follows the trends in telehealth, interprets and analyzes the results. This report is then made available in laymen's terms, enabling the common citizens to understand the role of telemedicine in the health sector of America. Following the trend of events also enables ATA to make positive changes to the direction of telemedicine, make educated predictions that would help promote the goal of telemedicine and encourage investors. Some of the biggest achievements for telemedicine are (a) with help from American Medical Association(AMA) provided guidelines and best practices for the effective and efficient use of telemedicine in practice (b) political support by way of lobbying for issues in the interest of telemedicine and its stakeholders.

Conclusion. Although the Clinton administration did not succeed in passing the 'Clinton's healthcare bill', it paved the way for the growth of telemedicine. The bills that were passed into law (1993-2003) promoted the use and availability of technology especially in rural areas, developed government agencies and organizations that promoted the use of telemedicine and provided laws that allowed government agencies like NASA and the US army to use telemedicine in delivery of healthcare in space and on earth. The results of these actions will be discussed in detail in chapter four.

G. W. Bush Administration (2001-2009). President G.W Bush was a strong advocate for Healthcare Information technology which is a large umbrella that encompasses telemedicine, telehealth and e-medicine. "Computerizing health records can avoid dangerous medical mistakes, reduce costs, and improve care." (President Bush's State of the Union Address, 2004). Telemedicine and Health technology was the corner stone for the administration's 10-year goal plan for the health sector. The aim of the 10-year plan was to ensure access to care to all citizens and residents of the country. The proposed

access included electronic access to medical information at little or no cost, made it possible for individuals to have access to medical dictionaries and websites that define medical terms in layman language. Bush's administration also promoted the use of store-and-forward type of telemedicine. The President announced the goal, assuring that most Americans have electronic health records within the next 10 years. These electronic health records will be designed to share information privately and securely among health care providers when authorized by the patient.

To achieve the 10-year goal, the President took some steps to encourage coordinated public and private sector efforts that would accelerate adoption of health information technology. The most notable achievement towards the growth of telematics was the adoption of Health Information Standards, which allowed medical information to be stored and shared electronically while maintaining privacy. In the last several years, the Department of Health and Human Services (HHS) has been collaborating with the private sector and other federal agencies to identify and endorse voluntary standards that are necessary for health information to be shared safely and securely among health care providers (Peters and Woolley, 2004). Some of the adopted standards appear in table 2.2.

Table 2.2

Adopted standards for the use of telemedicine
• Standards for transmitting X-rays over the Internet to be seen immediately by doctors;
• Electronic lab results transmitted to physicians for immediate analysis, diagnosis, and treatment -- assuring a prompt response and eliminating errors and duplicative testing due to lost laboratory reports; and
• Electronic prescriptions to save time for patients and help avoid serious medical errors.

Telemedicine in Bridging the Gap in Primary Care

Adapted from (Peters and Woolley, 2004).

Other steps that were taken to achieve the President's 10-year plan were (a) Naming a National Health Information Technology Coordinator to provide national leadership and coordination necessary to achieve the President's 10-year goal (b) Increased funding for Demonstration Projects. The FY2015 budget increased budgeting for healthcare information which was proposed to be used in continuing telemedical projects (c) Using the Federal Government to Foster the Adoption of Health Information Technology. Federal Government created incentives and opportunities for health care providers to use electronic records, much like the private sector is doing today (Whitehouse Archives, 2009). The collective actions of the presidency during this era further encouraged the use of telemedicine to provide services and to increase access to healthcare. Although telemedicine was still in its primitive stage in the context of achieving a nationwide adoption, the new standards allowed; healthcare practitioners to practice telemedicine safely, the transfer of medical information which increased the quality of care, reduced medical error in prescriptions and improved timeliness in patient care. This could be called the trial era.

Obama Administration (2009-2016). Barack Obama's administration was anchored around better access to healthcare. A healthcare which would be accessible to all Americans and residents garnished with high quality, at a low cost. This promise came by the way of the Patient Protection Affordable Care Act (ACA) AKA 'Obamacare'. One would wonder why did Americans accept this change (Obamacare)? Why was this change needed at this time? Was it political? The researcher would address these questions by studying a snapshot of the then American healthcare system. The snapshot would carry out the study using four variables: (a) number of physicians practicing; (b) number of licensed nurses; (c) number of physicians who are primary care physicians; and (d) number of ongoing telemetry

projects. Results will be compared pre- and post- Obama era to arrive at an educated objective conclusion of state of the healthcare industry.

Pre-Obama (2008-2009). The state of the American healthcare before Obama was filled with 'doughnut holes'. The 'doughnut hole' entails people who are caught in the loophole of the rigors of healthcare, those who aren't poor enough to qualify for Medicaid and not wealthy enough to afford healthcare insurance. Chokshi (2014) compared the healthcare industry against the two government eras in an article for Washington post, argued that about 79 million — more than one in four Americans — either lacked health insurance or were underinsured (para.4). Chokshi summarized the pre- Obama era as follows: (a) the poor disproportionately lacked adequate coverage; (b) there was wide variation among states; (c) Inadequate coverage afflicted people in the middle-income range, too; (d) Insurance costs were outpacing income increases; (e) about one in 10 was outspending the Obamacare premium threshold. This study was carried out from the patient's perspective, analyzing access and cost of care. However, to understand the whole picture the researcher will study the healthcare based on availability of care providers using the variables summarized in table 2.2).

The table denotes that the healthcare industry didn't have enough healthcare providers to cover 304.1 million Americans (United States Census Bureau, 2008). Although not evenly geographically distributed the ratio of active physicians was about 393:1 (2008). The situation was even worse at the lower level of care, with the ratio of PCP to population been 1: 1,116 (2008). As access was getting worse, the cost of health was inversely proportional to the cost with a per capita expenditure of about $7,209 (OECD health database, 2008). Most people would argue that the cost of healthcare has been independent of healthcare reforms or policies judging by the trend of increased raise in healthcare cost throughout the history of America. However, the quest for a change in healthcare trends and for a better

healthcare could be the reason Obamacare (ACA) was passed with little opposition. The ACA was signed into law on the 23rd of March 2010 and eight years down the line has healthcare improved?

Table.2.3 Geographic Distribution of Health Care Professionals (2008)

	All (%)			**Primary care (%)**					
Geography	*NP*	*PA*	*Physici-ans*	*NP*	*PA*	*Family Medicine*	*General internal medicine*	*General pediatrics*	*U.S. population(%)*
Urban	84	80	91	72	75	78	90	78	80
Large rural	9	9	7	11	12	11	7	10	10
Small rural	4	4	2	8	7	7	2	7	5
Isolated rural, frontier	3	3	1	9	6	4	1	6	5

Note: To eliminate physician shortages at a population-to physician ratio of 2,000:1, the goal set by the Health Resources and Services Administration, the supply of physicians would need to be increased by 2,670 in rural areas and 3,970 in urban areas. Adapter from *American Family Physician*, Jun 1, 2013. *Am Fam Physician*. 2013;8711. This series is coordinated by Sumi Sexton, MD, *AFP* Associate Medical Editor and United States Census Bureau, 2008.

Post-Obamacare (2016). The Obama administration was steadfast and bent on correcting what was seen as a 'defunct healthcare system'. Were cost discrepancy with the quality and access to healthcare? The population of US in 2016 was 323.1 million (United States Census Bureau, 2016)., active physician to population ratio was 375.3, PCP to population ratio was 708 at a cost per capita of $9,990 (U.S. Centers for Medicare &

Medicaid Services database, 2015). The researcher can conclude that ACA improved access to care while driving cost up. With the expansion of Medicaid, addition of Medicare part D (to address another

form of 'doughnut hole') and other changes that the ACA offered, there was still a problem with cost. Though statistically, states that took full advantage of the ACA had lower rates of people without health insurance. There was a geographically uneven improvement to access to care at the primary care level as well.

The effect of ACA can be exemplified by studying the healthcare trends in rural communities. Barnett and Berchick (2017) noted that in 2016, the percentage of people without health insurance coverage for the entire calendar year was 8.8 percent, or 28.1 million, lower than the rate and number of uninsured in 2015 (9.1 percent or 29.0 million). Ideally, low rates of the uninsured population should be evenly matched with; increased access to care, increased patient load, increased provider workforce, controlled cost. The ACA increased access came with dreaded consequences of a continued raise in healthcare cost, and decreased workforce especially PCPs. Physicians preferred to specialize in other field that had little or nothing to do with primary care. As a consequence, the growth of specialization is a major contributor to the geographic maldistribution of physicians. Many of the shortages in communities with fewer than 10,000 residents could have been reduced or eliminated if even a small fraction of subspecialists produced over the past 15 years had chosen to become primary care physicians in rural or underserved areas (Rosenblatt and Hart, 2000).

The loss of interest in PCP by young doctors could be attributed to hierarchical structure of the system. Primary care physicians are seen as been at the bottom of the chain of command, and most times denied the respect it deserves as the first contact to patient care and as the gateway to healthcare (a can't do without step). In a course to get better specialties young doctors migrate to urban hospitals with larger tertiary or comprehensive centers where specialty trainings are offered (urban migration).

The cost of medical education is escalating another reason for young physicians feel the need to dump primary care. New doctors typically owe more than $140,000 in loans at graduation (Pear, 2009).

Most of these doctors believe PCP's are not paid enough to cover accumulated bills and pay off the student loan. On average, primary care physicians overall -- and family physicians, specifically -- earn $195,000 annually, compared with $284,000 for physicians in other specialties (Laff, 2015). As Summarized on table 2.6 These disparities were to be addressed by the ACA, under which PCPs were to be treated better with more incentives to make it an attractive field in medicine. These incentives did little or nothing to address the shortage in the supply of PCPs.

Conclusion. In summary, the ACA worsened the current trend of a shortage in the supply of PCPs. Measures taken by the bill to address the shortage and to make subspecialties are involved in primary care more favorable to attract young medical graduate also failed. The 'scope-of-practice' law also worsened the situation by further depleting the number of mid-level practitioner (NPPs) that could take up the mantle of serving as a primary care provider.

