

Applications of Telehealth in the Practice, Upgrading of Knowledge, and Communication of
Physicians with their Colleagues and Patients in Canada

by

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B.Sc., University of Victoria, 2009

M.Sc., University of Victoria, 2017

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University of Victoria

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ABSTRACT

Applications of Telehealth in the practice, upgrading of knowledge, and communication of physicians with their colleagues and patients in Canada was explored in this study. The research used exploratory-grounded theory to investigate the opinions of practicing clinicians regarding the use of Telehealth. The study involved conducting semi-structured interviews with physicians who were using or might in the future use Telehealth in their practice. This study was designed to assess the major advantages and shortcomings that Telehealth has to offer in the field of medicine. The research found that clinicians predominantly had a very positive view of Telehealth, although some minor concerns were expressed with respect to the use of Telehealth in private offices and the home (rather than in the hospital). The data indicated that Telehealth can improve overall patient care by bettering the speed and accuracy of communication and diagnosis and the subsequent treatment of patients, saving physicians and patients time and money, reducing waiting lists, aiding the environment, reducing emergency visits and hospitalizations, addressing shortages of physicians (particularly in rural areas), increasing access to specialists, and enabling convenient distance education. These are just some of the many benefits of Telehealth which outweigh its disadvantages.

This study also was designed to extract clinicians' opinions on avenues for improving Telehealth, which thus led to implications for future research. Barriers to the use of Telehealth were found to include concerns about security and IT support, lack of public knowledge of Telehealth's existence, and installation and maintenance costs for the necessary equipment in the private sector.

The study suggests that Telehealth will become more widely available and accessible to the general public. The study also proposes that, through increased governmental support and funding, Telehealth should be advertised and promoted, researched in more depth (in part, to discourage misconceptions regarding Telehealth), collaborated on by stakeholders, and expanded.

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Dedication

Thank God for Every Blessing He Has Given Us

To my parents, siblings, friends, and all my instructors since childhood,

with much love

Who taught me:

“Education is a social process. Education is growth. Education is not a preparation for life; education is life itself” - John Dewey

Without their support and prayers I would not have been able to achieve my goals

CHAPTER 1: INTRODUCTION

1.1. Telehealth, application in education, practice and communication of physicians and patients in Canada

Canada has a population of about 36 million people occupying 3.8 million miles of land mass, with its citizens residing mostly in remote areas. Since 1986, the physician: patient ratio has increased slightly. In 2015, there were only approximately 229 physicians per 100,000 people, i.e., approximately 437 patients per physician (Statistics Canada, 2015). In an effort to provide an accessible health care system to these remote locations, Canada is applying Internet and computerized systems to answer the demand of its citizens (Palkhivala, 2011). In the last several years, the Internet has been established as a worldwide low-cost communication medium (Jaatinen et al., 2002). With the advent of computerized mobile devices, real-time videoconferencing (VC), and digital information databases, collaboration and information retrieval have been revolutionized. This technology has enabled people the world over to freely communicate to others their ideas, research, findings, and reactions in a format that is accessible, fast-paced, convenient, and efficient. Morgan et al. (2009) believe that in rural areas, availability, accessibility, and acceptability of services are vital factors, and the delivery of care, without taking advantage of computerized and communicating services, is not possible. Canada has emerged as a leader in Telehealth networks through its ability to deliver quality health care through an economically feasible modality to hundreds of small communities (Palkhivala, 2011).

The benefits of Telehealth are numerous. Telehealth empowers patients with the knowledge and capacity to participate and contribute to their own recovery in both urban and rural areas. It also allows physicians to educate, practice, and communicate to develop their competency and care for their patients from anywhere in the world. This then contributes to a vision of a more patient-

centric health care system (Morgan et al., 2009). As mentioned, a shortage of physicians and increased acuity among the patient population, traveling inconveniences and expenses make Telehealth a convenient alternative in the demanding world of health care. Moreover, Telehealth provides opportunities that allow patients to be discharged faster, prevents nosocomial infections (hospital-acquired infections) due to extended stays in hospital, and enables patients to be visited in the convenience of their homes, in a place where they feel more secure and supported, through telephone or VC.

In many articles, Telehealth is defined as the delivery of information and health-related services via telecommunication for optimizing the health of individuals and helping them to live independent and healthy lives, regardless of geographical location, time, social or cultural barriers (Noorani, 2001; Lear, 2008; House & Roberts, 1977). As Noorani (2001) mentions, Telehealth in physician practice has different applications and can be described in various ways, categorized by technology (VC), by activity (teleconsultation, or Clinical Education), by setting (remote or rural Telehealth), or by medical or health care discipline (telespecialities). Telehealth as it applies to VC is the real-time broadcast of video images, data, and voice between users at different sites. Physicians and patients connect with full color, video and audio links, using various electronic devices (Noorani, 2001). Physicians may also use telediagnostic instruments such as digital stethoscopes, otoscopes, patient examination cameras, as well as virtual Picture Archives and Communication Systems (PACS) (Palkhivala, 2011; Holmes & Hart, 2009). Many physicians who use Telehealth apply electronic health records (EHRs), a systematic collection of electronic health information, or a computerized system where individual patients' records are created, exchanged, stored and retrieved as well, to facilitate and enhance their communication with colleagues and patients (Gunter et al., 2005). Telehealth lowers the cost and enables

physicians to monitor patients with the help of nurses in the convenience of their home or local clinics.

1.2. Research Focus

This study involved developing several literature reviews and obtaining feedback from physicians through telephone interviews conducted by Master's student Irandokht Vahedi. The report investigated the use of Telehealth to support the education, practice and communication of physicians and their patients. The main focus of this research was to comprehend the current use of Telehealth and to compare the advantages and disadvantages of this technology. The response of physicians' firsthand experiences with this method of learning, consulting, and practicing provided insight into the Perceived Usefulness (PU) and Perceived Ease of Use (PEU) of Telehealth in the health care system.

1.3. Research Objectives

- 1- Review the literature in order to investigate the benefits and disadvantages of using Telehealth as a means of enhancing physician knowledge, consultation, and practice.
- 2- Examine the Perceived Usefulness (PU) and Perceived Ease of Use (PEU) of Information and Communication Technology (ICT) in the form of Telehealth, and how it meets the needs of physicians and their patients.
- 3- Conduct qualitative telephone interviews of practicing physicians regarding advantages and disadvantages of replacing face-to-face learning, practicing and consulting with online methods.
- 4- Determine how Telehealth facilitates learning, consultation, and practice.
- 5- Determine what barriers there are to adopting new methods, as well as what remains the same regardless of the means of information delivery.

- 6- Analyze how distance learning, consulting, and practice impacts physicians and their satisfaction and performance in their practices.
- 7- Consider the positive and negative aspects of using Telehealth, and determine possible ways of improving the efficiency and effectiveness of this valuable resource in educating, consulting, and communicating.

1.4. Research Questions

The specific research questions developed to achieve a better understanding of Telehealth in education and practice of physicians in Canada were:

1. What are the current practices of physicians in applying Telehealth in practice, education and communication in Canada?
2. What are the common challenges associated with Telehealth?
3. What are factors affecting the implementation of Telehealth in Canada?
4. What are physicians' opinions about the perceived usefulness (PU) of Telehealth?
5. What are physicians' opinions on the perceived ease of use (PEU) of Telehealth?

Solely looking at the literature may be a rapid way of gathering data regarding Telehealth, but it is not the only way to gather accurate information. It is important to remember that national, geographical, personal, and jurisdictional differences in the application and use of Telehealth and to provide an alternative view of individuals. Asking the above questions to physicians with different backgrounds and life experiences in the form of personal telephone interviews conducted by the researcher, and gathering data can help the researcher to collect data and

compare Canadian physicians' feedback with other physicians as reported in the literature review. This process can help the researcher to come up with a better understanding of Telehealth applications. Obviously, learning from the experiences of physicians in Canada and exploring how to resolve issues can ease the pathway for other physicians in future application of Telehealth.

The literature review shows that Telehealth technology affects many aspects of the health care system, and the application of Telehealth in the education, practice and communication of physicians with each other, as well as their patients, has changed the delivery of care. Telehealth facilitates and speeds up communication between physicians, aids patients' survival rate, as well as enables cost reduction. Understanding these impacts and evaluating the effectiveness of the technology is beneficial to the health care system, as well as to patients. Investigating the current usage of Telehealth in educational and practical domains not only aids the health care system by determining problems to be addressed, but also highlights areas to be developed. Clearly, there are many challenges associated with Telehealth's application, and isolating and understanding these through personal interviews with physicians is crucial to the improvement and development of the technology, as well as to establishing new policies and guidelines for its usage.

Understanding the factors involved in the implementation of Telehealth in Canada will bring clear insight to the community of physicians for achieving the goal of creating problem-free systems, which is beneficial to future technological endeavors. Learning more about the factors that play a major role in the implementation of Telehealth among physicians in Canada should help stakeholders to move faster towards easier implementation in a shorter time with lower costs. Finally, since the community of physicians is the main group using Telehealth systems in healthcare, their satisfaction and opinions should be highly valued. Learning and evaluating their

perspective by interviewing them is essential and crucial to the improvement of the health system.

1.5. Significance

This study explored the benefits and detriments of using Telehealth from the perspective of practicing physicians, and outlined the positive and negative aspects to its implementation, dealing with time, finance, social implications, and infrastructure. Thus this research served to detail the pros and cons of Telehealth, providing evidence about the impact of introducing Telehealth in professional and educational medical settings.

CHAPTER 2: LITERATURE REVIEW

A: Part One of the Literature Review

A.2.1- Purpose

This literature review analyzed Telehealth and its applications in physician education, practice, consultation, and communication with their colleagues and patients. It also covered areas such as use of videoconferencing, Web technology, and remote access to Electronic Health Records (EHRs), as well as physicians' reactions to the use of Telehealth technologies, the comparison of e-learning to traditional learning (classroom-based or face-to-face), the impact of Telehealth on learning online, and the facilitators and barriers to the use of Telehealth technologies.

A.2.2- Eligibility Criteria

Studies for this review were first evaluated and critiqued based on study strength, limitations, reliability, validity and generalization. For an article to be selected, it had to pass the first review as well as having to be focused on one or more of the following topics: (1) Telehealth and its applications in education, practice, consultation and communication (2) the knowledge upgrading and practice of physicians, (3) indirect and direct patients' benefits from educational and practical programs via Telehealth, (4) the use of videoconferencing, Web technologies and remote access to Electronic Health Records (EHRs) for improving the education and practice of physicians, and (5) the comparison of face-to-face practice, education, and consultation with e-learning and distance conferencing.

A.2.3- Data Sources

The database search included the following databases: MedLine, CINAHL, PubMed, Health Source, PsycInfo, BioMed Central Journals, ScienceDirect (Elsevier), Telehealth Information Exchange and EBSCOHOST.

A.2.4- Study Selection and Evaluation

The key search terms used were “Telehealth,” “e-learning,” “physicians + education,” “physicians + consultation,” “physicians + patients online communication,” “videoconferencing,” “telephone consultation + physicians,” “Electronic Health Records,” “rural and remote health,” “continuous education,” “distance education,” “Web-based technologies,” and “physician online consulting.” Those articles that met the eligibility criteria were included in the study. Also, articles that were from the references of the selected articles were evaluated for relevancy and used if applicable.

A.2.5- Data Extraction

An in-depth review of every article that met the eligibility criteria was conducted. For each article, the abstractor noted the involvement of physicians targeted, timing and periodicity, and rules shaping intervention. Primary measures of effect, and reported differences in process and outcome, were considered as well. Studies were analyzed to see whether the intervention had a positive outcome, an improved performance, or indicated negative results.

This research started by searching the above mentioned key terms in databases, such as Google Scholar, separately, which produced about 2 000 000 results. Narrowing the search by combining key terms such as “Telehealth” + “physicians” + “practice” or “Telehealth” + “physicians” +

“education” pared down the number of articles to about 23,700 and 22,900, respectively. When the key term “Canada” was added, the results were further narrowed down, to about 12,200 articles each. Changing the timeframe to “since 2008” reduced the results of the search to about 8,660. Including “practice” and “education” in the same search increased the number by 7,440 (to 16,100). Changing the timeframe to “since 2009” when searching “Telehealth” + “physicians” + “practice” + “education” + “Canada” brought about 13,200 results. Continuing this research, changing the timeframe to “since 2016” resulted in 8,720 articles. After looking to the abstract and title of each and applying eligibility criteria, the researcher chose over 200 articles and categorized them into the major topics of this study, such as the application of Telehealth in practice, education, communication, the speed and quality of health care services, and reducing costs, that will be discussed in the results section. In other research, conducted by the author, using databases such as EBSCO, the advanced search (narrowing to articles written in English after 2008, and specifying the Subject: Thesaurus Terms) produced additional useful results.

A.2.6- Process of Writing the Literature Review

For writing the literature review, the author searched scholarly articles and books (and also watched educational videos online). For the sake of the paper and for considering that ‘Telehealth’ is a bigger umbrella than ‘telemedicine’ (Harris et al., 2015), throughout the paper you will see the term ‘Telehealth’ used, even if in the original paper reviewed the term used was ‘telemedicine.’

A.2.6.1- First part: Definitions

This section defines some words such as: Telehealth, telemedicine, Telehealth vs. telemedicine, Electronic Health Records (EHRs), Distance Continuing Medical Education (DCME), videoconferencing, synchronous, asynchronous, synchronous vs. asynchronous, along with different facets of Telehealth.

Definitions

(1) Telehealth:

Telehealth is the delivery of health care services remotely at a distance. Telehealth also provides wellness and education using information and communications technology and real-time interactive videoconferencing.

Wade et al. (2014, p. 682) believe that “Telehealth is an engaging concept because it has been proposed as an all-in-one solution for several difficult problems in health care delivery, namely: 1) lack of access to care for rural and disadvantaged groups, 2) mal-distribution of specialist services, 3) the rising costs of health services, and 4) the need to deliver more care direct to the home for an aging population with chronic diseases.”

(2) Telemedicine:

Telemedicine is the exchange of medical information from one site to another via Information Communication Technologies (ICT) for the purpose of diagnosing, treating, and preventing disease and injuries in patients. Additionally, telemedicine can also be used for research and for upgrading knowledge in clinicians and health care workers (Malasanos & Ramnitz, 2013; WHO, 2010).

(3) Telehealth vs. telemedicine:

While these two terms are often used interchangeably in scholarly articles, both telemedicine and Telehealth can be defined broadly as “the provision of health care from a distance” (Nimmon et al., 2013, p. 39). To further clarify, “telemedicine” has been amended quite recently to “Telehealth”, with the former implying communication between two individuals via videoconferencing between either clinicians and patients or professional communication between health care workers (Nimmon et al., 2013). However, the term “Telehealth” is a modern

definition which is wider in scope and includes both traditional telemedicine in addition to “interactions with automated systems or information resources” (Nimmon et al., 2013., p. 39).

(4) Electronic Health Records (EHRs):

An Electronic Health Record (EHR) is an electronic version of a patient's medical history which is accessible online (under a particular provider). This record includes a patient's history, medical problems, allergies, and medications, amongst other information. It also contains demographics and progress notes. Based on many articles, including that of Voelker (2013), using EHRs and prescribing medical orders, prescriptions and tests electronically and obtaining laboratory and medical imaging results online have saved physicians' time and have facilitated patients' treatment (Voelker, 2013).

(5) Distance Continuing Medical Education (DCME):

DCME refers to a distance continuing medical education course or courses over the Internet as well as accessing medical information from digital libraries or knowledge bases (Waite et al., 2014).

(6) Videoconferencing:

Videoconferencing is a conference in which attendees in different locations are able to communicate with each other with sound and vision in order to share knowledge and data (in the case of Telehealth, this refers to medical knowledge and patients' information). Mobile videoconferencing apps are also now appearing and being used in healthcare.

(7) Synchronous:

A means by which data (including images, audio, and text) can be transmitted in real-time in an interactive manner.

(8) Asynchronous:

A non-interactive data transmission technique in which it is not necessary for data to be transmitted in real-time, yet it may be forwarded at a later time (Ferreira et al., 2015).

(9) Synchronous vs. asynchronous:

As highlighted above, synchronous Telehealth refers to data transmission in real-time. This methodology has a higher bandwidth requirement compared to asynchronous Telehealth applications, which only require a low bandwidth and thus increase the data transmission time while decreasing the system's performance (Brewster et al., 2014).

(10) Different facets of Telehealth:

As you will see in the body of this paper, four domains of Telehealth are used in clinical practice: (1) tele-education, (2) teleconsultation, (3) telemonitoring, and (4) teletreatment (e.g. telerehabilitation). In the review, you will see a number of different terms, including (but not limited to): telestroke, telerehabilitation, telemonitoring, telegynecology, telepsychiatry, teleradiology, teleultrasound, etc.

(11) Usability

Kushniruk and Patel (2004) define usability as "the capacity of a system to allow users to carry out their tasks safely, effectively, efficiently, and enjoyably" (p. 56).

(12) Generalizability and Transferability

Generalizability: the amount to which study results from a sample can be generalized to represent the results which would be attained given the entire population of the sample was drawn.

Transferability: the degree to which results given from one context match that in another context in a situation where evidence is produced.

B. Part Two of the Literature Review

SECTION 1: TELEHEALTH'S DEVELOPMENT AND HISTORY

LR.B.1.1- Definition of Telehealth

Telehealth is the use of information technologies for the purpose of communicating supportive care between not only patients and health care providers, but also to facilitate communication between expert colleagues and their peers (Nimmon et al., 2013). In a review published by Nimmon et al. (2013), the authors provide a broader more contemporary definition of Telehealth as “the provision of health care from a distance” (p.39). The term “Telehealth” is used herein in lieu of the term “telemedicine,” as the author feels that the former is a much more expansive and descriptive term which highlights all areas of health and health care, including medicine. As such, while scholarly articles generally prefer the latter term, the author will hereby refer to this branch of medicine as Telehealth throughout this document, as seen elsewhere (Nimmon et al., 2013).

LR.B.1.2- Development and History of Telehealth

Global populations are expanding, physicians are in critical shortage worldwide, and more diseases and chronic illnesses are prevalent in today's society than previously. Moreover, caring for chronically ill patients comprises almost 80% of US federal health care spending (Baker et al., 2011). Bodenheimer et al. (2009) rationalize that the enormous burden of these costs is considerably challenging for Medicare and other insurers in the United States when it comes to the management of care and budget. Given the challenging and novel environment of health care in this era, it is imperative to find new solutions to adjust to the nature of today's world.

In conjunction with the advent of technology that is revolutionizing the 21st century, it has become obvious that technology could be utilized alongside medical care, first through use of the telephone, and subsequently through videoconferencing and text messaging (Wittson & Benschoter, 1972). For example, the first incidence of an electrocardiogram transmitted telegraphically occurred in 1906 (Raison et al., 2015). Twelve years later, Australia's Royal Flying Doctor Service was instrumental in laying the foundations for Telehealth, where in 1928 they initially conducted teleconsultations using Morse code and subsequently by voice radio (Raison et al., 2015). As such, they successfully created novel solutions with the aim of distributing health care across the nation (Raison et al., 2015). In 1950, a prominent radiologist used a fax to send X-rays (Raison et al., 2015), while in 1959, the University of Nebraska's Psychiatric Institute hosted the first psychiatric consultations via video to reach patients in rural areas (Wittson & Benschoter, 1972). By 1962, the Lebanese-American cardiac surgeon Michael E. DeBakey introduced the first knowledge-based teleconference which demonstrated an aortic valve replacement (Raison et al., 2015) and during the mid-1980s, telesurgery (operating remotely via the use of a surgical robot, which is controlled by an operator at a distance) became an available form of Telehealth, where the advent of the PUMA 200 robot effectively enabled a CT-guided brain biopsy (Raison et al., 2015).

Further advancements in this technology – via a ZEUS robotic system – were a landmark in intercontinental operations via telesurgery, enabling Dr. Marescaux in New York City to perform a successful, complication-free laparoscopic cholecystectomy on a 68-year-old woman in Strasboug, France in 2001 (Raison et al., 2015). Clearly, the use of this technology is perhaps as equally awe-inspiring as it is exceptionally pragmatic. Finally, the Médecins Sans Frontières (MSF) in France has been using Telehealth since 2010 (Walji, 2015). Here, the primary physician was motivated by the need to bring together expert colleagues to the field who were not members

of the MSF teams. The portal has since documented 1 301 cases from 243 reference sites around the world, with the Central African Republic, Malawi, and South Sudan being the top referring countries. Currently, 271 physicians are acting as consultants through the portal, where cases are assigned virtually, depending on the clinicians' field of expertise. Each expert is required to respond within 1 day with information that is not only practical, but appropriate and of the highest possible quality, permitting them to extend knowledgeable suggestions through the portal (Walji et al., 2015).

Despite the fascinating history of Telehealth, early Telehealth was limited and had a low uptake (Tanriverdi & Iacono, 1999; Wade et al., 2014). According to the Yale Telehealth Center in a 1995 report, suitable Telehealth programs have existed in the United States since the 1960s, yet Telehealth only became a topic of interest very recently when it became clear that a revolution in health care was beginning (El-Mahalli et al., 2012). For example, in 1992, 10 Telehealth programs existed, which doubled to 20 the following year, yet an early plan in 1995 stated that US hospitals were determined to contain some form of a Telehealth program for either clinical or administrative reasons (El-Mahalli et al., 2012). A more recent study revealed that while the number of sites and services has multiplied since the 1990s, Telehealth services still only constitute a small portion of total health care (Grigsby et al., 2004; Wilson & Maeder, 2015). For example, teleconsultations, which were one of the first popularized and adopted forms of Telehealth, originally had a frequency of occurring between a few hundred to a few thousand episodes per year (Wade et al., 2014; Wilson and Maeder, 2015). More recent analyses reveal that in 2002, the use of Telehealth in the USA has increased, with more than 85,000 teleconsultations conducted each year and performed by more than 200 programs in over 300 specialties (Craig & Patterson, 2005). Part of the initial resistance to implementing Telehealth may have been fiscal in nature. In the beginning, Telehealth demanded costly equipment in order

to connect patients and their general practitioner with a specialist (Achey et al., 2014). In addition, the astronomical cost of implementing telecommunications devices considering a limited infrastructure prevented the wide-scale adoption of Telehealth until only recently (Wilson & Maeder, 2015). Fortunately, through quantum leaps in technological improvements, the cost of using such advanced devices has declined considerably. During this revolution, the accuracy, quality, and security of transmitted data through connections improved, allowing Telehealth to expand in scale and scope worldwide (Achey et al., 2014). Clearly, this trend has expanded and today, Telehealth is a multi-billion dollar industry that is a vital component in not only medical procedures, but also in education (Raison et al., 2015).

With respect to the data transmission from clinician to patient today, Telehealth consists of the following components: data and information is first collected from the patient, following which the data is transmitted electronically over a distance from the patient to the clinician. The patient is able to receive personalized feedback via an interactive process between the patient and the health care worker (Nimmon et al., 2013). Telehealth is not limited in scope to data transmission from clinician to patient, as Telehealth can be used diversely (Ghani & Jaber, 2015). Gagnon et al. (2003) suggest that the three functions of Telehealth were: 1) physician to patient, 2) education and professional knowledge upgrading, and 3) administrative/organizational in nature.

While Telehealth is vital in delivering quality medical care to patients in need, it is also an excellent platform for use in education, as highlighted previously (Raison et al., 2015). While knowledge acquisition for physicians traditionally relied on paper-based learning, the movement away from this style of learning and towards Internet technology via Telehealth has clearly advanced the delivery of education upgrading via Distance Continuing Medical Education (DCME) (Conradi et al., 2009). For instance, junior surgeons or even medical students, for the purpose of expanding their surgical knowledge, have the opportunity to consult with a senior

specialist surgeon via telemonitoring/teleconsultation. Fortunately, teleconsultation, both pre- and post-operation, provides the opportunity for senior surgeons to educate their patients and their students, while telesurgical monitoring by expert surgeons during surgery reduces the percentage of errors performed by novice surgical doctors. Telesurgery thus enhances the quality of patient care in a more cost-effective manner and facilitates the process of teaching and learning (Raison et al., 2015). DCME is not a new concept, however. In fact, in 1995, 50% of Telehealth used in Vermont was for the purpose of delivering DCME (Ricci et al., 2005). In the same year, even though over 80% of physicians knew Telehealth existed and were very satisfied that it was an option for them, only 32% were associated with rural Telehealth projects yearly (Demartines et al., 2000). In 2001, one study found that only 2.7% of physicians in the United States used the Internet as a form of DCME, but this number increased to 31% by 2005, and is expected to increase even more in years to come (Waldorff et al., 2008). From 2003 to 2004, directly sponsored Internet DCME activities increased by 21% (Waldorff et al., 2008). Thus, we can see the demand for universities to continue to develop and improve methods for providing DCME to physicians in order to be able to upgrade their knowledge and communicate more efficiently with other colleagues and their patients (Newman et al., 2009 ; Noorani et al., 2001 ; Rossett et al., 2006).

LR.B.1.3- Purpose, vision, and goals of Telehealth

The overarching theme and purpose of Telehealth is to take advantage of today's technology to facilitate communication between medical practitioners, bring together junior physicians with mentors, and communicate with patients. It is becoming increasingly recognized that Telehealth can bring a wealth of opportunities to the future of health care by upgrading the knowledge and licensing of physicians, preventing unnecessary and costly travel for patients and clinicians alike, and bringing together nations from across the globe. As such, a growing vision for Telehealth is that ultimately, it will bridge the gap between nations in the role of health care and improve health-related communication around the world.

Research shows that the concept and use of Telehealth is increasing and gaining acceptance with time. The highest increase in digital data transmission and communication occurs in developed countries, where 200 programs are in place in the US and Canada; Australia and the UK also have increased their use of Telehealth considerably as of 2005 (Craig & Patterson, 2005).

According to the World Health Organization (WHO), Europe, USA, and South-East Asia are among the highest users of Telehealth, while Africa and the Eastern Mediterranean had the lowest uptake (World Health Organization, 2010). Although more prominent in developed countries, developing countries are exceptionally accepting of this new technology, yet these nations are more limited in their resources (Craig & Patterson, 2005). Clearly, each country's vision and ability to implement Telehealth varies from one region to the next. Regardless, Telehealth can permit early discharge of patients from hospital, which shifts the responsibility and cost of care from the health care system to family caregivers at home (Young et al., 2007). This review highlights that the advancement of telecommunications technologies has improved, facilitated, and changed the very nature of the delivery of care in both urban and rural areas alike. Not only has Telehealth enhanced communication between members of society (from

specialist, to clinician, to patients and their families), but it has also revolutionized the speed at which these interactions can occur, while simultaneously reducing the associated costs.

The introduction of modern telecommunications (including computers and the Internet) to the field of Telehealth has expanded the possibilities for real-time interactions in the form of tele-education, teleconsultation, and videoconferencing (Brown, 1995; Hyer, 1999; Jaatinen, 2002; Lattimer, 2002). This transmission of information assists in upgrading physicians' practical knowledge, helping them feel more confident in applying and adopting novel technologies, learning about emerging diseases and disease management, and using new medications approved and available on the market. Aside from physician education, Telehealth provides the ability to consult with specialists, where physicians have the chance to confirm their diagnosis with a more established peer and to garner appropriate recommendations for subsequent patient care in specific cases (Jaatinen et al., 2002; Noorani, 2001). In theory, these principles can bring about a revolution in the way health care is managed. As such, the vision of Telehealth in reforming health care can be summarized as follows, in that it can:

- 1- Improve patients' access to health care, regardless of location, where specialists can be brought either to community health centers or directly to the home of patients
- 2- Allow the patient to take an active role in maintaining and treating chronic conditions by providing preventative care prior to hospital admission and reducing hospital re-admissions
- 3- Act in place of a medical facility, whereby general practitioners can bring in specialists for their patients via teleconference
- 4- Transform a "fee-for-service" to a "pay-for-performance" system, reducing time and geographic limitations for medical care and education. This can permit the expression of novel opportunities for effective care (Malasanos & Ramnitz, 2013).

While the opportunities and potential for Telehealth to become pivotal in reforming health care abound, it is vital to address the fact that the acceptance of Telehealth lies primarily in the hands of those who primarily administer it: the physicians (Asua et al., 2012; Wade et al., 2014). Wade et al. (2014) believe that the acceptance of Telehealth services by clinicians is the most important factor in the successful implementation of Telehealth, where it is stated that “if clinicians wanted to use Telehealth, they would make themselves available” (p. 687). Fortunately, the next generation of practicing physicians has grown up with and relied upon technology presumably most of their lives and therefore implementing this branch of technology will likely not be an issue (Terschüren et al., 2012). In the meantime, it is important to ask several questions regarding physicians and Telehealth: what are physicians’ reactions to Telehealth – do they enjoy it? Do they find it easy to work with? Are they comfortable with using and relying on the technology? Does the convenience of using the technology in order to avoid travel from rural areas or avoid scheduling conflicts create a strong enough motivation to use the technology rather than meet face-to-face? These questions and their subsequent answers will be addressed and are the focus of this review and thesis, as the author will also interview Canadian physicians about their opinions of Telehealth.

SECTION 2: ACCOMPANIMENT OF COMPUTERIZED DEVICES AND ELECTRONIC HEALTH RECORDS (EHRS) WITH TELEHEALTH

LR.B.2.1- Technological advancements have enabled and facilitated the use of Telehealth

For several decades, the physician-patient ratio has been largely imbalanced, and this continues while new physicians cannot keep up with the increasing demand. With a rise in population size, deliberately low medical school entrance rates, and exceptional cost associated with medical school, geographical distances are among the numerous issues related to adopting an appropriate solution. Clearly, one possible remedy is the use of electronic devices and electronic health records. With the advancement and speed of technology, connections and communication have become simpler, more cost-effective, and more feasible (Marchibroda, 2015). Applying different electronic devices such as computers, smart-phones, iPads, and their related apps and software has revolutionized many fields, including the medical field. This revolution opened a great pathway to new innovations such as Telehealth. Many developing and developed countries have access to phone and Internet services. For example, statistical analyses reveal that the majority of households in Canada have either landline or cellular phones in their home (99.3%), along with a computer and Internet access (80.5%) (Bredin, 2013; Statistics Canada, 2010). Nowadays, a medical expert or colleague can be reached by various modalities, including phone or network, where FaceTime, Skype, ooVoo, and other video chat apps can be used. As Chan et al. (2015) reveal, the transfer of medical information in the form of Telehealth technology from one site to another through two-way video, smartphones, e-mail, and other telecommunications technology is less expensive, faster, and more convenient than in-person visits. Many investigators believe that the advantages that electronic devices have brought to the medical field and the accompaniment of computerized devices with Telehealth and Electronic Health Records (EHRs) ease the task of taking care of individuals' health. Kushniruk and Patel (2004) define usability as

"the capacity of a system to allow users to carry out their tasks safely, effectively, efficiently, and enjoyably" (p. 56). The easier a system is to use, the quicker it will be integrated into a health care system (Kushniruk & Borycki, 2006). The usability of computerized devices is an area that is currently an issue, however, when designed to be usable the benefits of these technologies will emerge.

The history of Telehealth shows that it is an innovative technology that if designed properly can be useful, capable, effective, and enjoyable for physicians and their patients. It is important to mention that some technical issues related to computerized devices exist, many of which have been addressed in order to make Telehealth more acceptable and effective. For example, latency or delay time was a problem for several years, rendering many applications of Telehealth unusable (Raison et al., 2015). Latency is the time delay in which audiovisual information is sent or received over a network, and while in personal audiovisual use delays are more of a nuisance, latency time in Telehealth is unacceptable, particularly in telesurgery (Raison et al., 2015). In telesurgery, long latency times adversely affect a surgeon's ability to operate, and providing a means to shorten delay time was and still is expensive. While surgical performance for a latency of less than 300 ms is accepted, lag times of over 700–800 ms lead to significant and unacceptable problems in surgery (Raison et al., 2015). Fortunately, the application of ISDN with speeds of up to 128-kbps and faster lines such as ADSL reduced time delay to less than 150 ms and therefore delay times are no longer a prime issue (Raison et al., 2015). Consequently, the reduction in delay times caused a large expansion in Telehealth and surgical specialties benefit from it locally and globally (Raison et al., 2015). For example, in an article from 1997, Rosser and co-authors highlighted an example related to a portable satellite-based connection used by "Operation Messiah" to mentor a surgeon in the Dominican Republic in various laparoscopic procedures. Furthermore, during Marescaux's pioneering laparoscopic cholecystectomy (as

examined in section 1), an average latency of 155 ms was achieved by using a high-speed fibre optic cable with a dedicated asynchronous transfer mode (ATM) connection. In this surgery, the quality of data transfer was measured throughout the operation and a 10 mb/s bandwidth was used for the procedure. In total, 40 technicians and support personnel were involved. Parker et al. (2010) additionally mentioned another example related to remote assistance for junior surgeons performing laparoscopic cholecystectomies which was provided via video clips recorded on a BlackBerry smartphone. In all of these examples, technological revolutions permitted these exquisite surgical procedures.

While technology has enabled these unique forms of communication, critics argue that total dependence on computerized devices for medicine and medical care is erroneous. However, even individuals who cannot trust computerized devices owing to security, confidentiality and privacy issues confess that the traditional way of practicing medicine is no longer functional or feasible. While some disagreement remains with respect to the benefits computerized devices bring to the community, many cannot dispute that global accessibility, cost, and speed are among great advantages. Some critics also set forth the fact that older generations, including physicians and patients alike, do not have the same proficiency and excitement for computer use as compared to the younger population. According to the Pew Research Center (2014), difficulties in using or accessing technology and distrusting attitudes about the benefits of these technologies are some of the challenges elderly people face (Marchibroda, 2015); while others agree with and support these concerns, they also state that proper education and user-friendly apps have made learning easier than before (Mori et al., 2011). Obviously, with the proper IT support in place, user-friendly software, the availability and affordability of tools and electronic devices, interoperability of systems, and little or no intervention required by the individual will encourage the adoption of computerized devices, EHRs, and Telehealth (Marchibroda, 2015).