Table 2.4 *Provisions in the Healthcare Reform Law Related to Primary Care*

Topic	PPACA Provisions
Workforce	• Establish a multistakeholder workforce advisory committee to develop a national workforce strategy • Increase graduate medical education (GME) training positions, with priority given to primary care and general surgery, and states with the lowest resident physician-to population ratios • Increase flexibility in GME funding to promote training in outpatient settings and increase residency programs in rural and underserved areas • Establish federally funded health centers that include primary care residency programs • Increase workforce supply and support healthcare professional training via scholarships and loans • Provide state grants to providers in medically underserved areas • Train and recruit providers to serve in rural areas • Establish a public health workforce loan repayment program • Increase funding for nursing education, training programs, loan repayment and retention grants, and career ladder creation • Provide grants to employ and train family nurse practitioners who provide primary care in federally qualified health centers and nurse-managed clinics • Support development of training programs that focus on primary care models, such as medical homes, team management of chronic disease, and integration of physical and mental health services

Source: Henry J. Kaiser Family Foundation. Focus on Health Reform: Summary of New Health Reform Law. April 15, 2011. www.kff.org/healthreform/upload/8061.pdf. Accessed January 12, 2012

Obama's Administration and Telemedicine. Telemedicine was positively affected by Obama's administration. Telehealth got more federal government funding, reimbursements policies were reviewed, incentives for facilities that adopt telehealth and promotion of the store-and-forward telemedicine tool.

National Digital Medical Records Mandate was incorporated in the American Reinvestment & Recovery Act (ARRA) of 2009. The ARRA was signed into law by President Obama in 2009, a $787 billion economic stimulus package that was aimed at jump starting American economy (Steinbrook, 2009). According to LeRouge and Garfield (2013) the ARRA included $22 billion in government subsidies for the modernization of Health IT systems and $10 billion for health research and the construction of facilities via The Health Information Technology for Economic and Clinical Health (HITECH) Act. Federal policy initiatives, Medicare and Medicaid EHR incentives and reimbursement penalties, and the transition to new, more secure claims transmission standards like ANSI 5010, are all elements of this national EMR mandate to migrate health care providers to EMR technology (Medical Records, 2017). The goal of ARRA is for every person's current health record to be converted into an electronic health record by 2014. This was a bipartisan mandate, developed by both the Bush and Obama administrations and is the foundation for health information exchange as well as healthcare reform.

The HITECH act is part of the ARRA which supports the concept of electronic health records - meaningful use [EHR-MU], an effort led by Centers for Medicare & Medicaid Services (CMS) and the Office of the National Coordinator for Health IT (ONC). EHRs are defined as "a longitudinal electronic record of patient health information generated by one or more encounters in any care delivery setting (Menachemi and Collum, 2011). Mears (2012) describes that 'Meaningful use' requirements call for the implementation and use of electronic health records to demonstrate quality of care, improve the process of care and anticipate health information exchange. The overall goals of meaningful use are to: Improve quality, safety and efficiency of patient care; Engage patients and families to participate in their healthcare process; Improve care coordination; Ensure privacy and security of personal health information; and Improve public and population-based health. CMS grants an incentive payment to

Eligible Professionals (EPs) or Eligible Hospitals (EHs), who can demonstrate engaged in efforts to adopt, implement or upgrade certified EHR technology. Participation in the CMS EHR incentive program is totally voluntary, however if EPs or EHs fail to join in by 2015, there will be negative adjustments to their Medicare/Medicaid fees starting at 1% reduction and escalating to 3% reduction by 2017 and beyond (Jamoom and Yang, 2015). EMR was well adopted by hospitals and practitioners, as of 2016, over 95% of hospitals eligible for the Medicare and Medicaid EHR Incentive Program have achieved meaningful use of certified health IT (Office of the National Coordinator for Health Information Technology, 2017). More than 90 percent of large, medium, small rural, and critical access hospitals were meaningfully using certified health IT, and more than 4 in 5 of small urban hospitals were meaningfully using certified technology (Charles, Gabriel and Searcy, 2015).

The National Digital Medical Records Mandate was a success as the healthcare industry has seen wide adoption of the EMR system. Incentives were reimbursed based on hospital stage using the EMR Adoption Model (EMRAM). Using EMRAM, hospitals were classified based on the level of integration of the EMR-MU in the delivery of care. Hospitals and physicians took full advantage of ARRA as compliance attracted incentives from the federal government. Murphy (2013) argued that most healthcare and health IT professionals are aware of the EMR Adoption Model (EMRAM) used by the analytics division of Healthcare Information and Management Systems Society (HIMSS) to track the progress of inpatient and now ambulatory hospitals in their implementation of EMR solutions and advanced functionalities (para.4). EMRAM uses stages (0-7) to rank adherence and compliance to the guidelines of EMR-MU (figure 2.2). EMRAM stage-7 correlates with paperless healthcare facilities while stage 0 facilities have not initiated any form of EMR guidelines. The popularity of the EMRAM scoring system does not only assist professionals in ranking hospital organizations, it also helps in promoting awareness and enforcing positive changes.

EMR Adoption Model Trends℠ (2009–2010)

Stage	Cumulative Capabilities	2009 Final	2010 Final
Stage 7	Complete EMR*; CCD* transactions to share data; data warehousing; data continuity with ED*, ambulatory, OP*	0.7%	1.0%
Stage 6	Physician documentation (structured templates), full CDSS* (variance & compliance), full RPACS*	1.6%	3.2%
Stage 5	Closed loop medication administration	3.8%	4.5%
Stage 4	CPOE*, CDSS (clinical protocols)	7.4%	10.5%
Stage 3	Nursing/clinical documentation (flow sheets), CDSS (error checking), PACS* available outside radiology	50.9%	49.0%
Stage 2	Clinical data repository, controlled medical vocabulary, CDSS, may have document imaging, HIE* capable	16.9%	14.6%
Stage 1	Ancillaries—laboratory, radiology, pharmacy—all installed	7.2%	7.1%
Stage 0	All three ancillaries not installed	11.5%	10.1%
		N = 5,235	*N* = 5,281

Data from HIMSS Analytics™ Database © 2011

Figure2.7: showing the stages of EMR Adoption Models, matched with %adoption rates 2009-2010 as adapted from HIMSS Analytics Database 2011.

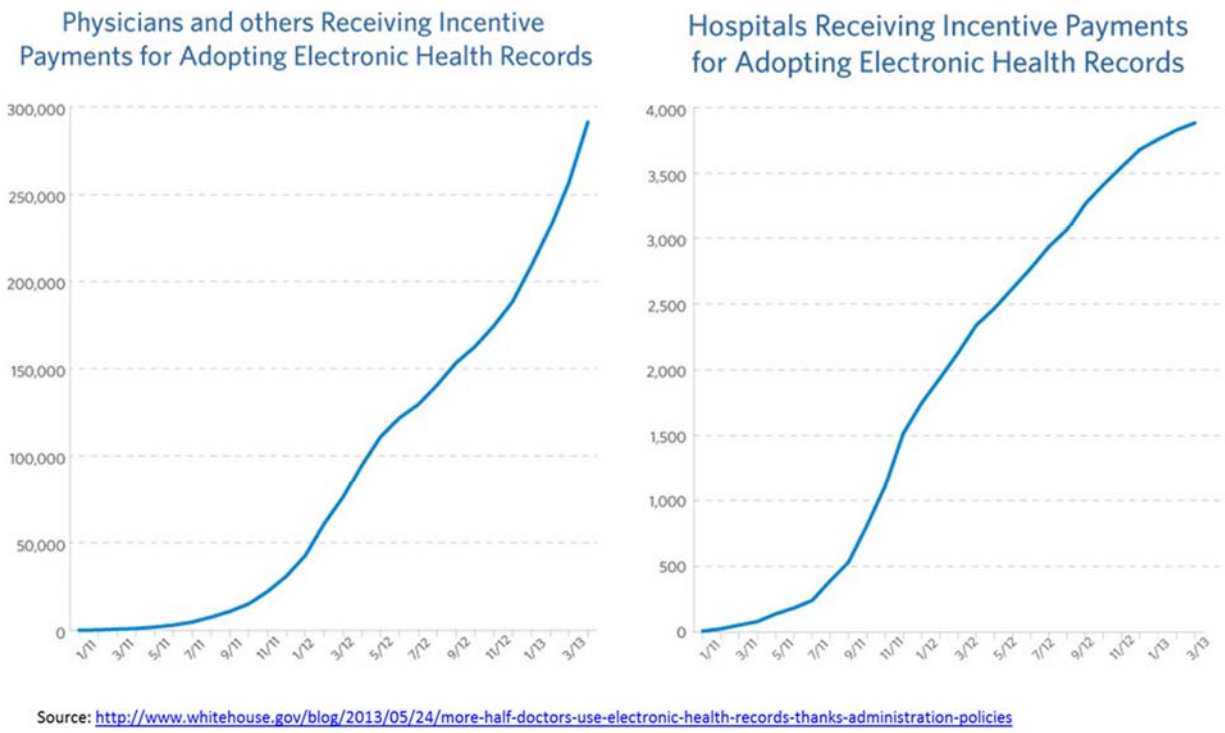

Figure 2.8 as adapted from Whitehouse Archives (2013).

Conclusion. Adopting new methods of storing and forwarding medical information recordings improves clinical, organizational and societal outcomes, reduces medical errors and increases the quality of patient care. The widely adopted EHR systems is evidence that telemedicine can be used to advance patient care while eliminating the short comings of the current healthcare system. Understanding existing theories as to why telemedicine has not been similarly adopted as a means of bridging the gap in patient care created by the increasing shortage of physicians would help in understanding the stagnant/slow adoption of all types of telemedicine

Theoretical Framework.

Theories are formulated to explain, predict, and understand phenomena and, in many cases, to challenge and extend existing knowledge within the limits of critical bounding assumptions (Abend, 2008). The theoretical framework helps the researcher understand and explain why the research problem

under study exists and helps in predicting the future of the problem. In this context, the research: (a) will draw a theoretical framework elaborating why the shortage of primary care physicians is a problem; (b) explain the delayed adoption of all types of telemedicine as a solution.

A Four-Level Model of the Health Care System. The continued shortage of PCPs has created a significant gap in patient care, creating a gap that lowers the quality of care delivered to patients. Campbell, Roland, and Buetow (2000) suggested that there are two principal dimensions of quality of care for individual patients; access and effectiveness. Campbell *et al.* highlights that access to care forms the very foundations of quality care alongside effectiveness. The Four-Level Model of the Health Care System (Figure2:3) describes the health care system as being divided into four "nested" levels: (1) the individual patient; (2) the care team, which includes professional care providers (e.g., clinicians, pharmacists, and others), the patient, and family members; (3) the organization (e.g., hospital, clinic, nursing home, etc.) that supports the development and work of care teams by providing infrastructure and complementary resources; and (4) the political and economic environment (e.g., regulatory, financial, payment regimes, and markets), the conditions under which organizations, care teams, individual patients, and individual care providers operate (National Academy of Engineering (US) and Institute of Medicine (US)Committee on Engineering and the Health Care System, 1970).

The Four-Level Model of the Health Care System

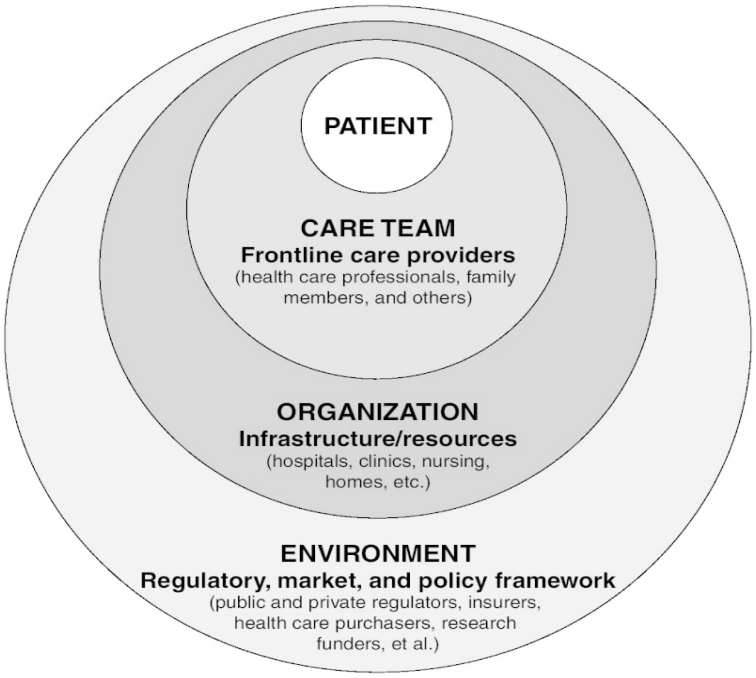

Figure 2.9: Showing the four-level Model of the Health Care System as adapted from National Academy of Engineering (US) and Institute of Medicine (US)Committee on Engineering and the Health Care System, 1970.

The first part of the Four-Level Model describes how patient has shifted from been passively involved to being actively in the delivery of care. This shift in paradigm of care has forged a more customer driven healthcare system. The model attributes this change to (a) fragmented delivery system (b) chronic disease (c) need for continuous care. Also, argues that the availability of information, the establishment of private health care spending accounts, and other measures reflect an increasing expectation that patients will drive changes in the system for improved quality, efficiency, and effectiveness. Ferlie and Shortell from the patient's perspective, improving the timeliness, convenience, effectiveness, and efficiency of care will require that the patient be interconnected to the health care system.

> Synchronous communication between patient and physician could improve the quality of care in a number of ways. For example, continuous, real-time communication of a patient's physiological data to care providers could accelerate the pace of diagnosis and treatment, thereby reducing complications and injuries that might result from delays. Remote (e.g., in-the-home, on-the-go) monitoring, diagnosis, and treatment would make care much more convenient for patients, save time, and conceivably improve compliance with care regimes (see paper by Budinger in this volume). Communication technologies also have the potential to change the nature of the relationship between patient and provider, making it easier for patients to develop and maintain trusting relationships with their clinicians (2001, p.2113).

The second level deals with the individual physician and a group of care providers, including health professionals, patients' family members, and others, whose collective efforts result in the delivery of care to a patient or population of patients operate (National Academy of Engineering (US) and Institute of Medicine (US)Committee on Engineering and the Health Care System, 1970). The article describes care team as being the basic building block of a “clinical microsystem,” defined as “the smallest replicable unit within an organization [or across multiple organizations] that is replicable in the sense that it contains within itself the necessary human, financial, and technological resources to do its work” (p. 55-56). Care team has greatly been skewed to the negative side as the shortage of PCPs continued soar. This negative skew has negatively affected the paradigm of the health care system which in turn has a negative impact on patient care at all levels.

The third level is the organization level, which has been described as a critical level of change in the health care system. Ferlie and Shortell (2001) explained that it can “provide an overall climate and culture for change through its various decision-making systems, operating systems, and human resource practices” (p. 287). The organization is the business level, where hospitals, clinics, and home are

structured to generate revenue at the expense of patients or provides (cost-shifting). To support patient-centered care delivery by well-functioning clinical care teams or microsystems, health organizations must find ways to bridge the health care professional/ delivery system management divide and invest in information/ communications technologies, systems-engineering tools, and associated knowledge (National Academy of Engineering (US) and Institute of Medicine (US)Committee on Engineering and the Health Care System, 1970)

Lastly, the fourth level explains the role of government and the economic environment on health care system. The federal government influences care through the reimbursement practices of Medicare/ Medicaid, through regulation of private-payer and provider organizations, and through its support for the development and use of selected diagnostic and therapeutic interventions (e.g., drugs, devices, equipment, and procedures). Also, the widely adopted EMR-MU by hospitals and practitioners was greatly influenced by policies made by the Federal Government. By exercising its responsibility to monitor, protect, and improve public health, the federal government shapes the market environment for health care.

Researchers perspective. The Four-Level Model helps to understand the healthcare system as a simple flow chart, where one level of care leads to another. Ultimate outcome is aimed at delivering a "customer-driven" patient centered care. Shortage of PCPs especially in rural areas threatens the basic building block of a "clinical microsystem", disrupts the flow of health and puts enormous burden on the organization level. The paradigmatic shift from passive patients to active patients were patients play a more active role in the delivery of care presents an opportunity. A rare opportunity which should be rightfully harnessed by implementation and adoption of telemedicine, as a tool to bridge an existing distance in care.

Innovation Diffusion Theory. Diffusion of Innovation (DOI) Theory was developed by E.M. Rogers in 1962, as one of the oldest social science theories (Figure 2.5). According to Zhang, Yan and Spil (2015), the theory describes innovation as an idea, process, or a technology that is perceived as new or unfamiliar to individuals within a particular area or social system. Diffusion is the process by which the information about the innovation flows from one person to another over time within the social system. There are four main determinants of success of an IT innovation: communication channels, the attributes of the innovation, the characteristics of the adopters, and the social system (Zhang, Yan and Spil, 2015). Roger's theory argues that communication channels relate to how well people or users are educated on the advantages and disadvantages of innovation. The more knowledgeable the consumers, the easier adoption and acceptance becomes. The attributes of an innovation include five user-perceived qualities: relative advantage, compatibility, complexity, trialability and observability (Rogers and Singhal, 2003).

According to Zhang *et al.* (2015), relative advantage is the degree to which the user perceives benefits or improvements upon the existing technology by adopting an innovation. Compatibility captures the extent to which an innovation is consistent with the existing technical and social environment. The more an innovation can integrate or coexist with existing values, past experience and the needs of potential adopters, the greater its prospects for diffusion and adoption. Complexity measures the degree to which an innovation is perceived to be difficult to understand, implemented or used. An innovation that is less complex is more likely to be rapidly accepted by end users. Trialability is the ability of an innovation to be put on trial without total commitment and with minimal investment. An innovation with higher trialability is more likely to be adopted by individuals. Finally, observability is the extent to which the benefits of an innovation are visible to potential adopters. Only when the results are perceived as beneficial, will an innovation be adopted (Zhang *et al.,* 2015, p.122).

Rogers (1962) divided adopters into five groups based on their attitudes toward an innovation: innovators, early adopters, earlier majority, later majority and laggards. These groups range from the first individuals who adopt the innovative to the last group of individuals to adopt the technology, which was referred to as laggards or slackers. Zhang *et al.* (2015) demonstrated that Rogers' innovation theory is useful for conceptualization of technology adoption in the context of e-heath.

Conclusion. The Diffused Innovative theory tries to predict how users would adopt and accept a new technological concept. As with EHR documentations, innovative adoption was slow at first, but incentivization saw a turnaround as the system was widely adopted by organizations and practitioners. Persistence, consistency and community education of the pros and cons of new technology reduces the 'laggards' percentage on the Diffusion Innovative theory. In chapter four, this paper will analyze results of telemedicine on the delivery of care thus far.