LR.B.2.2- Electronic Health Records (EHRs) and Telehealth

Prior to the use of Electronic Health Records (EHRs) and modern Telehealth, physicians had no choice but to refer to textbooks and phone consultations for helping their patients. In the past, having telephone conversations, compared to traveling, was inexpensive and convenient.

However, the ability to see patients first-hand via videoconferencing and to access information in the form of EHRs visually and in-depth – a feature which cannot be duplicated over the telephone – led scientists, engineers, and researchers to find better ways of communication in the form of Telehealth (Brown, 2005; Craig & Patterson, 2005; Jaatinen, 2002). The accompaniment of computerized devices and EHRs reformed the delivery of care, and as a consequence, Telehealth was born.

Patients increasingly demand the use of electronic communication, and 65% want more electronic access to their personal information (Peled et al., 2009). Electronic Health Records (EHRs; accessible at <https://www.healthit.gov/providers-professionals/faqs/what-electronic-health-record-ehr>) are an electronic and online record accessible from any location. They allow patients to be in touch with clinics directly, ask for appointments online, update contact and emergency information, and enable physicians to follow their patients' needs anywhere, anytime. EHRs enhances communication, since they have the ability to present educational and up-to-date information on the treatment of a patient's medical state. Clearly, having all of the patient's information (medical history, family health details, allergies, and medication history) compiled together on one electronic database makes it possible to more effectively diagnose medical conditions and hasten the clinical process. EHRs have resulted in excellent clinical outcomes, reduced workflows and errors, and have enabled transparent communication between physicians and their patients and families (Bates, 2003; Browne, 2001; Canada Health Infoway, 2010). In general, EHRs have broadened the use of Telehealth.

In many countries, including Canada, electronic information systems are being explored to increase the consistency and accuracy of care and documentations – an excellent example is wound care in Canada. Usage of m-health (mobile health) or EHRs for chronic wound care in western Canada brought many benefits to its applicants. The advantages include: 1) The ability to consult between facilities, clinicians, or rural communities remotely, 2) organizing and analyzing data, and 3) educational assistance for non-specialized care providers (Friesen et al., 2013). The advantages observed above have changed the speed and efficiency of care. Consequently, patients will heal faster than before.

Smartphones are extremely useful when it comes to using online resources such as EHRs. Another example regarding wound care will highlight the usefulness of computerized and electronic devices. Friesen et al. (2013) discussed a wound app framework which was designed to facilitate extensions to other platforms (iOS, BlackBerry, and device-agnostic HTML5 framework) and to other wounds (e.g., surgical wounds) in Canada, where users were satisfied with the enhanced quality of care it generated.

Due to the significance of EHRs in patient treatment and for the purpose of facilitating communication between all parties, the Canada Health Infoway allocated \$500 million towards the adoption and implementation of EHRs in the 2009 Federal Budget (Canada Health Infoway, 2010). While this is significant, one report showed that the US is progressively more approving of the use of EHRs for patient care and clinical enhancement of knowledge than Canada. EHRs reflect on academic performance and provide more feedback for both physicians and patients. EHRs also prompt scholars to ask patients more about their histories. For example, when using EHRs, 72% of physicians were reported to have asked more questions about patient histories, allowing 69% to improve their patient documentation. The use of Telehealth is not limited to

physician use, however. Overall, 58% of nursing schools as physician assistants in hospitals planned to implement Web-based tools into their curriculum in 2009 (Lemley et al., 2009).

Based on investigative reports, the application of EHRs in the medical field impacted the speed and quality of care services. As mentioned before, EHRs made it possible for patients and physicians to access valuable information anywhere and at any time, making national and international traveling less stressful than before. The concept of moving to an online documentation resource via EHRs has also improved the quality of care and performance of health care workers. Additionally, this technology has enabled a patient-centric approach, rather than a clinician-authority approach (MSN, 2009; Nagle, 2008). The usage of EHRs brings other benefits, such as saving time, reducing expenses, improving the quality of care, enhancing communication between physicians and other disciplinary team members and patients, improving diagnostic accuracy, increasing safety for patients, and reducing paper consumption, and has only moderate storage requirements (Borycki & Kushniruk, 2005; Kushniruk et al., 2005; Lapointe et al., 2006).

While EHRs are becoming widely used, the complete and precise collection of patient information and effective communication in health care is crucial (Friesen et al., 2013). For instance, treatment and follow-up of elderly patients regarding their conditions and progress while suffering from bedsores is more convenient when applying EHRs. Pressure ulcers (bedsores or decubitus ulcers) are a common yet avoidable situation seen most often in elderly persons and people with limited mobility in the ICU or other units. As Keast et al. (2006) and Gilder (2008) stated, the best interventions to preventing and treating pressure ulcers consists of regularly repositioning the patient, applying appropriate skin care, maintaining appropriate support surfaces, optimizing nutrition, performing risk assessments, and regular standardized documentation. The prevention or speedy treatment of bedsores saves money related to wound

care and related complications. Unfortunately, as Harrison and Harrison (2013) mention, like any other system, the lack of thoroughness, absence of standardized vocabulary, redundancy, lack of flexibility, and non-mobility of EHRs is observed in the wound EHR systems. In general, it is urgent to publicize EHRs and their application in order to bring them to hospitals, clinics, and home-care residencies.

LR.B.2.3- Podcasts and Telehealth

Physicians are becoming increasingly more mobile; therefore, being able to retrieve information anywhere and at any time is becoming more necessary and appealing. Telehealth usage in the form of podcasts is just one of the tools that enables physicians to take advantage of Web-based information and skills to be retrieved at any time with just the click of a button. A podcast is “a form of digital media” which contains a periodic series “of audio, video, digital radio, PDF, or ePub files subscribed to and downloaded automatically through Web syndication or streamed online to a computer or mobile device” (Jham et al., 2007). Devices such as computers and podcasts are simple and user-friendly and they have reduced the costs of audiovisual material for knowledge sharing through the usage of the Internet (Jham et al., 2007). Furthermore, podcasts are used widely in medical schools and medical colleagues for educational purposes. The New England Journal of Medicine states that more than 30,000 people a week receive information from podcasts. At least 20 institutes in the UK and several in the USA, including the Massachusetts Institute of Technology (MIT), are using podcasts to deliver lectures to their learners and faculty. Podcasts not only serve physicians who enroll in DCME classes from distance, but also give them the opportunity to learn new knowledge and skills while on their way to work. Moreover, research shows that the programs created enable podcasts to help

patients with post-operative and home care instructions and enhance communication between physicians and their patients (Jham et al., 2007).

LR.B.2.4- Smartphones and short messaging services (SMS)

Estimates suggest that 9.6 trillion text messages are sent each year by short messaging services (SMS) (Portio Research, 2015). Even more astonishing is that 2.7 billion people (almost 40% of the global populace) have Internet access and videoconferencing can easily be accessed given the 1.4 billion smartphones on the planet. Considering the ubiquitous usage of text messaging, it is perhaps not surprising that telecommunications technologies (Telehealth) in the form of smartphones (mobile or e-health), alone or in conjunction with add-on devices, have shown excellent potential in point-of-care (POC) diagnostics (Xu et al., 2015). Compared with laboratory-based tests, POC diagnostics offer several advantages. They are portable, inexpensive, rapid, and easy to-use (Beyette et al., 2011). Cellphones themselves are used as devices for the transmission of health messages, which enables the collection of information, management of supply systems, service delivery, and evidenced-based practice (Sarkis & Mwanri, 2013).

Different software applications developed for smartphones and tablets have increased communication and made documentation more straightforward, standardized and easy to read (Friesen et al., 2013). Not only are smartphones with built-in or external cameras, microphones, and sensors equipped with mobile health applications (with more than 40,000 apps as of 2012), but they are also able to detect biological signals involving very complicated biochemical reactions (Gold, 2012). They can be used to collect, analyze, display, and transmit data such as simple images and sounds, body temperature and functional images of organs and tissues (Xu et al., 2015).

The study by Scheuermeyer et al. (2015) showed that SMS of emergency department (ED) EKGs from a small Canadian community hospital to a referral center is a safe and effective strategy to communicate vital patient information. When a patient attends the emergency department (ED) with chest pain, obtaining an electrocardiogram (EKG) is a routine task. Normally, patients with abnormal EKGs suffer from ischemia or arrhythmias. An expert doctor is simply able to interpret the EKG and take the necessary action, but a new graduate may not be able to do so. If this happens in rural or remote areas, the novice doctor requires assistance from senior doctors residing in referral or tertiary hospitals (Anderson et al., 2007; Von Wangenheim et al., 2012). This method is rapid, accurate, portable, and an inexpensive means of data transfer. For each case in the Scheuermeyer study, the on-call emergency physicians, located at a large referral care site, received an EKG picture alongside with a short patient clinical history via SMS within two minutes. The specialists evaluated all images merely on a mobile phone. A total of 926 SMS (298 patients (14.6%) and 409 EKGs) were sent. While the current accepted process is for a physician to decipher an EKG and evaluate the patient in person, it is certainly reasonable to use a text message strategy to transmit the EKG image along with a brief overview via SMS. Overall, the study cost 4.1 cents per texted image and 921 SMS (99.5%) arrived within two minutes with a median transmission time of nine seconds (inter quartile range (IQR) 3–32 s). “Between the gold standard original EKG, and the interpretation of the texted image, 6 out of 409 (1.5%, 95% CI 0.6–3.3%) had any differences recorded, across all 13 categories” (Scheuermeyer et al., 2015, p. 1). Given that SMS accounts for so much of our communication today, it is astounding that the practice of text messaging in the medical field is not more widespread. However, this study has clearly demonstrated that text messages are a cost-effective and timely method of transmitting EKG data.

LR.B.2.5- Technology assimilation in older adult cohorts

Estimates suggest that by the year 2030, nearly half of the American population will be age 65 or older (Marchibroda, 2015). These populations are most affected by chronic diseases and thus they will need care in an efficient, convenient, and cost-effective way. Today, remote monitoring of vital statistics, including blood pressure, weight, blood sugar, and other medical concerns, by a physician at an alternative location is now possible by the use of innovative technologies (Marchibroda, 2015). These medical devices not only prevent major health crises, but also remind the patient of daily exercise routines, taking medications, and scheduling check-ups. Telemonitoring in Canada has been successfully utilized in different settings. One such example was documented by Woodend et al. (2008) in Ontario, Canada regarding telemonitoring for cardiac patients. In this program, patients used weekly videoconferencing and transmitted their weight, blood pressure (daily), and twelve-lead ECG periodically. In this example, a decrease in hospital admittance and length of hospitalization were noted (Woodend et al., 2008). By measuring their own blood pressure in their homes and transmitting the data in real time to their health care providers, patients can more effectively reduce medical expenses, all the while being empowered to manage their own health (Czaja et al., 2014). While the efficacy of telemonitoring in older adults is still under question (Czaja et al., 2014), this technology can positively impact a significant portion of those affected by chronic disease, both the young and elderly alike.

Clearly, accompaniment of computerized devices and EHRs with Telehealth have had a great impact in the delivery of care in the 21st century, and more advancement in technology will bring more benefits to the medical field. Following this review of technology, section 3 will highlight and address a few of the branches of Telehealth in use and existence today. It will also discuss and reveal that the very nature of the specific Telehealth branch is fundamental to its outlining success.

SECTION 3: BRANCHES OF TELEHEALTH AND USE IN MEDICAL PRACTICES

LR.B.3.1- Branch of Telehealth important in determining successful implementation

It is important to note that while Telehealth overall is a powerful approach to health care management, it is equally important to advise that not all types of Telehealth are successful. One can easily understand the very nature of psychiatry, for example, would bode well with Telehealth, while other branches, including gynecology, may not be accepted so readily, as will be reviewed below. As such, each individual branch of Telehealth will have varying degrees of usefulness and success in medical practices. What follows in the text below is by no means an exhaustive report on all of the available branches of Telehealth.

LR.B.3.2- Telemonitoring

Chronic diseases are a leading health concern worldwide (Asua et al., 2012). Unfortunately, in the USA, reports show that there are only nearly 4,000 intensivists to operate the 4,000 adult intensive care units (ICUs) in the nation (Wilson & Maeder, 2015), highlighting a critical shortage of expert professionals. This problem is felt even more acutely in rural areas with partially-staffed ICUs, ERs, or ORs (Wilson & Maeder, 2015). Given the lack of qualified medical personnel, it is clear that introducing improved methods of health care be addressed.

To control and manage chronic disease and prevent and reduce hospitalization, home health care via telemonitoring is one of the fastest growing and most valuable, cost-effective sectors in the health care system for serving chronically ill patients (Asua et al., 2012; Henderson, 2012; National Association for Home Care and Hospice 2010). Telemonitoring is the process by which

patients can be monitored by their physician remotely in the comfort of their own homes. In 2010, 12 million patients were served by 12,000 home health agencies in the United States, leading to a reduction in the number of hospital visits and in physician workloads (National Association for Home Care & Hospice, 2010). Telemonitoring provides the opportunity for patients to feel secure at home and it improves the patients' quality of life. Here, daily monitoring of patients causes early detection of warning signs and causes a decline in hospitalizations or unnecessary costly emergency department visits. Furthermore, telemonitoring enables homebound patients with chronic diseases to make informed decisions regarding their own health, all the while allowing them to remain home and avoid transitioning to high-cost care settings. In a paper discussing telemonitoring for chronic disease in the UK, the study revealed that applying telemonitoring resulted in decreased hospital admissions and mortality among patients (Steventon et al., 2012). Furthermore, a systematic review showed that data transmitted through telemonitoring by patients enhances self-management, thereby empowering patients themselves to take control of their own health (Asua et al., 2012). In addition, the study revealed that telemonitoring has a supreme level of accuracy and reliability, while involving limited technical problems and errors (Asua et al., 2012). Lastly, in rural areas, telemonitoring can make a phenomenal difference in the survival rate of patients and more people can be helped in a shorter timeframe (Wilson & Maeder, 2015).

LR.B.3.3- Telepsychiatry

Psychiatric care is one area where a huge gap between patients' demand and available health human resources is noticeable (Buske, 2012; Sargeant et al., 2010; Sunderji et al., 2015; Thomas et al., 2004). As with many other branches of medicine, the shortage of psychiatrists, psychiatric services, and funding constraints nationwide cannot be understated, and the shortage of health

care professionals in the USA and in Canada is a serious issue (Chan et al., 2015; Sunderji et al., 2015). Unfortunately, 55% of states in the USA suffer from a lack of psychiatrists and only 27% of community hospitals have inpatient psychiatric wards (Chan et al., 2015). Undiagnosed depression leads to a heightened risk of suicide and substance abuse and reports show that the rate of rural suicide exceeds that of urban suicide (Olson et al., 2006; Wissow, 2000). Adding to this, psychiatric care is profoundly needed in remote areas of Canada, where concerns such as lower life expectancies, unique challenges in supporting indigenous populations to recover from political and cultural oppression, and higher rates of suicide and violence are observed (CCMHI, 2006). Considering the high rate of suicides in Canadian indigenous populations, it is vital to address the mental health of Aboriginal peoples, yet the lack of qualified psychiatrists can be acutely felt in these remote and rural areas (Gibson et al., 2011).

Fortunately, Telehealth comes to the aid of physicians in diagnosing and treating illnesses from a distance, particularly in the field of telepsychiatric consultations (Chan et al., 2015).

Telepsychiatry is “the application of Telehealth to the specialty field of psychiatry. The term typically describes the delivery of psychiatric assessment and care through telecommunications technology, usually videoconferencing”. Telepsychiatry is perhaps the most utilized and effective branch of Telehealth. For example, the statistic from Canada’s Ontario Telehealth Network shows that over one half of the 204, 058 Telehealth consults in the fiscal year 2011–2012 were for telepsychiatry (Chan et al., 2015). A review suggested that between 2003–2011, telemental health was effective for many populations (including adults, children, geriatric, ethnic) in many settings (emergency, home health, hospital) (Chan et al., 2015). The broad use of telepsychiatry may, in part, be a consequence of the effectiveness of telepsychiatry in diagnosing disorders, as revealed through a consultation-liaison model by the University of California Davis Health System, who demonstrated videoconferencing can successfully diagnose a broad array of

psychiatric disorders (Yellowlees et al, 2010). However, telepsychiatry is versatile and can be used for consultations in specialist clinics, including pain, obesity, and surgery clinics, as well as for primary care and for patients' home care (Chan et al., 2015). Not only is telepsychiatry the most utilized and effective branch of Telehealth, but with sufficient patient volume, it is more cost-effective compared to an in-person visit (Chan et al., 2015).

The American Academy of Child and Adolescent Psychiatry points out that telepsychiatry has the potential to “address the child and adolescent psychiatry workforce shortage... and to improve access to care for children living in rural or impoverished areas” (Myers & Cain, 2008). A study analysis of 100 psychiatric evaluations, where 41 case managers were interviewed in the Hospital for Sick Children in Toronto Canada from 2003-2004, shows that case manager attitudes towards acceptance and following orders are excellent, yet major obstacles to carrying out specialist recommendations exist (Myers & Cain, 2008).

Inequality in receiving proper mental health care in rural areas has recently been addressed by a telepsychiatry consultation in rural Georgia and Alabama (Jacob et al., 2012). The authors explain that patients located remotely in rural Georgia receive two telepsychiatry consultation sessions consisting of a psychiatric evaluation session and a recommendation session. An investigation by Jacob et al. (2012) addressed the benefits and challenges of telepsychiatry consultation clinics with rural pediatric patients whose families either found travel challenging, lacked health insurance, or were involved in a lengthy waiting list. Using videoconferencing, a psychiatrist visited a child for several sessions and then offered a care plan to the patient's doctor and family. This model of care is beneficial by reducing cost, travel time, and the stigma of having a mental illness since medication is prescribed by a general practitioner (GP).

Furthermore, specialists can visit more patients, and patients with social anxiety disorders and/or autism felt less inhibited and more eager to engage with a monitor than a person. As highlighted

above, it is clear that telepsychiatry has the potential to meet the needs of patients in underserved areas in a timely manner.

LR.B.3.4- Teleophthalmology

Visual impairment and irreversible blindness as a result of age-related macular degeneration (AMD) and diabetic retinopathy are among the greatest health concerns of many societies (Augood et al., 2006). Estimates suggest that by 2020 in the United States, approximately 9 million people will have AMD and 6.1 million people will suffer from diabetic retinopathy (Kempen et al., 2004; Pizzarello, 1987). In addition, visual impairment in seniors can lead to falls and consequent complications, including hip fractures. By using digital imaging photography, dual-band audio-video communications systems, telephones, and smartphones, teleophthalmology has been nominated as an important replacement management strategy for delivering superior eye care and screening to help meet the increasing pressure on the medical ophthalmology community. Eye examinations for patients with various ophthalmic diseases (including AMD) by teleophthalmology prioritize patient referrals and can replace face-to-face examinations (ManCho et al., 2009). Teleophthalmology is also important since it prevents traveling and is cost-effective, especially for residents in remote areas (Kelly, 2011; Vaziri, 2015). The development of programs such as the one implemented in 1998 by the Department of Ophthalmology at the University of Alberta for patients who cannot access ophthalmology care because of difficulties related to travel, distance, time, and expenses, help expert physicians visit patients from long distances, and prevent any unnecessary courses of action (Ng et al, 2009; Tennant et al, 2000). As further highlighted in the literature review by Vaziri et al. (2015), the validity and feasibility of teleophthalmology in detecting diabetic retinopathy and AMD showed strong precedence in the literature in full support of its success (Vaziri, 2015).

LR.B.3.5- The role of Telehealth in Neonatology and Neurology

A study by Wenger et al. (2014) assessed whether Telehealth can be used to carry out dysmorphic and neurologic examinations in the neonatal intensive care unit (NICU). In this study, 10 subjects with dysmorphic features were assessed by geneticists and 10 subjects with encephalopathy were examined by neurologists via Telehealth. In general, neurologists successfully classified “92% of abnormal neurologic examination features in encephalopathic patients” while geneticists accurately detected 93% of “dysmorphic examination features” (Wenger et al., 2014). The results of the study showed that Telehealth has the ability to properly classify dysmorphic and neurologic examinations in NICU patients (Bonifacio et al., 2011). Further conclusions unequivocally suggest that these assessments are most often precise and correct; consequently, neonatologists retained a positive impression of Telehealth (Wenger et al., 2014).

Based on the American Psychiatric Association (2013)’s definition, Autism spectrum disorder (ASD) is a chronic and pervasive neurological developmental disorder characterized by deficits in reciprocal social interaction, social communication, and the presence of restricted and repetitive behaviors (Wainer & Ingersoll, 2015). Having a child with autism and lacking awareness in managing such a delicate situation is frustrating for families, particularly for those residing in remote areas. A study by Golnik and Ireland (2009) highlighted that physicians normally care for at least 10 patients with Autism, wherein 52–95% of children with Autism are treated with complementary alternative medicine (CAM) (Dosreis et al., 2006; Hanson et al., 2007; Harrington et al., 2006; Wong & Smith, 2006). With the growing acceptance rate of CAM, CAM is used for approximately 20–40% of healthy children and over 30–70% of children with special needs (Kemper et al., 2008). Care of children with Autism who are being treated with CAM or other alternative medical plans may be challenging for both the physician and their

families. Like many of those in the medical community, Golnik and Ireland (2009) believe that further exploration regarding the safety and efficacy of CAM therapies is required. Moreover, educating physicians and families, as well as continuing communication and updating of knowledge, is necessary. Wainer and Ingersoll (2015) affirm that in remote areas, the use of Telehealth programs to train the parents of children with ASD in an intervention-based technique would be beneficial.

LR.B.3.6- Telestroke services

Telestroke services are also a tremendously successful branch of Telehealth. Telestroke is defined as “the use of audio (including telephone), video, and other telecommunications and electronic information processing technologies for the [remote] transmission of information and data relevant to the diagnosis and treatment of acute stroke” (Harris et al., 2015). “A telestroke service is often used for medical consultations in rural areas”

(<http://searchhealthit.techtarget.com/definition/telestroke>; date accessed: May 11, 2016).

Telestroke services have been successfully applied in a variety of cases. For example, from 2007 to 2010, six successful resuscitations of patients with major trauma, pulseless tachyarrhythmia, cardiogenic shock and severe hypothermia were performed in Labrador, Canada (Jong, 2010; Khan et al., 2010). In another study by Shuaib et al. (2010), Telehealth greatly improved the quality of care during 3 years of experience in rural areas with portable tomography scanners for the treatment of acute stroke patients via Telehealth. During the 3 year period of the study, more than 140 teleconsultations were completed and over 40 patients with thrombolysis were treated by physicians in central regions. Another study by Khan et al. (2010) demonstrated the numerous benefits of telestroke usage in a remote hospital in Northern Alberta over a 2-year period. The

results of this study show that the usage of the Telestroke Survival Line helped local physicians to meet and communicate with experts in a fast way, and brought on an increased survival rate.

When a patient enters an emergency room, many steps need to be taken by doctors and nurses.

The following steps are necessary for acute stroke management decision making: 1) intubation, 2) blood pressure control, and 3) determination of risk/benefit for thrombolytic intervention (Harris et al., 2015). As highlighted in many articles, the best management of patients with acute stroke and transient ischemic attack (TIA) is time sensitive. Often, it is not easy to manage critical situations easily. In rural areas, where the GP is alone and specialist consultation is required, the incorporation of videoconferencing (Telehealth consultation) is recommended (Harris et al., 2015). “Optimal acute ischemic stroke care is aided by timely consultation with stroke neurology specialists. Emergency physicians may draw upon their expertise for assistance with image interpretation, diagnosis and therapy” (Harris et al., 2015).

LR.B.3.7- Telerehabilitation

Falls are oftentimes an unavoidable occurrence when aging, and are a cause of increasing morbidity, hospitalization, and physiotherapeutic follow-up after surgery. Reports reveal that one in three seniors fall once per year and that 10% of these falls cause fractures (Tousignant et al., 2014). However, Tousignant et al. (2014) stated that only 37.2% of people with upper limb fractures received physiotherapeutic rehabilitation, and this service is greatly underutilized and unavailable, most notably in remote areas. Telerehabilitation is a relatively new aspect of Telehealth yet based on a study by Tousignant et al. (2014), it can help physicians in remote and urban areas to manage patient care along with tele-education, teleconsultation, telemonitoring, and teletreatment. Telerehabilitation is used by orthopedic patients and has been discussed

previously in the literature, where the feasibility and effectiveness of this new health care service has been proven (Tousignant et al., 2014). For example, Tousignant et al. (2014) revealed that patients who had received post-knee arthroplasty telerehabilitation were tremendously pleased, with a 90% satisfaction rate, thereby improving the participants' quality of life. As such, telerehabilitation for orthopedic patients seems a promising way to dispense rehabilitation (Tousignant et al., 2014).

LR.B.3.8- Teleradiology for the treatment of cancer

In 2015, 539 Canadians were diagnosed every day with cancer (Canadian Cancer Society, 2016). Cancer is one of the leading causes of death in Canada, with approximately 30% of Canadians dying from cancer (Watanabe et al., 2013). Concurrent with the high rate of cancer patients, a survey conducted by the WHO in 2009 demonstrated that teleradiology is the most common application of Telehealth (World Health Organization, 2010). Palliative care (PC) and palliative radiotherapy (RT) consultation are integral to the care of patients with cancer. Obviously, traveling to urban centers to access these services can be burdensome for both patients and their families (Sharon et al., 2012). Sabesan et al. (2012) concluded that this videoconferencing technology can be used for the treatment and caring of rural and remote patients and could be considered complementary to any models of care not only in Oncology care, but also in all fields of medicine.

LR.B.3.9-Physical activity monitoring via the Physical Activity Line

The fourth leading risk factor for global mortality is physical inactivity (World Health Organization, 2010). One problem in contemporary society is the substantial growth in and use

of media technology, including computers, television, and the Internet – factors which commonly contribute to increased levels of physical inactivity (Bredin, 2013). Playing seated video games and watching television for more than four hours per day is unhealthy, as research shows that those who engage in these activities are at risk of developing cardiometabolic disease, becoming overweight, developing high blood pressure and increased lipid count (Bredin, 2013). It is well known, however, that the prevention of various chronic diseases caused by inactivity (e.g, cardiovascular disease, osteoporosis, hypertension, type 2 diabetes, and some cancers) is possible with regular physical activity.

An interesting and novel Telehealth approach has been designed to target physical activity levels. The Physical Activity Line (PAL), a free telephone and online resource counseling program (www.physicalactivityline.com), is an exciting new Telehealth approach to the promotion of physical activity and was developed and implemented in the province of British Columbia, Canada, in 2008 (Bredin, 2013). Here, university-trained, qualified exercise professionals provide low-cost help via telephone or Internet (online resources) for both healthy individuals as well as for those with established medical conditions. Bredin and Warburton (2013) specify the role of the Physical Activity Line in the effective knowledge translation of the information originating from the systematic reviews of the literature used to derive the “new risk stratification and physical activity clearance strategy” (Bredin, 2013). This article also highlights the importance of knowledge translation tools on end-users and in clinical practices. More specifically, Mori et al. (2011) provide an overview of Telehealth approaches (telephone, Internet-based, and home-based monitoring) for the promotion of physical activity in individuals with diabetes. Any individual can connect with this program and make a personal plan of care and consequently benefit from it. Obviously, primary care via utilizing online resources (a Telehealth approach) will reduce health risk factors and lower the rate of illness.

LR.B.3.10-Endocrinology

Type 1 diabetes is the most common chronic illness in children and adolescents. Annual reports calculate that 15,600 youths are diagnosed with type 1 diabetes and 3,600 are diagnosed with type 2 diabetes in the US (Butler et al., 2012; Malasanos & Ramnitz, 2013). Sadly, about 215,000 people under 20 years of age have diabetes (type 1 or type 2), yet millions of adults over 20 also suffer from this debilitating condition (Liese et al., 2013). Unfortunately, there is a desperate shortage of pediatric endocrinologists to fill the ever-increasing need. In fact, depending on location, for every 290 children with type 1 diabetes, there is only one board-certified pediatric endocrinologist. Ratios differ based on location, with 370:1 in the Midwest to 144:1 in the Northeast where two states—Montana and Wyoming—have no board certified pediatric endocrinologists (Lee, 2010). Given this desperate shortage of qualified medical practitioners, the average wait time for an appointment is about 10 weeks, and in 68% of hospitals, it exceeded 2 weeks. On top of this, traveling up to 130 km is necessary for about 11% of patients attending an appointment (Mayer, 2006; NACHRI, 2013). As with many other fields of medicine, it became critical to address these challenges in qualified health care service workers.

Practical alternatives such as Telehealth prevent families and specialists from traveling to other locations. For instance, the Florida Initiative in Telehealth and Education diabetes project serves underserved regions in Florida. Here, the use of Telehealth over a 2-year timeframe resulted in fewer emergency department visits (from 8 to 2.5 per year) and a reduction in hospitalizations (from 13 to 3.5 per year). In a separate analysis, the result of a teleconsultation for type 2 diabetes in Austria by Abrahamian et al. (2002) shows that 4 general practitioners (GPs) through 94 requested consultations were able to help adults with diabetes to overcome their acute

complications. Clearly, the role of Telehealth in diabetes management is crucial in solving the supply issue in clinicians.

LR.B.3.11- Predictive Genetic Testing

The ability to predict an individual's risk of developing and expressing genetic diseases in advance is, while not without controversy, an example of 21st century technological advancements in the medical field. Evans et al. (2001) mention that "predictive genetic testing is the use of a genetic test in an asymptomatic person to predict future risk of disease. These tests represent a new and growing class of medical tests, differing in fundamental ways from conventional medical diagnostic tests. The hope underlying such testing is that early identification of individuals at risk of a specific condition will lead to reduced morbidity and mortality through targeted screening, surveillance, and prevention" (p.1052). Many experts in the health care field believe that predictive genetic testing (PT) reduces morbidity, mortality, and health care costs for taking care of ill individuals (Evans et al., 2001). PT will help individuals at risk plan for the future and, in advance, find support groups and research opportunities and also acts to relieve their uncertainty. Although the benefit of screening the community and individuals at risk is enormous, the barriers such as distance and the inflexibility of the testing process cause delays, interruptions or cancellations to the process.

LR.B.3.12- The branch of Telehealth is a critical measure of success

While telepsychiatry is a tremendously successful and helpful branch of Telehealth, other branches of Telehealth – such as telegynecology – are perhaps inappropriate and unsuitable branches of Telehealth. Consequentially, the particular branch of Telehealth and its functions are

vital to its success, as not each case is appropriate for Telehealth (Barlow et al., 2012). For example, Barlow and colleagues (2012) sought to determine whether Telehealth could be appropriate for pediatric and adolescent gynecology (PAG) services. Of the 1,533 patients involved in the study, while 30.6% of the patients (n=469) were considered suitable for PAG services based on geography, only 10.9% (n=51) were considered appropriate for Telehealth, according to clinic physicians. Here, the physicians argued that the need for physical examinations, imaging, and privacy were the key factors required for the physical presence of patients in care centers. From the patient's perspective, only 28 patients/families vocalized an interest in Telehealth for this purpose, as they generally preferred in-person consultations (Barlow et al., 2013). Given the private nature of some medical concerns, it is certainly understandable that not all Telehealth branches can be successful. However, for those branches in which applications are readily accepted by clinicians and patients alike, the popularity and growth of Telehealth can be expected in years to come.

SECTION 4: PHYSICIAN UPGRADING OF MEDICAL KNOWLEDGE IN A COST-EFFECTIVE MANNER AND THE MENTORING OF JUNIOR PHYSICIANS VIA TELEHEALTH

LR.B.4.1-Physician continuation of education via Telehealth to maintain licensing and to upgrade knowledge

Physicians are required to constantly acquire additional, diversified training in order to remain competitive and competent in their practice and to assure that their medical licenses are kept up-to-date with the latest medical information and technologies available (Krupinski et al., 2004). Internet technology in the form of Telehealth has moved beyond simple paper-based learning (PBL) and challenged the conventional delivery of care and education, where Conradi et al. (2009) feel that PBL can only progress in a one-dimensional direction, which prevents physicians from discovering the full impact of their decisions. As such, it becomes clear that Telehealth is a valuable tool to upgrade knowledge and to enhance scholars' ability to understand, receive, and analyze data in a convenient, time-effective approach. Through live or recorded material and demonstrations, knowledge and skills can be upgraded in a way that is beneficial for physicians who are required to upgrade their skills (Kerfoot et al., 2006). This process can be completed by taking Distance Continuing Medical Education (DCME) online courses, attending online videoconferences, sharing knowledge with colleagues, reading online articles, watching online videos, and consulting with and learning from specialists (Krupinski et al., 2004). These technologies can additionally enable a greater number of physicians to enroll in a given upgrading class, allow experts to share their knowledge from anywhere in the world, and hasten the process of progressing junior/mentoring physicians through the medical system.

In particular, the Canadian community takes advantage of technology not only in the practice of physicians, but equally in their education upgrading, consulting with colleagues, and in communication with their patients. It seems that with the advancement of technology such as smartphones and laptops, recent physicians are more engaged in using Telehealth as a tool of learning and upgrading knowledge than before (Xu et al., 2014). In 1981, there was evidence that 73.3% of physicians updated their knowledge and 55.7% of physicians updated their skills by reading books and articles in a paper format. At that time, approximately 73.2% of physicians residing in Maritime Canada stated that they would prefer reading or taking courses as a way to update their medical knowledge, and 72.2% of physicians said that to update their medical skills they preferred clinical internships, courses, and reading. Overall, when physicians were asked what forms of DCME had the greatest effect on the way they managed patients, 42.5% chose reading, 18.8% chose courses, 14.6% selected informal discussions, and 12.4% preferred formal consultations (Curry & Putnam, 1981).