Diffusion of Innovation (DOI) Theory

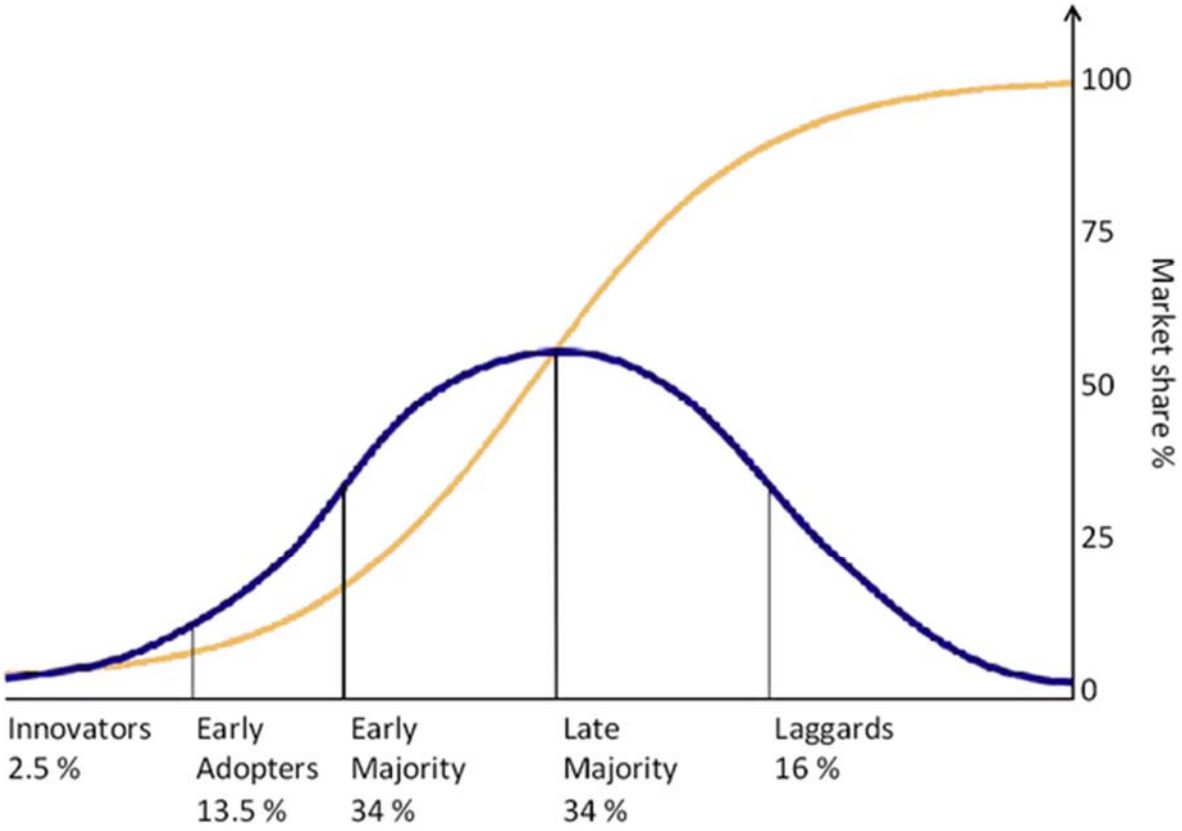

Figure 2.10: Diffusion of Innovation (DOI) Theory as adapted from Zhang, X., Yu, P., Yan, J., & Ton A M Spil, I. (2015). Using diffusion of innovation theory to understand the factors impacting patient acceptance and use of consumer e-health innovations: a case study in a primary care clinic. *BMC Health Services Research*, *15*, 71. http://doi.org/10.1186/s12913-015-0726-2

Evaluation Model

Patient satisfaction is an important aspect of patient care. Evaluation of patient satisfaction help healthcare managers and stakeholders alike in making decisions that improve the quality of care rendered. The Institute of Medicine (IOM) outlined six aims for a quality health care system patient safety: (a) safe; (b) equitable; (c) evidence based; (d) timely; (e) efficient; and (f) patient centered. In turn high-quality encourages the increased use and adaptation of services. IOM's six aims of quality can

be summarized as the delivery of patient service that is safe, reduces waste (cost, time, man power and equipment), effective and efficient and improves patient satisfaction. DeLone and McLean Information System success model (D&M IS Model, 1992) uses six interdependent variables or components: system quality, information quality, use, user satisfaction, individual impact, and organizational impact (Figure 4.1). Variables contained in the D&M IS Model are considered "interdependent" due to the mutual reliance between components. It is important to note that, although there are have being many modifications to the D&M IS Model, this research uses the 2003 version of the model and themes used in coding found on the next section were partly derived from these components.

The concept of the IS model was built on three main variable that driven any technology: (a) system quality; (b) Information quality and (c) service quality which contained elements of the IOM's quality aims.

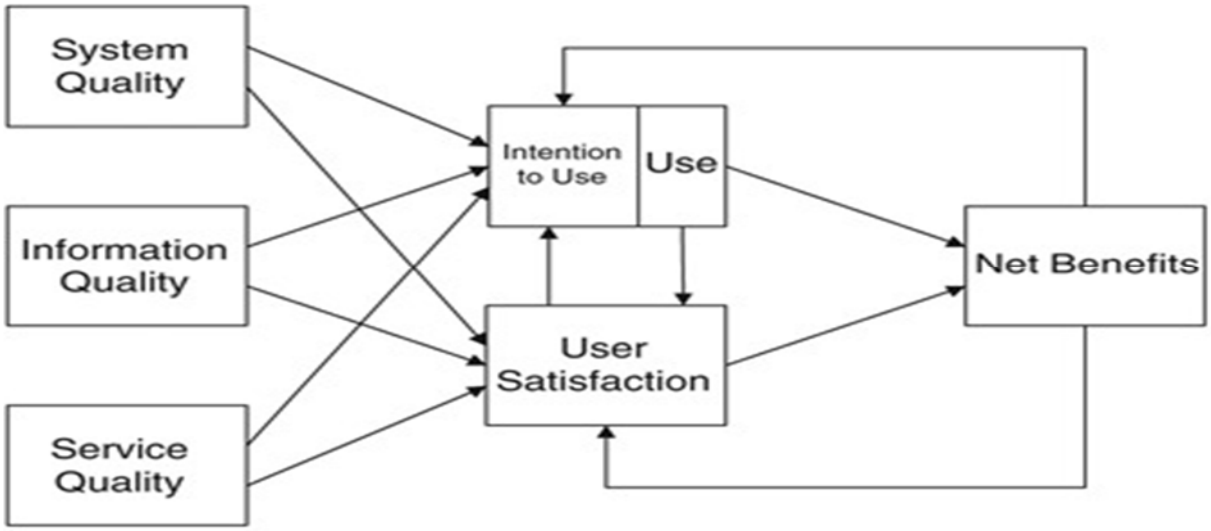

Figure 2.11: Adapted from DeLone & McLean (2003) The DeLone and McLean model of information systems success: a ten-year update. Journal of Management Information Systems 19 (4), 9–30.

System quality – the desirable characteristics of an information system. For example: ease of use, system flexibility, system reliability, and ease of learning, as well as system features of intuitiveness, sophistication, flexibility, and response times (Petter, Delone & Mclean, 2008).

Information quality – the desirable characteristics of the system outputs; that is, management reports and Web pages. For example: relevance, understandability, accuracy, conciseness, completeness, understandability, currency, timeliness, and usability.

Service quality – the quality of the support that system users receive from the IS department and IT support personnel. For example: responsiveness, accuracy, reliability, technical competence, and empathy of the personnel staff. SERVQUAL, adapted from the field of marketing, is a popular instrument for measuring IS service quality (Pitt, Watson, & Kavan, 1995).

System use – the degree and manner in which staff and customers utilize the capabilities of an information system. For example: amount of use, frequency of use, nature of use, appropriateness of use, extent of use, and purpose of use. This reflects with the incentivize adoption of the EMR in health centers as discussed in chapter two.

User satisfaction – users' level of satisfaction with reports, Web sites, and support services. For example, the most widely used multi-attribute instrument for measuring user information satisfaction (Ives, Olson & Baroudi, 1983).

Net benefits – the extent to which IS are contributing to the success of individuals, groups, organizations, industries, and nations (Brynjolfsson, Hitt & Yang, 2002). For example: improved decision-making, improved productivity, increased sales, cost reductions, improved profits, market efficiency, consumer welfare, creation of jobs, and economic development. Brynjolfsson et al. (2002) have used production economics to measure the positive impact of IT investments on firm-level productivity.

The D&M IS model evaluates the process, use and outcome. Establishing a direct relationship between usage and patient satisfaction. The model puts in consideration both stakeholders (investors) and patients. Therefore, the researcher finds the model suitable for the as a tool in this research which seeks to ascertain the cause of the "wax and wane" phenomenon in the adoption of telemedicine as a means to close the gap in the patient care as a result of primary care physicians. The challenges that comes with the use of this model lies in the measurement. Coughlan, Moore, Lucid, O' Farrell & Murphy (2013) developed a standard framework that could be used in the measurement of the D&M IS model (figure 4.2). Both the D&M IS Model, and the framework used in measuring are highly subjective tools. Variables are measured qualitatively and subjectively in accordance with how the user or stakeholder perceives its component. For example, LaVela & Gallan (2014) defined 'patient experience' as

Framework for Evaluating the Success of an IS Unit

Context	Quality		Impact	
Stakeholders • Technical • Individual • Group • Organisational • Other	**System Quality** • Efficiency • Reliability • Flexibility • Effectiveness • Ease of use • Customisation	**Information Quality** • Availability • Usability • Importance • Relevance • Accuracy • Timeliness	**Individual Impact** • User satisfaction • Ease of use Usefulness • Individual productivity • Learning • Decision effectiveness	**Organisation Impact** • Business Process Change • Overall productivity • Staff requirements • Organisational costs • Cost reduction • Alignment
Type of IS				
Against which referent is success to be judged? **Success compared to:** • An alternative system • The preceding system • Some ideal level of success • Stated goals of the system • Competitors' system • Other	**Structure of IS Unit**		**Net Benefits**	
Is use voluntary or mandatory?	• Top management support • Communication • Culture • Employee skills and training		• Improved decision making • Productivity • Increased sales • Reductions in cost • Profits • Economic development • Creation of jobs	
Purpose of evaluation				
Timeframe Employed				
What types of data to be used? • Perceptual • Objective				

Figure 2.12: As adapted from Coughlan, Moore, Lucid, O' Farrell & Murphy (2013).

Framework for Evaluating IS Success from

https://sopinion8ed.wordpress.com/2013/02/22/framework-for-evaluating-is-success/

"the sum of all interactions, shaped by an organization's culture, that influence patient perceptions across the continuum of care." (p. 29). The complexity of this definition makes it hard to ascertain the level satisfaction perceived by patients as one patient's satisfaction could be another's dissatisfaction.

Summary

The review of literature has shown that there is increase in the distance between patients and providers which has been fueled by the continued shortage in primary care physicians. From definition, telemedicine emerged to foster the integration of technology within distant patient care. Throughout the history of American medicine, telemedicine has gained popularity through the influence within political, social, medical and technological spheres, with the major player being the political arena. Through the development of policies, organizations have begun to heighten the enforcement of rules, which includes reimbursements and incentives, the federal government shaped the process of integration of technology and medical practice. The slow nationwide adoption of all types of telemedicine has an asserted an effect on medical practice. In Chapter Four, the researcher will summaries the 'effect' of the slow integration of all types of telemedicine in patient care.