Additionally, young professionals entering the medical workforce may find Telehealth an attractive novel domain because it allows them not only to maintain and upgrade their knowledge, but also to network and communicate with their peers more easily (Bagayoko et al., 2014). As suggested by Conradi et al. (2009), the migration of physician learners from a traditional learning platform to a clinical teaching environment inside a three-dimensional virtual world has given medical practitioners a second chance at performing virtual surgeries and gifting a second life to patients. Conradi et al. (2009) believe that for these scholars, collaborative learning through case-based or problem-based learning scenarios is a wonderful opportunity for novel skill upgrading. In this way, physicians can acquire knowledge and enhance their decision-making skills.

Research into the impact of Telehealth on continuing education shows that physicians benefit

from electronic DCME to enhance their skills and receive clinical support (Allen, 2002; Hugenholtz, 2008; Ricci et al., 2005). DCME via videoconferencing enhances interactive training and motivation and improves professional development and competency; therefore, it is a prime factor in addressing the shortage in human resources personnel (Sarkis & Mwanri, 2013). Lifelong learning through distance continuing education permits doctors to cope with job requirements, respond more positively to the specific health needs of patients, take on more challenging tasks, communicate more effectively with colleagues and increase job satisfaction. Telehealth has also provided opportunities to recertify licenses, to practice facilitated interdisciplinary interactions, and to consult and exchange ideas and feedback from medical experts, and it has made the delivery of constant educational and emotional support in distance areas for all parties - including patients and their families - possible. DCME is widely acknowledged as an invaluable part of the working life of the physician and other practitioners (Hugenholtz, 2008). Furthermore, Bagayoko and colleagues (2014) believe that the training of health care professionals should include Information and Communication Technologies (ICT) and Telehealth in the curriculum. It becomes necessary then that future doctors, nurses, midwives and medical assistants familiarize themselves with these advancing technologies before they graduate and join the workforce, especially in remote areas.

One such specific example regarding the benefits of Telehealth and Web-based programs in DCME examined the benefits in upgrading practicing physicians' previous knowledge regarding human anatomy (Ferreira et al., 2015). The study revealed that Telehealth and Web-based programs were highly successful and additionally documented that a Web-based program for learning human anatomy benefited undergraduate students, where researchers found that distance learning students performed better than on-campus students with a mean grade of 91.4% compared to the 88.9% for on-campus students (Limpach et al., 2008; Nilsson et al., 2008). Test

results further revealed that physicians who are educated using electronic delivery methods achieve a higher degree of success overall than those who learn exclusively through traditional methods. Satisfaction among physicians is reportedly high as well, showing that the use of Telehealth in different forms not only provides a more effective way of upgrading knowledge, but also leads to more positive personal experiences. In a paper by Kerfoot et al. (2006), Web-based teaching increased comprehension rates by three times compared to non-Web-based teaching and physicians tested at a later time demonstrated significantly higher retention scores than their non-Web-based peers. Why is this so? Data suggest that online learning is a technique which enables thorough understanding and retention as well as enables students and physicians to have the means to explore new avenues of study not available in a classroom and it can act as a supplement to pre-existing course material. Telehealth is convenient, offers flexible scheduling, offers a high availability of supplemental resources, and is adaptable (Supiano et al., 2002). In a paper by Supiano et al. (2002), it is pointed out that electronic resources used in a course on geriatric care are "useful to the [physician] because self-directed [Web-based ways of upgrading knowledge] can be targeted to address weak areas while interactive features make it much more dynamic than a written transcript." Also, the benefit to experts and the program in general is outlined when the same paper states that "evaluation of performances will also aid program directors to appropriately modify the curriculum to address any deficiencies" (Supiano et al., 2001).

Despite the appeal of Telehealth in DCME, not all feel that upgrading physician knowledge via Telehealth is beneficial. One study declared that a limitation of Telehealth in DCME was that often, rural clinicians did not obtain the DCME credits offered even if they attended a course. It was shown that less than 25% of the DCME credits were received by online courses (Krupiniski et al., 2004). "Often participants provide identifying information in ratio to the credit they seek

and usually physicians are charged rates that correspond with the certifying organization based on the likelihood they are seeking specific credits” (Stamm et al., 2005). In general, it can be noted that the field of health care can be a very challenging and demanding field and upgrading knowledge requires time and patience (Wilson & Maeder, 2015). In rural communities, one study found that limited bandwidth and personal preference limited videoconferencing as a form of physician DCME. It was mainly seen that technology distracted physicians from the value of the Telehealth presentation, leading to physician complaints. Distance education respondents also ranked appropriateness of topic and presenter lower by videoconference as reviewed in Wilson and Maeder (2015).

LR.B.4.2-Costs and time associated with upgrading knowledge can be remedied via Telehealth

When looking at improving and upgrading physician training with the use of videoconferencing, Web technologies, and remote access to EHRs, the first thoughts which will invariably come to the surface of the mind are “who pays for this service?” and “is this way the most cost-effective strategy?” Although initial technology investments may be vast, over time, governments, universities, and hospitals benefit from the long-term savings as a result of introducing Telehealth. Consequently, medical students, instructors, practicing physicians, nurses, health authorities and patients will save not only financially, but also in travel time, transportation costs (additionally accrued from providing courses at a given location), fuel, daycare, parking and job absence.

It is worthwhile to mention that regardless of the method, the cost of upgrading skills and licensing can be monumental. These costs pressure physicians to quicken the process of their skills upgrading in order to alleviate as much difficulty as possible to finances, schedules, and

social lives. Telehealth reduces the costs, increases the quality of physicians' learning, and gives physicians in rural areas the chance to contribute their input and collaborate with other experts both professionally and personally (Wilson & Maeder, 2015). Telehealth can provide opportunities for physicians to save time and money while using convenient online-based resources (Wilson & Maeder, 2015). In this way, physicians not only upgrade their knowledge, but also enhance their sensitivity towards their roles, increase multidisciplinary connection, and gain greater cohesion and support among colleagues. Clinicians in remote areas are also able to communicate with larger universities in order to access wider knowledge bases (Stamm et al, 2005; Thomas et al, 2004; Cunningham & van Der Merwe, 2009; Krupinski, 2004). One study showed that costs decreased by about 40% (from CDN \$1050 to CDN \$650) owing to Telehealth usage, stating that with experience, the costs of planning, coordinating and evaluating videoconferencing systems in DCME can decline (Allen et al., 2002).

LR.B.4.3-Physician's knowledge of Telehealth and viewpoints on Telehealth's effectiveness

No matter where they are located, it seems that the majority of medical professionals are aware of Telehealth and, as evidenced by documentation in the literature, many of them have had experience with the subject matter before (Watanabe et al., 2013). One study found that 24% of physicians had already completed practical work in Telehealth, while 63% had specific contact with Telehealth in knowledge acquisition. However, 50% of participants were not aware of the scope and limitations of Telehealth and only 13% had read any literature regarding specialist Telehealth and EHR applications (Gschwendtner et al., 1997). Analyzing this research shows that it has been more than 10 years since those in the medical field have been aware of the benefits of Telehealth. In 1997, a study asking participants about their views on Telehealth showed that 75% of learners had a great interest in Telehealth-assisted teaching. These scholars said that they

would attend lectures if Telehealth applications were readily available at their location for them to use, but most of the institutions at that time did not offer multimedia teaching or were not aware of it. Also, 93% of these academics believed that Telehealth would become very important to the future of health care (Gschwendtner et al., 1997). A more recent study showed that 99% of physicians wanted to recommend DCME to their co-workers and 100% intended to use the materials that were taught (Alexander et al., 2008). Clearly, many physicians are in accord regarding the benefits of Telehealth and education.

Telehealth application in education is well-established and its benefits have been acknowledged by some for many years. Research by Stamm et al. (2005) shows that using Telehealth in DCME courses gives rural clinicians the opportunity to connect with local professional training institutions, which encourages them to train locally rather than far away. There are many additional studies which indicate that learners and educators are aware of the benefits of Telehealth on their DCME options (Gul, 1999; Newman, 2009; Limpach, 2008; Nilsson, 2008).

It is important to note that while many agree with the effectiveness of Telehealth, Wade and colleagues (2014) have eloquently stated that aside from cost, the acceptance of and interest in Telehealth by practicing physicians is the key factor on the effective implementation of Telehealth. Many scholars have highlighted that if clinicians wanted to use Telehealth, they would make themselves available. When a specialist physician in a rural area was interviewed with respect to his philosophies on Telehealth, he stated, “It’s very hard, if there’s not the [clinician] interest at both ends, for the service to work in a sustainable way” (Wade et al., 2014, p. 688). “One of the consistent problems in making the service work is maintaining the cohesion of relationships in the network” (Wade et al., 2014, p. 689). Colleagues agree with these statements and additionally reinforce the notion that “money’s not the savior of everything, and so it means that the players do need to have an interest and think that it’s worthwhile; if you

don't have that, it won't get up anyway" (Wade et al., 2014, p. 688). Hence, while costs associated with introducing Telehealth to the masses are certainly a valid concern as noted above, it is perhaps more important to consider the physician's viewpoints on Telehealth in order to bring about lasting change.

LR.B.4.4-Telehealth as a means to educate junior physicians

Hands-on training under the supervision of a mentor is unequivocally the most effective tool for learning (Raison et al., 2015). Unfortunately, the number of skilled mentors is low and the cost of such mentoring is high. This cost is felt most acutely with respect to the time and fiscal constraints of traveling away from the mentor's own institution. Additionally, professional surgeons rarely have the time or availability to take part regularly in such programs due to their own resident students and patients. Real-time audiovisual interaction via telementoring is a means which can bridge the gap between mentors and students by providing remote guidance and assistance using telecommunication technologies. Here, physicians are able to mentor junior physicians and attend telerounding or remote patient rounding through low-cost Web and telephone-based consultation software, while videoconferencing has facilitated surgeons' interaction with junior physicians. Further evidence suggests that telesurgery through synchronous and/or asynchronous interaction helps junior surgeons make more accurate decisions on surgery and determines the suitability of patients by looking at patients' details and pictures, whereby they benefit from the leading surgeon's knowledge and opinions (Raison et al., 2015). A study by Gul et al. (1999) rated how useful Telehealth would be during undergraduate surgical teaching. It was found that in the operating theatre, 30% of observers felt uninvited by surgeons and felt as if they were in the way of procedures; meanwhile 63% felt as if precious time was misused during their presence in the theatre. Therefore, juniors found that

videoconferencing assisted their learning process and prevented them from feeling as if their time was wasted. Overall, it was found that participants preferred surgical teaching via Telehealth over attendance at the theatre venue (Gul et al., 1999). One study showed that 39% of participants received more feedback on their assignments when they used videoconferencing than if they attended classes in session, as it allowed feedback to be both written and verbal (Peled et al., 2009).

Given that the majority of physicians applaud the use of Telehealth in education upgrading and given the insistence of the next generation in using technology, it can be presumed that the future of Telehealth is secure. As such, the next goal of this thesis will be to address the satisfaction rate and acceptance of Telehealth not only by clinicians and health care workers, but also by patients and their families.

SECTION 5: SATISFACTION RATE AND ACCEPTANCE OF TELEHEALTH BY PHYSICIANS, PATIENTS, AND THE COMMUNITY

LR.B.5.1- Communication is a key aspect in Telehealth's implementation and success

Communication is an essential part of human beings' daily interactions. When it comes to the physician-patient relationship, precise and clear communication is even more crucial. Telehealth no longer refers to a distance phone conversation between two health care professionals; it defines a range of information and communication technology (ICT) applications (Steele & Lo, 2013). Internet access and its attendant support for data transmission (records, images and other health-related data) make it possible for physicians to communicate using different applications such as videoconferencing, smartphones, or social media to communicate with their colleagues, peers, and patients.

In rural areas, communication between health care providers via videoconferencing creates confidence in physicians when handling a wide range of challenges. In addition, it removes them from isolation and permits them to share their concerns, receive feedback, and act accordingly. Administrators also benefit from videoconferencing, since they can communicate their issues, learn from like-minded peers at different locations, and offer their own solutions to others, all the while without setting foot outside of their offices. The engagement of administrators with physicians and health care delivery problems is a great asset to the development of the future of health care delivery. Consultations using videoconferencing connect different specialists, enable virtual multidisciplinary team work, permit quicker and simpler diagnosis of medical problems, and reduce the delay in implementing treatment (Axford et al., 2002; Bowater, 2001; Rosina, 2002). The application of Telehealth has changed the delivery of health care in recent years.

Using various modalities of technological equipment (i.e., a camera equipped with a smartphone app or a computer with chat software), patients, primary physicians, and specialists can synchronously speak over a secure video chat channel (Chan et al., 2015). For example, telepsychiatry apps enable language translation technologies to allow different communities such as Hispanic communities to connect easily with practitioners in spite of language barriers (Chan et al., 2015). This formidable software, enabling multi-nationalities to come together for a common psychiatric interest, also saves transportation of senior patients. By communicating using Telehealth, language barriers can be effectively addressed and overcome.

In medicine, areas of expertise are incredibly vast and in any single physician's professional life, there is a moment of needing colleague help (Walji, 2015). As Dr. Raghu Venugopal, an emergency physician at the University Health Network in Toronto, states, "Often times, doctors and nurses are working alone, without any back-up or additional support, and limited resources" (Walji, 2015). His narration about a very interesting and successful incident of a young man in the Middle East suffering from a gunshot wound in the leg reinforced the critical role of Telehealth in saving lives. In this anecdote, physicians were able to operate on the patient, stop his bleeding, and save his life, yet they were uncertain about the management and proper medication required following the surgery. Dr. Venugopal acknowledges that with the help of a Spanish vascular surgeon who provided guidance on the long-term management of the patient, the surgical team met with success when treating the patient. He also believes that the advantages of being able to access the expertise of medical colleagues from around the globe via Telehealth is remarkable (Walji, 2015).

LR.B.5.2- Satisfaction rate and approval of Telehealth by physicians, nurses and medical experts

Due to the shortage of physicians in Canada, Telehealth technologies are useful, as they enable physicians to learn from their colleagues and experts and to refer the simpler cases to nurses.

One of the most notable examples of this is the Nurse Hotline, which is a 24/7 system serving patients in home care (Marttos et al., 2012). A study by Roberts et al. (2007) is one of many which outlines the importance of telecommunication technologies in connecting patients with their nurses. In this study, a family that belongs to the Fraser Health (FH) Hospice Palliative Care (HPC) called RN at BC NurseLine at midnight to connect with a palliative care clinic for an emergency. The results demonstrate how informative and communicative technologies have facilitated the amalgamation of BCNL's Telehealth expertise and specialized community-based palliative expertise to deliver after-hours care to home-based HPC patients and their families.

This service improved symptom management, decreased visits to emergency rooms, enhanced support for families who are caring for loved ones at home, and reduced costs, while the nurses directly communicated with physicians in order to act as a bridge between physicians and their patients (Roberts et al., 2007). Studies also confirmed that training and support via videoconferencing affects interdisciplinary collaborations, since they increase networking connections and enable greater cohesion among physicians, experts, scholars, patients, and their families (Comish, 2003). This increases the chances for clinical support, consultation, and skill development, which allows for quicker and more precise medical decision making.

Physicians also found that Telehealth applications increased their interdisciplinary connections, not only in their own hospitals, but within other communities as well. A feasibility project proved that Telehealth reduces physician isolation, as videoconferencing allied physicians, creating the potential for increased interaction (Xavier et al., 2007). When physicians use Telehealth tools,

they communicate with colleagues and experts, as well as other health care professionals such as nurses, physiotherapists, occupational therapists, psychologists, case managers, coordinators, and a broad range of additional medical and non-medical experts. This direct communication via Telehealth helps physicians to take charge of the chain of action regarding patients' treatment and gives them the opportunity to communicate and learn from other multidisciplinary members, which they require for the benefit of their patients (Jaatinen et al., 2002). Nurses, for example, are physicians' primary assistants, and the role of Telehealth in their communication and patients' follow-up plans is complimentary and equally important to the physicians' communication with other experts. A research project by Tang et al. (2004) indicates the importance of delivering Telehealth services to isolated populations of nurses and physicians in rural areas.

It is said that Telehealth and EHRs can change physicians' and academics' clinical performance. On a 5-point scale, one study found that participants estimated 3.8 when asked if the information they received via DCME courses would change their practice (Stamm et al., 2005). On evaluation forms, one study found that 11 of its participants were willing to make changes to their practice after taking a DCME course, but only 4 made the change (Allen et al., 2002). About 78.6% of physicians found themselves able to contribute information and opinions to sessions (Newman et al., 2009). Overall, a change in the way physicians practice medicine was seen (Allen et al., 2002).

Latifi and co-authors (2009) researched a Telehealth program in Arizona which focused on helping communities in rural Arizona that were suffering from a disproportionate mortality rate. This program connected the university health care center with five other rural sites which used telephone and Web-based technologies, offering physicians support from urban experts. The study revealed that during a 4-year period, there were 59 successful consultations, 35 traumas treated, and 24 general surgeries conducted with the aid of Telehealth. Furthermore, the study

demonstrated that 17 unnecessary transfers were prevented through physician knowledge communicated over the Internet and via videoconferencing. This study highlights the importance of distance consultation and physician skill and knowledge upgrading. Saving the lives of five trauma cases and one general surgery confirmed the vital role Telehealth took in this study, and stresses the importance of implementing such techniques in more rural and remote regions.

Studies point out that the area of expertise, years of experience, and age are important factors in accepting Telehealth (El Mahalli et al., 2012). Counterintuitively, the older the health care provider is, the stronger his or her intention will be to use Telehealth. Scholars believe that senior physicians are more prone to using Telehealth perhaps because knowledge gives providers more visions about the important role Telehealth plays in improving the quality of care. In contrast, a survey of doctors in Milan, Italy showed otherwise. In this study, older physicians had no interest in Telehealth and they were not sure that Telehealth could improve clinical practice (Gaggioli et al., 2005). Clearly, geographic location and cultural preferences play a strong role in whether individuals choose to practice or believe in the benefits of Telehealth (Ricci et al., 2005). A further study which focused on the successes and failures of Telehealth mentioned that physicians did not like the way other colleagues used the sessions as a “personal consultation,” nor did they appreciate the fact that some sites did not take a lot of questions and that the range of participation was not equal (Faulkner, 2001).

Finally, the concept of physician interest is a key factor in implementing Telehealth. For example, Wade et al. (2014) believe that physician interest is the most critical factor on the successful implementation of Telehealth services. During an interview with a specialist physician regarding his service to rural areas, it was made abundantly clear that if the physician personally was not interested, it was very difficult for Telehealth to operate in a sustainable way (Wade et al., 2014). Another physician reinforced the above idea when he stated, “Money’s not the savior

of everything, and so it means that the players do need to have an interest and think that it's worthwhile. If you don't have that, it won't get up anyway" (Wade et al., 2014, p. 688).

LR.B.5.3-Satisfaction rate and approval of Telehealth by patients and the community

A study by Young et al. (2007) regarding post-surgical Telehealth for children, families, and caregivers concludes that using technology in the form of Telehealth is essential, and the selection of the proper technology for the specific situation is equally important. In this study, nurses under the supervision of physicians used videophone instead of telephone to help patients and families monitor post-surgical conditions of patients. The results of the study revealed that Telehealth took the pressure off families, helped solve problems, and the visuals available with videophone technology "[spoke] a hundred words." The authors concluded that Telehealth reduces costs, saves physicians, nurses and families time, and reduced the anxiety of families and patients while simultaneously maintaining personal interaction. In northern Queensland, a study about the successes and failures in videoconferencing for a community health education program showed that 95% of community members found videoconferencing sessions informative and interesting. 96% found videoconferencing to be a suitable method for health education and would attend another session in the future (Faulkner, 2001). In 2000, the number of attendees in a pilot project by Dalhousie University's Office of Continuing Medical Education (CME) increased approximately 40% from 2500 attendees to 3500 attendees (Allen et al., 2002). Results showed that professor interaction increased the implementation of CME to smaller communities by offering a more efficient experience. One study saw that videoconferencing allowed 76.4% of physicians to communicate with other community members and it also allowed 76.8% of them to contribute valuable knowledge to the community (Newman et al., 2009).

Patients and their families can also benefit from such communication sessions both directly and indirectly. When learning directly via videoconferencing, patients have the chance to hear from health experts and are able to ask questions (Jaatinen et al., 2002). Indirectly, patients benefit because their personal physician can teleconference with another health care expert in order to learn or consult about the patient's medical condition, or to gain specialized training in their profession and upgrade their skills. Learning about their own medical issues empowers patients to take control of their situation, giving them the tools necessary to manage their illnesses and to be part of their personal care plans. Connecting health care members to patients by Telehealth is a suitable method for enhancing a patient's level of care (Jaatinen et al., 2002).

With respect to home Telehealth care, at-home telemonitoring has generally been well received by the community with different health concerns. For example, high-risk pregnant women, those with heart failure, and those with chronic obstructive pulmonary disease have found home telemonitoring beneficial and helpful in reducing hospitalizations and emergency department rates (Chan et al., 2014). More specifically, home telemonitoring of patients suffering from diabetes and asthma found an enhanced improvement in their perceived quality of life and had a reduction in symptoms exhibited. Curiously, the rate of acceptance of telemonitoring was higher in men than women, as evidenced in one particular study (Kielblock et al., 2007). Consequently, the cost reduction among men is significantly reduced in comparison to women. In any case, Baker et al. (2011) documented the influence of a home telemonitoring approach called the "Health Buddy Program" for patients with congestive heart failure, diabetes mellitus, and chronic obstructive pulmonary disease. Here, Telehealth tools and techniques are used to connect patients with their health care providers in addition to facilitating communication. The Health Buddy device (a handheld device with four buttons and a large, high-resolution colour screen) was located in a patient's home and linked via telephone with their health care provider. The

Health Buddy device permitted daily answers about each patient's symptoms, vital signs, knowledge, and health behaviours, where the data was uploaded to a Web-based computer application and responses were reviewed by health experts. The data analyzed assisted health care providers to document any abnormality in patients' physical or psychological health and address them in a timely manner. A control and intervention group (n=1,767 each) were established to evaluate the feasibility and benefits of this program. The results showed that the intervention group's mortality rate in the first year was slightly less than the control; however, the second year mortality rate of the intervention group was 2.5% lower than the control group, meaning that the Health Buddy program was successful in reducing mortality rates over a 2 year period. Clearly, the development of Web-based computer applications and the installation of electronic devices in patients' homes augment health care delivery (Baker et al., 2011).

Chronic disease patients are high-cost, high-risk patients (Bott et al., 2009). In a study by Katterl and Kalucy (2014), patients with hypertension, diabetes, and heart disease were able to manage their health problems within an educational Telehealth group sessions. Here, group programs were more successful than individual programs. Telehealth videoconferencing can assist pressured and work-laden health care providers in helping their patients with respect to illness management. Group videoconferencing has many benefits, including preventing unnecessary transportation, providing a suitable time for all parties involved, preventing the discomfort of meeting new people in person, enhancing peer support, and more (Osborne et al., 2011; Keating et al., 2011). In the case of "My Health Clinic At Home" in a rural town in New South Wales, Australia, this approach sought to service patients with chronic health conditions for 5 weeks. Seniors with little computer experience were supported to use the equipment remotely or were given instructions. During the session, participants could view and interact with all members of their group and the facilitator. After 5 weeks, the participants (some of whom lived alone and

with limited mobility) found the program enjoyable. Being part of a community with others experiencing similar life challenges helped patients to connect with others in similar circumstances, to learn how others cope with their condition in the context of their everyday lives, to exchange information, to feel inspired by others, to reflect more on managing their own health problems, and to feel that someone else cared. In particular, those who lived alone and typically lived with little or no daily contact with others enjoyed these interactions immensely. Clearly, the community of patients in a videoconference can provide a resource of strength and compassion for each individual in the group, which benefits the whole.

Caring for children and young adults with special health care needs is a challenging task. The patients on home ventilation require complicated care due to their susceptibility to sudden respiratory, neurological or metabolic decompensation (Casavant et al., 2014). A study by Casavant et al. (2014) was conducted to confirm the feasibility and usability of videoconferencing for supporting patients on home ventilation. Researchers also intended to calculate whether Telehealth has supported physicians in the decision-making process and whether it has impacted the self-confidence of families regarding their ability to adequately care for their child in the home. In this study, videoconferencing software was provided for 14 English-speaking families who had a computer and webcam. In total, 27 Telehealth sessions were completed in the duration of the 9-month study. The results of the questionnaires (one regarding their clinical management 2 – 3 months after the Telehealth session and a second regarding their experience with videoconferencing) showed that families preferred videoconferencing to telephone sessions and that it helped them feel less stressed and more confident overall. Furthermore, Telehealth use during the duration of the study not only assisted the families of medically fragile patients with active clinical problems, but it also saved time and money while providing value to clinicians in their decision-making process. In total, it was

estimated that videoconferencing saved approximately 23 clinic visits, three emergency room visits, and probably one hospital admission. Casavant et al. (2014) concluded that although the study was small, videoconferencing appears to be useful in the management of patients on home ventilator support and is as effective as and similar to face-to-face care. As such, families with special needs children also valued the Telehealth videoconferencing experience.

Czaja et al. (2014) conducted a feasibility study to identify issues related to the implementation and functioning of a home Telehealth system (monitoring blood pressure and body weight) and elderly patients' experience in using the system. A total of 34 patients with hypertension were tested (n=10 males and n=24 females; mean age=72 years; 94% self-identified as Hispanic). The participants had fairly low educational accomplishment and only 50% had any prior computer knowledge. A messaging function was responsible to send a daily reminder to the participants. Participants used the Telehealth system for six months and 24 participants (9 males and 15 females, mean age = 71 years). Among these patients, 92% of them found the device easy to use and 96% felt that the training they received in advance was adequate. Physicians and other health care providers indicated that use of the system improved their ability to manage their patients. Since the study's results indicated strong positive perceptions regarding the usability and feasibility of the Telehealth system, the use of home monitoring in Hispanic patients with hypertension in the future was recommended. They acknowledge that their focus was primarily on feasibility, and clinical outcomes in future studies need to be evaluated. While this study analyzed members of an urban community, other studies have shown that home videoconferencing increased care and reduced caregiver burden by decreasing travel time and consequently lost wages. In addition, the support of family and friends in the home community was instrumental to the caregiver (Casavant et al., 2014). Clearly, community members of both urban and rural patients acknowledge the fiscal and temporal benefits of Telehealth.

The preceding text highlighted the tremendous experiences patients, physicians, health care workers, and the community at large had with Telehealth. In the next section, the author will discuss in detail the costs and sociological impacts of Telehealth.

SECTION 6: COST-BENEFIT ANALYSIS, TIME-SAVING BENEFITS, SOCIOLOGICAL IMPACTS, AND HEALTH BENEFITS OF TELEHEALTH

LR.B.6.1- Fiscal and temporal benefits of Telehealth

Approximately 80% of US health-related expenditures are spent on treating the chronically ill (Baker et al., 2011). Chronic diseases are the major cause of death, resulting in 70% of deaths each year (US statistics), and absorbing more than three fourths of health care costs (Radhakrishnan et al., 2016). The management of chronic diseases has been under investigation in recent years, owing to the enormous cost related to this administration (Achelrod, 2014). The National Council of State Legislature website published that Telehealth is now a cost-effective means for providing examinations in lieu of face-to-face care, particularly for states with high remote populations (Malasanos & Ramnitz, 2013; Mowatt et al., 2003). Providing therapeutic services to patients in their homes by skilled and trained nurses under physicians' supervision lessens the health care workload and cost (Bagayoko et al., 2014). For example, patient costs for Telehealth were shown to be lower (\$17 to \$70) than if they attended face-to-face meetings (\$240 to \$1048) and above a certain patient workload, Telehealth services would be more cost-effective than face-to-face services for physicians (Persaud, 2005). In the case of telesurgery, a study outlined in Raison et al. (2015) demonstrated telesurgery's feasibility and its cost saving in a pediatric population following urological surgery. In this study, examiners revealed that telesurgery saves families an average of \$88 and 2.6 h per consultation (Raison et al., 2015). Regarding cost and saving money, one study revealed the cost saving benefits of integrated Telehealth for managing chronic disease, where the quarterly mean intervention group's spending was reduced by around 7.7–13.3 percent (\$312–\$542 per person) over a 2-year period,

compared with a matched control group (Baker et al., 2011). In general, a positive and noticeable health outcome was observed and the researchers highlighted the benefit of Telehealth.

The Internet as a whole has had a tremendous impact in reducing the cost of global communication (Jaatinen et al., 2002). Using computers and other electronic devices for the purpose of communication, for example, brings down the cost of Telehealth and videoconferencing. Using Telehealth and videoconferencing, physicians and patients alike will benefit from having access to online data and resources, both locally and internationally (Rochette et al., 2010). In this way, physicians and patients are able to attend online conferences and consultation sessions without travelling, effectively saving time and money. With respect to videoconferencing for administrative, clinical, educational and research purposes that have lowered health care costs, Telehealth has both financial and temporal benefits for physicians, clients, and their families who would otherwise have expenditures such as travel, parking, child care, food, fuel, accommodation, and time away from work (Barlow et al., 2012; Smith et al., 2003; Wootton, 1996). Telehealth and videoconferencing are often more convenient and cost-effective options that allow patients to cut down on consultation fees as well as travelling fees (Barlow et al., 2012; Hui, 2002; Smith, 2003). Cost-saving strategies are particularly important to patients, as an overwhelming 96% of families complained about expenses relating to parking, fuel, and meals when attending a face-to-face session and regarded videoconferencing as a more affordable and time-efficient option (Smith, 2003). While Telehealth employment and implementation is no trivial expense, many believe the return on investment will be well worth the efforts. For example, the FITE diabetes project (Malasanos & Ramnitz, 2015) is excellent proof of this claim. In this 2-year project, patients received education and a standard level of care, and the cost in general for all sectors dropped significantly as well. Furthermore, the mandate of health care reform regarding affordable and accessible care to all was met.

While some praise the cost reductions of Telehealth, others are quick to point out that some of these savings are surface-level. For example, Achelrod (2014) questions the suitability of Telehealth in decreasing cost and its ability to answer the expectations of policy makers. Bodenheimer et al. (2009) further considers the costs a burden and a challenge for Medicare and other insurers when it comes to the management of care and budget. Demartines et al. (2000) also stated that because of factors such as maintenance of the unit, debt payment, space and personnel, the cost-effectiveness of Telehealth is complex. Finally, Allen et al. (2002) postulated that for educational purposes, costs must be taken into account, as it may be too expensive to implement Telehealth in areas where the full commercial costs of Telehealth are absorbed by users. Later articles reveal that videoconferencing previously was more expensive than telephone conferencing because of the higher line charges (Davis & McCracken, 2002). Another study stated that some physicians refused to participate in the DCME program due to a lack of funding to cover the dial-up connection costs for sessions (Faulkner, 2001). With the advancement of technology, the costs of Telehealth have been reduced, yet some physician still hesitate to adopt it, as they are unsure as to whether its long-term benefits will be worth the cost of initial implementation. While a practicing physician believes that Telehealth is an invaluable tool for education (Bowater, 2001), he also mentions that equipment is expensive and he was not able to cover the cost of purchase in the two years that he worked with a mining town in Western Australia. With respect to the costs, this physician suggested that incentives providing physicians/specialists with the means to purchase or share the equipment with other health organizations or companies would be an effective solution to the problem (Bowater, 2001). Finally, in order to take more advantage of Telehealth's benefits and to encourage the growth of Telehealth services, multistate licensing should be adopted (Malasanos & Ramnitz, 2015). The reimbursement for Telehealth services should increase by Medicare, Medicaid, and private

insurers. Most importantly, the health care and technology industries should focus on designing less expensive devices and find more affordable means to implementing Telehealth. While 42 states recently provided some form of Medicaid reimbursement for Telehealth services, many private insurance companies preferred not to pay unless pressured by Telehealth parity laws (Malasanos & Ramnitz, 2013). With respect to USA Medicare, according to Malasanos and Ramnitz (2013), beneficiaries are eligible for Telehealth services and physicians can submit reimbursement claims easily with a modifier for services such as out-patient or emergency department visits or consultations.

LR.B.6.2-Sociological impacts of Telehealth

In recent years, community-based care has changed the delivery of care for the elderly, who may need support while suffering from emotional, mental, and physical difficulties. An article by Arnaert and Delesie (2007) spoke of the effectiveness of video-telephone nursing care for the homebound elderly. The authors concluded that physician-nursing home care not only saved costs, but also improved the outcome of care for elderly patients who desired to live at home for as long as possible. Furthermore, older patients find mobility more difficult and enjoy the convenience of Telehealth. For example, in Hong Kong, 90% of older citizens live at home with family. In this case, cultural differences – as many Westerners choose to use the services of nursing homes, who have trained staff on hand – could account for an increased need for Telehealth.

In a review of the socio-economic impact of Telehealth, researchers found that Telehealth increased access to educational opportunities, saved time and money, enhanced social support, and developed quality care (Jaatinen et al., 2002). Many studies and interviews proved that

patients, their families and community members benefitted from Telehealth and they were happy with receiving information and treatment closer to home, such as in a local clinic or hospital. For example, using Telehealth services also prevented emotional breakdowns and created some degree of comfort when families were not forced to take their child far from home (Foster & Whitworth, 2005). In the field of telepsychiatry, studies showed that linking patients with depression to members of a telemental health group aided in improving mental health while simultaneously reducing side effects and reducing antidepressant use in a high-intensity Telehealth-based collaborative care.

Finally, it has been documented that health care workers who agreed to serve in remote areas spent approximately half of their total time traveling to regional capitals for training-related matters (Bagayoko et al., 2012). Not only is this an ineffective financial solution, but the sociological impact on the physician traveling away from home and family may also play a role in the practicing physician's mindset. While the notion of compassion fatigue in health care workers is only just in its infancy, it is important to remember the emotional well-being of the physician who is responsible for patients. Given that education via Telehealth is a platform for eliminating travel and thus time away from home, it can be intuitively understood that a physician may be more content having this as an option, thereby preventing physician burnout.

LR.B.6.3-Health benefits of Telehealth

Telehealth allows physicians to promote health and screening services more easily (Hui, 2002). For example, patients following hospital discharge often encounter problems including nosocomial infection, yet follow-up via Telehealth in the form of telephone calls from nurses (under physician supervision) can address and prevent these issues (Ouellet et al., 2003).

Furthermore, for Aboriginal Canadians residing in remote, isolated locations, Telehealth can address the health needs of this underserved sector of the population (Gibson et al., 2011). With 105 Telehealth programs in 73 sites in Manitoba serving a wide portion of First Nations peoples, Telehealth can address their health concerns while preventing them from moving to urban regions (Elliott et al., 2012; Alison et al., 2011).

A study by Mashru et al. (2016) investigated challenges involved with setting up Telehealth-based infectious disease consultation services, types of cases referred to this service, and satisfaction rate. An administrative database was designed to collect data and patients filled out a survey regarding their satisfaction with services after each initial consultation. Based on the report, this service during the first year successfully operated 191 teleconsultations. Amid these consultations, 28 Telehealth patient visits occurred in their remote home communities, which saved time, cost of travel (i.e., medical transfer by aircraft for non-emergencies saved a total of CDN=\$3000, emergency cases = CDN\$15,000) and other expenditures. The results of study showed that the health benefits of Telehealth accurately reflected the needs of the community and patient satisfaction rates were very high.

As examined above, Telehealth has financial, temporal, social, and health benefits to all who use its services. As will be examined in the next chapter, Telehealth benefits and practices vary according to geographic location, where international Telehealth practices will be comparatively analyzed alongside rural and urban areas.

SECTION 7: INTERNATIONAL PRACTICE OF TELEHEALTH, INCLUDING URBAN AND RURAL AREAS

LR.B.7.1- Practice of Telehealth in developed countries

Providing “golden standard” health care is a key objective in many countries around the world. Tied in with this objective is the awareness that population sizes are booming, physicians are in demand worldwide, and medical costs are soaring while funding is limited, leaving the very nature of health care today in peril. Unless Telehealth is spread worldwide, providing this exceptional level of standard is not possible (Steele & Lo, 2013). Fortunately, Telehealth has become increasingly more accepted and used as a non-traditional means of health care; for example, a decade ago, 52 Telehealth programs were in place outside of the USA, with Canada, Australia and the United Kingdom seen as the major contributors (Craig & Patterson, 2005; Grigsby, 2004; Rosina, 2002). More specifically, in Western Australia, approximately 73% of responding health care facilities was using Telehealth. In this case, the most common purposes of Telehealth usage were: wound care (55%), education (76%), and psychiatry (53%) (Bahaadinbeigy et al., 2010).

Since 2007, the Townsville Cancer Centre (Queensland, Australia) has provided routine and urgent medical Oncology services through videoconferencing (VC). VC has been used as an alternative model of care for rural patients. Using this alternative model, the specialist’s time will be saved and will prevent a disruption in routine. Patients are allocated a time slot; severely unwell patients are seen more frequently through video link, and urgent cases are seen anytime. Treatment decisions and chemotherapy regimens are decided by medical oncologists, and under the supervision of a local medical team, are administered by competent nurses. This alternative model has easily covered an area of about 1200x1200 km² and has brought major benefits for

patients, doctors, nurses, and allied health workers. Due to following the procedures and policies established by the hospital, it is accepted by patients as a trusted, satisfying and a safe practice and furthermore lacks any medico-legal concerns.

A study by El-Mahalli and colleagues (2012) regarding successes and challenges in the implementation and application of Telehealth in Saudi Arabia showed that dissemination of information about Telehealth and adequate training of health professionals in the country is a crucial step prior to taking action. The purpose of the study was to evaluate the opinions of health professionals in Saudi Arabia at hospitals adopting (n=3) and not adopting (n=1) Telehealth. In this study, willingness to use Telehealth (using audio, video, and data communications) and its benefits and challenges were determined. Nonparametric statistical analysis and descriptive statistics were used to analyze data collected based on two paper-based questionnaires. Non adopters' insights into Telehealth's advantages were higher than that of adopters and the percentage of adoption of Telehealth by health professionals was low. The authors revealed that even though the Ministry of Health in Saudi Arabia has allocated a substantial budget for e-health and while noting Telehealth is a promising method for the delivery of care to isolated jurisdictions, the Telehealth modalities used were very limited. Adopters most frequently cited benefits including developing access to health care, enhancing the quality of care, and simplifying patient care and management.

In Germany, two million patients suffer from congestive heart failure (CHF), with 300,000 new cases annually (Achelrod, 2014). In 2006, CHF was the most common reason for hospitalization in the country, with 50% of the patients returning after six months of discharge. For managing CHF, telemonitoring (TM) is a formidable tool with the capacity to measure vital signs and to transfer data via telephone or the Internet to electronic patient records in a surveillance center in a hospital (Müller et al., 2010). Fortunately, TH reduced the frequency of hospitalization and the

rate of admission to the emergency department, thereby simultaneously reducing hospital-related costs as well. Cost-effectiveness analysis (CEA) in Heinen-Kammerer et al. (2014) reported that TM achieved a cost reduction of more than 50%, from €6400 to €3060. This cost reduction was further enhanced by Kielblock et al. (2007), where TM resulted in a cost reduction of 40% (€10,560 vs. €17,450). Clearly, Germany would be wise to adopt and enhance further TM policies and procedures.

Despite the acceptance and tremendous benefit of Telehealth in developing countries, it is important to note that before taking action, an organization's weaknesses and threats need to be assessed and addressed. Without paying attention to factors such as continued funding allocated to projects and social acceptance, Telehealth-related projects will encounter defeat, and the time, effort, and investment will be lost (Keshvari et al., 2014).

LR.B.7.2-Practice of Telehealth in developed countries: emphasis on Canadian usage and practice

Canada is a geographically vast place with an exceptionally disperse population. Home to a few densely populated regions with a high concentration of specialists located within large hospitals, the remainder of Canada is expansive and contains small hospitals with few specialists (Scheuermeyer et al., 2015). For example, British Columbia is home to 4.5 million residents with slightly less than 100 emergency departments (EDs); in contrast, the population size of the Yukon is approximately 35,000 with 5 EDs (Scheuermeyer et al., 2015). In both examples, remote areas have only small hospitals or clinics and are far removed from the closest referral center. These communities oftentimes only have a single ambulance (where severe weather plays a concern for the majority of the year) and the EDs are staffed by a solo family physician and

lack physician coverage at night (Scheuermeyer et al., 2015). It is also important to emphasize that rural areas in Canada have a higher proportion of seniors (16.1%) than urban areas (13.9%) or rural areas close to cities (13.2%) according to the 2006 census (Statistics Canada, 2007). This highlights a vast need to bring medical attention to these underserved regions.

Perhaps through necessity, literature reviews reveal that some of the most advanced Telehealth programs are found in Canada (Achey et al., 2014; Brown, 2013). In Canada, Telehealth is considered an invaluable factor by provincial and federal agencies in addressing the health needs of remote and isolated areas, where its implementation and use enhances and promotes access to health care services (Elliott et al., 2012). Furthermore, precedence in the literature suggests Canada is also a formidable leader in real-time Telehealth. For example, in 2006, 10 of 12 provinces (except Newfoundland and Labrador and Prince Edward Island) and 3 territories had real-time Telehealth programs. However, "a provincial Telehealth program was established in 2005 in Newfoundland and Labrador, while in Prince Edward Island, Telehealth is maintained at the individual hospital level" (Alison et al., 2011). One example of an enormously successful Telehealth program is through the Ontario Telehealth Network, funded primarily by the Ministry of Health and Long-Term Care (Brown, 2013; Holmes & Hart, 2009). This service, amongst others, has helped over 300,000 Canadians and over 600 with movement disorders (Achey et al., 2014). Finally, the Canadian physician community (in addition to their colleagues, patients, and families) have embraced this technology and utilized it not only to solve problems, but also to upgrade the knowledge and practice of physicians across the country (Ahmed et al., 2010). While Canadians generally are quite welcoming of Telehealth, a report by Hailey in 2001 stated that Canadians prefer in-person consultations compared to using Telehealth (Elliot et al., 2012). Ten years later, however, work done by Alison et al. (2011) highlighted the fact that Canadian Telehealth services progressed forward and the number of participants increased along with

praising the comfort, time, and cost associated with Telehealth. Although it stands to reason that some problems still need to be resolved (which will be addressed at large in a subsequent chapter, Webster, 2012), overall it is agreed upon that the benefits of Telehealth programs in Canada outweigh the problems (Inman et al., 2011).

LR.B.7.3-Telehealth's application in rural Canada and for Aboriginal peoples

Northwestern Ontario is approximately 385,000 km². As with a significant portion of Canada, this region is a large yet remote area mostly without road access and is home to 32 First Nations communities (Mashru et al., 2016). A significant proportion of Canadian Aboriginals live in remote, rural and isolated locations (Elliot et al., 2012). The community members suffer from shortage of health care services and providers, especially physicians. Furthermore, given the sensitive nature of interactions, patients and physicians can often be caught in jurisdictional red-tape when accessing care, in view of the common need for care across provincial and territorial boundaries (Mashru et al., 2016). In these regions' area, managing infectious disease is one of the most critical aspects to be addressed. Infection disease such as tuberculosis, hepatitis C, blastomycosis, acute rheumatic fever, and infections due to CA-MRSA are very common in these communities and are caused by a lack of clean water, overcrowding, and inadequate housing (Gordon et al., 2015; Mashru et al., 2016). In July 2014, a Telehealth-based infectious disease consultation service was established by The Division of Infectious Diseases at the Ottawa Hospital and the Sioux Lookout Meno Ya Win Health Centre in order to service this population.

LR.B.7.4-Practice of Telehealth in developing countries

Reports from both the World Health Organization (WHO) and the United Nations (UN) reveal

that while the shortage of skilled health care workers is noted worldwide (including in high-income countries), the lack is much more acute in both developing countries and rural areas (Alharthi, 2012; Gordon et al., 2012; Johnston et al., 2010; Wade et al., 2007). Researchers have found a direct correlation between the shortage of qualified health care providers and mortality rates (Chen et al., 2004). Fortunately, not only has the usage of Telehealth increased in developed countries, but as researchers found, there is an increasing interest for the use of Telehealth in developing countries (Craig & Patterson, 2005). While many of these countries do not have the resources to utilize Telehealth right away, this is likely to change in the future as we move into the age of technological expansion (Craig & Patterson, 2005).

Attaining basic health care for developing nations and accessing qualified health care professionals in remote areas such as sub-Saharan Africa is under investigation (WHO, 2013). For example, in Mali there are no cardiologists within the country and there is only one radiologist outside Bamako, the capital. However, a study by Bagayoko et al. (2014) measured the impact of Telehealth on the recruitment and retention of health care professionals in remote areas in Mali. In this study, researchers used a 75-item questionnaire, rated on a five-point Likert scale, to perceive the various factors related to Information and Communication Technologies (ICT), particularly Telehealth, and their impact on health care professional recruitment and retention. The results showed the positive influence of Telehealth on the recruitment and retention of isolated health care professionals. Recognizing the role of Telehealth and other factors influencing physicians' decision making in residing and practicing in such areas is fundamental. Similarly, Simonyan et al. (2013) investigated the impact of Telehealth services and the changes it could bring to the health challenges children face in Bamako, Mali. While it is surprising to hear that children's health remains a serious problem in 2016, the conditions in some countries like Mali are extremely challenging. The mortality rate in Mali (2010) among

infants and children is high, with infant (0 to 1 year) mortality rates at 99 per 1000 live births and children under five at 178 per 1000 (Simonyan et al., 2013). Doctors believe as much as 70% of these early childhood deaths could be avoided using simple and inexpensive interventions, including watching basic signs and observing weight changes (PMNCH, 2013).

Simonyan et al. (2013) pointed out that the underutilization of locally available medical services led to an increase in mortality rates in children. The authors believed that mobile health (m-health) can be considered a remedy to solve this phenomenon. For example, Simonyan et al. (2013) additionally discussed a successful and positive effect of m-health in a pilot study in Rwanda. In Rwanda, health care providers used mobile technology for basic automated remote diagnostics, data collection, community health management, and tracking pregnancy and newborn life cycles. The study stressed that the rate of health challenges between a Telehealth group (TG, 91 children, median age = 1.4 enrolled in the Telehealth program) was significantly greater as a result of using these health care services compared to a control group (CG, 89 children, median age = 2.9; did not enroll). As a result of this program, many more women delivered their babies in health facilities and consequently the infant mortality rate dropped (Simonyan et al., 2013). Clearly, involvement in Telehealth programs will change many children's and their families' lives and assist them in handling the unique health-related circumstances they face.

In an article by Keshvari et al. (2014) at Iran-Isfahan's University of Medical Sciences, the possibility of equality in receiving care using Telehealth in the province of Isfahan's countryside with 1.3 million people is under investigation. In their study, 60 health care experts (21 men, 35%; 39 women, 65%) and managers of Isfahan's University of Medical Sciences were involved to decipher the barriers associated with the failure to implement Telehealth in Iran. Resistance to change (i.e., a lack of technology acceptance) among all the stakeholders, from doctors to

patients, managers, and policymakers, is the major cause of failure. Rezaeian (2002) stated factors including fear of the unknown, fear of failure, lack of confidence, loss of reputation or job security, disruptive organizational culture, coworkers' pressure, personality conflicts, lack of taste, propriety and poor timing as common underlying causes of resistance to change. In another study by Keshavari et al. (2015), the readiness of key experts and policymakers and their attitude, eagerness, and awareness of Telehealth's benefits in the Deputy of Isfahan's health care were explored. Authors believed that the readiness and education of all stakeholders as the first step for the implementation of any novel technology is mandatory. Enough awareness about ICTs for improving health services and positive feedback and acceptance are keys to success. Using Spearman's correlation test, the study's results showed mediocre awareness among this population (managers and experts: 21 male, 35%; 39 female, 65%) and a weak correlation (0.451) between educational degree and the awareness of the subject. Unfortunately, this highlights that Iran is not ready for adopting Telehealth programs with respect to the Isfahan province. Authors feel that changes in infrastructure, future planning, organizational culture and structure, and education in the future will change the atmosphere and will make the region more agreeable to applying Telehealth services.

LR.B.7.5-Telehealth practice and development in rural areas

Addressing human resources for health (HRH) is an international need (Sarkis & Mwanri, 2013). This need is felt more emphatically in geographically isolated areas, as stated previously (Tershüren et al., 2012). Physicians who are close to retirement struggle to find successors. Moreover, students and young physicians hesitate to practice in primary care or hospitals in isolated areas (Kopetsch, 2010). Some authors believe that health centers should ideally be available closer to patients' homes to promote a high quality of life and to encourage equality of

clinical support (Sabesan et al., 2011). To address this issue and to support the remaining physicians, Telehealth via telemonitoring is an effective alternative to face-to-face visits. Here, Telehealth and videoconferencing have altered, eased, and improved the delivery of care in both rural and large urban areas. Due to the shortage of health care workforce and long travelling distances, reaching and receiving appropriate care in radiation Oncology, Hematology and palliative care, and allied health services is difficult. For example, the shortage of HRH in the Pacific is undeniable, and Telehealth is an avenue to addressing this issue easily and quickly in a cost-effective manner (Sarkis, 2013). In Fiji, Telehealth under the supervision of the Vodafone Foundation has enabled the use of an m-health application service, which services many subscribers. These individuals receive daily health tips and have the opportunity to text their symptoms to receive brief medical advice by a staff of 20 volunteer doctors (Vodafone Foundation, 2012). Other investigations show that professionals already residing in remote areas have very positive perceptions of Telehealth (Bagayoko et al, 2014). The only factor significantly associated with retention was the perceived effects of Telehealth on retention ($p=0.0018$). The strongest motivators for recruitment for Telehealth in remote areas included: perceived effects of Telehealth on recruitment ($p=0.0018$), Telehealth training (0.0338), perceived benefits of ICT ($p=0.0478$), and information on Telehealth (0.0073) (Bagayoko et al., 2014). Based on these results, applying Telehealth in remote areas is beneficial for recruiting and retaining health care professionals. Moreover, communicating with colleagues and other professionals through networking opportunities makes Telehealth an efficient and innovative tool.

In section 8, the barriers to the successful adoption of Telehealth services – including the fiscal, technical, and social barriers to Telehealth's acceptance – will be addressed.

SECTION 8: BARRIERS TO IMPLEMENTATION AND ACCEPTANCE OF TELEHEALTH

LR.B.8.1-Technological barriers to implementation of Telehealth

In the past, patients living in rural or isolated areas often were forced to travel (often many kilometers) to nearby city centers in order to receive medical care. With the advent of technology, including Internet access, e-learning, videoconferencing, and immersive technologies, new pathways to solving travel-related problems became available. Specifically, videoconferencing is one of the major tools in communication today. While videoconferencing has solved a variety of travel-related problems, it has also introduced a host of new issues including cost, technical limitations, and accessibility, to name a few (Faulkner, 2001). Many feel that some sites are hard to find or not very inviting, and that the modeling of the program was very labor-intensive. Others still feel that “the technology has not yet lived up to its expectations” (p. 192).

Studies revealed that in-person consultations are preferable to videoconferencing because face-to-face communication feels more relaxed and social (Delaney, 2004). For example, one must be aware that due to delay, pausing for others to finish speaking is necessary. Moreover, physicians found that conversing over the Internet required more social skills than were expected from a real time face-to-face conversation. Other hindrances included: poor video quality, which may not allow expert physicians to judge the level at which learners engage or contribute to sessions, poor audio quality, which may not transmit speech clearly or omit parts of words, and audio lag, which may lead to participants at multiple sites speaking all at once (Allen et al., 2003; Wainer & Ingersoll, 2015). The importance of this technical role was highlighted by the difficulty of

starting sessions on time (Allen et al., 2003). An additional study agreed with this contention, asserting that the availability of clinical staff for teaching was usually limited by time restraints and a lack of resources (Gul et al., 1999). However, technical difficulties often occurred when the site coordinator was unavailable and the participant did not know how to use the equipment properly (Xavier et al., 2007). Consequently, effective communication and education in technology-related social skills was fundamental when many patients were unwilling to give up face-to-face contact with medical professionals.

A lack of appropriate information and communication technology (ICT) infrastructures can delay particular Telehealth services (Steele & Lo, 2013). Today, challenges in establishing broadband infrastructure in remote areas exist, where cost and download limits can affect the speed and quality of care (The Regional Telecommunications Independent Review Committee, 2008).

While Telehealth has long been known for its capability to facilitate remote care of patients in rural areas, the possibility of providing the specific bandwidth to support all types of Telehealth applications, such as videoconferencing, in some areas is questionable (Steele & Lo, 2013).

Clearly, supporting Telehealth services demands a high-bandwidth, but in some instances, low-quality videoconferencing still would be beneficial for some consultation purposes. As an example, the Center for Information Technology Leadership (CITL) developed The Telehealth Technology Taxonomy to reference the minimum bandwidth requirement (Pan et al., 2008). This bandwidth requirement directly leans on the type and quality of information being transmitted, and in situations where financial or infrastructural obstacles prevent large bandwidths, using low bandwidths is a viable option for physicians (Howard, 2001). However, with the ubiquitous use of smartphones, smartphone-enabled sensor technologies for home-based capturing of physiological data for at-risk patients, automated health emergency notification systems, mobile-device-based videoconferencing applications, and access to simplify EHR forms, the delivery of

health care worldwide will be changed.

As with any advanced equipment which is required to remotely transmit data from various regions, technical and logistical problems should be expected, particularly with respect to low-income seniors, many of whom live alone (Czaja et al., 2014). For example, in Czaja et al. (2014)'s study, many of the patients were in a low-income bracket and lived in crowded places, where even a task such as using a telephone occasionally interfered with data transmission and data measurement. In addition, the movement of furniture in the home sometimes resulted in equipment becoming disconnected and participants were usually unaware of the disconnection. Problems with data transmission also occurred due to equipment failure. Many participants further vocalized their issues regarding the extensive time the device required to record a measurement (Czaja et al., 2014). While it is understandable to accept some technical and logistical limitations, it is important to be aware of these issues and consequently to address them as they arise. Table 1 highlights a summary of the barriers to adopting and implementing Telehealth.

Table 1: Author’s summary of barriers faced in Telehealth for improving physician practices.

Technical	Social	Financial	Miscellaneous
Lack of infrastructure	Social isolation	Location costs	Legal uncertainties
Technology limitations	Lack of public awareness of Telehealth	Cost of equipment/startup	Low number of experts and advocators in the field
Lack of technical standards	Poor stakeholder communication & participation	Work and resource constraints	Low literacy rates about Telehealth
Lack of educational training and support	Limited availability of clinical staff for teaching	Lack of business model which involves Telehealth in service portfolio	Multi-disciplinary instead of inter-disciplinary approach
Quality of presentations	Family and childcare obligations		Medical hierarchy
Bandwidth speeds	Need of community leadership		Low service utilization
	Lack of clear interaction between physicians and patients		Fragmented delivery system
	The need for practical skills development		Lack of continuity of care
	Resistance to change and implementation		Organizational and bureaucratic difficulties
	A breakdown in communication between patients and professionals		

TABLE 1 REFERENCES: (Allen et al., 2003; Krupinski et al., 2004; Ho et al., 2010; Noorani ,2001 ; Alexander et al., 2008; Jham et al., 2007; Hall et al., 2009 ;Cornish, 2003; Faulkner, 2001 ;Davis et al., 2002; Wagner et al., 2001 ; El-Mahalli et al., 2012.

LR.B.8.2-Personal, social and psychological barriers to Telehealth's implementation and acceptance

While technological issues are a clear barrier to the successful implementation of Telehealth, other less obvious barriers to adopting and using Telehealth exist relating to the personal, social, and psychological acceptance of Telehealth. For example, the particular branch of Telehealth is fundamental in outlining its success. While many feel comfortable (and arguably more comfortable) having telepsychiatric care in lieu of a face-to-face visit, other branches, including telegynecology, require an in-person consultation due to the sensitive nature of the topic. For example, one year of a prospective observational study of patients who attended pediatric adolescent gynecology (PAG) clinics showed that 10.9% were considered suitable for Telehealth, but 45.0% of families/patients in this group proclaimed that they would choose a traditional clinic visit (Barlow et al., 2012). From an additional psychological viewpoint, people – patients, physicians, and lawmakers alike – must be ready to adopt and embrace Telehealth prior to its implementation. For instance, a review by Brewster et al. (2014) outlined seven potential (mainly psychological) barriers to Telehealth's implementation: skepticism about Telehealth on the part of front line staff, strategic planning, identifying appropriate patients, partnership working, project management, technology, and funding. The investigator revealed that staff support was one of the most significant factors, since without staff support, pilot projects are often not sustainable or successful. Following this, staff should be informed that using Telehealth does not mean that they do not use their clinical knowledge and judgment in patient care and/or in situations which require their management skills (Brewster et al., 2014). Researchers also found that there was also a lack of interaction between training physicians, the consulting doctor, and

participating patients, as the physicians were usually seen as “passive” spectators rather than being more actively involved in the videoconference (Gul et al., 1999).

To highlight the obstacles in the way of Telehealth, it is vital to address various ways in which Telehealth fails to progress. Other barriers including the time-consuming process of arranging Telehealth appointments, the need to connect different health care providers and coordinate with rural nurses, limited Telehealth facilities in place, and the need for family physicians as well as traveling significant distances to reach the Telehealth site for some patients. These are simply a handful of reasons why experts hesitate to implement Telehealth (Watanabe et al., 2013).

Hospitals that do not belong to a managed care organization and which are not sure about the profitability of Telehealth for them do not have interest in Telehealth’s implementation (Malasanos & Ramnitz, 2013). Obviously, these hospitals do not like the idea that Telehealth reduces admissions and visits to emergency departments of hospitals. Policymakers who want the benefits of Telehealth need to consider that substantial financial commitment, reimbursement, interoperability (the ability to scale up beyond regional networks), ethical issues, technological illiteracy, fear of social isolation, privacy intrusion, and other related issues need to be addressed before the vast implementation of Telehealth (Achelrod, 2014; Grzybowksi et al., 2012).

Physicians and their patients therefore need to shift their attitudes toward technology, and expose themselves to the challenges it will bring to them. Keys to increase willingness to enrolling in Telehealth are flexibility of tests and considering individuals’ life circumstances and needs (Hawkins et al., 2013).

LR.B.8.3-Lack of knowledge of Telehealth

As observed by some health care providers, the lack of knowledge and the dissemination of information about Telehealth is perhaps the greatest barrier to its use (El-Mahalli et al., 2012). Lectures on Telehealth are infrequently offered in university hospitals and there are very few specific departments for Telehealth. Consequently, a great need for information regarding Telehealth, along with co-operation and enthusiasm from everyone for this rapidly developing field, is mandated (Gschwendtner et al., 1997). Other similar studies documented that there is a difference between what health care professionals expect from Telehealth and what they observe after working with it (El-Mahalli et al., 2012). Prior to implementing Telehealth, expectations are high, whereas following its use, owing to difficulties, inadequate training, etc., beliefs around Telehealth and its effectiveness may have changed (El-Mahalli et al., 2012). For example, the immense majority of participants in one study pointed out that CME is the best way to maintain clinical competency and the three main reasons for participating voluntarily in Continuous Medical Education are self-improvement, to learn more in their particular field, and to remain current in practice (Harper, 2000). While these interests are clear, a different study showed that the top three factors that were given for not attending sessions were 1) cost of program, 2) inconvenient conference times, and 3) lack of family/childcare support (Harper, 2000). Some authors felt that more workshops, seminars, symposia, conferences, and so forth are needed to highlight benefits of Telehealth (El-Mahalli et al., 2012). As such, one might suggest slowly adopting Telehealth information sessions by universities, physicians, and the public alike to highlight the growing need for this important health care service.

LR.B.8.4-Steps to resolving barriers

Many reports suggest that Telehealth has been slow and difficult to adopt and sustain (Wade et al., 2014). Wade et al. (2014) performed a qualitative interview of 36 Australian Telehealth services to investigate what could overcome the hurdles identified as: 1) low interest and demand, 2) technological issues, 3) workforce pressure, 4) lack of resources, and 5) regulatory barriers. Other barriers suggested by other authors included privacy and security concerns, cost of technology implementation and IT support, reimbursement schedules for physicians under fee-for-service methods of payment, and managing new tasks associated with using new technology (Marchibroda, 2015). The results of the former study highlighted that the most important factor affecting the success of Telehealth and overcoming barriers was clinician acceptance (Wade et al., 2014). Based on 3 reviews, the authors concluded that discovering the enablers and addressing the barriers will increase success in Telehealth's uptake. They also stated that to overcome barriers, the following must be implemented: 1) well-functioning technology, 2) training users effectively, 3) promoting provider participation and implementing planned change, 4) establishing proper, user-friendly protocols, 5) health care professionals' acceptance, 6) proper support for collaboration purposes, 7) in-place, effective business models, and 8) supporting policy and legislation (Wade et al., 2014). However, problems which have affected Telehealth users in the past (i.e., lack of technological infrastructure, poor audio/visual reception, low bandwidth, and high start-up costs) have now been largely resolved, removing further barriers to online-based education (Chan et al., 2015). While there is no set method for solving the lack of qualified human resource personnel and this topic will require long-term solutions and planning, particularly in remote areas (Lehmann et al., 2008; Raison et al., 2015), the policy promotion of Telehealth in practice – particularly in the USA and UK – advocates that despite the barriers in

place, implementation of Telehealth is recommended. Furthermore, despite these barriers and limitations in technological infrastructure, Telehealth is regarded as a means to enhance quality health care services and it assists in delivering education; as such, these services have sparked interest among practicing clinicians and policy makers in Canada (Assadi, 2003; Gagnon, 2007).

The following section will address the legal, ethical, privacy, personal, and environmental aspects of Telehealth.

SECTION 9: LEGAL, ETHICAL, PRIVACY, PERSONAL, AND ENVIRONMENTAL ASPECTS OF TELEHEALTH

LR.B.9.1- Legal aspects and governmental responsibilities of Telehealth

Legal aspects are extremely important to the successful implementation and use of Telehealth. For example, Wade et al. (2014) believed that some barriers to use can only be overcome with supportive policies and new legislations, including addressing regulatory barriers in licensing and standards (Wainer & Ingersoll, 2015). Like many other programs, moving these programs into practice requires more investigation in policy, administrative and staffing issues, and reimbursement schedules by insurance companies (Gros et al., 2013). All of this legal work requires time and the appropriate documentations. In turn, the policymakers' demand improved patient outcomes, reduction in costs, and an acceptance of technology by patients and health care providers alike (Jacob et al., 2012).

In a similar vein, licenses are required when practicing in Telehealth outreach clinics (Malasanos & Ramnitz, 2013). Liability of health care providers who offer Telehealth services for patients in another state has always been in question. Physicians required new licenses for each state in which they had a Telehealth outreach clinic (Malasanos & Ramnitz, 2013). Even for remote clinics in a hospital, they have needed hospital privileges. For these physicians, the credentialing process was time-consuming and expensive. To answer the need of underserved regions, reciprocal licensure was recently approved by some states. Physicians in city centers and rural regions also need to seek legal advice from those who can legally counsel them on matters such as patient privacy and confidentiality, next of kin, and jurisdictional concerns. When it comes to

jurisdictional and international policy, making judgments about proper actions requires Telehealth resources including email, phone, online resources, videoconferencing, and professional websites. Recently, however, Congress announced its support to the practice of medicine specifically within the military with only one state license. Clearly, national licensing in Telehealth is the next logical step forward and is critical to the practice of Telehealth.

One such report provided an excellent example of the importance of the legal and ethical aspects of Telehealth (Stanberry, 2006). When using Telehealth for enhancing the knowledge of physicians or sharing patient information, viewing patients' EHRs with confidentiality, responsibility, and liability is a very significant and important concept. This article points out potential difficulties, such as challenges or harm, caused by a Telehealth device which malfunctioned or is under question. When something goes wrong (for example, connection issues occur, or Internet and device problems such as freezing or powering off happen) and results in patient harm during a tele-educational session or a telesurgery consultation – especially in cross-border practices – who is responsible? Is it the direct responsibility of the physicians, vendors, or software creators, or all involved? According to Stanberry, Canadian law considers Telehealth practices as "virtual transportation of the physician" and in international border scenarios, a contract on behalf of both parties usually lays out the terms of legal responsibility. Therefore, the implementers of Telehealth need to assure that confidentiality is protected and that the safety of the patient is guaranteed. Legal aspects are particularly concerning in reference to cross-border applications (Raison et al., 2015). Strangely, health services fall far behind other industries, including banking, where concerns like malpractice and liability are considerably more important in the case of Telehealth than in-person encounters. Furthermore, jurisdictions

over clinicians practicing abroad remain vague and uncertain; additionally, accessing medical records across borders is also a challenge (Raison et al., 2015).

LR.B.9.2-Ethical and privacy concerns of Telehealth

A just concern amongst patients and health care workers is that of privacy: is using Telehealth secure and is it mindful of the privacy of the individual? Currently, there is an act under Canadian law which protects the privacy of citizens and gives them the right to access their own personal information (Jarvis-Salinger, 2010; Protti, 2009). In this case, not only is confidentiality, security, and privacy of patients' information important, but maintaining trust between physicians and patients is equally vital (Carter et al, 2009; Gul et al., 1999 ; Watanabe et al., 2013). There is the belief that keeping a client's personal information private is essential for any successful treatment and counseling relationship. However, legal and ethical experts argue that certain aspects of Telehealth delivery and confidentiality can be breached by using insecure Internet connections (Jarvis-Salinger, 2010; Protti, 2009; Watanabe et al., 2103). Privacy issues, such as attack by hackers and viruses to computers, losing data, stealing patients' medical and personal data, and so on have always been a great concern in Telehealth's application. As Malasanos et al. (2013) advised, any providers considering adopting Telehealth should consult with an information technologist to maintain security. It is well known that the electronic transmission of medical information online, use of USBs, printed materials, storage in computer hardware and submitting data asynchronously (store-and-forward) always has had potential risk of confidentiality breaches. However, high-security applications permit the safe transmission of patient information and data, while user-friendly programs will help Telehealth to deliver urgent

health care to every individual in need, regardless of their geographical locations (Malasanos & Ramnitz, 2013).

Ethics are also an important component of Telehealth. All citizens, despite their geographical location or race, have the right to receive care for their medical, psychological, and emotional needs, which meets the highest possible degree of care (Achey et al., 2014). Ethically and morally, saving the life of a patient cannot be delayed. In emergency situations, when a patient has a stroke, heart attack, or serious injuries related to accidents or warfare, there is an ethical importance to provide them with the best possible care, which in many cases includes using Telehealth to access experts residing in distinct regions. A country's government has the responsibility of providing a safety net with appropriate policies regarding equality of care, since citizens pay equal taxes regardless of where they choose to live. More importantly, equity of access to health care and educational services, while receiving quality care from competent practitioners, is the right of all community members in underserved areas such as geographically isolated areas. In these instances, Telehealth made possible a doorway to open communication between physicians and patients and rural and urban sites. For example, telesurgery offers promising solutions to address inequality in health care systems, particularly in rural and isolated areas (Raison et al., 2015). In telepsychiatry, Sunderji and colleagues (2015) confirm that telepsychiatric evaluations are as effective as in-person care, as based on clinical research. Throughout the medical system, residents need to focus on values such as social accountability, interprofessional care, and cultural sensitivity (Sunderji et al., 2015).