CHAPTER THREE

Methods

The purpose of this study is to ascertain how the telemedicine industry could be used in bridging the gap in care created by the shortage of primary care physicians. This chapter describes the research design, the research methods, confidentiality, steps taken to ensure the protection of human subjects, and the limitations of the research.

Research Design

The research design that was used for this study was the program hermeneutic approach. "Hermeneutics" means the theory of interpretation, i.e. the theory of achieving an understanding of texts, utterances, and so on (Forster, 2007). The researcher, through the hermeneutic method, argued that a more fundamental understanding and explanation of social life may be found in the meaning that action has for social and political actors.

The researcher defined the target for the evaluation using demography, geology, medical and political categories. Meaning, the target population for this research are affected by the defined problem demographically, geologically, medically and politically. For clarity, stakeholders in this context, have stakes (usually monetary or politically) in the problem or solution to the problem. The rate of the growth or shrinkage of the problem was explored using social standard indicators which had been approved or used in past studies to determine how well a program is doing within the context of hermeneutics qualitative study.

The word qualitative implies an emphasis on the qualities of entities and on processes and meanings that are not experimentally examined or measured (if measured at all) in terms of quantity, amount, intensity, or frequency (Denzin, Norman, and Lincoln, 2000). Qualitative research methods

allow the research to take advantage of the different beneficial characteristics of both types of qualitative research methods.

Data Collection

The researcher collected data that helped in evaluation: (a) the programs activities; (b) program objectives; and (c) program results. Analysis in this context gave the researcher the stands/foundation to draw objective conclusions. The U.S. General Accounting Office (1996) noted that data collection is driven by: (a)defining the variables to use; (b) defining the material to include in the analysis; (c) defining the recording units; and (d) developing an analysis plan (p. 13). The purpose of this section was to provide information on the proceedings or the researcher's approach to finding and collecting of data. A recording unit is the portion of text to which evaluators apply a category label (General Accounting Office, 1996). A recording unit could be in words, sentences, or themes.

Sample Size. The researcher used web search and library search to review all past studies on the topic. Agency websites were sought to get accurate data on the trends which helped the researcher get a clearer picture of the past, present and be able to predict the future. The aim of the research would be to reach 'saturation'. Saturation in this context was when the researcher kept finding same information in different searches. This would mean that no other information can be found from further searches.

Sample frame. This researcher started by using the search terms: telemedicine; primary care physician; primary care; shortage of primary care physicians (PCP); use of telemedicine; telemedicine versus primary care physicians; political views on telemedicine; and political views on the future of PCP**.** The data base that was used for the study included: PubMed, Google and Google Scholar, CSUB online library, NCBI, CDC database, American Telemedicine Association database, rockhealth, nap, Census Bureau. As previously stated, the researcher concluded the study when saturation was attained.

Data Analysis. Textual analysis was the method communication researchers used to describe and interpret the characteristics of a recorded or visual message (Frey, Botan, and Kreps, 1999). The purpose of conducting a textual analysis was to describe the content, structure, and functions of the messages contained in texts. Content analysis is a type of textual analysis that is used to identify, enumerate, and analyze occurrences of specific messages and message characteristics embedded in texts. Content analysis is defined as a research method used by sociologists to analyze social life by interpreting words and images from documents, film, art, music, and other cultural products and media (Crossman, 2017). Bengtsson (2016) explained that data analysis could be done in two ways: Manifest and Latent analysis. Both ways yield the same result with slight differences. The Manifest-type analysis deals with superficial textual analysis such as 'what has been said'. On the other hand, Latent-type analysis tries to add context to what the literature denotes. The central idea in content analysis is that the many words of the text are classified into much fewer content categories (Weber, 1990). For the effective categorization of text, content analysis has been divided into four main stages: the decontextualization, the recontextualization, the categorization, and the compilation for both methods (Bengtsson, 2016). The first stage deals with identifying variables for study and coding.

GAO (1996) describes 'coding' as a classification process of marking text passages with short alphanumeric codes which creates "categorical variables" that represent the original, verbal information and that can then be analyzed by standard statistical methods. To classify a document's key ideas, the evaluator identifies its themes, issues, topics, and so on. For this paper, the analysis was a Manifest-type, in which 'themes' were used as record units. The boundary of a theme delineates a single idea; we are not restricted to the individual semantic boundaries of sentences and paragraphs. Holsti describes a theme as "a single assertion about some subject" (1969). Examples of a category to be used is 'medical use of telemedicine', further classified under type of medical condition 'cardiovascular' or 'diabetes

mellitus'. These themes were grouped under a broader spectrum for example 'useful' or not useful. The researcher was thorough in the coding stage to make sure the themes were not overlapping. The research avoided common errors by: (a) setting clear boundaries for the chosen themes to avoid overlapping; (b) finding repetitive patterns of action and consistencies in the study; and (c) employing a systematic approach. Lincoln and Guba (1985) argued that an evaluator uses classification reasoning plus tacit and intuitive senses to determine which data "look alike" and "feel alike" when grouping them together.

Methodological rigor. Tobin and Begley (2004) rigor explained the means by which we demonstrate integrity and competence, a way of demonstrating the legitimacy of the research process. The research focused on trustworthiness. How trustworthy the research was reflected on the paper's credibility, transferability, dependability, confirmability and the goodness of the research. Credibility was established by ensuring prolonged engagement, persistent observation, triangulation, peer debriefing, negative case analysis, and referential adequacy (Lincoln and Guba, 1985). Triangulation involved using multiple data sources in an investigation to produce understanding, examining the consistency of different data sources from within the same method and applying multiple theoretical perspectives in the examination and interpretation of the data. Dependability (comparable with reliability) is achieved through a process of auditing (Tobin and Begley, 2004). Auditing entails consistent review with professors and peers. Confirmability relies on objectivity and reduction of observer bias. The researcher subjected research to an objective audit by discussing result findings with peers and supervisors.

Protection of Human Subjects.

This research was submitted to the Institutional Review Board (IRB) on the 18th of October 2017. The copy of the IRB form can be found in the Appendix.

Limitation

The major limitation that was encountered by the researcher was time. The time available to investigate a research problem and to measure change or stability over time was constrained by the due date of the project.

Chapter Four

As the country continues to experience a shortage of primary care physicians and a transient poor primary care system, telemedicine offers a way out of the conundrum. The purpose of this chapter is to understand and analyze separate ways in which telemedicine can and has helped bridge the gap in primary care. The purpose of this textual analysis is to describe the content, structure, and function of the messages contained in 37 peer reviewed journals, 28 websites and the gathering of anecdotal evidence of customer reviews. Literature was located using the search words: telemedicine; primary care; primary care physicians; role of primary care in patient care; outcome; cost effectiveness; assessment tools; and quality improvement.

Results

As a result, of this research project, a content analysis based on the research question (How can telemedicine help bridge the gap in primary care) and guided by are existing telemedicine assessment model, the researcher developed categories matching main roles of primary care (see Table: 4.2) clearly stating the advantages and role in primary care. The Institute of Medicine (1996) summaries the roles of primary care to as Table 4.1.

Table 4.1

Role of primary care
Guides patients through healthcare
Facilitates an ongoing relationship between patients and clinicians
Fosters participation by patients in decision making about their health and own care
Provides opportunity for disease prevention and health promotion
Helps build bridge between personal health care services and patient families.

As Adapted from: Institute of Medicine. (1996). Primary Care: America's Health in a New Era. *Front Matter." Institute of Medicine*. doi:10.17226/5152

Table 4.2 shows that telemedicine improves the outcome of primary care when properly applied. This has proven to be beneficial to both individuals, hospitals and/or organizations although not without limitations. The results of the content analysis appear below:

Table 4.2

Advantages and Limitations of Telemedicine in Rural Areas

Advantage	Limitations
• Reduces Readmission Rates	Legal Issues
• Unnecessary emergency department visits	Standard reimbursement system
• Drives volume	Cross-border medical practice
• Decreases cost and waste	Uncompromised privacy
• Quality Monitoring	Communication
• Addresses Physician shortage in rural settings	Broadband internet infrastructure

Lowering Readmission Rates

In 2012, the Hospital Readmissions Reduction Program was launched by the Centers for Medicare & Medicaid Services (CMS). This program slashes reimbursement fees for hospital readmissions of less than 30 days for Medicare patients. Boccuti and Casillas (2018) noted that total Medicare penalties assessed on hospitals for readmissions increased to $528 million in 2017, $108 million more than in 2016. Although penalty fees are on the rise, total readmission rates continue to drop since the program was launched in 2012. The penalty slash increase was attributed to the addition of new conditions or rules to the readmission reduction program. However, the type of telemedicine that has played a role in reduction in readmission rates is called 'remote monitoring'. Hospitals provide patients with computers, videoconferencing equipment and portable monitors that can track vital signs such as blood pressure and blood oxygen levels. Patients hold real-time video calls with nurses, complete questionnaires online designed to assess their condition, receive education via interactive

programs and send their vital signs tracking information direct to their health care provider (Gordon, 2015). Telemonitoring has been widely accepted by both patients and providers. In Boston, Partners Healthcare recorded a 50% and 45% reduction in readmission rate for heart failure and non-heart failure patients respectively from 2006-2014. This saved the hospital over ten million dollars (Gordon, 2015). Checking the effect of telemedicine on outcome doesn't give us the full picture of how quality of care could be improved using telemedicine.

Unnecessary Emergency Department Visits

Hospitals and health organizations are taking full advantage of advancements in telemedicine to improve patient care. In 2016, Kaiser Permanente launched telemedicine/virtual visits which allows health care professionals to evaluate, diagnose, and treat patients using telecommunication technology. The program supplements in-person visits by allowing for more frequent communication with physicians using visual or audio technologies, helping physicians monitor their patients in the comfort of their homes. According to Barkholz (2017), Kaiser Permanente CEO Bernard Tyson stated that Kaiser Permanente members annually have more than 100 million encounters with company physicians, 52% of which are now virtual visits. Members are covered on a capitated basis, meaning that Kaiser Permanente is paid a monthly member fee to take care of a patient's full range of healthcare needs. As a result, Kaiser Permanente physicians don't have the same worries as other practitioners about getting paid for virtual visits (2017). Payment methods has been controversial and a stumbling point to the adoption and integration of telemedicine.