LR.B.9.3- Personal and community matters in Telehealth

While compassion fatigue is only a recently emerging field of study relating to the burnout of caregivers to their patients, the physician as a person can only absorb a particular amount of stress depending on their personality. For example, the emotional well-being of physicians who are sent to isolated regions can succumb to isolation and stress (Grzybowski et al., 2011).

However, Telehealth enables physicians to communicate with colleagues and keep up-to-date with recent medical advances while allowing them to have the company of others (Martos et al., 2012). In the case of physician support via Telehealth, professionals in one instance were dissatisfied with their Telehealth experience, as only one participant was receiving adequate support. Therefore, researchers realized the necessity to supply physicians with enough support during the project in order to reduce the rate of clinician burnout. Such specialist support via Telehealth will ultimately reduce General Practitioners' stress and burnout (Wilson & Maeder, 2015). Furthermore, it will enhance the quality of care in underserved areas. Additionally, the majority of physicians believed that engaging in a Telehealth program challenged them and increased their academic interest by allowing them to gain more skills and training (Tousignant et al., 2014). Clearly, the stimulation of interest and thereby the reduction of boredom promotes mental health. Finally, adopting Telehealth can have an emotional impact on the community, as Telehealth permits decentralization and therefore permits the community to have a more active role in making decisions (Craig & Patterson, 2005)

LR.B.9.4-Environmental aspects of Telehealth

While environmental concerns may not be a topic which would immediately come to mind regarding Telehealth, it is important to note that specialists, patients, and practitioners were traditionally required to travel long distances, and in the age of fossil fuel consumption, so Telehealth can offer a carbon neutral offset. Fuel consumption not only produces heat, but it also adds to pollution and global warming; therefore, Telehealth can prevent unnecessary journeys and thus conserve fuel resources while simultaneously preventing wear and tear on physician and client vehicles alike (Yellowlees et al., 2010). It also helps the environment by reducing paper consumption. For example, compared to other industry sectors, the US health care system has the second highest output of carbon. In an age where health care is mobile, traveling long distances by physicians (for the purpose of seeking enhanced facilities and expert colleagues) results in releasing approximately 1700 metric tons of carbon into the atmosphere each year. As travel becomes more expensive (from hotel rooms, to fuel expenses, to food while on the road), adding new strategies such as Internet and Web-based dissemination of educational information are replacing traditional ways (Yellowlees et al., 2010). Reducing travel thus reduces the health-related carbon footprint. In a more specific example, researchers examined that telepharmacy services prevented approximately 45,000 km of travel by patients (Bagayoko et al., 2014). Clearly, applying Telehealth to address medical issues has a positive impact on the environment.

SECTION 10: GAPS AND LIMITATIONS IN TELEHEALTH RESEARCH

LR.B.10.1-Study limitations and gaps in Telehealth research

Physicians would not be able to apply Telehealth to their education and practices and patients especially who reside in rural areas cannot benefit from it unless researchers find resolutions to barriers and obstacles in implementing Telehealth. Developing, evaluating, and disseminating Telehealth programs is a challenging task and requires further study. Research itself is a gateway to gathering information, examining barriers and searching ways to solve problems based on expert suggestion or outcomes, investigating possibilities, and measuring satisfaction rates. However, researchers need funding and a strategic plan to deliver acceptable and reasonable results in their studies, results which must be generalizable. Unfortunately, research in different fields has gaps and limitations which need to be addressed in order to be valuable and usable. For research, it is important to be aware of which process is more beneficial for the purpose of the study. Is an anonymous questionnaire more appropriate, or an in-person interview? To add to this, as an interviewer, one must be humble and sincere to elicit genuine responses from others during the interview process. Questionnaires themselves must be clear and free of ambiguity; often, professionals use wordy documents which may confuse those under investigation. For instance, Asua et al. (2012) stated their attempts to phrase the items in a questionnaire to increase their relevance to the context of the study, yet they acknowledged the wording may have impacted the target population's response. Still others lament on the inability to receive satisfactory explanations and insights from users who did not enjoy their Telehealth experience (Mashru et al., 2016). Clearly, it is important to recognize and word questionnaires carefully and to communicate mutually and effectively with study participants.

LR.B.10.2-Research biases and demographic issues

A number of studies additionally highlight selection and participation biases as a challenging factor (Asua et al., 2012; Bagayoko et al., 2014; Chan et al., 2014; Hawkins et al., 2013; Nimmon et al., 2013; Tousignant et al., 2014) as well as sample sizes (Achelrod, 2014; Chan et al., 2014; Czaja et al., 2014; Ghani & Jaber, 2015; Nimmon et al., 2013; Wade et al., 2014; Wainer & Ingersoll, 2015) and control groups (Bagayoko et al., 2014; Tousignant et al., 2014; Wainer & Ingersoll, 2015). For instance, Tousignant et al. (2014) recognized in their study a likely selection bias owing to the fact that patients who were amenable to participation were likely more enthusiastic and willing to explore new modalities. Furthermore, an investigation by Ghani and Jaber (2015) stated that only 35 respondents participated in their study on the willingness to adopt Telehealth in Iraq. Information biases as a result of self-administered questionnaires “related to the presence of social desirability and recall biases” also impacted the results of Telehealth-related investigations (Asua et al., 2012; Bagayoko et al., 2014; Hawkins et al., 2013; Simonyan et al., 2013). Still others note participant dropout (Banbury et al., 2014) as a source of gaps in research. Socio-demographic (gender, spoken language, and experience) and socio-economic factors also play a role in Telehealth’s research limitations. This signified that results may not be able to be generalized to a larger population of health care providers or patients (depending on the nature of the study), where the lack of generalization to the whole was a significant factor in many other studies’ limitations (Asua et al., 2012; Casasvant et al., 2014; Hawkins et al., 2013; Nimmon et al., 2013; Radhakrishnan et al., 2016; Wainer & Ingersoll, 2015). To add to this, although authors in a comprehensive literature review documented positive results regarding Telehealth studies, they felt their discoveries could not be generalized to a larger population owing to the fact that many studies exclude patients with typical age-related

limitations such as cognitive and visual impairment, hearing problems, or even physical disabilities; consequently, some patients benefitted more than others (Nimmon et al., 2013). In other incidences, patient populations were homogenous and from particular geographic regions (Barlow et al., 2012). As a result, such studies may not be generalized outside of the region they have investigated, whether it is an urban area, rural region, or country, particularly in areas where wars or political climates are a concern (Barlow et al., 2012; Ghani & Jaber, 2015). In such countries, gaps in research can be felt more acutely, since to the authors' knowledge, no studies regarding the perceptions of health care workers for Telehealth have been conducted in Saudi Arabia (Ghani & Jaber, 2015).

LR.B.10.3-Language and cost

Language barriers and cost also integrate themselves into gaps and limitations in Telehealth research. To elaborate, many studies are conducted in English and study populations are also mainly limited to English-only native speakers (Barlow et al., 2013). In contrast, another study investigated mainly senior Hispanic community members living in an urban zone, owing to the investigators highlighting that studies need larger and more diverse sample sets (Czaja et al., 2014). Even still, others suggest that while language barriers are often not addressed, videoconferencing can enable an interpreter alongside the clinician and patient to address this shortcoming (Casavant et al., 2014). Even from informative points of view, authors limit their search to scholarly articles published in English only, thereby potentially missing relevant articles published in other languages (Nimmon et al., 2013). From a fiscal perspective, not only would greater financial resources enable the purchase of better technology (Chan et al., 2014),

but costs may not be reflective in all jurisdictions (Scheuermeyer et al., 2015) and many can only theorize the cost-reducing benefits of Telehealth, as economic analyses are often not reported (Mashru et al., 2016).

LR.B.10.4-Technology

Technology is often at the forefront of limitations in Telehealth research in the literature (Brewster et al., 2014; Chan et al., 2014; Wenger et al., 2014). Audio difficulties were the most commonly reported problem in several investigations (Banbury et al., 2014; Chan et al., 2014). For instance, participants living in multi-dwelling complexes reported more audio and visual problems than those living in single-dwelling residences and participants connected with 4G also had more problems than those on NBN networks, yet the authors stressed that connectivity needs to be reliable in order to ensure participants remained in the study (Banbury et al., 2014). In addition, locally-based IT specialists were required to be sent to resolve problems in some instances, and this was easier to arrange in small rural towns than in large urban areas (Steele & Lo, 2013). By contrast, however, the ICT services available in urban areas are often significantly better than their rural counterparts with respect to price, speed, and download limits (Steele & Lo, 2013). Telehealth technology is also relatively novel in some parts of the world; thus, gaps in research show that physicians in these areas have a limited idea of electronic consultations (Ghani & Jaber, 2015). One final study used mobile phones to transmit data over networks in a small Canadian emergency department (Scheuermeyer et al., 2015). In this instance, the authors could not comment on the image quality of different models of mobile phones, nor did they attempt to diagnose conditions or assess patient outcomes, as their primary investigation was

based on the transmission speed and the image quality of the text message. As a consequence, data remains unknown as to whether different mobile phones could produce similar results, highlighting the important role technology plays in study limitations.

In lieu of all of the gaps and limitations mentioned above, the following section will address the future of Telehealth and the role it will play in reshaping and reforming health care.

SECTION 11: FUTURE PROSPECTS OF TELEHEALTH

LR.B.11.1-Reflections on how Telehealth will be used to upgrade medical knowledge, solve the physician supply dilemma using a patient-centered approach, and how to fully recognize Telehealth's benefits in the future

The future is closer than we can even imagine. The clock does not stop and any pause in taking action regarding Telehealth's enhancement is unwise and illogical. As highlighted throughout the duration of this literature review, Telehealth has changed and will continue to change the delivery of health care systems worldwide. The growing population and their health care demands cannot be denied and the traditional way of practicing medicine is no longer functional. In the following text, the author will highlight the ways in which our current actions can make a positive and lasting change in the future.

It is important to reiterate the serious matter of global physician shortages. Considering that nearly half of Americans will be age 65 or older by 2030 and many likely will suffer from chronic disease, it is clear that Telehealth can address this need in a convenient, efficient, and financially accessible way (Chan et al., 2015). With Telehealth, patients mostly have ability to care for themselves ("patient-centered" approach) and their own sickness, especially with the help of telehome monitoring. The idea of involving patients in the management of their own well-being undeniably reflects not only inter-professional collaboration, but also a realization that the successful achievement of optimal well-being and effective management of chronic disease processes involves comprehensive models of care. These collaborations involve the active engagement of clinicians, patients, concerned family members, and communities. In other words, adopting Telehealth can allow primary care and training to be done and developed at the

community level (Craig & Patterson, 2005; Wootton, 1996). Communities can benefit from videoconferencing, educate themselves, and know where to refer to in times of need (Gagnon et al., 2007).

With respect to upgrading medical knowledge, Telehealth and videoconferencing will find their place in the upgrading of knowledge, practice, and consultation, and communication and have doubtlessly improved practicing physicians skills. Telehealth and videoconferencing will help advance the future of physician training and will make communication and transformation of knowledge as well as patient treatment much easier than before. Consequently, physicians and community members who are actively enrolled in Telehealth programs, and who benefit from Telehealth and videoconferencing services, are among the advocates and supporters of projects such as Telehealth implementation and its application in enhancing knowledge and communication. Those clinicians who prefer old-fashioned ways of treatment and enhancing knowledge are trying to learn new technologies and improve their practices. By simply updating and circulating information and education, physicians can be given broader access to expertise and second opinions via Telehealth (Demartines et al., 2000). Some believe that the practice of Telehealth is still not considered part of mainstream health care, but distance education and physician training via Telehealth through telephone, Web technologies, and videoconferencing are major plans for the future (Brown, 1995; Jaatinen et al., 2002). However, it is still important to treat Telehealth as a supplement to health care rather than a complete alternative (Krupinski, 2004).

Despite the extraordinary plans for the future, Telehealth cannot spread and improve without readiness and acceptance, no matter how beneficial and cost-effective it is. Authentic community

engagement is critical to the success of any project. Community education using Telehealth is an effort to relocate services from hospitals to communities (Subirana et al., 2001). As powerfully articulated by Walji (2015), “We just have to change the mindset [of physicians]. Increasing the portal’s reach and physician involvement will help improve its impact” (p. E124). Muttitt et al. (2004) believe that involving government, community and health care champions in Telehealth activities and programs can significantly add to the success and sustainability of the services. Even with all the efforts of governments, policymakers, and providers, and the advancement of technology and reduction of cost, there is no guarantee that the implementation of Telehealth will be rapid. Some physicians still hesitate to adopt it, since they are unsure as to whether its long-term benefits will be worth the cost of initial implementation. Clearly, more international conferences and sharing of expertise between medical doctors and engineers is critical to the future of Telehealth.

Researching ways for developing Telehealth, as a method with the ability to provide quality assistance to general physicians in remote and urban areas, must be continuously improved (Ferreira et al., 2015). Educational strategies for physicians in needy locations with the purpose of standardizing training protocol and providing quality assistance to this population needs to be addressed. Overcoming the barriers requires funding, training, and support from project planners as well as courage, time, and enthusiasm from physicians, experts, and patients (Ferreira et al., 2015). The fact that the initial and long-term benefits will outweigh the losses should be proven and work as a motivating factor for physicians, experts, other health care professionals and community members.

Some studies suggest that if federal initiatives, community support, health care reforms, and

technology expansion occur, then the usage of Telehealth itself will increase (Cornish, 2003).

During the last ten years, with a boom in commercial companies and medical services, Telehealth has shifted towards Web and mobile technologies (Chan et al., 2015). This action was fueled by increased Internet access even in isolated communities, expectations and acceptance of Telehealth by millennials, and consumer preferences for convenient, inexpensive on-demand services. When it comes to reimbursement policies, Medicare, Medicaid, and federal reimbursement have made recent moves towards Telehealth parity coverage (Chan et al., 2015). Moreover, due to an increase in the number of employers offering Telehealth from 22 % in 2014 to 37 % in 2015, the service delivery will be more convenient. As such, Telehealth's expansion is almost certain to continue alongside the development of advanced technology. As high speed networks become increasingly available across the globe, use of Telehealth within surgery is also a probable area to expand and allow health care to be a united global market.

To summarize, El-Mahalli and colleagues (2012) eloquently highlighted that the future investments in Telehealth technologies can be fully recognized if the following steps are taken:

- 1) More effective distribution of information regarding new research and development in Telehealth with the assistance of national programs to “educate and train” medical professionals
- 2) Training of medical professionals in Telehealth to the highest quality standard to expand their skills

- 3) A reduction in non-related medical activities needed by clinicians implementing Telehealth to permit them to dedicate more time to implement the various modalities of Telehealth
- 4) More effective use of the previously existing Telehealth framework and expanding the amount of Telehealth service centers

The future of Telehealth looks bright and promising, yet the potentials and unknowns can be viewed with a child-like wonder. The final section will conclude this literature review.

LITERATURE REVIEW SUMMARY

With the development of communication technology and the supporting frameworks in recent decades came a more efficient means of transferring medical data and information through the use of Telehealth and Electronic Health Records (EHRs). These mediums have improved communication between primary physicians and other experts who are otherwise geographically isolated, aided in enhancing the knowledge of practitioners, and helped to disseminate medical knowledge to patients regarding procedures and illnesses. These digital information sources allow for continuous communication and learning among physicians across Canada. E-learning for physicians across Canada is a convenient and efficient method of recertification through distance classes, and ensures a high quality of medical practices and services, as well as physician competency. The convenience and option to receive information presented in different formats (email, group chat, videoconferences) incorporates methods of data transference, facilitating the needs and schedules of individual physicians. Furthermore, the use of digital data transfer allows for significant savings in time and money for all facets of the medical field, from practitioners and health care providers to patients, their families, and the public.

Some barriers exist, such as the lack of knowledge and funds for applying this technology, infrastructure, technological deficiencies and barriers, resistance to adopting new technology, being unaware of the advantages of using Telehealth, and a lack of face-to-face interactions, as well as feeling uncomfortable communicating via Telehealth; these can be overcome with education and time. The true key to success lies in the implementation of reliable technology that is easy to use across Canada, regardless of one's economic standing, location, or public recognition, acceptance, and demand, with the aim of providing the best health care possible.

The upgrading of physicians' knowledge gives them the opportunity to leave their isolation in rural areas and provides them with excellent communication environments to convey their needs with other experts, in order to provide the most accurate and quickest diagnosis and treatment for their patients via Telehealth's applications in their daily life practice.

CHAPTER 3: METHODS

3.1 - Subjects

3.1.1 - Population and Subjects

Subjects of this study were physicians and pharmacists who presently use or may use Telehealth in future within Canada (especially BC). These people were recruited through snowball sampling. In snowball sampling, it is requested of a participant that they refer a potentially appropriate person they know to be included in the study. In circumstances where researchers cannot obtain a list of participants who share the sample characteristic, this method is frequently employed (Jackson & Verberg, 2007). Names and titles were kept anonymous in the study for privacy's sake, and interviewees were informed that they have the right to quit the study at any time they wish without penalty. It was initially a goal that subjects included a cross section of a roughly equal number of male and female physicians, depending on availability (unfortunately, this did not happen; the researcher ended up with female=8; male=17). Participants were notified of proper ethical procedures undertaken to protect their rights.

Exploratory grounded theory was used descriptively in this study, which also entailed semi-structured interviews, to investigate participants' opinions regarding Telehealth and its advantages and disadvantages. Grounded theory is a powerful methodology for investigating social phenomena in order to generate theory that has been used since the 1960s. Grounded theory was used in this study because it avoids predetermining the results, and instead adopts a more neutral, realistic view on human action in a social setting without being presumptuous (Simmons, 2006; Glasser & Strauss, 1967; Corbin & Strauss, 1990). The data for grounded

theory can come from a wide variety of sources, including interviews, multimedia, observations, documents and books, and any reliable source that describes the topic at hand (Corbin & Strauss, 1990).

The semi-structured interview process used in this study involved asking a number of predetermined questions, although there was the open-ended possibility for participants to be encouraged to elaborate and clarify their answers (Holloway, 2005).

Inclusion criteria included being an English speaking practicing physician, using Telehealth in an educational and professional setting, or having knowledge regarding its usage, availability, and willingness to provide anonymous data on their experiences with and impressions of Telehealth. Written and verbal consent were then obtained. If any of these stipulations were not met, potential participants were excluded from the study.

3.1.1. a- Telephone Interview

Twenty five physicians (meeting the inclusion criteria described above) were interviewed via telephone. The interviews were audio recorded.

3.1.2- Recruitment

3.1.2. a- Telephone Interviews

The snowball sampling method was used to recruit enough participants to reach a saturation point for telephone interviews. The thesis supervisor, Dr. Andre Kushniruk, introduced the first people for telephone interviews, and the rest of the chain was introduced by the interviewees.

Qualitative interviews are a major means for researchers to comprehend the way in which clinicians understand their work environment and others' motivations, as well as occurrences in their professional setting (Rubin & Rubin, 1995).

Participants were recruited through snowball sampling, a non-probability, convenience-sampling technique, with the initial goal of conducting 10-15 telephone interviews. A Research Ethics Committee approved of the recruitment method prior to implementation.

3.2- Setting and Materials

The setting of the telephone interview for the researcher was her personal phone in her home and for the physicians was a place of their own convenience (home, office or hospital/clinics). The setting was research-question-driven, as the study looked to analyze the use of Telehealth and its application in practice, education, and communication of physicians and patients.

3.2.1- Telephone Interview Questions

Demographic data that was considered for inclusion in the telephone interviews of physicians were: Age, gender, city and province of practice, workplace (i.e., hospital, clinic, pharmacy), years in the profession, years using Telehealth technology, exposure to different teaching methods, specialty, professional status (if applicable), number of patients visited over distance versus in the office, and computer literacy.

Note:

In each interview, the interviewer introduced herself, asked for verbal consent, and informed the interviewee that the interview would be audio recorded and that they had the right to quit the study at any time.

Telehealth is defined as the delivery of information and health-related services via telecommunication for optimizing the health of individuals and helping them to live independent and healthy lives (Noorani, 2001). According to the American Telehealth Association and the International Society for Telemedicine, eHealth application of Telehealth assists physicians to evaluate, diagnose and treat patients from anywhere in the world.

The following prompts were used in the recorded telephone interviews with physicians.

The demographic questions asked by the interviewer:

1-How old are you?

2-What is your gender (Male or female)?

3-What is your education level and what is your specialty?

4-In what year did you get your medical degree?

5-How long have you been a practicing doctor?

6-In which city do you practice? Do you practice mostly in clinic or hospital?

7-How many years have you used Telehealth technology?

Additional questions:

1- How would you define Telehealth?

For the purposes of this study we define Telehealth as:

Telehealth is the delivery of health care services remotely at a distance. Telehealth also provides wellness and education using information and communications technology and real-time interactive videoconferencing. Telehealth encompasses a broad variety of technologies and tactics to deliver virtual medical, health and education services.

2-Do you use Telehealth? If so describe how you use it

If participant said “No” then interviewer continued with questions in “Section A”

3- How many years of experience do you have working with Telehealth, for what purpose, educational/clinical and what equipment have you in the past or do you currently use, i.e. videoconferencing, phone, fax, or Web?

4- In your opinion does your age or gender influence your usage of Telehealth?

5- Approximately how many hours per week do you use Telehealth in your practice, education, consultation and communication with your colleagues and patients? Please explain.

- 6- Describe how you use Telehealth, including type of Telehealth technology and applications used, and type of patients involved?
- 7- Can you give the number of patients that you visit over distance versus in the office?
- 8- What are the major advantages and disadvantages to using Telehealth based on your personal experiences?
- 9- Do you think that computer literacy and technophobia influence the adoption of new technologies and are there any particular skills or competencies that you feel enhance one's ability to use Telehealth?
- 10- What has your experience been with technical support, system maintenance or system installation? Is it costly, time-consuming, effective, or ineffective?
- 11- Is using Telehealth technology nowadays more or less difficult? Who is facing more challenge, health professionals or learners? Do patients have problems with Telehealth technology? If so, describe.
- 12- Have you ever enrolled in any distance CME classes (Continuing Medical Education) and were these classes more convenient and effective than traditional classroom methods?
- 13- Is there any financial support available for the implementation of Telehealth in your daily life as a physician, and do you believe the value of this technology matches its initial cost?
- 14- How do you get reimbursement for using Telehealth visit? Do you get reimbursement for each visit? Has that been an issue?

15- Would you agree or disagree that access to Telehealth and different kind of software helps to minimize costs for physicians in furthering their profession?

16- How does Telehealth influence communication between patients and physicians? Can you give examples of how such communication was influenced, from your personal experience using this technology?

17- Who are the stakeholders and what will they gain from implementing Telehealth in the education and practice of physicians in British Columbia Canada? What challenges might they face?

18- Have you had any concerns about privacy using Telehealth? If so what are they?

19- Do you have any suggestions for improving the Telehealth system? If so, please explain.

“Section A”

Questions used if participant said “No” to question 2 above (i.e. participants don’t use Telehealth)

1- Why don’t you use Telehealth?

2- Would you use Telehealth in the future? When might you use it, or why not?

3- Do any of your colleagues use Telehealth, if so for what?

4- What do you see Telehealth being useful for in medical practice and for medical education?

5- Do you think Telehealth could be a part of your practice or education? If so, describe how you might see it used

6- What do you think are the potential problems with Telehealth?

7- What do you think are the potential advantages of Telehealth?

3.3- Procedure

3.3.1- Telephone Interview Procedure

1. Initially, subjects and physicians were contacted to participate using the above mentioned snowball sampling method.
2. Convenient times for the telephone interviews were arranged with subjects willing to participate (via email).
3. The interview (one time) was conducted using the questions given above. The interviews were audio recorded (of which the subject was informed).
4. The audiotape of the interview was transcribed in entirety for analysis.

3.3.2- Considerations

To gather data, research was carried out using one-on-one telephone interviews. Since there was a need for standardized questions in order to provide clear, valid, uniform data for those reviewing this study in the future, this individual telephone interview approach was considered to be more appropriate to use than focus groups, which may affect study participants freedom of expression through one or several individuals dominating the interview and pushing their own ideas.

The interviewer, Irandokht Vahedi, a Master's student at University of Victoria, sent an electronic consent form prior to the interview. Irandokht Vahedi has previous experience as a midwife and also as a computer engineer, writer, editor, and science instructor of several years. She graduated as an O.R. Nurse in 2009 from UVIC. The individuals approached to be participants in this study were informed of the use of this information in the future, while also having been made aware that their other personal information will not be disclosed, as it will not influence the nature of the results. The researcher sought detailed, non-biased, concrete information through recorded telephone interviews. The information was assured by the personal interest of the researcher as a student aspiring to make a valid and recognizable contribution for future studies to enhance the education and practice of physicians across Canada.

In telephone interviews, subjects and physicians were made to understand that they can quit the study at any time. Their information was made anonymous, and the interview was recorded for review afterwards to ensure accuracy in portraying opinions and information. The participants were also made aware of the intent of the study and the benefit of this study for the medical and informatics community as well as patients and the health care system in the long term.

Physicians were informed of approximately how long the interview would take ahead of time and that the interview was being recorded for coding and analysis of the data.

While collecting data, the interviewer attempted to minimize bias and enhance trust and rapport with the participants. The data was collected in a way that safeguarded the rights of study participants and physicians, as outlined by an institutional review board, with individual informed consent.

3.3.3- Anonymity of participants

In order to protect anonymity of participants in the study, code names were applied referring to subjects' education background, gender, profession, and placement in the population. The system was outlined as follows.

First, a letter (m or f) indicated gender. Second, a number (two digits) referred to number of years in practice. Third, another number (two digits) indicated the number of years the physician has used Telehealth. Fourth, yet another number (two digits) indicated population position in the list of interviewees.

For example, a male physician who had practiced for 15 years, and used Telehealth for two years, who was entered into the population in the 8th place was expressed as M-15-02-08, and a female health professional in her sixth year of practice, who had used Telehealth for 3 years was placed 14th in the population and was therefore expressed as F-06-03-14.

3.3.4 - Data collection

For the telephone interviews, the researcher collected data in the most detailed, appropriate, accurate, and concise manner possible. All data was collected in a manner that safeguarded the rights of the participants, as outlined by an institutional review board, with individual informed consent. The participants' comprehension of the interview procedure, and of their rights, was a priority to the researcher. Therefore, all participants were asked to consent to the interview being audio recorded, as well as informed of their right to quit the study at any time.

It is extremely important for research purposes that the interviewees feel comfortable throughout the interview; the following steps were taken to encourage that. The interviews were conducted in a quiet place, in order to provide a calm environment for the interviewer and interviewees. All interviewees were sent a courtesy email two days before the scheduled interview date as a reminder. They also received a telephone call from the interviewer five minutes before the scheduled time, in order to ensure that they would be comfortable and ready to complete the interview. The researcher, at all times, attempted to minimize bias, keeping a professional and appropriate tone for the duration of the interview. There was a strong focus placed on enhancing trust and rapport with the participants, in order to facilitate a positive experience for both parties, and to receive the most honest responses.

3.3.5 - Data Analysis

“Once data collection has begun, it is time for the researcher to begin data analysis” (Jacelon and O’Dell, 2005, p. 217). “Data analysis is a body of methods that help to describe facts, detect patterns, develop explanations, and test hypotheses” (Levine, 1996). The researcher anonymized the data by coding the participants’ names. The analysis of qualitative data gathered through telephone interviews was considered the content analysis (Taylor-Powell, 2003; Borycki, 2010; Jackson & Verbeg, 2007; Loiselle et al., 2007).

The process of analysis was based on Taylor-Powell (2003) as follows: 1) Get to know the data, 2) focus the analysis, 3) categorize the information, 4) identify patterns and connection (within and between categories), 5) interpretation – bringing it all together. These simple yet effective steps enabled the researcher to focus the analytical process and draw specific information from the gathered data. The researcher then employed content analysis, a method where counting various aspects of the content was utilized to summarize said content.

In the analyzing phase, the researcher read, re-read, intuited, analyzed, synthesized, and reported on data, and reported findings to the supervisor, Dr. Andre Kushniruk, for feedback. The supervisor offered his advice, and provided the researcher with valuable suggestions on working with the data.

3.3.6 - Timing

Date	Research Stage
2015/2016	Reading literature and drafting literature review
May 2016	Finalize proposal
June 2016	Ethic application submitted
July 2016	Ethic approval obtained
July/November 2016	Data collection
November 2016/January 2017	Analysis and conclusion

Table A. Timing

CHAPTER 4: RESULTS

1. Participants' demographic data

In this section, you will be introduced to participants' demographic data: their ages, genders, educational levels, specialties, etc. Later you will read about this study's participants' definition of Telehealth and the advantages and disadvantages of Telehealth from the perspectives of these participants.

The researcher interviewed 25 participants. Eight (32%) of these participants were female and 17 (68%) were male. The youngest of these participants was 28 years old (female) and the eldest was 72 years of age (male).

Male	Female
Seventeen out of twenty five 68%	Eight out of twenty five 32%

Table B. Proportion of participants who were male versus female

Age Range (Years)	Number of people	Percentage (%)
20-29	1	4
30-39	1	4
40-49	8	32
50-59	9	36
60-69	5	20
70-79	1	4

Table C. Age range of participants

The participants were house/family practitioners (4; 16%), surgeons (3; 12%) with different specialties, pharmacists (6; 24%) with different specialties and levels of education, radiologists (2; 8%), an ophthalmologist (1; 4%), cardiologists (2; 8%), a psychiatrist (1; 4%), an oncologist (1; 4%), internists (2; 8%), a nephrologist (1; 4%) , a pathologist and surgeon (1; 4%), and an anesthesiologist (1; 4%).

Eighteen of the participants (72%) had twenty or more years’ experience in their respective professions. Two participants (8%) had fewer than ten years’ experience in their fields. The rest of the participants (20%) had between ten to twenty years of experience in medical field.

Number of Participants	Percentage of Participants (%)	Years of Experience in their field
18	72%	20+
5	20%	10-20
2	8%	< 10

Table D. Participants’ years of experience in their respective professions

Regarding usage of Telehealth in their practices, only two participants (8%) in total strongly felt that they had no experience with Telehealth, but during the course of the interviews, they mentioned that they did in fact use it without having known it. Eight participants (32%) had

between 4-9 years of experience with Telehealth, while the remainder (60%) had ten or more years' experience with Telehealth.

Years of Telehealth Exposure	Percentage of Participants (%)
Less than 4	8
4-9	32
10+	60

Table E. Participants' years of Telehealth exposure

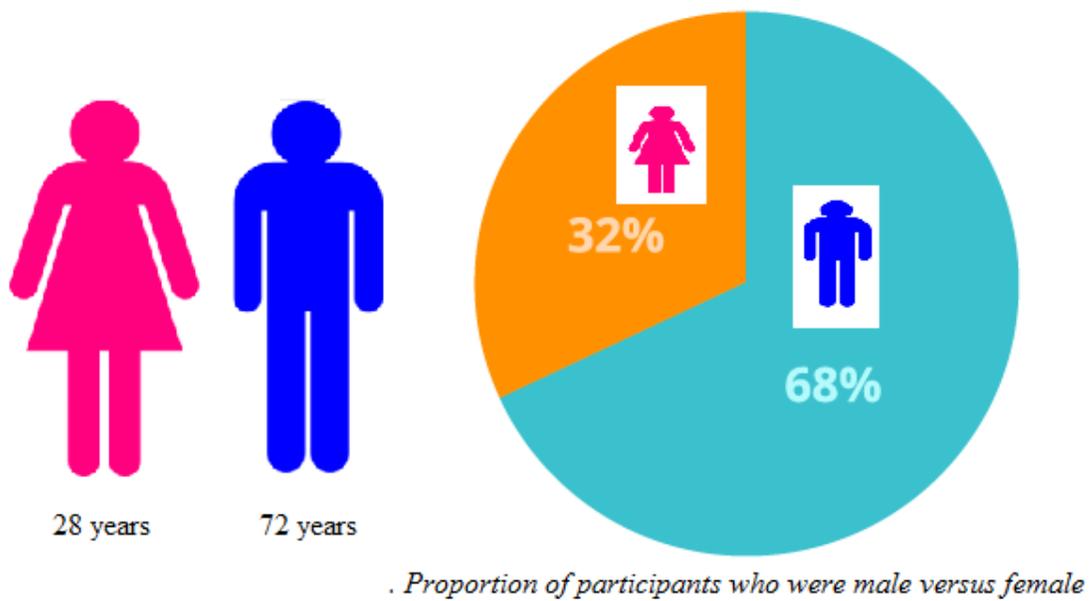


Figure R.1. Gender Proportion - (Youngest and Eldest)

2. The definition of Telehealth according to interviewed participants

As you remember, the researcher defined Telehealth as the delivery of health care services remotely at a distance. To this study's researcher, Telehealth can provide wellness and education using information and technology and real-time interactive videoconferencing. Telehealth encompasses a broad variety of technologies and tactics to deliver virtual medical, health and education services to far or close distances.

During the interviews, the majority of participants agreed with this definition; some added extra lines to this definition. For instance, a psychiatrist with fifteen years of Telehealth exposure mentioned:

Telehealth, besides what you said, has asynchronous services, so Telehealth can have store-it-forward and, umm, for instance, whether it's lab results or videos of anatomy or interactions, behavioural interactions, uhh, a range of things and that information can then be sent for a specialist or physician or a clinician to view and examine and then communications can be had directly between providers and patients and families, umm, and/or recorded in a chart with directions for others and that can also be connected with real-time interactive video at various other times, you know, umm, so to me it's a very fluid system (M-15-15-04, Page 14, Line 14).

He added:

In fact lately I've been using, in the last several years, texting with my patients because they initiate it and, umm, it serves a tremendous purpose in what I consider Telehealth to connect at times and moments – even for just a moment - and it keeps them on track or it

gives me an important communication with their medications or something that otherwise they would have to wait weeks, for some physicians months, to see another physician, which could be quite problematic, so it's quite a dramatic improvement (M-15-15-04, Page 15, Line 1).

A radiologist said "I, I think it is, umm, the ability to communicate from a distance and analyze data and communicate the data from a distance" (M-26-15-03, Page 10, Line 10).

Another participant said:

It is a system to allow doctors and specialists at a remote location to provide patient care without having to actually travel or have the patient travel to meet them, I guess, umm, so it involves video length and also other medical devices they can supply back at a distance (M-21-00-01, Page 2, Line 10).

A pharmacist with forty one years of experience defined Telehealth as "various communication through telephone and fax, transmitting information back and forth between doctors and patients" (M-41-41-05, Page 26, Line 13).

A fifty-year-old nephrologist with fifteen years of experience with Telehealth had a different definition of Telehealth. He believed that any kind of communication through email, phone, fax, videoconferencing, or Internet encompasses Telehealth, no matter if you are in the same city or building as the person with whom you're communicating. He communicated with many different colleagues and patients on behalf of the patients to solve their medical problems. To him, even calling a colleague in a different room of the same hospital is Telehealth, which is expanded on in the following quote:

I consult with physicians, radiologists and pharmacists. I communicate with patients through phone and email. I guess another way is if I'm looking to speak with another transplant nephrologist, umm, I'll pick up the phone and ask them, so that would be sort of asking their advice.... I use Telehealth (M-15-15-13, Page 69, Line 1).

A very young pharmacist believed that Telehealth is “a means of communication that is more convenient for [all] parties, including physicians, patients and health care providers” (F-04-04-07, Page 38, Line 18). She mentioned that besides telephone, as excellent tools of communication, pharmacists make sure that they use fax in order to keep official record of their communications and also, because "the doctor often isn't available to come to the phone right away” (F-04-04-07, Page 39, Line 14).

A radiologist with twenty-three years of medical experience and ten years of Telehealth experience defined Telehealth as "using predominantly video to assess patients remotely.” He used the telephone and email occasionally as well (M-23-10-06, Page 32, Line 13).

A cardiovascular specialist with twenty-eight years of experience defined Telehealth as:

Delivering care remotely through a communications device, umm, whether it be a computer, a telephone, and that's what we've been doing for many years and in fact, uhh, utilizing Telehealth enables us to take care of a larger volume of patients and it helps with efficiency and economy of scale (M-28-20-15, Page 78, Line 1).

A female family physician said:

My definition of Telehealth would be, primarily, it's used to provide health support to remote settings and I think of it not so much, umm, as, uhh, speaking over the phone as more videoconferencing (F-07-07-18, Page 97, Line 2).

A fifty-year-old ophthalmologist with several years of successful surgical history in the hospital looked at Telehealth as the remote delivery of services using communications technology.

A remote area physician defined Telehealth similarly when he described it as “using technology to share clinical care over distance” (M-20-10-22, Page 120, Line 10).

A sixty-three-year-old female anesthesiologist expressed her thoughts about Telehealth in the following quote:

[It's] being able to communicate remotely with a patient, so that they don't have to travel in order to get an interaction. I don't think of Telehealth as being, umm, interacting with other physicians. I think of it as a physician-to-patient interaction (F-33-33-23, Page 123, Line 1).

A thirty-four-year-old male physician with seven years of experience with Telehealth and a specialty in general internal medicine defined Telehealth as “any means that allows a physician to provide remote care to a patient who's not actually present in the same room” (M-11-07-24, Page 125, Line 12). To him, sending a fax to other parts of the same hospital or further and discussion from colleague to colleague (physician to physician) was not Telehealth. He said that videoconferencing between a physician and his patient or videoconferencing between two hospitals could be called Telehealth. A physician who considers himself a non-user of Telehealth

was of the same mindset and said, "I didn't think Telehealth... somehow, umm, I thought it was a video screen where you present to your patient" (M-35-00-02, Page 8, Line 10).

A sixty-nine-year-old male thoracic surgeon has used Telehealth in his practice for about twelve years and defined Telehealth as:

Audio and visual connectivity with other sites so that patients don't have to travel down to [major cities] (M-46-12-25, Page 133, Line 14).

A cardiac surgeon with eighteen years of experience in his field and seven years of Telehealth usage believed that there is not a specific definition about Telehealth. He said, "I do not know... let's just say, umm, a tool which has changed the field of medicine" (M-18-07-14, Page 73, Line 16).

Despite some misconceptions among the physicians interviewed, a very knowledgeable psychiatrist who used Telehealth for many years proved their clarity on the subject in the following excerpt:

Well, it's quite clear and straightforward, umm, it's about convenience. If someone is remote or distant it doesn't have to be remote, like hundreds of miles – they could be on the other side of the city, they could avoid traffic or they couldn't make an appointment because they might be at work, they could take a thirty minute break at work and they could connect in with Telehealth and manage something and stay at work (M-15-15-04, Page 17, Line 14).

As you read in the lines above, you learned about Telehealth in BC and physicians' definitions and their understanding of Telehealth and how they differ from one another. Notice that the

above participants are among those who accepted the interview invitations. These participants revealed that they heard about Telehealth and they used it or were thinking about why they never used it, and the participants were confident in their personal opinions of what constitutes Telehealth. The researcher questions the fact that such a research project's participant number may increase if more participants were aware of what Telehealth really is. The researcher believes that the first step in increasing and improving the usage of Telehealth is making sure that all the physicians, despite their age, gender and areas of expertise have a general and accurate understanding of Telehealth. It seems that the participants' understanding and definition of Telehealth is very much related to their daily tasks and the way they use it routinely. These physicians should invite and give an opportunity to participate in virtual or real conferences about Telehealth in order to deepen their understanding of it.

In the following section, the thesis will report about physicians' different ways of using Telehealth in their practices.

3. Telehealth and Clinicians

One of the researcher's questions in this research was designed to explore how physicians use Telehealth, why they use it and why they do not use it and what they think about Telehealth. The following are physicians' answers to these questions.

A hospital-based practising physician responded that:

You can categorize me as a non-user of Telehealth but occasionally, when a patient has an x-ray image taken, if I look at it and I'm not sure what I see, I phone down to the radiologist. I see that as the only form of Telehealth that I use. I, I call the radiologist, umm, five to seven times per week, which makes it... I guess, uhh, about three hundred and thirty six times per year, correct?" This number excludes the number of times he connects with specialists per year via telephone (M-35-00-02, Page 8, Line 9).

He added:

Hmm, I don't really have any need to use Telehealth. My work is in the, uhh, hospital and every test, every image, all the information is available in the Electronic Health Records, so I have no reason to use it. In my career I probably wouldn't use it and wouldn't need to use it, again because everything is here, all the specialists are here [in hospital]. Now, if I were practising in a remote location, you know, umm, somewhere I couldn't access the multiple specialists I have here that are a phone call, or a text away. I might use it if I were in a rural place, but not here (M-35-00-02, Page 8, Line 1).

He believed that the power of videoconferencing and media in the medical field is undeniable.

He highlighted an event where he used videoconferencing to share his concerns with the media

to advocate for himself and his colleagues. In this videoconference, published in YouTube, he spoke about the health care system's problems and addressed his and his patients' needs.

As you read in the literature review, radiologists are pioneers in using Telehealth, as expressed by a radiologist in the subsequent quote:

We use Telehealth frequently. Every day, we read imaging studies from across a distance and also from Salt Spring Island and sometimes from other communities on Vancouver Island, we do it from here, umm, I also communicate with multiple physicians every day that call and ask for advice or clarification about something and I look at the data while I'm speaking to them over the phone (M-26-15-03, Page 10, Line 15).

He elaborated by stating:

I use our PAC system (Picture, Archiving and Communication System; frequently employed alongside the Radiology Information System (RIS)) and that uses information that comes from different sites, hmm, so I use it all the time, every working day and then during the week, umm, I'll also participate in conferences that umm, where we have to communicate from a distance across the Island, or elsewhere in the province and that's intermittent but maybe on average an hour per week or so (M-26-15-03, Page 11, Line 4).

A psychiatrist used Telehealth successfully for about fifteen years in educational and clinical forms. He is an experienced psychiatrist and he uses Telehealth for consultations, follow-up care in psychiatry, emergency consultations with patients' families, couple sessions, communicating with providers and employees and colleagues as well as education.

He mentioned that he and his staff use Telehealth "all the time when necessary when the phone itself doesn't suffice to coordinate office, practice, scheduling, so pretty much end-to-end" (M-15-15-04, Page 17, Line 11). He uses videoconferencing, phone and web to communicate with his patients. He was one of the pioneers in helping to set up the North Network and the Ontario Telehealth Network and one of the first people to use GoToMeeting, Polycom, ISBN and IP addressing to support patients and empower them for gaining their health.

The above psychiatrist who researches Cognitive Behavioural Therapy in Ontario using Telehealth also used Telehealth for addiction and pain management for the past several years. He said that during these years, "I engaged from hospital and also outpatient practices with both patients and their families from the centre to the patient, whether it's in another centre that has a studio" (M-15-15-04, Page 15, Line 7). He believed that Telehealth works very well for this purpose. He said that nowadays, patients can use their iPad or personal computer to address their health concerns. He added that he uses Telehealth as a modality combined with face-to-face visits. He believed that the flexibility of Telehealth is incredible. As an example, he has a patient with Postpartum Depression who lives far from the physician who is residing in an urban area. He said that it was far more convenient for his patient to do Telehealth for most of her care rather than travelling to the physician's office while having another toddler in the home besides her new baby. It saves lots of time, money and stress for this family. The psychiatrist believed that when there is a site for Telehealth usage, no matter where the physician or patients go to communicate through videoconferencing, it will work. He called it a reverse ("flip") of positions and explained that when he was in London, Ontario, he was able to use the studio centre over there to visit his patients who were in the physician's office using the physician's videoconferencing devices with

the help of the physician's secretaries. He added that emergency consults across the province happen through Telehealth very effectively nowadays.

A female pharmacist with four years' experience mentioned that faxing is the major means of using Telehealth in her field. Faxing is convenient and secure and it connects physicians, specialists and patients together but it is not environmentally prudent.

A participant uses Telehealth for communication with colleagues and his patients through email, phone, fax, tele- and video-conferencing, or Internet. He frequently communicates with physicians, radiologists and pharmacists or another transplant nephrologist on behalf of the patients to solve their medical problems. He made it known that using Telehealth made a huge change in his patients' care.

A physician uses Telehealth in his job to provide consultation to other physicians through videoconferencing. He also uses phone, email and fax. He mentioned that telephone consultations in his job are not that popular – he just does six or seven consultations this way per week. He added that, in the field of cardiology, British Columbian surgeons and cardiologists have monthly Tevar rounds, which are thoracic endographing rounds in which all physicians in this field enrol. These rounds help physicians to educate themselves and to exchange knowledge. He said that each of these videoconferencing rounds is about an hour long session. He elaborated his answer in the following lines:

We have that once a month or once every other month. We present cases to each other between here and Vancouver, so I've been using that for about seven years now. This

sharing of cases and educational Telehealth sessions enhances physician knowledge and surges health care quality (M-18-07-14, Page 74, Line 2).

A Doctor of Pharmacy and cardiovascular specialist who is responsible for all the medical aspects of cardiology (surgery, thrombosis and antithrombotic management, care of patients with mechanical heart valves) uses Telehealth modalities as means for periprocedural antithrombotic therapy and patients' other needs. He mentioned that his department is in charge of patients who are having complicated surgeries inside and outside of the province. Prescribing the right medications and correct dosages before and after surgery is crucial for that kind of patient. He believed that Telehealth made this possible.

He said:

We've even had patients attending other hospitals in other provinces where we have looked after their periprocedural coagulation and we do it all by telephone instead of seeing them physically, we do it over the phone, we fax prescriptions to pharmacies and so really utilizing fax, power charts and the phone. There is no difference whether this patient is a resident of BC or outside of BC; the surgeon refers the patient to us and we [specialist pharmacists] give our advice in return (M-28-20-15, Page 78, Line 12).

He added that Telehealth helps with the delivery of pharmaceutical education, making it more widespread and accessible. He himself presented many educational videoconferencing sessions. For instance, he said he did an educational session for the Cancer Agency that was broadcast to twenty two locations in British Columbia and the Yukon, so it was really an educational program

put on for people who were across a very wide geographical area. He did it using videoconferencing, which he said is very common these days.

A female house doctor (who practices inside of the hospital) does not use Telehealth very often. She eagerly would like to practice Telehealth more regularly. She believed that Telehealth is "an evolving part of our medical system" and went on to say:

I would use it. So in my case, I would be using it for consultation, inputting patient information, communicating with physicians outside the hospital about their patients, like on admission and discharge as well, communicating with family members about patient conditions (F-07-07-18, Page 100, Line 18).

She even went so far as to say that she has a desire to use Telehealth in her private office if it would be secure and not too expensive, as well as if it had strong IT support.

A very successful and professional ophthalmologist believed that he and his colleague surgeons in other fields owe their success in part to new technologies, especially videoconferencing. To him, Telehealth, using new technologies including telephone consultations, videoconferencing, and so forth, revolutionized the health care system and the quality of its delivery. He communicates with other colleagues via Telehealth and uses online resources, videos and virtual conferences frequently to upgrade his skills and stay on top of the latest surgical techniques. He affirmed that the rapid influx of technological improvements and unbelievable advancement to surgical techniques pressure surgeons and their teams to find quick ways of learning. He claimed that Telehealth helps new generations of surgeons to learn easier and faster than before as well as gives them direct access to experienced colleagues around the globe in emergency cases.

A female cardiologist in an advanced clinic in British Columbia uses Telehealth (videoconferencing and telephone) to visit her patients from a distance. She uses special electronic stethoscopes to listen to her patients' heart rate from miles away. She revealed that patients have received and welcomed Telehealth visits, especially because these days there aren't enough cardiologists available in many cities. She and her team have worked hard to advance this clinic. According to many physicians as well as her, this clinic is very beneficial for patients, the environment, physicians and the government.

A thoracic surgeon with thirteen years' usage of Telehealth as a means of follow-up believed that Telehealth has:

Created an opportunity for consultations and office visits that we can accomplish without the patient necessarily travelling great distances.... During Telehealth sessions, we can educate and retake patients' medical histories (M-21-13-20, Page 107, Line 1).

A male family physician who believes that Telehealth found its place among physicians in the last ten years, voiced that on a daily basis, he teleconferences with patients and their families, as well as does video learning and rounds with his medical students. Although these ways of communication are different from traditional ways, which he recognized, he was enthusiastic to learn more and apply more of this technology in his practice.

A male physician, having done many Telehealth visits, acknowledged that he used Telehealth for medical consultations, follow-ups and educational purposes. He pointed out that nowadays, many different platforms are available for physicians to use, as expressed in the following quote:

I've used a number of different platforms, it just depends on the environment that I'm in. I've used the proprietary system that, umm, Island Health has, which is a Polycom system. I've used – with express patient consent regarding privacy – I've used the, uhh, what's it called? FaceTime that Apple produces – that's with patients being fully consented to the fact that their information is going to be recorded by the United States, China and possibly Russia, but these are generally situations where patients are okay with that and I also, uhh, made heavy use of the Medio System.” He explains that “Medio is a proprietary system, it's a company in Vancouver that produces a proprietary videoconferencing system that allows you to use your smartphone and the whole system is Canadian-based, it doesn't have any cross-border stuff (M-11- 07-24, Page 126, Line 14).

A high-ranking female anesthesiologist believed that the usage of Telehealth in the anesthesiology field will be a great asset for anesthesiologists and their patients, as articulated in the subsequent quote:

I would like to use it [Telehealth] and I think that it would be very good for our patients that live outside the city so that they could go to their local hospital, so it's a secure line to my local hospital and I think it would be hugely advantageous to the patient (F-33-33-23, Page 124, Line 3).

She explained, “We do use this [Telehealth] for educational purposes” (F-33-33-23, Page 124, Line 6). She continued:

Absolutely, it [Telehealth] could be part of the practice because it would save patients from places like, three and four hour drives to come down to see us and we could answer all of their questions and that would reassure them and good data to show that if people have seen an anesthesiologist that they're informed and they're calmer coming to surgery (F-33-33-23, Page 124, Line 11).

Through answering the question, she clearly declared that she and her other colleagues would like to use Telehealth in their department, but unfortunately, it is not available to them, as revealed by the proceeding quote:

It's not available to me.... Two reasons [for not using it are] first, it's not available to me, it's not widely available to me, and secondly is the fact that there's no fee in the MSP guide for us to do consultations via Telehealth for anaesthesia. We don't have a fee for that, so people aren't going to do it because they're not going to get paid (F-33-33-23, Page 123, Line 16).

She stopped for a minute and then continued again by saying:

Do my colleagues [who have access to Telehealth] use Telehealth? No because they don't get paid... there's no fee for it and so people would be working for free... not receiving money is the major reason why many physicians hesitate to rejecting Telehealth (F-33-33-23, Page 124, Line 10).

Summing up the responses of physicians, one can conclude that physicians mostly use Telehealth for communicating with colleagues, their patients, and patients' families for the purposes of consultations, follow-ups and assessments. Through interviews, physicians declared that the

educational aspect of Telehealth benefits all sectors; in particular, novice physicians and medical students and patients. Physicians use it to facilitate the process of care, reduce waiting time, speed connections, and save their patients money and time as well as to protect their own interests and welfare. Supporting the environment through reducing paper consumption, preventing CO₂ emissions, avoiding road and automobile erosion (or abrasion) is another mandate for physicians to use Telehealth. Some physicians thought they do not use Telehealth because according to them, speaking with colleagues over the phone and faxing and emailing are not Telehealth. To them, sitting in front of a screen and talking to a patient directly, rather than to the patients' families or other physicians, solely means Telehealth. Interestingly, the second group of physicians have used Telehealth for many years now for videoconferencing to patients and colleagues and still do not consider themselves Telehealth users. They enrolled in many distance classes and had many tele- and video-conferencing sessions for consultation purposes and confess that they never even think about that as Telehealth. A physician said, "Me, no. It is not Telehealth.... It is weekly videoconferencing between two hospitals. Is it? Oh... maybe?" (M-20-10-22, Page 120, Line 13). Finally, others do not use it simply because it is not available to them and their departments.

Are there other reasons besides availability that possibly could be considered as an underlying cause of some physicians' hesitance in using Telehealth? Factors such as age, gender, computer literacy and technophobia ought to be accounted for and are discussed in the next section.

4. Influence of age, gender, and computer literacy in the adoption of Telehealth

As you were informed in the last sections of this paper, the majority of participants and their colleagues are eager to use Telehealth and their patients are happy and satisfied with the Telehealth services. It has been said by Telehealth critics that being technophobic, not having computer literacy and being aged and having a specific gender are among factors that have prevented the adoption of Telehealth by some physicians and their patients. They (critics) believe that investments in this kind of project are wasting money. Let's read through physicians' answer and see what they had to say regarding this idea.

A specialist said, "It's true that some physicians do not embrace Telehealth as easily as others" (M-26-15-03, Page 11, Line 14). He continued his answer by saying:

I think that, umm, if you're a technophobe, you would have a hard time adopting it initially. I think it's easy enough for anyone to, uhh, learn, but computer literacy makes a difference and, umm, I don't think there's any particular skill or competency, it's just exposure to the technology that you need (M-26-15-03, Page 11, Line 17).

He considered Telehealth usage to be very easy, as echoed in the following excerpt:

I don't talk to them [colleague physicians, regarding their comfort level with Telehealth] directly.... I do not know what they think.... Some of the physicians in town do have a problem using [Telehealth]; the more experience you have, the easier." This specialist added that "usage of the system is less difficult than previously, but besides some physicians, a considerable number of patients suffer from not knowing what to do with technology (M-26-15-03, Page 12, Line 3).

In the researcher's interviews, all of the physicians believed that using Telehealth is less difficult than it was in the past. An elderly participant said that in his area, the system is pre-set and none of the pharmacists working with the system are facing a problem, but patients who are aged face more difficulty. These aged patients have problems with automatic telephones, punching in the right numbers, and figuring out how to follow the simple directions of an automatic ordering system.

A fifty-two-year-old psychiatric practitioner who shares his office with his wife, a child psychiatrist, believed that age and gender do not affect the use of Telehealth, as indicated in the following quote:

My wife and I actually set up the urgent Telehealth Program that we use to most of [the region] right now for psychiatry. We probably do the largest number of consults, too, so any ages can do it as well (M-15-15-04, Page 17, Line 3).

He added, "My wife sees and does it [Telehealth] exactly the same as I do," (M-15-15-04, Page 17, Line 7) suggesting that there is no gender gap. He believed that being technophobic impacts the usage of Telehealth, no matter if the patient or physician is the technophobe. He voiced that, for patients, it's easier because the installation will be set up by a third party for them and mostly, they attend in a studio and will receive staff technical support. However, for physicians, especially older generations, computer illiteracy and technophobia are a huge obstacle in their practice, as articulated in the following statement:

Some of the older generation have a conservative mindset, and physicians don't trust things until they're extremely vivid. It's hard for some to adopt technology (M-15-15-04, Page 19, Line 12).

He suggested that this group of physicians should be given a second chance, the chance of being reintroduced to technology in a simpler way and the chance of knowing that it is very simple and easy to use, as revealed in the following quote:

They [some physicians and patients] should be informed that it [Telehealth] is easy.... It is like FaceTime or Skype; everyone is doing it. The use of Telehealth is simple and there is no challenge pertaining to its rejection (M-15-15-04, Page 23, Line 4).

Answering the question regarding impact of age and gender in usage of technology, one of the physicians was mentioning that her seventy-four-year-old patient was telling her that through Skype, the patient edited her daughter's PhD proposal and stigma regarding old patients being unable to use Telehealth properly, while they use many other social media devices, needs to be ended. He also said to look at the age of Nobel Prize winners these days. Doesn't this say something? To him, this implicated that age is not a barrier to technological achievement.

A sixty-four-year-old pharmacist believed that age and gender do not impact the usage of Telehealth. He said that "computer literacy allows you to connect various electronic devices to your phone or fax machine, so you can do a lot of things with your computer literacy" (M-41-41-05, Page 28, Line 14). He said that he learned it very easily and has no problem with technology.

A radiologist believed that technophobia is age-related, as seen in the subsequent quote:

If you're not comfortable with computers, then you probably wouldn't take advantage of it to the same extent... and the younger of my colleagues are more comfortable with computers, so they probably are more... have a greater degree of facility with using it (M-23-10-06, Page 34, Line 6).

A young pharmacist believed that in general, individual motivation is separate from one's gender and age; she believed that she would love to use Telehealth, especially videoconferencing, more often if it were more widely available, as the following lines suggested:

I would definitely use it more often than I am now; we don't have electronic prescriptions, which I think would be a great step forward for the pharmacy business and health care in general (F-04-04-07, Page 39, Line 16).

She also believed that technophobia plays a substantial role in the rejection of Telehealth and technology, as elaborated on in the following quote:

We do work with a lot of doctors that are older and aren't kind of as excited to pick up new technologies, like even if electronic prescriptions they're prescribing were an option, I don't know if they would go for it right away just because there's a learning curve (F-04-04-07, Page 41, Line 18).

A seventy-two-year-old pathologist and a practising physician said that technophobia exists but there is no other remedy apart from Telehealth for serving the growth of the population, and consequently, the growth of the number of patients requiring medical attention, particularly increasingly in the future. He claimed:

We need contact with all the various disciplines in medicine and it's not possible to happen person-to-person nowadays. We use Electronic Health Records, telephone, fax, and email, solidifying old information and gaining new information. We use Internet-based tools to enhance our knowledge base (M-40-10-09, Page 51, Line 7).

He added that nowadays, in the surgery room, doctors utilize videoconferencing as a part of their teaching method for residents and students, and some use it more than others, but it is irrefutable that everybody uses Telehealth to a degree. He believed that the older you are, the more likely you are willing to use traditional ways of teaching and learning. He added that younger generations are very familiar with texting, emailing, Tweeting, and other kinds of media and some, like him, still prefer phone if there is no face-to-face meeting possible.

A nephrologist mentioned that the technology needed for Telehealth is not a barrier. He believed that “most hospital-based physicians use video link for sort of seminars and lectures pretty continuously” (M-15-15-13, Page 70, Line 4). He added that there is no need to encourage elderly physicians to use Telehealth – they use it every day without noticing by just picking up the phone and giving consultations and communicating indirectly. He said, “We just need to let them know that they are using Telehealth already” (M-15-15-13, Page 70, Line 16). He didn’t think that gender or age affect its usage whatsoever.

Despite stigma regarding physicians’ computer literacy being poor, a specialist explained that he used to be an app creator in the 1980s, as illustrated in his following words:

I wrote some applications which could be called Telehealth and it really involved, initially in the 1980s, the preparations of neonatal total parenteral therapy, which we did over a computer network in the early days (M-28-20-15, Page 79, Line 5).

He added that there is no difference among genders using technology nowadays when he said:

I think regarding age, I am, uhh, in the group of people who had exposure to computers. I'm, umm, probably at the start of that generation that had computer exposure young, so probably, I would be more likely to utilize Telehealth than, perhaps somebody who might be ten years older than me might not have had the same early exposure to computer technology. I think in the early days, if I was to, uhh, go back twenty years ago, interest in computers I think was a largely male thing, but I think nowadays, there's really no distinction in that; females are utilizing technology equally, the same as males, so I really don't think currently there's really a difference (M-28-20-15, Page 79, Line 15).

He continued by saying that gender does not play any role in the embracing and practising of Telehealth, but he believed that age plays a role in the triangle of patients', physicians' and pharmacists' communication.

Regarding physicians, this specialist said:

I think there's a real mix and probably for those physicians who, maybe I'd probably say right now may be older than fifty-five or sixty years of age, they have less adoption of technology, although I know there's some exceptions. I know in the early days, it was on the clinical computing committee of the health region back in the 1980s and some of those key early technology adopters are now in their - approaching their seventies, some

of them are still practising, so that would be an exception to that rule (M-28-20-15, Page 82, Line 10).

In terms of patients, he believed that even though they use specific studios and settings for communicating with their physicians, still some understanding of technology is necessary. He went on to say that:

Because a lot of our patients, though, are older than us, quite often in their seventies and eighties, that sometimes we get patients who don't understand or know how to utilize the technology. We are even sometimes using text messaging for patients. I communicate with a lot of patients via text messaging, but there are patients out there who will not have a smartphone or not know how to use it (M-28-20-15, Page 82, Line 5).

A mature internist with many years of teaching experience believed that age and gender do not impact the learning or usage of Telehealth in the medical field, as the subsequent quote expanded on:

I'm sixty-four and I'm potentially a technophobe, but I'm not. I don't actually have any trouble with the Electronic Health Record or the fax machine or email or, obviously, I've gotten used to the electronic video and audio conferencing, so I don't have any trouble with anything.... Some people do express technophobia, but they're getting fewer and fewer. I don't run into a lot of [physicians] who seem to be inept or unwilling to use or learn new technology or that sort of thing either. A lot of people I see, they're young people because I teach young people and they're all very adept (M-20-10-16, Page 90, Line 9).

A cardiologist believed that age and gender specifically do not influence the usage of Telehealth, as indicated by the following quote:

I think it's somebody's perspective on technology and change. So somebody, it doesn't matter if they're older or younger or male or female, if they're somebody who's resistant to change, then they would be less likely I think to bring that into their practice, whereas if they're more interested in that kind of thing, they're more willing to ride out the bumps on the road as you're trying to get that technology going (F-11-06-12, Page 63, Line 8).

A female pharmacist believes that computer literacy and technophobia influence the adoption of new technologies. She highlighted that age plays a huge role in learning and recalling, while gender doesn't have any impact, in her opinion, as expressed in the following excerpt:

Yeah, it takes longer to learn the technology, so you're learning new information and you have to learn the technology.... No, I don't think it's gender-related but I think it's definitely age-related.... I still think some people always adopt technology easier, but I think that generally, as you get older, you – depending on – there's so much more technology that it's hard to retain it all, whereas younger people are in technology all the time. They're communicating with it, so it's a lot easier for them to adapt to new technology, while older people, you know, they're slower and then once they master something, the technologies always change because they're slower to adapt (F-31-31-17, Page 95, Line 3).

A female family physician believed that the adoption of Telehealth is directly related to the age of the practising physicians, as indicated in the subsequent quotation:

To be honest, physicians who are reaching retirement have no motivation to learn new computer skills or even adapt their offices and practice to computer-based technology, umm, because it's expensive and they're near the end of their practice and they're not going to invest money that they're not going to get returns from, so I think that's a huge barrier for physicians within, uhh, five to seven years of retirement. For anybody, let's say younger than that period of time, I think most people are engaging; however, change, any change, is always difficult and the medical system puts emphasis on efficiency and if it's perceived as causing a decrease in efficiency from physicians or administrators, it's not going to move forward (F-07-07-18, Page 97, Line 14).

A male thoracic surgeon believed that computer skills are akin to one's like or dislike of technology. Another male family physician stated that some of his colleagues have problems with technology, but since they mostly use phone or email and use videoconferencing under the hospital IT team's supervision, they don't face that many challenges. He himself mostly uses phone conversations with specialists regarding his patients, and attends weekly videoconferencing between hospitals.

A thirty-four-year-old physician believed that “gender is not an effective factor in embracing Telehealth, but age is an influential factor,” as expressed in the following quote:

I am a young physician. I was somebody who grew up in the era of computers and I have a much greater comfort level with computers and mobile technology than my older colleagues and so I think that my age plays a major role. I don't think gender plays a role at all (M-11- 7-24, Page 123, Line 2).

A sixty-nine-year-old male thoracic surgeon was against the idea that age or gender plays any role in adoption of technology. He, as a frequent user of Telehealth, encouraged the doctors who do not need to do in-person physical assessments to use Telehealth. He did not find working with technology hard ultimately, as articulated in the proceeding excerpt:

At first, I found it a little bit difficult in terms of, umm, I would consider myself a little bit old-school, where I like to be sitting in a room, you know, with the person – you read body language a little bit better, you just get a sense of how they're doing. In our office, we can sometimes get a very good sense of how a person's doing simply by watching them walk from the waiting room into the office. Here, we don't see that, we see them sitting in front of the screen [at the other end] but I think in this day and age, I think for us it's [Telehealth's] a very good way, particularly for follow-up visits, you know, when we're reviewing patients after they've had surgery, umm, discussing pathology with them, reviewing their operation, seeing how they've been doing and we had the benefit of that. I don't use and I don't think my colleagues use the, umm, some of the aids you can use for Telehealth, such as the stethoscopes, stuff like that, we rely mainly on our imaging (M-46-12-25, Page 128, Line 5).

This specialist continued and said:

It is not hard.... I think it's partly because the people that instituted it were very anxious that it be a painless experience for me, you know, everything has worked very well. Occasionally, we'll have little glitches with our contacts and stuff but I have, there's very good supports. I have a couple of phone numbers we can phone and we can set things up (M-46-12-25, Page 129, Line 18).

He did not believe that approaching technology is hard. He stated:

There's different things that you have to know with regards to surgery, but with regards to communication and computer-based stuff, I think all current physicians and people that are out of training, you know, only a few years or just coming out of training are so comfortable with the interfaces. It's just, intuitively, you have to use them over and over again until you feel comfortable, like well this is the problem, this is how I solve it, not that there's that many problems, I mean, this system that we're using is very easy (M-46-12-25, Page 130, Line 2).

The analysis of physicians' answers showed that, among the 25 participants, 100% believed that gender has no impact on the usage of Telehealth, while about 80% believed that age is not relevant.

	Impact of Gender	Impact of Age
Participants	On the usage of Telehealth	On the usage of Telehealth
25	100% - Gender has no impact	80% - Age is not relevant.

Table F. Participants' opinions of the impact of gender and age on the usage of Telehealth

As you may recall from having read this section, the stigmatization regarding gender is not dominant in the community any longer. Some of the participants considered themselves technophobic, but they said that they overcame their fears and learned what they needed to learn in order to use Telehealth. As you previously learned, a physician said:

So some people do express technophobia but they're getting fewer and fewer. I'm sixty-four and I'm potentially a technophobe, but I'm not... so I don't have any trouble with anything (M-20-10-16, Page 89, Line 4).

Fortunately, this part of the study's results shows that physicians, even older ones, are ready and eager to learn and they have no problem facing challenges regarding technology instalment in their practices.

Before looking at other obstacles such as the disadvantages of Telehealth visits in section five, the next section will examine differences between face-to-face and distance visits.

5. Face to face versus Telehealth or distance visits

For many years, physicians had only visited their patients in their offices. This close distance visit gave physicians opportunities to examine and assess their patients directly. The health care system's trouble began as humans started to travel more easily and became free to choose their own habitats. Sooner than was expected, the big cities were born and fewer people stayed in rural areas. Unfortunately, the quick growth of the population, aging, and the incidence of an imbalanced ratio of physicians to patients have added to health care problems. The advancement of technology and the possibility of long distance visits became the only sparkle of hope to address patients' medical needs. To solve the problem, many physicians commenced to embrace technology. Fears of technology and the unknown caused others to become hesitant towards technology's embracement or to stay undecided for many years now. Technology's adoption for the portion of the physicians that accepted it proved useful. Since then, physicians not only easily have visited their patients, but also have had the opportunity to use Telehealth for their educational and administrative purposes. The following lines are participants of this study's reports regarding the nature of their Telehealth visits, the amount of time they spend for this, their comfort level, and the proportion of patients they visit through distance.