Telemedicine services at Kern Medical include clinics that provide health care remotely by utilizing bi-directional (two-way) electronic communications (such as voice and video chat) in the management of multiple sclerosis and diabetic eye screening. Kern Medical has since expanded their telemedicine services to include teleconference, dermatology, tele-stroke and telepsychiatry.

Finally, a report by Results of a systematic review suggest a 20% reduction in emergency hospitalizations among patients with cardiovascular disease (primarily heart failure) using telemonitoring (Takahashi, *et al.,* 2012). Continuous monitoring of patients with chronic diseases aids in early detection of potential dangers which in turn guides calculated interventions by care givers.

Drives Volume

Advancement in technology has improved the way we live and the general understanding of life. Health sector, although slow in adoption, has had significant impact on the understanding and management of diseases and disease conditions alike. Application of electronic devices in medicine cuts across all sectors with similar expansion in telemedicine, fields like: a) tele-stroke services; b) tele-ICU; c) Tele-rehabilitation; d) telenursing; e) telecardiology and many more. Electronic monitoring falls under two types of telemedicine: the remote monitoring; and real-time interactive services. Driven by faster internet connections, ubiquitous smartphones and changing insurance standards, more health providers are turning to electronic communications to do their jobs—and it is upending the delivery of health care (Beck, 2016). Research shows that hospitals have taken advantage of the expanding potentials of telemedicine to increase the volume of services provided and thus patient load. Mace (2013) reported that the UC Davis Health System now offers access to 30 specialty care services ranging from behavioral health and dermatology to audiology and ophthalmology for both children and adults through telemedicine. Since launching UC Davis Health System's telemedicine program in the early 1990s, UC Davis Health System has provided nearly 37,000 consultations. This represents synchronous (real-time communication) and asynchronous (recorded and stored for another time) telehealth consultations to more than 100 sites spanning 44 of California's 58 counties. The volume drive benefit of telemedicine is not limited to hospitals, the Department of Veterans Affairs (VA) has also integrated telemedicine with patient care. Mazmanian argues that when the history of telemedicine is written,

significant credit will go to the VA for leading the way in deploying telemedicine on a large scale. In fiscal 2013, more than 600,000 veterans accessed VA care using telemedicine programs -- for a total of more than 1.7 million episodes of care (2014). By integrating telemedicine in patient services, organizations have increased volume of care, services provided, and volume, while cutting cost and waste.

Decreases Cost and Waste

Results of the textual analysis showed how telemedicine has been used to cut costs and waste in the healthcare system. Gamble (2013) described that waste in healthcare can be categorized as one or more of the following: 1) defects, which were attributed to time spent treating the wrong diagnosis; 2) over-production, described as doing more than what is needed by the patient or physician; 3) transportation, as unnecessarily moving patients, specimens or materials throughout a system is wasteful; 4) waiting; 5) inventory; 6) motion, implies the movement of employees from room to room, floor to floor and building to building more than necessary; 7) over-processing, which describes work performed that is not valued by the patient or caused by definitions of quality that are not aligned with patient needs; 8) human potentials, when employees are not engaged. Increased cost and waste attributes to the general increase in patient care and decreases the quality of care delivered to patients which affects both the hospital and patient. Healthcare providers reduce waste and cost and integration of telemedicine.

This research has found that the use of telemedicine has contributed to tremendous reduction of cost and waste. Lagasse (2017) reports that those who use telemedicine for sports medicine appointments saved an average of $50 in travel costs and 51 minutes in waiting and visit time, according to the study. This finding demonstrates how telemedicine addresses both the cost and waste in patient care. Gordon, Adamson, and DeVries (2017) argue that while average episode costs differed by

condition, they tended to follow a similar pattern of virtual visits having lower medical costs than care at other patient care settings across conditions (figure 4.1).

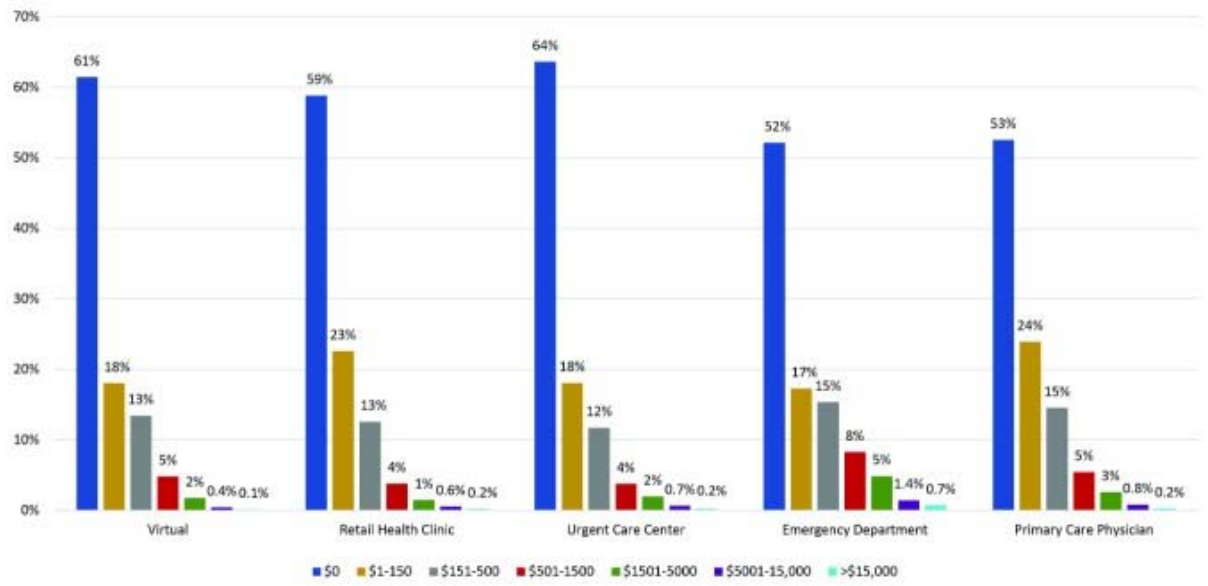

Figure 4.1: as adapted from Gordon, A. S., Adamson, W. C., & DeVries, A. R. (2017). Virtual Visits for Acute, Nonurgent Care: A Claims Analysis of Episode-Level Utilization. *Journal of Medical Internet Research, 19*(2), e35. http://doi.org/10.2196/jmir.6783.

The result concludes that total costs per episode were $36, $153, $1735, and $162 more expensive other care settings, like, urgent care, primary care physician and retail health clinics compared with virtual visits. Although the cost of healthcare influences the quality of health, telemedicine plays a direct role in improving the quality of patient care.

Quality Monitoring

Quality monitoring is on the agenda of most healthcare systems. Through quality monitoring, deficits are identified, quality of care is improvement, and the overall performance of the organization is assessed and reviewed. Healthcare systems make these findings public which in turn portrays an image

of transparency and trustworthiness for internal and external organizational environment. Quality monitoring centers around the effective use of storage-and-forward type of telemedicine. Indicators are defined as measurement tools, screens, or flags that are used as guides to monitor, evaluate, and improve the quality of patient care, clinical support services, and organizational function that affect patient outcomes (Mainz, 2003). These indicators tailor monitoring to specific measurements like performance, outcome, and patient satisfaction. The nationwide adoption of electronic medical records is more beneficial than paper records because, using different indicators, providers can track data over time. Telemedicine also improves quality by: 1) identify patients who are due for preventive visits and screenings; 2) monitor how patients measure up to certain parameters, such as vaccinations and blood pressure readings; 3) lowering readmission rates has been beneficial to both patients and providers.

Addresses Physician Shortage in Rural Settings

Shortage in primary care physicians' workforce has the greatest impact on rural communities. Ripton and Winkler argue that rural hospitals are in trouble because more than 48 rural hospitals have closed since 2010, according to the National Rural Health Association, and another 283 are in danger of closing (2016). The article attributes the situation to: 1) reduced populations; 2) higher percentage of uninsured and elderly patients; 3) equipment underuse (lack of ICT training); 4) the absence of high-margin specialty services makes for a bleak economic outlook; 5) shortage of doctors willing to work in remote areas; and 6) the challenge of getting patients into rural hospitals in a timely manner because travel distances sometimes are too great (2016). Adoption of telemedicine addresses this challenge by linking rural hospitals to urban hospitals (table 4.2). Despite limitations to the swift adoption of telemedicine in rural areas studies by Beaton (2017) showed that PCPs practicing in a rural setting were three times more likely to have used telehealth in the past year than providers in urban settings. Additionally, telemedicine reduces cost of patient care by reducing: cost of transportation (median cost savings:

$5,718 per medical facility, annually); lost wages savings ($3,431 per medical facility, annually); hospital cost savings ($20,841 per medical facility, annually); and increased revenues for local labs ($145,109 per medical facility, annually) and pharmacies by $8,558 per medical facility, annually (Landi, 2017).

Limitations

There are multifactorial limitations to the integration of telemedicine in primary care. However, this content analysis identified three major attributors to the limitation as listed in table 4.2. Laws and polices tend to be at the forefront of these limitations.

Legal and Reimbursement Issues in Telemedicine

Literature shows that there have been several laws enacted under the Affordable Care Act (ACA) that has shaped and yet limited the use and adoption of telemedicine. Most of the law limits reimbursement to providers for telemedicine services. In 201, according to a survey of healthcare executives, 41% of respondents do not receive reimbursement at all for telemedicine services (Jacobson, 2015).