A psychiatric physician said that, on average, he does forty to fifty hours per month of Telehealth consultations. He estimated that up to 40% of his patients are seen using Telehealth. He highlighted the need for Telehealth in remote communities in the following quote:

The ability to consult and provide care to remote locations, so up at Port Hardy or Fort McNeill, I do that all the time and I have regular patients of mine, otherwise I wouldn't have and I collaborate and provide shared care with the physicians up there who are so

grateful because they don't have the specialty care capabilities that we do (M-15-15-04, Page 18, Line 12).

A forty-nine-year-old remote area male physician who practices in many First Nations communities in the north (Takla and other areas) stated, "I have about 1000 virtual visits a year, almost 50-50% face-to-face versus over distance in the office" (M-20-10-22, Page 117, Line 4). He considered his Telehealth visits as effective and as efficient as his face-to-face visits and encouraged his other fellow physicians to adopt Telehealth sooner rather than later.

Here we need to mention that many physicians, in their interviews, had stated that families are more in tune nowadays and people like patients' spouses take more responsibility to alleviate health problems. These physicians believed that it is a physician's job to give the patients and their families answers to their health-related questions (patient-centered care), and upgrade their knowledge. Patients definitely need easy-to-understand and accurate information regarding their sicknesses. When people become ill, they need more support. They want to know: why did this happen? How will this illness affect their lives? What do their lab results mean? What did their reports say and what does that mean? What should they do while taking their medications? They need to get their answers to these questions in a timely fashion. In the opinion of participants, Telehealth communication with patients and their families will answer the above questions quickly.

Furthermore, all of the participants of the study believed that long waiting lists are unnecessary and they are a potential danger to the patients' wellness. It is very distressing for patients to wait lengthy amounts of time to see a physician and address their health concerns. A family physician voiced that:

Simple and short phone or videoconferencing can answer patients' questions quickly and solve their problems very easily and prevent the occurrence of more complications for them.... Why be on a waiting list when patients can go to the nearest Telehealth walk-in clinic and videoconference with their physicians or simply call them? (M-20-10-22, Page 117, Line 12).

A specialist pharmacist said that the number of distance visits with patients is increasing; nowadays, it is almost 50:50 Telehealth versus in-person meetings. He elaborated by stating:

I would say that probably in a typical day, I might be doing maybe twenty patients per day Telehealth-style and then I might be doing an additional twenty perhaps per day in inpatient settings and it'll fluctuate quite a bit, depending on what's going on and depending on what service I'm rotating on (M-28-20-15, Page 79, Line 9).

A specialist explained that British Columbia is successful in implementing several strong Telehealth programs in different fields of medicine. One of them is a special cardiac clinical centre in the heart of one of the major hospitals. In this centre, a cardiologist and a group of specialized nurses are in charge of education and the visiting of patients through distance. This centre covers several Telehealth studios in different cities (e.g., Ladysmith, Nanaimo, Parksville, Campbell River, Comox, Port Alberni, Salt Spring Island) as well as covering cardiac floors in hospitals. Through weekly educational sessions, for example, regarding heart failure, not only local patients who attend physically in the centre benefit but they also broadcast to different sites from this centre. These sessions also upgrade the knowledge of health care providers and physicians attending at the centres.

Besides face-to-face visits, Telehealth visits are very routine in this centre. In these Telehealth videoconferencing visits with different sites, there is a specialist nurse who reads all the comments of a general practitioner, does a physical assessment (weight, blood pressure) and medical history. The nurse can also place an electronic stethoscope on the patient's chest and transmit this information over a distance to the receiving Telehealth site's cardiologist, who can then address the patient's health concerns, as expressed in the following quote:

We have a great technology where a nurse on the distant site meets the patient, does their weight and their blood pressure for us, and then they put a stethoscope on the patient's chest, perhaps in Nanaimo, and here, we can put a stethoscope in the ears and hear their heart and lungs and all that kind of stuff (F-11-06-12, Page 61, Line 8).

As this female cardiologist said, there is no specific amount of time that this heart function clinic can spend on Telehealth; it varies from week to week depending on the number of phone calls or videoconferencing appointments for communication with family doctors, ER doctors, or other cardiology colleagues and patients. These patients are very fortunate, since this videoconferencing takes perhaps only an hour out of their day, rather than having to take an entire day off from work in order to commute to and from an in-person appointment. The cardiologist revealed:

Having the opportunity to come to a videoconferencing visit means they don't have to take the whole day off work; they don't have to drive down here; they don't have to do their parking; they don't have to make their way back, so they could lose a whole day of work, whereas if we do a videoconferencing visit, then it's maybe an hour out of their day (F-11-06-12, Page 61, Line 4).

She added that Telehealth visits are as effective and efficient as face-to-face visits. This cardiologist said that comparing the duration of two visits, face-to-face and Telehealth, is not logical, since each person and each visit has its own characteristics and it is very different from patient to patient and date to date. She said, “I can't comment on time because it varies” (F-11-06-12, Page 61, Line 7). She acknowledged that for her follow-up visits for both face-to-face and Telehealth, she spends equal amounts of time for reviewing a patient's file, but in Telehealth visits, nurses spend extra time making patients ready for the visit, as articulated in the subsequent excerpt:

For them, as nurses, instead of the patient coming to clinic and filling in their questionnaire, nurses call them the day before, nurses review patients' meds, make sure their medications are right, their pharmacy is right, where they would go for labs, just kind of to prepare and I think nurses spend more time preparing for a videoconferencing visit than they would for a face-to-face visit, not me (F-11-06-12, Page 64, Line 3).

She continued by saying:

Telephone conversation, on many occasions, works as well as videoconferencing.... I and my team are able to manage patients' heart conditions through telephone.... This clinical centre takes advantage of incoming and outgoing telephone calls with patients and physicians as well, especially when the videoconferencing for any reason has disconnected, acting as an important back-up resource (F-11-06-12, Page 64, Line 11).

She strongly believed that phone management, for some patients who are dependent upon direct follow-up with the centre, works very well, especially with the elderly, who have some

technophobia or who do not have the required technological devices. For these patients, whenever necessary, the closest Telehealth studio provides them with their videoconferencing needs. She suggested that the other areas of health care need to upgrade their treatment system. She wanted other physicians to know that last year, under the supervision of the Heart Function Clinic simply through telephone or videoconferencing and not through travel to an in-person location, their team solved many patients' problems. She mentioned that telephoning or videoconferencing a specialist can circumvent the need to travel all the way to the clinic and can help immensely to manage patients' illnesses.

A sixty-four-year-old male specialist in complex adult medicine (an internist) uses Telehealth mostly for educational and administrative purposes. He practices in outpatient clinics and visits patients in person about twenty weeks a year. He believed that he didn't use Telehealth for visiting his patients, but mentioned that he exchanges emails with patients who live far from the city, as revealed by the following quote:

I will give my email address to some of my patients, a very small number, to communicate with them, uhh, either because they live too far away – I have someone who lives on Galiano Island – can't always come over, sometimes I'll answer the questions by email or telephone (M-20-10-16, Page 86, Line 9).

He indicated that he prefers face-to-face visits to videoconferencing, especially for the first or second time of visiting with his patient. He added:

The reason I don't do consultations by videoconference is because I need to be in the same room as patients and I cannot imagine not examining them.... Well, yes, I can – I

don't examine patients every time I see them, I examine them the first time and then as needed, depending on what's wrong with them (M-20-10-16, Page 87, Line 16).

This internist believed that:

Telehealth is really for the purpose of getting high-quality intervention for people who don't physically have it in their neighbourhood, uhh, in under-serviced areas. People on islands, people in rural areas, those are the people who should be accessing Telehealth.... For me to videoconference with a patient who is three miles in that direction is ridiculous. I mean, I would rather meet them in person, unless it's a very small thing: your potassium was 6.2, a small thing like that. Also the interactions with patients in particular require a back-and-forth. I prefer to see what's in their eyes and to understand their body language, you know, it's much better and then I have the opportunity to see – what's his pulse? Or if it's sore here, where is it sore? Point here and touch it and say, 'does that hurt?' I prefer to actually be able to see and touch the patient (M-20-10-16, Page 88, Line 19).

A female pharmacist believed in the advantages of technology; however, she maintained that you cannot deny the benefit of face-to-face communication with the patient. She mentioned that face-to-face allows you to "read their body language. You can ascertain things that you can't get just by talking to them over the phone, they feel more comfortable, there's a myriad of reasons" (F-31-31-17, Page 92, Line 9). She acknowledged that "the phone rings incessantly, about thirty times a day.... More of it is face-to-face than over the phone, about forty five patients in person" (F-31-31-17, Page 92, Line 15).

A thoracic surgeon who uses hospital facilities to follow up with patients via videoconferencing is very satisfied with his Telehealth visits. He said with the help of these technologies, now he and his fellow colleagues in the surgery department have the opportunity to visit many patients this way. In his own case, he visits one out of seven patients, approximately, via distance.

A female high-ranking anesthesiologist, in thirty three years of her experience as a physician, mostly communicates with her colleagues via telephone or fax; she has started to use Internet within the last ten years. She visits all her patients face-to-face, since the hospital she is practising in did not provide any Telehealth visit facilities for anesthesiologists.

A male physician who partakes in lots of Telehealth sessions per month acknowledged that approximately fifty percent (50%) of his patients are visited via Telehealth. He mentioned:

I use videoconferencing, umm, I have a consult tomorrow.... My patients are internal medicine patients and not just internal medicine patients but I've also done consultations regarding medical assistance and using Telehealth.... I do this for several years and it is very convenient and easy for both of us [me and my patients] (M-11- 07-24, Page 121, Line 7).

Obviously, reading the aforementioned lines inform one that physicians are more involved in Telehealth visits nowadays than ever before. They see the advantages of Telehealth visits for their patients and they try their best to increase these visits and reduce the number of waiting list patients. In the next section, the researcher asks physicians' opinions in more detail regarding the advantages and disadvantages of Telehealth visits.

6. Major advantages and disadvantages to using Telehealth

In previous sections of this paper, some reasons such as the impact of age, gender, computer literacy, and being technophobic were discussed. Through preceding pages, the writer also points out physicians' ideas regarding two different kinds of visits, face-to-face versus Telehealth. Up until now, there was no convincing reason for the rejection of Telehealth. As you read, all of the Telehealth users (participants) who were interviewed were satisfied with Telehealth and encouraged their colleagues to take a step forward and give it a try. Let's now look at the advantages and disadvantages of Telehealth from the perspective of the interviewed participants. Might it be the disadvantages of Telehealth which cause some physicians to reject it? Are these perceived disadvantages legitimate?

A physician who considers himself to be a non-user of Telehealth said that he did not use Telehealth because he is not aware of its advantages and he generally dislikes it and is concerned about its disadvantages; for one, he does not use it because he is practising in a big hospital in a major city. He said:

I guess it [Telehealth] has advantages.... Umm, if I was a physician in a rural place or something and had a chance to practice it, I was a user... the potential is to really improve the care for that patient and get a high level of advice to help the patient... I will use it if I need to use it (M-35-00-02, Page 9, Line 3).

Another non-user said that the advantages may include getting much faster and cheaper consultation from a distance, as expressed in the subsequent quote:

The number one [advantage] is just being able to get people, umm, medical care in a remote place, which would otherwise take much too long to get them to see a doctor, and so the time factor – getting more timely care – and number two is, umm, it should be a lot cheaper in many cases because of all the flying that you need to do to see patients in remote areas, so they're getting faster care and also saving money doing it, I see is, uhh, the biggest advantages.... I guess I have a positive opinion of it in terms of – it could be from either side – if I were in a remote location with my family, I could use Telehealth to access a specialist that knew more about the condition, then I'd be happy to do that. And also I think it's, umm, I haven't actually used it and I already think it's a valuable tool for helping a lot of other patients who are in remote places, especially ones that are really far from health care, which we have many of in Northern BC in particular (M-21-00-01, Page 3, Line 16).

This non-user added:

A reliable system without glitches in communication is the ultimate goal. In reality, there are some disadvantages to videoconferencing.... There will always be some interfaces that can't be electronically linked.... I guess you'd want it to be reliable, if somebody is going to the trouble of going to a Telehealth appointment, it'd be nice if it didn't have lots of outages due to things you can't control though like downed power lines and things like that... I guess there's always going to be limitations to exactly what level of feedback the remote doctor can get, for example, feeling tissues with their hands to see what shape something feels like under the skin, that sort of thing." He concluded that "it doesn't completely replace an in-person meeting (M-21-00-01, Page 2, Line 10).

A radiologist, as a frequent Telehealth user, said:

There are only advantages; there are no disadvantages from my point of view. The advantages are that I can see more information from a broader area and communicate with physicians immediately using telephone and that data that's available on our system (M-26-15-03, Page 11, Line 11).

He supports the advantages of Telehealth, as indicated in the following excerpt:

Telehealth is something that we do more and more every day because it's very convenient, so it's good for the referring doctor to reach us that way. The benefit of Telehealth is that more people can use it, so you reach a wider audience from further away and it's more convenient. You usually don't have to travel for conferencing (M-26-15-03, Page 12, Line 14).

As you may recall, one of the major advantages in telepsychiatry, as mentioned in the literature section by the researcher, is that psychotic patients, on the whole, tend to feel less overwhelmed with Telehealth than they do with face-to-face visits because Telehealth entails fewer novel stimuli that can be aggravating and provides confidentiality. For instance, no one will see you go in to a mental health clinic in person when using Telehealth in lieu of in-person consultations. Based on a participant psychologist, a smaller proportion of psychiatric patients need to be visited in person for the first several sessions, as expressed in the proceeding quote:

A smaller proportion of psychiatric patients are looking for engagement on a human, emotional, interpersonal level, and because of that, they're believing, umm, because that's

what humans do, uhh, that you need that face-to-face human touch, and once they get that, then often they're quite willing to try Telehealth (M-15-15-04, Page 19, Line 5).

He pointed out that he's "never had anyone avoid doing Telehealth once something was set up" (M-15-15-04, Page 19, Line 8). He added, "I've had a very small number, I'd say five people in fifteen years, said they didn't want to do Telehealth.... There are dramatic advantages in Telehealth usage" (M-15-15-04, Page 19, Line 10). He restated an example of a Postpartum Depression patient who is in a situation that would require her to drive an hour and a half each way for a face-to-face visit with a physician. He said that, thanks to Telehealth, this fuel consumption, family separation – especially for the newborn baby's sibling – time and money can be circumvented.

A pharmacist believed that using Telehealth technology nowadays in general is less difficult than before, especially for young and middle-aged generations. He believed that the possibility of any kind of long distance communication in a "busy and crazy world is a bonus." He explained:

Thanks to technology... patients can phone in, put the first four letters of their name in and their birthday and prescription number and it shows up on our computer the next morning, [so pharmacists can send patients their medications without them having to come in to the store or clinic in person] (M-41-41-05, Page 28, Line 9).

He added:

Patients are getting prescriptions filled or refilled by us [pharmacists], so they don't have to go back to the doctor.... The only disadvantage I see is that there is a time lag from when we relay information to the doctor's office to the time we get it back, umm, which

may even take longer for them if they want to do that themselves (M-41-41-05, Page 28, Line 12).

A young female pharmacist, in her interview, mentioned that in a typical twelve-hour shift she speaks with approximately fifty people (approximately 70% in person and the remainder via telephone). She concluded that if each conversation takes about five to seven minutes, and she speaks with fifteen people over the phone per day, she will be spending about eighty-five minutes on the phone per shift. These eighty-five minutes save patients time, money, travel, and hassle and prevent traffic congestion and possible vehicular accidents. She emphasized that the majority of people she speaks with over the phone are elderly and this is beneficial for them because many have issues such as limited mobility, impaired vision (for driving), and dementia, so being able to do telephone consultations and not leave their homes may reduce injuries, getting lost while commuting, and car accidents. It also prevents passing information through a secondary source who is attending in the pharmacy and breaching the confidentiality of the patient.

Another advantage of Telehealth, from this pharmacist's perspective, was that phoning patients can be a means of follow-up, which is important because patients forget some of what they hear the first time, as articulated in the subsequent excerpt:

I've always been taught that they're holding onto maybe 40-50% of the information, just because you're kind of bombarding them the first time and they might be stressed out about it. Follow-up calls are always useful to kind of make sure that they understand the information that you gave them the first time, to clarify any questions they might not

have thought of at the time, but maybe wouldn't have bothered to follow up with us themselves (F-04-04-07, Page 39, Line 17).

She stated, "Obviously, phone is more convenient and less expensive than travelling back to the pharmacy in person for a simple question" (F-04-04-07, Page 40, Line 2). She acknowledged that videoconferencing for backing up a pharmacist technician in rural areas is wonderful. She explained:

Telepharmacy and videoconferencing are big things in rural areas where they don't necessarily have the pharmacy back-order support... which is where they have a storefront in a rural area with technicians, but they might not necessarily have a pharmacist on staff and so the prescriptions in that case are checked over videoconferencing (F-04-04-07, Page 40, Line 7).

She elaborated that videoconferencing, telepharmacy, and using fax bring a huge advantage to the field.

Another female pharmacist with twenty years of experience has her own opinion regarding using the phone as a device for communication at a distance. She mentioned that she wishes to see all her patients in-person, but it's "a dream that cannot come true" (F-20-04-10, Page 57, Line 10). She said that looking at her patient's face while explaining about medication reassures her that they understand what she is instructing. She liked the fact that a courier can deliver medication, such as antiretrovirals, to patients, but she wished that there were a videoconferencing possibility rather than telephone so that she can assess patients' facial responses and show them their

medication(s) more thoroughly. She mentioned that clarification and reassurance in the field of pharmacy and medicine are crucial.

Besides what you have already read in this paper about the Heart Function Clinic's success stories in using Telehealth, the BC Cancer Agency, applying Telehealth, did a great job in making a huge difference in the field of Oncology. The study's researcher, as a practising RN in Victoria herself, visited the Cancer Agency several times (as a nurse and as a patient's family member). During her many years of nursing practice in BC, she heard many stories about the BC Cancer Agency's success from physicians whom she worked with. Her recent interviews added to her knowledge. Because of the presence of this centre, many patients do not need to travel distances.

A participant said that, in the BC Cancer Agency of Victoria, there is a multipurpose room where patients can visit physicians and vice-versa. In this room, physicians can visit patients from Sooke, Santula, Grand Forks, Cranbrook, Creston, Golden, Centre for the North (Ontario), Alberta (rarely), Prince George, Masset, Port Hardy, Salt Spring Island, Fort McNeill, Port Alice, Parksville, Nanaimo, Mesquite, Gabriola (Gabriola is not a VIHA site), Comox, Cortez Island, Duncan, Campbell River, Bamfield, Alert Bay (when confidentiality is not a concern, since in this centre, they just have a huge board room, not a private one), etc. In many connections, Vancouver Telehealth plays the role of a bridge.

The above participant added that there is a specific Hereditary Cancer Program in Vancouver where a specialist counsellor from the program visits attending patients in the Victoria site to check their background Genealogy as a preventative measure. For example, if you are the daughter of a mother with breast cancer, through this program you have hope to prevent your mother's situation from happening to you in the future if you are genetically similar. This

participant also revealed that the presence of this centre has helped many patients and families not only to save money, time and extra expenses, as well as physician time and effort, but also was and is a great support to physicians', their patients', and patients' families' mental and emotional well-being. Using secure channels with great quality and privacy, high confidentiality and effective and efficient technical support plus appropriate reimbursement for the physician and services made this centre an excellent example and a great advocate for the benefits and advantages of using Telehealth.

A nephrologist is very positive regarding the advantages of Telehealth. He believed that Telehealth has many advantages, but the most important one for him was its speediness. Another participant, a cardiac surgeon, said that on average, he has ten to fifteen physician conferences per month. He said, "Videoconferencing makes it possible to prevent patient movement... and it facilitates expansion of care" (M-15-15-13, Page 67, Line 6). To him, a disadvantage was that "we don't have everybody in the same room" (M-15-15-13, Page 67, Line 14). He is among the group of physicians who prefer direct human interaction.

A specialist believed that Telehealth increases the number of patients he can visit within a certain time constraint, especially some repeat patients that do not need physical assessments, since they have belonged to the program for a long time, as described in the following quote:

The number one major advantage is that you can do consultations on a higher number of patients than you could had you been seeing them physically, so for a perioperative anticoagulation service, we would not be able to do the volumes that we are doing now if we physically had to see them; umm, quite often, these patients are repeat patients that

we've done five to ten times before, over the last twenty years, so that is certainly helpful (M-28-20-15, Page 78, Line 12).

This specialist continued and said:

Obviously, not all the cases can be rectified through Telehealth. There are some disadvantages, such as the fact that there's some situations where you may need to do a physical assessment, and obviously that's not, you can't do that over the phone currently (M-28-20-15, Page 78, Line 17).

He explained:

A physical assessment might be anything from measuring blood pressure and a pulse to determining heart rhythm.... Through our thrombosis clinic, we have a lot of patients with venous thrombotic disease and pulmonary embolisms when you sometimes need to look at the limb that's affected, among other things like Post-Thrombotic Syndrome. The other situation is we have a fairly high volume of post-operative patients where we're resuming anticoagulants, who may develop post-op bleeding: blood in the urine, bladder tumour resection, something like that, and sometimes it's helpful if you can actually see the colour of the urine, too, to determine whether it's a minor bleed that we don't need to do anything about or whether it's a more significant one, in which case we have to re-involve the urologist, so I would say that there's a weakness there in settings where you have to do a physical assessment (M-28-20-15, Page 79, Line 2).

He added that, fortunately, Telehealth is advancing, and solutions for problems such as these are forthcoming. He said:

Despite some challenges, there's a lot of information available now – power charts that we have access to that are very helpful medically, imaging, consultations from other specialists involved in the care and then sometimes, we are getting physical findings described to us over the phone by a physician from another community phoning us (M-28-20-15, Page 79, Line 7).

He said that, in addition to seeking help from other colleagues to learn about patients' situations at a distance, nurses can be an asset too. Nurses sent to patients' homes help to overcome Telehealth's challenges, as indicated in the subsequent excerpt:

Even though it's a small proportion, we do have some patients who are receiving home care nursing and then we can speak over the phone to the nurse who was able to physically look at the patient (M-28-20-15, Page 79, Line 11).

He went on to mention the Heart Health Program, which uses a lot of remote technology or programming and monitoring medical devices via secure Internet. He revealed:

The traditional way of caring for people plus the growth of the population do not let us [physicians] go to the other way [of in-person health care] if we don't make our system computerized. We just have one doctor and many patients (M-28-20-15, Page 79, Line 17).

He believed:

Maintaining the cost effectiveness of the system, that technology really increases access to specialty care in an efficient mode.... It's certainly really the only way to proceed in the

future because we've already learned that we have difficulty extending our health system at the same rate as the population growth (M-28-20-15, Page 79, Line 19).

The danger of long distance travelling, especially for elderly and sick people, is a great concern of physicians who are among top Telehealth advocates. Many participants of this research acknowledged that in British Columbia, there are cities where driving in the winter time is very dangerous and time-consuming. For instance, a cardiologist and a thoracic surgeon agreed that the Malahat is a highly risky place to be driving during winter months and can prevent patients from attending their in-person appointments. Likewise, a cardiologist highlighted that many of her elderly patients feel comfortable driving in their own town but they cannot drive safely or comfortably outside of their immediate area. Telehealth provides an opportunity for these patients to be visited by a physician within their own community or a place closer in proximity. A physician, as well as this cardiologist and a thoracic surgeon, all confessed that they'd like Telehealth if they make sure that patients' privacy is not going to be breached. A specific participant said if such a disadvantage as compromised privacy is solved, "Why should we not use it more frequently?" (M-21-00-01, Page 3, Line 12).

A male specialist believed that long distance communication in the form of Telehealth and videoconferencing changed his professional and personal life for the better. Now he can spend more time for himself and his family than before, which he indicated in the following quote:

Fortunately, UBC and UVic and VIHA have enough teleconferencing resources and it's far better to do a videoconference where I can actually see people and the technology is getting better than it is in an audioconference (M-20-10-16, Page 89, Line 14).

He revealed that technical issues happen, and since people do not see each other in an audioconference, it is very hard to manage a session. He iterated this in the following statement:

There are technical glitches. Sometimes I can't hear the conversation. It's getting better but sometimes I can't hear the conversation when there are a large number of players, so there could be fifteen or twenty people in a room and half a dozen or more microphones, ten microphones, and if they don't click the button, I don't hear them, so that's a potential problem. It's also difficult for me, when I'm regularly scheduled to give a report, then I have the floor, that's fine, but if I want to chime in with a comment, I have to get somebody's attention and then I do the comment and it's not as effective as if you're in the same room.... I don't like audioconferences because I just don't, I can't see the people I'm talking to and I seem to prefer more personal communication.... However, it's a necessary evil because otherwise, I would not be able to maintain the close communication ties that I have established by making sure that I regularly attend the teleconference meetings (M-20-10-16, Page 89, Line 5).

A female family physician believed that reaching out remotely, particularly in under-serviced populations throughout the country, is the biggest advantage of Telehealth, especially when the access is not limited to a specific time; however, she believed that it should never replace a physician's presence, because "that's going to be the gold standard" (F-07-07-18, Page 98, Line 10). Simultaneously, she thought there is a high possibility of breaching patient confidentiality. She felt really uncomfortable revealing her patients' identities or private lives and she also observes occasional miscommunications through some Telehealth tools.

A thoracic surgeon with six years' usage of Telehealth as a means of follow-up and a huge satisfaction with it believed that Telehealth is a good chance to consult and have an office meeting without the patient being required to commute long distances. These sessions enable him and his colleagues to inform and redo patients' medical histories. He added that his Telehealth visits help patients to escape from losing time, money and facing the dangers of driving. He expressed a key advantage of Telehealth in the following quote:

I think the main advantage is that the patient doesn't have to travel, so if the patient is close, there isn't much of an advantage. People that are up and down the island, in Comox, the West coast, Nanaimo, all those things, the big advantage is they don't have to travel down to us and so therefore they get all the benefits of that, meaning travel time, so their time, their cost in travel costs, and I guess you could work out some of the other things that go with it, including danger, given the fact that places [some highways] are a bit of a dangerous drive, particularly in the winter time, and then the green, environmentally sound benefits of it, not spending all that time driving cars, so I think those are the advantages (M-21-13-20, Page 107, Line 19).

To this surgeon, the other big advantage was that since the system is computerized, he doesn't need to carry lots of paper and a bunch of charts over to the hospital or to his office. He uses Electronic Health Records.

This thoracic surgeon believed that videoconferencing is a very useful tool for follow-up, although as a surgeon, he prefers to visit his patients in person before the surgery. He reflected this in the following excerpt:

I like to see them in person. I like to see how they move; I like to see how they essentially react and are and then a physical exam is part of that consultation. We do most of our consultations in the office and we do a lot of our follow-ups through the videoconferencing, so I feel like that's some of the limitations (M-21-13-20, Page 108, Line 8).

He believed that, for some physicians, it will not be possible to use tools like videoconferencing because of their need to physically, directly assess patients. In those physicians' practice, touching is the major method of assessment and gathering data. In the thoracic surgery field, however, medical imaging can assess patients' health concerns immensely, so videoconferencing is a more often used tool. Additionally, videoconferencing has the benefit for families with English barriers to bring their English-speaking relative(s) to the session without forcing them to travel great distances.

Despite these benefits, a disadvantage to Telehealth is described by the following surgeon in the subsequent quote:

We occasionally get patients who go to the wrong place and occasionally, we have patients who don't show up and I find that there's a slight disadvantage to Telehealth. When those things happen, it's more time-consuming for me because I'm the one responsible for solving those problems, not my staff, whereas if I'm in my office, I can just move on to the next person and they can sort those things out, so it's one of the minor difficulties with Telehealth is there's a little bit more responsibility of the physician to fill in when there's those glitches (M-21-13-20, Page 111, Line 13).

A male family physician who doesn't use Telehealth as frequently as his other colleagues believed that videoconferencing helps physicians in many ways. One of the most important of these, besides educating, is bringing all the patient's family members under the same roof when it comes to making a unanimous decision regarding patient treatment. Family members across the globe can connect this way. To him, one of the disadvantages regarding Telehealth pertained to the fact that it is a less personal way of communicating than in-person visits are, so when delivering serious news to patients and their families, in-person meetings are best. Also, most physicians were not sure that they can forego physical examinations in lieu of Telehealth because this is the most important part of medical assessment.

A female anesthesiologist believed that Telehealth has no disadvantages. She articulated this optimistic perspective in the following quote:

Well, I only see potential advantages because if you, you know, basically if you're on a secure line face-to-face with a patient.... I think the major advantage is the fact that the patient doesn't have to travel long distances in order to have a medical consultation (F-33-33-23, Page 123, Line 6).

An internist believed that Telehealth brought lots of advantages to his personal life and the field of medicine. He mentioned that many physicians can visit their patients through distance, especially the ones who do not need to do frequent physical assessments. This internist summarized his viewpoints on Telehealth's pros and cons in the following quote:

The obvious disadvantage is the inability to do a complete physical exam.... The advantages are: number one, umm, the patient doesn't have to leave their home or their

hospital if they're in a remote hospital. Number two, umm, so what are the advantages specific to that? Well if a person is disabled or in pain, it avoids them potentially experiencing more pain, frustration, the possibility of becoming injured as a result of being transported. Uh, hmm, number [three]: greenhouse gas emissions. There's a lack of a need to do four hours of driving in each direction, you know, on Vancouver Island, which people think is small. It takes seven hours to Port Alice from Victoria and seven hours back and that's a lot of gasoline, right? Even for a fuel-efficient vehicle it's a lot of gasoline and so there's an advantage to the environment, there's an advantage to less congestion on the roads because people don't have to transport themselves, even if they're living in the same city from one part of the city to the clinic if they could be seen this way (M-11- 07-24, Page 129, Line 20).

This internist added:

There are advantages, and then in my experience, Telehealth interactions take less time than in-person interactions. There is the advantage that the patient is seen in their own living environment, which provides additional historical data that can be helpful in understanding the patient's illness and how it interacts with the patient. There is, umm, a significant advantage for neurocognitively impaired patients and there is, uhh, plenty of research to support this, but neurocognitively impaired patients, when they have a whole bunch of extra stimuli, which is what happens when you're transported and in a new environment, they're not able to think as clearly as they are in their own environment, so uhh, you're able to get more accurate information from them (M-11- 07-24, Page 130, Line 7).

Finally, a male surgeon believed that videoconferencing with patients is easy and has lots of benefits. He stated:

It seems to be a very nice way to, uhh, connect with patients. Being a little bit old-fashioned, I do the same face-to-face contact in the room but I realize that for some of these people, they're coming two and a half to three hours for maybe, at most, five minutes of time with me, so we can do virtually all we need to do by the Telehealth, you know, asking questions about how they're feelings, you could get a sense of how they're looking. For us and our type of specialty, the X-ray imaging is probably the most important part of the whole process (M-11- 07-24, Page 131, Line 1).

A participant, who is close to retirement, revealed that visiting patients via videoconferencing may seem hard in the beginning, but it gets easier. He believed that visiting patients through Telehealth is much easier for him and takes less time and energy for him. Since he is an elderly physician, conserving energy in this way is particularly helpful.

As you may have noticed, the majority of physicians who participated in the study believed that the advantages of Telehealth outweigh the disadvantages. In the next section, you will see that some of the physicians voiced that privacy, system maintenance and support (technical issues), financial issues, reimbursement, unclear policies and procedures and governmental deficiencies lacking in full support of Telehealth have slowed the processes of the vast and quick spread of Telehealth.

7. Technical support, system maintenance and system installation

Working with electronic devices, for some people, is not as easy as for others. Moreover, technical issues happen unwantedly. For using Telehealth, system installation is mandatory. The installed system needs maintenance and support. Technical issues such as glitches or system malfunctions may happen when visiting via Telehealth. On these occasions, to be able to continue their visit, physicians need backup methods such as telephone connections with studio sites where the patient is present. Normally, after any problem, IT personnel will be reached and they'll guide physicians over the phone or while physically present in the studio to solve the problem.

The majority of participants in this study mentioned that they use big hospitals facilities. The ones who use the hospital's computers and Telehealth systems mentioned that they are not usually involved with system installation or system maintenance. Their satisfaction rate regarding technical support was totally dependent on which department they belong to. Let's read through the following paragraphs, hear physicians' insights regarding system maintenance and support, and see what they thought and find out what aspects of this made them satisfied and eager to adopt Telehealth.

A male family physician believed that IT support in the hospital is wonderful, and he never faces any problems, even though he considers himself technophobic and doesn't know much about technology. He exemplified that IT support can be so strong that it can triumph over a physician's lack of knowledge regarding technology.

A participant with skills in Systems & Software Development was happy with his Telehealth system's support. He described the potential for telemaintenance. He acknowledged that besides the medical and educational advantages of Telehealth, through videoconferencing, system maintenance can happen at a distance. His proceeding quote elaborated on this:

There are cases where, umm, something comes up, technical things, uhh, there are cases where something comes up with specialized hardware at a distance; you might be able to do some better troubleshooting if, you know, you see someone in a video troubleshooting and you speak with the person who's manipulating the functions on the digital gadget from a distance and maybe you can troubleshoot it faster that way than if you had to fly out to fix it (M-21-00-01, Page 4, Line 12).