Ishikawa diagram displaying telemedicine limitations

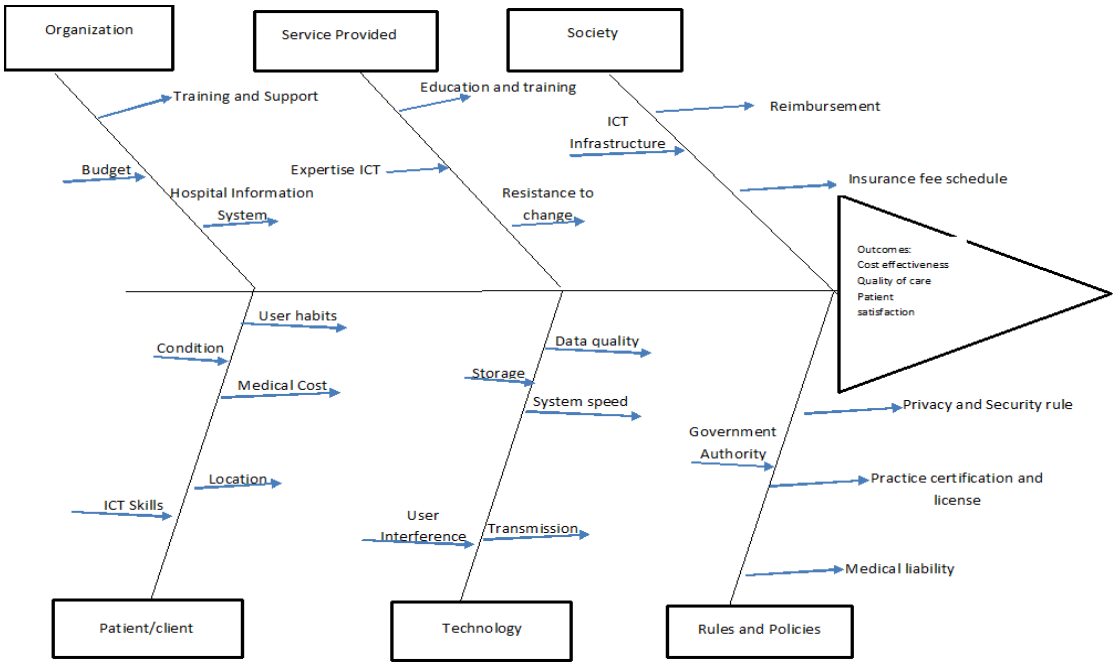

Figure 4.2: Multiple sources see reference

For example, Medicare only reimburses telemedicine services that mimic in-person physician visits (face-to-face video interactions) and the patient must call in from a medical facility located within in a designated Health Professional Shortage Area (HPSA). These include: a) Offices of physicians or practitioners; b) Hospitals; c) Critical Access Hospitals; d) Rural Health Clinics; e) Hospital based-or Renal Dialysis Skilled Nursing Facilities; and f) Community Mental Health Centers.

Newly enacted laws like the telemedicine parity law, give states the power to redefine telemedicine and make policies that limit reimbursements for tele-services. Private payer parity laws generally require private insurers and health maintenance organizations to cover, and in some cases also reimburse, for the provision of telehealth services in the same manner and at the same level as comparable in-person services (Thompson, 2017), the rationale being to give states the authority shape the use of telemedicine to meet the needs of individual state citizens. Thus, some states are passing parity laws that require

health plans to cover specialties through telemedicine that would be otherwise covered through their policy, exemplified in New York. As of today, 33 states have partially or fully adopted the parity law (Holman, 2017). Studies show that states that have not adopted telemedicine parity law limit the use and hence the expansion of telemedicine. Furthermore, states with partial adoption have failed to harness the full potential of technology in patient care. Some states blame the partial or failed adoption on the cost of telemedicine infrastructure and thus blame the federal government for not doing enough to ensure the equipment needed for the implementation and maintenance of telemedicine are not installed nationally.

Cross-Border Medical Practice

Cross-border medical practice entails the practice of medicine across state lines. Physicians who are licensed in one state are not allowed by law to practice in another state. This law restricts the aim/purpose of telemedicine, which is the practice of medicine from a distance. TeleHeath.org claims that when this happens, the originating site (the location of the patient) is considered the "place of service", and therefore the distant site provider must adhere to the licensing rules and regulations of the state in which the patient is located. There are some exceptions to these rules according to telehealth.org: 1) Physician-to-physician consultations (not between practitioner and patient): 2) Educational purposes; 3) Residential training;4) Border states; 5) U.S. Military; 6) Public health services; 7) Medical emergencies (Good Samaritan) or natural disasters. Health systems that are unaffected by this barrier tend to excel in telemedicine. For example, The Department of Veterans Affairs(VA) has reported a 35% reduction in hospital admissions and a 59% reduction in total bed days of care since launching one of the country's first broad telehealth programs in 2003 (Schumacher, 2015). Due to the overwhelming success in the program, the VA proposed the enactment of Veterans E-Health & Telemedicine Support (VETS) Act of 2017 which gives VA doctors the authority to treat veterans via telemedicine no matter where those veterans are located (Wicklund, 2017). The recent trend in cyber hacking also disfavors the

expansion of telemedicine in that some patients who do not trust the web could opt out of the use of telemedicine.

Communication and Uncompromised Privacy

From a perspective, telemedicine sounds like a solution to the shortage of physicians in rural areas. However, studies have shown that those areas are often resident to non-English indigents or people with little or no educational background. This creates a barrier to the use of telemedicine as physician direction could be misunderstood. Normally, physicians are required to provide professional interpreters in cases where disparity in language exist. Toulet (2014) acknowledges that although technological innovations continue to break down barriers between patients and doctors who can't always meet face to face, language barriers remain problematic. There are private and non-governmental organization that aim to address this barrier. For example, Otto (2016) reports that San Francisco-based ConsejoSano, a company that helps connect employees to Spanish-speaking doctors, is designed to help employers simplify care, increase engagement and lower costs related to Spanish-speaking employees. ConsejoSano and other companies like it provide a solution to the communication barrier of telemedicine.

The use of technology and the involvement of second part poses as a threat to privacy. Privacy risks involve a lack of control over the collection, use, and sharing of data. For example, home telehealth devices and sensors designed to detect falls may collect and transmit information on activities in the household that a patient wishes to keep private, such as substance abuse or that the house is unoccupied at particular time (Hall and McGraw, 2014). This information in the wrong hands could cause harm to the patients or users. The research concludes that concerns about the privacy and security of telehealth systems may adversely affect people's trust in telehealth and threaten the ability of these systems to improve the accessibility, quality, and effectiveness of health care.

Broadband Internet Infrastructure

The lack of broadband internet infrastructure in mainly rural areas limits the use of telemedicine. Zhang (2017) explains that with half of rural Americans still lacking broadband-level speeds, the use of telemedicine is close to zero and that even if healthcare providers are willing to provide the technology needed (for example, tables for monitoring glucose levels) lack of internet renders this effort useless. According to the National Rural Health Association, more than 48 rural hospitals have closed and an additional 283 are in danger of shutting due to a number of bottom-line cost issues. As these rural hospitals shut down, it leaves a gap in coverage for patients in those areas. Telemedicine can help, but only if there is a way to connect (Kern, 2016). Furthermore, A Pew Internet poll from 2013 found that 44% of Americans still lacked access to smartphones. Many of those patients were elderly, low-income, or had lower levels of education, and may be more likely to lack regular access to healthcare (Smith, 2013).

In conclusion, despite the limitations in the adoption of telemedicine, benefits clearly outweigh risks. This research shows that telemedicine can help bridge the gap in primary care. The researcher concludes that, although telemedicine faces multifactorial barriers to the expansion, reimbursement policies and laws and lack of infrastructure are the main factors that contribute to the restraints in the expansion of telemedicine services.

Theory Application

Theories that were applied to this research were The Four-Level Model of the Health Care System and the Diffusion of Innovation theory. These theories explained and predicted the outcome of the study.

The Four-Level Model of the Health Care System

This model demonstrates the gap created by the shortage of physicians. Rural communities have more to gain by expansion of telemedicine. Hospitals and health organizations who are willing to pattern with locals have an opportunity to not only better the world but also to reap the benefits of telemedicine. As displayed in figure 4.3, when the four

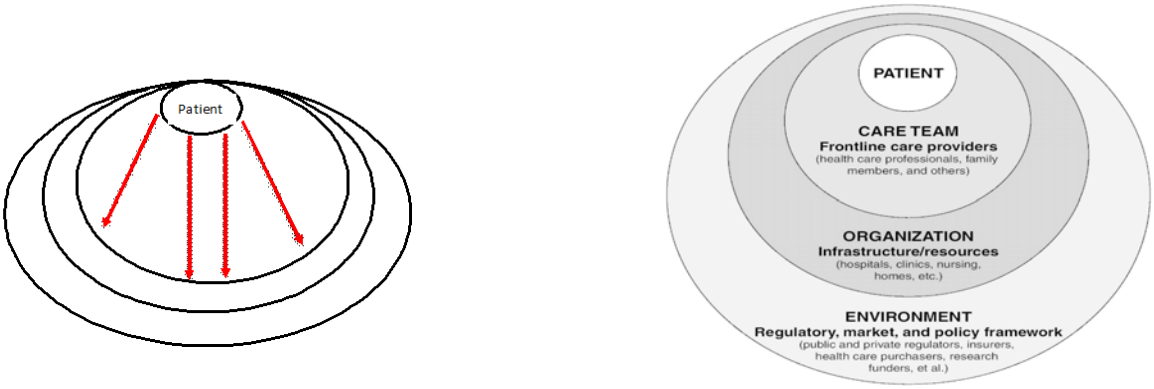

Figure 4.3: Showing results of the four-level Model of the Health Care System when applied to the U.S healthcare.

level model was applied to the current state of patient care in the U.S results show that there was much gap between patients and primary care physicians (frontline care providers), a “gap” which is more pronounced in rural communities. This gap represents untapped revenue for hospitals and low-quality of patient care for the population affected. The red lines represent the distance patients must go to meet the frontline care providers. This is a gap that could be easily bridged by telemedicine.

Diffusion of Innovation theory

This theory was used to explain the slow adoption of telemedicine in the U.S. The results of the study show that the U.S., on the average is currently in a transition stage from laggards to late majority. However, rural settlement where telemedicine is needed most is still left in the dark (laggards).

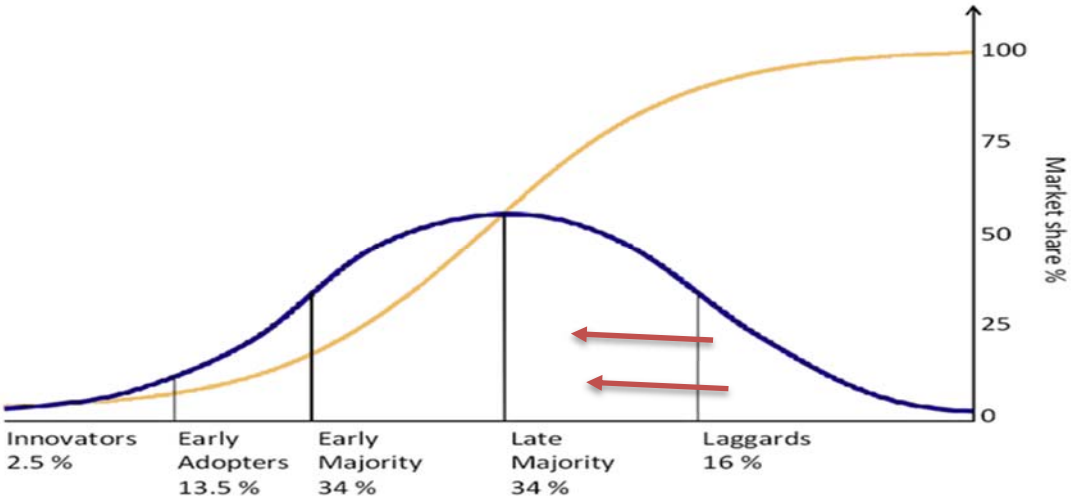

Figure 4.4: Diffusion of Innovation theory showing the transitioning of the U.S healthcare system from Laggards to Late majority.

The arrow demonstrates the transitions. With it comes new reforms like the VA programs, the parity law, and bills that promote funding for high-speed internets for rural areas. Adoption of bills that promote integration of telemedicine would speed up this transition process.

Discussions

The researcher uses this section to tie the results of the study to the thesis question: How does telemedicine bridge the gap in primary care. The results of this research clearly show that telemedicine has the capacity to bridge the gap in primary care by the adoption and integration of telemedicine in patient care. The benefits of integrating telemedicine to patient care clearly outweigh the risks is summarized in table 4.3. showing that adoption of telemedicine is a win-win concept for all. Hospitals gain by receiving government incentives and increasing revenue by expanding service networks to distant places which would normally be considered out of network. Patients gain increase in quality of care by being able to receive care when needed, reducing cost and time wasted during transportation and hospital visit expenses.

Table 4.3: How Does Telemedicine Bridge the Gap in Primary Care

Telemedicine	Primary Care	Advantages
Patient Centered		
Electronic Device	Reduces hospital visits, work load	Accessibility
Prevention	cost, waste (time) and reduces patient	Comfort
Diagnosis	referrals.	Easy Access
Monitoring	Improves physician/patient relationship	Self-satisfactory
Home Care	Improves patient satisfaction	Ease of use
	Improves quality of care	Reliability
		Consistence
Hospital/ Managed Care		
Consultation between practitioners		Government Incentives.
Quality Monitoring		EHR for morbidity and mortality.
Information management		Boast confidence in both patients and
Case Tracking		providers.
Morbidity and Mortality Review		
Connecting rural hospitals to urban hospitals		Reduction in readmission rates.
		Client satisfaction
		Network expansion

Guided by the evaluation model, table 4.3 summaries the uses and benefits of telemedicine Theories used for this study have proven two points. First, there is a decrease in primary care workforce which affect both patients and hospitals. Patients stand the risk of not receiving the best care due to lack of access to care. Rural settlements are at a greater disadvantage, due to numerous factors stated in the text that draws physicians away from those areas, for example, physician isolation. Telemedicine offers a viable solution to this, including the adoption of rural hospitals by government owned urban hospitals

and improving consultations across state lines of which results have shown increases the quality of care. Secondly, the adoption of telemedicine is slow in United States. The diffusion innovative model demonstrates that the U.S healthcare system is currently undergoing a transition from laggards to late majority. The researcher arrived at this conclusion due to the many limitations facing the adoption of telemedicine. Although there have been changes in policies with every new president, more work needs to be done.

Finally, major limitations to telemedicine were seen to be policies and regulations. These, when addressed, could aid a rapid adoption of telemedicine. The ripple effect of such adoption could provide unforeseen solutions to the healthcare system.

Chapter 5

Conclusion and Recommendations

The purpose of this chapter is to discuss recommendations that would address the research question: How can telemedicine bridge the gap in primary care?

Based on the results described in Chapter Four, the researcher believes that by addressing the limitations and barriers facing telemedicine, services would be better adopted to improve patient care at the primary care level. Furthermore, results of the content analysis show that rural communities are affected the most by the shortage of primary care physicians in America. Integrating telemedicine in these areas would have a positive impact on the lives of these communities.

Recommendation #1: Increasing Resources to Rural Areas

Rural areas without telemedicine coverage are untapped revenues for urban hospital. Partnership with rural hospitals increases volume of patients/members for government owned urban hospitals. This benefit both the rural and urban centers given that it improves the quality of patient care delivered in rural areas. Coverage for rural communities would be done in a stepwise fashion (department by department) by partnering with local hospitals. Rural hospitals should be adopted by larger urban hospitals to help with making diagnosis via telemedicine and help reduce the feeling of isolation by physicians who practice in rural communities. This recommendation benefits both parties, in that, medical cases gotten from these hospitals could be used for teaching medical students in teaching hospitals and in training practicing doctors. The stepwise fashion would be done in a timely fashion (goals and objectives). For example, research has shown that the most commonly used telemedicine service is the teleradiology. Rapid advancements in technology has made the use of it as easy as sending an email or scanning a document. Hence, government hospitals should set up a teleradiology unit by 2020 and develop a plan for the adoption of underserved areas within their states. Furthermore,

President Trump enacted Creating High-Quality Results and Outcomes Necessary to Improve Chronic (CHRONIC) Care Act (Smith, 2018), the new law will expand telehealth coverage for accountable care organizations (ACOs), improve flexibility for telehealth use under Medicare Advantage plans, and allow nationwide reimbursement for tele stroke care and home dialysis treatment. The new law provides the largest boost to Federal telehealth coverage and payment in 17 years.

In conclusion, some community hospitals have been benefiting from telemedicine with good outcomes. Bresnick (2016) reported that Jim Dickson, Chief Executive Officer, Copper Queen Community Hospital attested in an interview that through telemedicine the community hospital was able to bring specialty care directly to our patients without time consuming and costly transport out of town and away from their family. Dickson concluded by suggesting more partnership such as the one they have be established through telemedicine.

Recommendation #2: Engaging International Medical Graduates in Telemedicine Services

Within the context of study, International Medical Graduates (IMGs) are foreign trained doctors who have successfully passed their board examination. IMGs who do not match in the annual matching program should be given an option to practice medicine in underserved communities in partnership specialty doctors via telemedicine. About 48% of all IMG applicants are not matched to residency programs every cycle (NRMP, 2017). Of the 12,355 IMGs who participated in the 2017 Match, 6,591 (53.3%) matched. Of the 5,069 U.S. citizen IMG participants, 2,777 (54.8%) were matched to first-year positions, a decrease of 92 from last year. Of the 7,284 IMG participants who were not U.S. citizens, 3,814 (52.4%) obtained first-year positions (Young, 2018).

These physicians should be given adequate training on how to use telemedicine (3-6months). This way, the workforce for primary care doctors would increase and the IMGs would still receive the

training offered in the residency programs at urban centers. This method has been adopted by schools a long time ago with the advent of distance learning, for example, online programs. The government would provide incentives for the training doctors. The program would be financed by both federal and state government. The concept behind recommendation #2 is not new to the United States healthcare system. Recently California revised the 'Medical practice act' which allows IMGs to enroll in a pre-residency program with the University of California, Los Angeles. The program is funded by the state government and its main goal is to train doctors that would practice in underserved communities. The Medical Practice Act should be adopted and integrated with programs such as the Veterans E-Health & Telemedicine Support (VETS) Act of 2017 for better efficiency and rewards.

Lastly, State government should also appeal to the federal government and the Department of Health and Human Services seeking an increment in the quota of J-1visa waivers issued to foreign workers under the Immigration and Nationality Act (INA). The INA, also called the Conrad 30 Waiver program, allows J-1 medical doctors to apply for a waiver for the 2-year residence requirement upon completion of the J-1 exchange visitor program. Each state is allowed 30-waivers by law, the recommendations suggest that this number be increased to support the integration of IMGs with telemedicine.

Recommendation #3: Exploring Patient-Centered Limitations

Future research on telemedicine should focus of patient-centered limitations. Limitations to the use on telemedicine are related to technology, learning to use, hospital use *etc.* There needs to be more research done on the practical implication of use of telemedicine. For example, patients are made aware of the adverse effects, contraindications, and concomitant use of drugs. These warnings give the users assurance that enough research have been done on the product. Furthermore, the information gives users a sense of security knowing what to expect and how to address outcomes. Telemedicine lacks this

completion. To fully apply and integrate telemedicine in patient care, information about the limitation of use and possible adverse side effect and common technical error that could result should be made available to patients. User based studies would help both developers and consumers understand the technologies limitations and benefits which would foster the adoption of telemedicine.

Next step

Policies and laws that address reimbursement rates and programs should be revised and expanded to meet criteria (recommendation #1). Lawmakers should develop policies that allow for the adoption and expansion of policies addressing medical practice across stateliness using telemedicine manned by international medical graduates who are board-satisfied (recommendation #2). Data and records should be collected and analyzed to detect weaknesses and strengths of integration of telemedicine to track overall outcome. Pilot programs should be started where they are needed most, such as, places with the least number of primary care (rural communities) and they should be gradually adopted and adjusted as needed.

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