A radiologist voiced his opinion on this topic and its significance in the subsequent quote:

The technical support and maintenance are very important. We don't do them directly. We have a team of people that do that, and we would not be able to function if we didn't. It's hugely important. It's expensive for that reason because it's a number of people that are involved but it's also for a huge number of users (M-26-15-03, Page 11, Line 18).

He said their job is very much dependent on Telehealth and long distance connections and communication and their department will be paralyzed if anything irreparably happened to the system.

Another radiologist mentioned that in their hospital, technical support, system maintenance and system installation in their department is ideal. According to him, nobody complains about anything within their department. He stated, "We have our own IT people that work with our

PAC system and that's different than the hospital IT department” (M-23-10-06, Page 34, Line 7). He overheard that the hospital IT and help desk is not as efficient as their internal IT department. He added that outside of the hospital, in private offices and clinics, financial issues are the biggest barrier to effective IT services.

From the perspective of a psychiatrist, who uses his private Telehealth service in his own office, some institutions "get themselves all wrapped up in bureaucracy” (M-15-15-04, Page 21, Line 13). To him, system maintenance and technical support in these institutions is very complex and problematic. This psychiatrist considered himself an individual provider, and said that a system with a good set-up functions with no complexity. He expressed his ease with Telehealth in the following quote:

I can now go on to Medio, I can go to GoToMeeting, I can go to 256-bit k encrypted servers in Canada and I have that criteria, you know, and I can have one-to-one with web RTC communications. It's easy, it's just like opening up a Web browser, so really, Telehealth can be as easy or as complicated as you want to make it based on whether you're intelligent and understand the system and the situations and by that, I mean as a leader to fill the system out, you should be understanding the legislation, the organization and guide them and say you need criteria like this (M-15-15-04, Page 21, Line 15).

A participant said that in his field, system installation is usually done in off-times and everything is pre-done by the company. He believed that technical support is “not too bad.” He highlighted a limitation in the following statement:

Sometimes, there's an hour or two delay because when we phone for technical support, it's always your phone call is queued, so you'll be answered in the appropriate time (M-41-41-05, Page 28, Line 18).

A female pharmacist was pleased with the system installation and maintenance. She said that they have their own specific IT team, who are fast and efficient, especially in crises. She explained that the big companies or contractors will do it and since it entails telephone and facsimile, it is not expensive. She believed that computerized devices and software make the job easier, faster and more accurate. She said that PharmaNet (an electronic health record of medications) in BC, for instance, improves customer service, makes the claims procedure easier, and reduces errors dramatically. She described this in the subsequent quotation:

PharmaNet is a province-wide network that connects all BC pharmacies to a central set of data systems. This system allows doctors and pharmacists to see all previous prescribed medications within the province. Keeping records with this system is easier and communications are more efficient. These computerized systems enable pharmacies to be a bridge between doctors and patients (F-04-04-07, Page 44, Line 3).

She believed that their efficient system, with its wonderful technical support, has helped her and her colleagues to save everyone an extra step by passing information from the patient to the physician and vice-versa.

For a nephrologist, installation and maintenance services in hospital were most effective in the last five to ten years. He said that for using devices, there are pamphlets and you can even go online – it's straightforward – for directions for the purpose of education. He never faced any

serious challenges working with the system, not finding IT people being uncooperative or being slow. In total, he was very satisfied.

Not having the courage or enthusiasm to install videoconferencing devices was predominant in the minds of some physicians. They were not only considering the financial aspects of installation, but also were afraid of being restricted in the maintenance and technical support components. A participant explained the potential barriers to be overcome in order to use Telehealth when he said:

I don't have any ability to teleconference or videoconference here. I guess I could, but I don't have a camera on any of the – on the computer or the television in my office, so I guess I couldn't do teleconferencing or videoconferencing here, so yeah, there'd be a cost, I guess, associated with it and then a technological hurdle to get over, too (M-18-07-14, Page 75, Line 7).

Like the majority of interviewees, a participant believed that Telehealth and technology are “always getting easier” (M-18-18-14, Page 75, Line 11) and that patients face more difficulty with it than physicians, typically. Unfortunately, such an educated doctor has no idea about where to begin in order to have a Telehealth facility in his office, cost support, or maintenance. He wished to have that but has no time to seek it.

A cardiac surgeon believed that using computers and videoconferencing in hospital is easy. He was not sure if he could afford financial and technical support the same way in his own private office. He stated his contentment with hospital-based Telehealth, as indicated in the following quote:

At least the way it's set up here at the hospital, it's convenient, we have an IT Department that sets everything up for videoconferencing, so all I have to do is walk into the room and turn the lights on, so there shouldn't be any barriers to that because almost every hospital at least will have IT endeavours (M-18-07-14, Page 75, Line 2).

He expanded on this by noting potential drawbacks when he stated:

If [he] didn't have access to the hospital across the street, it would be harder if [he] wasn't – if somebody isn't comfortable with computers and teleconferencing.... It's not easy to use it or afford it (M-18-07-14, Page 75, Line 5).

A specialist pharmacist believed that technical support and maintenance are the foundations of Telehealth. Policymakers and sponsors ought to dedicate a huge amount of money and resources to Telehealth. He believed that the dispersal of Telehealth and acceptance by health care providers would increase if the IT Department were more advanced and effective. He explained that to use Telehealth, one has to be self-sufficient, as indicated in the following quote:

We have a little bit of a fragmented approach. I know that for our system that we've established for all of our service, in the hospital, is that we got little to no help from the IT Department and we basically had to do the research on our own and kind of develop our own system of doing it, but I think right now, it's probably fragmented among all the departments overall and there's no office that you can call to get help; if you need to use some sort of technology, you need to figure it out for yourself. If there is such a service, I'm not aware of it (M-28-20-15, Page 86, Line 12).

A participant who used to be a programmer believed that technology is vulnerable and system glitches happen on a daily basis. When it comes to emergency situations, the condition may become worse. For instance, if some major disaster or serious weather conditions happen, the health care system will be paralyzed, especially in the areas that are very dependent on telephone, fax and computers. He voiced this concern in the following statement:

I would say that within the technology within [the system], I would say that about half of the time I would be satisfied with the technical assistance and support. Still, it's sub-optimal and we sometimes have periods of time where the computer systems are not functioning properly, whether it be a fax machine or access to the power charts and so on and I think that's also a bit of an Achilles' heel to all of this if you have technology failure and you depend on the technology to do your job, you can be, you know, sometimes when there's a power outage or something happens or some network issue or problem causes us to have technical problems, we are really paralyzed when our computers or fax machines are not cooperating with us (M-28-20-15, Page 82, Line 16).

He continued by explaining a lack of technological back-up for Telehealth in case of mishaps in the subsequent quote:

Sometimes, we've had situations where there's been a big storm and the phone system actually becomes overloaded that you can't, like when there's a big snow storm for example, a lot of people are phoning and I've had scenarios where I've tried to phone a patient, but all the telephone circuits are busy and I think if ever there was a natural disaster like a large earthquake or tsunami or major weather, that we are still not too well-

prepared in terms of redundant technology because even a snowfall will put our phone system out (M-28-20-15, Page 83, Line 1).

Defending Telehealth as the only remedy for overcoming the huge demand of a growing population, the participant added that major disasters do not exclusively impact Telehealth, a point which is addressed when he stated:

It's going to happen to the traditional way of caring as well if we have such a major disaster. Patients and physicians in this case would be unable to reach the hospital (M-28-20-15, Page 83, Line 8).

A female cardiologist described the relative lack of technological glitches experienced by her and her preparation for any system failures, as expressed by the following quote:

In our department, technical problems happen rarely. If such problems happen, it does not impact my visit. We have backup systems.... We use telephone and a trained nurse on the other end, the nurse who is with patients in other studios, listens to the patient's heart beat and reports it back to me. This nurse also takes responsibility to walk us through the phone visit (F-11-06-12, Page 63, Line 4).

Lately, this cardiologist and her team – in clinic – had some issues with the videoconferencing line and the cable was replaced very fast and the problem was solved quickly and easily.

A female pharmacist said that repair and maintenance are much quicker nowadays but subject to variability, as emphasized in the following quote:

It depends, if it's our PharmaNet database [that's down], then sometimes it's down for a few minutes, sometimes it's down for a couple of hours. If it's your own personal computer system here and there's something wrong with it, again, it can resolve quickly or sometimes you have to call in a technician to get it in (F-31-31-17, Page 94, Line 19).

A female family doctor believed that the access to IT people in the hospital is much easier than outside of it. She mentioned that the cost of system installation, maintenance and technical support is a noticeable concern for physicians when outside of the workplace. She said:

So access within the health care system is good and timely, so technical support is good, but outside, you must spend personal money for that. Umm, outside, I mean if you're thinking, so this is just within the hospital system, but if I'm thinking about the office setting or home office setting, hmm, if I go home here and need to do some work, technical support can be time-consuming, can be costly, and can be frustrating because you're maybe not reaching the person that you need to to solve your problems (F-07-07-18, Page 98, Line 17).

An ophthalmologist did not give credit to technical support and suggests that the presence of more teamwork in IT is necessary. He believed that the cost and time loss bore by the clinicians, physicians, and patients contribute to physicians' refusal to use such technology until it becomes mature. He went on to say:

Physicians are hesitant because most of the cost is born either in terms of direct cost for infrastructure, even if that is covered by the public health care system, the cost in terms of loss of time because of wasted time, which is down time is not, whereas the traditional

form of delivery of care, one person is a no-show then there's a very good mechanism for another person to be there, but in Telehealth if you have another appointment booked and nobody else is available at that time because that time is booked (M-20-15-19, Page 103, Line 17).

A thoracic surgeon evaluated Telehealth by his patients' willingness to use it. He said that there are some glitches and technical issues; still, patients prefer not to drive to their physician's office, and use videoconferencing with high-quality visual and audio details. He seemed very pleased with the technical support and telephone back-up (in case of videoconferencing glitches) that he has. He said:

I think the, uhh, generally the support has been good. There, over the years, there's only been one or two sessions that I think we've had some real technical glitches in and if we have, it's usually just been with one site, so I have had a couple of times where, let's say, a Campbell River site, you know, and the few patients that I had, I missed one or two of those because of a glitch and we've had that for a few different sites at a few different times, some of which have been corrected during the time, some of which have not, so you know, I would say due to technical errors there have been a few patients that have been missed with the videoconference; however, with those patients, if there is a problem with the videoconference, then I have a conversation with them on the phone, so you know, it's not gone by the wayside, they haven't missed their appointment and caused rescheduling issues, but it's taken away that element that we're actually looking at each other, which is kind of what we're going for in the beginning, but I would say that the loss due to technical errors or technical, not errors but technical failures, you know, is

probably less than five percent – it's quite a low number. They've [IT people] generally been responsive very quickly, yeah I would say they have been good (M-21-13-20, Page 110, Line 18).

An internist who is very involved with Telehealth believed that he and his colleagues grapple with different challenges with systems that can be overcome very easily, as expressed when he stated:

It depends on the system, right? I find that it's challenging to schedule Telehealth using the Island Health Polycom system. It's challenging to – you usually need to have someone come in and set it up for you. It's challenging in that there have been situations where the hardware has not worked as expected, so those are some basic challenges. On the other side, what's very challenging is actually getting the patient into the right spot for Telehealth, and usually that happens in coordinating the patient being ported from a room to the Telehealth site if it's a different hospital, or having the patient come from their home to the hospital Telehealth site. That's why I prefer the direct-to-patient method where you can use Skype, FaceTime, Medio or any other system that provides the same direct video link and that way, you can go right into their home. I find that one of the problems when you're using direct video link has to do with bandwidth – if the person's got crappy bandwidth at their home, then you can end up with choppy reception, which can be a problem, but nowadays, people tend to have pretty good bandwidth because we've got good ones in most parts of the populated part of Vancouver Island and finally, there are areas, particularly First Nations areas, that have very poor access to Telehealth

and that's usually because there's nothing that close to them and they have very little, if any, bandwidth and less data (M-11- 07-24, Page 131, Line 3).

A sixty-nine-year-old male surgeon found system maintenance, installation, and support to be highly effective and efficient. He pointed out that the people in charge of setting up his system were concerned that it might be difficult to maintain, so they made it simple for him to use by providing all their skills for its maintenance. He went on to say that from time to time, he and his colleagues will have minor system malfunctions with their contacts but that the support has been very strong. He has phone number resources in order to connect with IT support when he's in need of assistance. He said that people who have just been trained with technologies are very comfortable with using these interfaces. He said that you have to use these systems repeatedly until you become familiar with them and they become second nature. He was insistent that this system he and his colleagues use is was very simple and not overly problematic.

The researcher, as an observer nurse, attended several physician-patient videoconferencing sessions in different hospitals and clinics. She found the quality of audiovisual systems excellent and the computers and systems used by physicians are, to her, as a previous computer engineer, very up-to-date. On just one occasion in one of the sessions, there was a problem that was quickly solved by the physician simply by calling the help centre.

Reading the above comments gave you an idea of just how satisfied participants of this study were. It seems that most of them were satisfied and thought that, in real settings, technical issues often occur. The response may not be as fast as they wish, but considering the fact that Telehealth has helped physicians and their patients reach each other faster and easier than before, they were

willing to ignore and forgive shortcomings. The next section will describe physicians' opinions regarding the traditional way of learning versus Distance Continuing Medical Education.

8. Distance Continuing Medical Education Vs Traditional Classroom Setting

Constant learning and upgrading of their knowledge is a mandatory part of a physician's professional life. Most physicians and health care providers still prefer the traditional way of learning. Human interactions and having the opportunity to put their hands on in practice are the main reasons for favouring the classroom setting. Unfortunately, the busy life of man in the twenty-first century does not let these physicians enrol in in-person classes as much as they wish. Some classes are far from physicians' original residences and/or more expensive, requiring them to spend their time and money on it. Reading the following lines informs readers that none of the interviewees were against DCME, especially nowadays when they use it to learn from their senior physicians and educate their patients much easier than before. As you've learned from this paper's literature review, these classes of use are very convenient and available from any location, especially recorded ones which are not restricted to a specific timeframe. DCME classes that broadcast have the ability to involve more sites and more people than traditional methods, the latter of which is restricted to the size of the room being used. The following comments from interviewees will give you more information regarding the usefulness of both methods.

A participant explained reasons why DCME is preferred by him when he said:

I like the fact that you don't need to go anywhere special to do it and also in a lot of cases, you can do it at a time that's more convenient for you rather than at a specific scheduled time and place for a physical program (M-21-00-01, Page 2, Line 12).

A pharmacist specializing in Oncology said that for many years now, he teaches physicians through Telehealth. He never thought about the educational potential for patients, medical students and specialists, as seen in the following quote:

I hadn't thought about that before, but I guess also for medical education, having the video link is one thing but having the equipment where you could remotely train people on actually using equipment that has digitizing that's connected to Telehealth might be good for doing semi-hands-on medical training as well (M-21-00-01, Page 4, Line 4).

A participant said that he educates himself mostly through hospital experience. He said:

Umm, for me, it's experience-based learning with each clinical situation but, umm, here the Electronic Medical Record, my Bible, umm, gee, it has everything. It has a reference right on the power chart that you could look up on for reference of anything you need to look up (M-35-00-02, Page 8, Line 20).

The positive perspective of a specialist who supports distance classes was completely clear with his answer about using Continuing Medical Education, as the clinician voiced in the following quote:

Yeah I have [enrolled in DCME] and they are way more convenient because you don't have to travel. It's the way to go – it's the way everything will be (M-26-15-03, Page 12, Line 6).

Another physician who did his entire Master's of Health Information Science through Distance Continuing Medical Education (DCME) adamantly believed it is more convenient than traditional classroom methods.

One of the interviewed physicians said that no matter what profession you belong to, upgrading knowledge is mandatory and necessary. If you cannot attend classes physically, live stream videoconferencing is very beneficial. A pharmacist believed likewise, but he added that "quite often, in person classes are in an inappropriate time" (M-41-41-05, Page 27, Line 4).

An ophthalmologist said that in their field, there is a huge video library that they can refer to and watch the latest techniques at their convenience. He believed that it's better to live stream videoconference because some physicians, due to the busy nature of their jobs, cannot attend, even though he believed that once in a while, attending face-to-face classes and conferences is refreshing. He believed that traditional ways of learning are ideal but they're not widely accessible the way that Telehealth is. There is store and later review technology such as video recording that you might see on YouTube that is less effective but much more widely available, making it helpful for public and professional education and use. He added:

There is limited access to real-time CME availability of – there's a huge, huge video library available for surgical techniques for demonstration of various aspects of health care delivery and it's also valuable to the patient's education for that but that's not real-time, it's stored and then renewed (M-20-15-19, Page 103, Line 3).

A radiologist believed that the advantages of distance continuing education are numerous. Most importantly, it allows people to avoid travelling. He preferred to partake in traditional education but physicians' lifestyles and busy schedules do not always permit this, and that is when distance education can fill the gap.

A sixty-four-year-old pharmacist said that fortunately, younger generations of pharmacists in school have access to different software that are very beneficial for them. This software makes education much easier than before. He continued and said, "Prior to 1992, we weren't using videoconferencing" (M-23-10-06, Page 33, Line 2). He acknowledges that, in their field, normally, there are between fifteen to twenty one-hour online exams as distance continuing education that allow pharmacists to upgrade their knowledge while passing courses to get certification. These courses are very convenient, educational and the passing grade for them is 80%. There are also five to six traditional face-to-face classes per year locally. He said there are advantages for that type of education too because they are provided with dinner (as he laughed) and disadvantages when we are on our shift and cannot attend.

A female pharmacist said that renewing her license yearly requires attending online and in-person classes. As a young pharmacist, she found that fifteen hours of online classes per year is easy, especially since these online resources take participants through a teaching module and there is a quiz at the end of it. She mentioned that some of them don't even have a quiz. She liked the ones with a combination of the two methods (of face-to-face and online education). Ones with an online component before a one-day seminar of the topic are ideal and beneficial for consolidating her learning. She highlighted that online classes are more convenient for her than the traditional method, as explained in the following:

I find I take in information better that way, when I can kind of spend time on my own studying, rather than sitting in a classroom being spoken to and not necessarily having the time to go over it myself (F-04-04-07, Page 43, Line 8).

She added that the travelling required of the in-person method to another city, booking a hotel, spending time and money, wear and tear of the vehicle and fuel consumption, as well as limited parking spaces and pollution of the environment are all downsides to the traditional classroom method. She explained more and said that she and her colleagues are pleased with continuing medical education, since they can upgrade their knowledge and attend classes at their convenience and at their own pace. A positive aspect of these courses is that pharmaceutical companies who want to promote themselves pay to sponsor the distance education. That said, there is a negative aspect to this as well because sponsorship may bias pharmacists when drug companies portray their products in an unrealistically positive light and refrain from impressing upon pharmacists the negative side effects or costliness of their drugs.

A full-time seventy-two-year-old assistant surgeon with a background in pathology believed that the Internet makes learning easier than before. He thought positively about DCME while still having faith in the positive aspects of the traditional way of learning, as indicated in the subsequent quote:

I find DCME much more convenient than traditional methods. Telehealth enables people not to leave their homes. It saves time and money.... Well, I think there's some advantages of personal contact in your profession or others in related disciplines and so I think the exchange of ideas and thoughts is sometimes better done in a person-to-person manner in a context where the actual people are there with each other, so I think there's still value in that, but day-to-day, the use of the Internet or the media of various types to contact when texting, email is much more convenient and the transfer of information happens much more quickly (M-40-10-09, Page 50, Line 13).

He acknowledged that, nowadays, in the surgery room, doctors utilize videoconferencing as a part of their teaching method for residents and students, and some use it more than others, but it is irrefutable that everybody uses Telehealth to a degree. He believed that the older you are, the more likely you are willing to use the traditional ways of teaching and learning. He added that younger generations are very familiar with texting, emailing, Tweeting, and other kinds of media and some, like him, still prefer phone if there is no face-to-face meeting possible. He stated that learning an appropriate amount of information that will not be too little nor too overwhelmingly is the key. He said:

If there's a downside, it might be that the transfer of large amounts of information requires ability and time to process that, so sometimes, the amount of information being transferred, its demands on time can be overwhelming, too, so one danger is too much and is just spent with information and not patients, you know what I mean? So you can spend a great deal of time on social media in a learning capacity and that might take away from time spent with patients on the ward or people in need, so it's all about balance when you're dealing with people requiring medical help (M-40-10-09, Page 54, Line 9).

A female pharmacist with twenty years of experience and an average of sixty patients per day (about half of which are Telehealth patients) and forty times per week of direct phone conversation with physicians in the field of transplants (kidney, heart, etc.) strongly believed that traditional ways of learning do not work for her. She revealed that constant studying through DCME is mandatory for her to upgrade her knowledge and to be able to safely practice. She does use traditional methods to present locally, but she hugely benefits from self-studying sixteen hours per year, which is mandatory for her credits, and more for personal gain. She said new

stuff comes up each day, "like this Wednesday, we have anticoagulant presentations" (F-20-04-10, Page 56, Line 12). She mentioned that she is not opposed to traditional ways of learning, but there is simply no time for it. She added, "I study online for that before presenting, and having time to go to that presentation consolidates my distance learning" (F-20-04-10, Page 56, Line 18).

A nephrologist likes DCME classes very much, as illustrated in the following excerpt:

There are rounds that are province-wide rounds that are weekly and they're by video link and then there are biopsy rounds that are three months that are video-linked with our colleagues in Nanaimo and in terms of the grand rounds here, they're also video-linked (M-15-15-13, Page 69, Line 7).

He voiced that to him, there is no difference between traditional and distance education because "it's a lecture whether I'm hearing it directly or on a video link" (M-15-15-13, Page 69, Line 11). He believed DCME does an adequate job of teaching, while preventing travelling and spending money and time. He continued by saying that DCME is not only beneficial for physicians but also for patients. There are many patients that forget their list of medications or instructions from their physicians; they can then look at the video links to refresh their memories on a daily basis.

A specialist pharmacist who is in charge of teaching many other health care providers (other pharmacists, physicians, nurses, respiratory therapists, etc.) believed that distance education is an essential part of being a health care provider because it is required in order to upgrade one's knowledge and renew one's practising license. Unfortunately, the financial aspect of distance

education is subject to bias because it is often funded by industries who want to present their products in a favourable light. He said:

There's really not public support or funds available for these people [health care providers], so there is sometimes a level of frustration with professionals that sometimes feel their employer is not supporting their need for continuing education, so in terms of not having any dollars available.... There's sometimes ethics around, ethical issues around continuing education (M-28-20-15, Page 85, Line 20).

With all the problems in the way, he still advocates for DCME and simultaneously gave credit to traditional ways of learning. He acknowledged that:

WebEx is quite a popular way now for continuing education, and I've presented many WebExes and televised or recorded presentations, so yeah, it's certainly the way of the future for Continuing Medical Education. Yeah, I mean, there's advantages and disadvantages. The advantage is you can reach a larger population and have economies of scale. When you're doing a traditional PowerPoint presentation lecture, it takes just as much to do ten people in a room as it does a thousand people in an audience. On the downside, it takes away that aspect of physically interacting with the attendants, for them to ask questions and have some dialogue. Sometimes, case discussions are a useful aspect and that can be dampened when you can't physically see those that you're communicating with (M-28-20-15, Page 83, Line 18).

A cardiologist believed that Continuing Medical Education is necessary for all health care providers. She herself frequently enrolled in person or distance education and as a teacher, traveled to different cities and locations to educate physicians and nurses. In the Heart Function Clinics, several educational videos were shot from physicians' and patients' feedback regarding their Telehealth experience. These videos are available online for medical and nursing students and patients who want to learn about telecardiology (telecommunications to achieve the remote diagnosis and treatment of heart disease). She mentioned that, fortunately, in British Columbia, the media validates this clinical effort and has tried to promote telecardiology as a solution to solving the high demand in this field.

An internist believed that all the physicians on a daily basis use the Internet to educate themselves and attending DCME is more convenient than traditional classrooms, as the following quote revealed:

Everybody uses the web to educate themselves. So I'm constantly looking things up on my cell phone or the hospital computer or my home computer and I use Up-To-Date and PubMed and whatever other resources are available. That's to do clinical medicine and answer clinical questions (M-20-10-16, Page 88, Line 8).

A participant believed that using the Web for upgrading knowledge is very convenient, as revealed by the following quote:

It's convenient to use, so in terms of continuing education, the advantage of using the Web is the fact that you can do it on your own time, you don't have a time constraint, and

it's convenient at home, you can start and stop, that kind of thing (F-31-31-17, Page 94, Line 4).

A female family physician said that nowadays, DCME is part of their routine in the hospital. She explained that between hospitals, videoconferencing is used by groups of family physicians to share their knowledge, expertise, and rare cases. These sessions are more convenient than the traditional ways of conferencing and create a great opportunity for all of the practising physicians in the hospitals (house doctors) to upgrade their knowledge without leaving their place of employment twice a week for an hour per session.

This family physician believed that the education of patients via tele- or video-conferencing and giving them a pdf or printed version of a hand-out are the “only safest ways of education.” She revealed that it is risky to refer patients to websites to obtain information on their illnesses because those with no medical training tend to have a difficult time knowing whether or not a site is credible. This can lead to their being misinformed, a point that is highlighted in the following excerpt:

People who are – have no medical training wouldn't know how – often don't know how to decipher what is a credible website and what isn't and so then, they can receive misinformation about whatever they're looking up, so I think there's a lot of misinformation if you're doing it independently, you know, in my mind the gold standard for imparting information to patients would be hand-outs (F-07-07-18, Page 99, Line 16).

A physician said that DCME is a requirement for most physicians and pharmacists to accredit their practising licenses. Surgeons in BC need to pass yearly DCME courses with the Royal

College of Surgeons, and most of them are fortunate and happy that they can do so within their busy schedule through distance at their own pace. When this participant was asked about his preference regarding DCME versus traditional classroom methods of education he expressed his ambivalence in the following quote:

I don't have a preference, you know, it all depends on what the subject is. I go to lectures, I go to meetings, I go do stuff online, I do a lot of my own practice reassessments, which are done through my own records and charts.... I wouldn't say I have one preference or another (M-21-13-20, Page 112, Line 19).

A professional doctor with a long history of teaching preferred traditional ways of learning and teaching. He believed that teaching his students at a board and immediately after, having them do hands-on practice to reinforce what they've just learned, giving them an opportunity to consolidate their knowledge by doing physical assessments is priceless. He stated:

I'm involved in primary education of physicians in training, mostly, and they have a lot of electronic means of learning, but personally, I prefer what I do on Wednesday afternoons, which is to sit down with them and to teach them at a board and then take them to the bedside, show them physical examination skills, and talk about stuff. I much prefer to do that (M-20-10-16, Page 91, Line 21).

He added:

I haven't very much experience with taking courses online. I mean Continuing Medical Education, however it is, there's a lot available out there. Probably, I'm interested in picking up some Continuing Medical Education credits by doing things online. It's a lot

more convenient than having to go to San Francisco, to fly there, to get a place to stay, attend the hours of lectures and then come back. It's probably a lot more convenient to pick up small bits of that in my spare time (M-20-10-16, Page 92, Line 2).

A female anesthesiologist liked DCME classes and found them very useful. She mentioned:

I have enrolled in CME as an instructor and a student.... I've been both a student and an instructor.... I've been using this service for many years.... We use it all the time to get lectures from Vancouver and things like that, so that we can have our own CME lectures and they're linked in to the rest of the island, so people can have a look at them if they want (M-20-10-16, Page 124, Line 11).

Comparing DCME and traditional ways of learning, a very young physician who is very active in visiting his patients via videoconferencing expressed his idea in the following quote:

I like the traditional way better. It's a lot better to be in the same room as a group so that you're really participating in the offline discussion. People you're sitting next to you can talk to. After the presentation, you often talk to the presenter. A lot more you get out of it, being in the room with the presenter. With that said, you still can learn stuff from distance education and for some things, it's much more convenient because an expert may only be available in a place like Vancouver, which is not exactly easy for someone living here to get to (M-11-07-24, Page 128, Line 10).

To sum up, the DCME followed by a short session in a traditional classroom, even a one-day classroom, for a group discussion or possible hands on practice, is the ideal of many physicians. As was said by a clinician, "Learning an appropriate amount of information that won't be too

little or too overwhelmingly much is key” (M-40-10-09, Page 51, Line 18). Keeping balance in life is hard, especially in such a demanding field as medicine. By many who seek this balance, DCME may be considered a good resolution to give needed information and connect physicians to each other, as well as connecting them to their patients. For them, it also may be seen as easy-to-grasp, fast, and convenient; however, this idea has its own critics. These critics are always worried about privacy, confidentiality, security, quality, and adequacy of its technical support. The next section discusses concerns physicians may have pertaining to Telehealth.

9. Physicians' various concerns and thoughts regarding Telehealth

Since the beginning of the utilization of Telehealth, many concerns have arisen. The concerns involve financial support, service fees in general and physicians' payments, the development of new and appropriate policies and procedures, the establishment of new studies and computerized sites, the physicians, people, and authorities' reactions and rate of acceptance of Telehealth, the worth of using Telehealth for investing money on it (if the value of the technology's implementation matches or exceeds its initial cost), privacy and confidentiality of the system (which will be discussed in section ten), technical supports, and many more. In section five under the category of the advantages and disadvantages of Telehealth, readers became more familiar with some physicians' concerns. The following lines and next chapters will reveal more about physicians' different concerns and thoughts.

One of the physicians thought that the implementation and spread of Telehealth's visits is not as easy as some believe. As previously mentioned, he said:

The public would be wondering if they're going to get good enough quality of care through Telehealth rather than seeing a doctor in person. The government is going to wonder if their tax dollars are well spent on Telehealth, seeing as there's a lower level of connection between the physician and the patient. Doctors are going to wonder if they're able to get enough diagnostic information through Telehealth, which I think depends a lot on the conditions being diagnosed (M-21-00-01, Page 2, Line 16).

A radiologist said that he used Telehealth for many years. He liked the fact that he can read medical images from many places (Salt Spring Island, Vancouver, and other areas) while residing

in his own office in the hospital. He wished he were able to have this facility in his own home, but it is very expensive to install and maintain. He explained, "In the hospital, IT people will come quickly for repairs, but from home, no such financial support and speed of service is available" (M-23-10-06, Page 35, Line 7). He continued, "There is some financial support through the Doctors of BC to buy equipment for your office" (M-23-10-06, Page 35, Line 12). He has no problem with service fees and said, "There is something in the Doctors of BC fee guide that allows people to get compensated for phone consultations, there is a thing like that" (M-23-10-06, Page 35, Line 16) (For more information, please look at this link: <https://www.doctorsofbc.ca/resource-centre/physicians/handbooks-guides>).

Not every physician agreed with the above radiologist. One of them said, for physicians and some surgeons who give different kinds of services such as texting, emailing and/or phone consultations (using Telehealth), there is no computerized system to track their phone or other types of distance communication. Often, there is no fee code for their services and it is not possible for a doctor to personally keep track of all of his/her activities and claim it through the Doctors of BC fee guide. These physicians prefer not to claim it due to time constraints. "If we cannot track it, we prefer not to bill it" (M-23-10-06, Page 36, Line 5). When it comes to the satisfaction of reimbursement, many physicians repeat the same sentiment that they cannot do it for a long period of time without being paid.

Even though some physicians have concerns regarding the cost and maintenance of the system, a psychiatrist believes that one-time installation with a supporting professional IT team is the solution to reducing physician concerns, as indicated in the following quote:

Let's get your IT team on top of it and really make sure that they do it properly and then make it simple. In the community, you can do it and you still meet all criteria and you're just as safe as anyone else (M-15-15-04, Page 21, Line 20).

The above psychiatrist continued and said that the cost of installation of a Skype-like kind of set-up for physicians is cheap, but it's not recommended due to security criteria. He personally pays \$150 per month for Medio and \$50 per month for GoToMeeting and it doesn't cost the patient anything. He said that some physicians who need to do more complicated distance procedures such as attaching stethoscopes or other accessories may pay more. For health-authority-based or organizational and hospital-based facilities, he pointed out that you'll be paying hundreds of thousands for a simple studio. These organizations pay more for having wider bandwidth and training staff. Especially for videoconferencing and telesurgery sessions, there is a demand for increased bandwidth, which can be costly. He stated that decision-makers need to be aware of the capabilities of Telehealth. If they know what kind of benefits Telehealth has to the field of medicine they will dedicate more money and support it more strongly. To back up his claim, he brought a sample from telehome care. He said telehome care prevents the elderly and complicated medically ill patients from visiting hospital frequently. Telehome care enables them to stay at home and save 70% of costs. He said:

Telehealth lets me be able to sit at my control centre with my team and send out people to provide that care, where I can see one hundred people in a day and provide that care (M-15-15-04, Page 24, Line 2).

This psychiatrist has about a thousand Telehealth meetings per year and he gets reimbursed through the Provincial Medical Services Plan in BC. The cost gets covered on a fee-for-service

basis and there hasn't even been a single issue for him. He advised other physicians not to be worried anymore about Telehealth reimbursement and encourages them to use it. (If interested, please see the following link regarding reimbursement via the BCMA Guide to Fees:

https://www.doctorsofbc.ca/sites/default/files/fee_guide_uploads/medical_legal.pdf)

As you learned, pharmacy, by its nature, is one of the jobs where the pharmacists spend many hours on the phone, fax and sometimes email. There is no major reimbursement for these services apart from a fixed daily payment. When it comes to educating themselves, there is no financial support and they have to pay out of their own pockets, except the few sessions that are sponsored by pharmaceutical companies. A pharmacist said that "anything you do using the various means of getting information and continuing education is all at your own expense" (M-41-41-05, Page 29, Line 15).

Another radiologist mentioned that using Telehealth in any form makes the process faster, more efficient and more convenient, especially money-wise. Unfortunately, telephone conversations have no reimbursement typically because physicians "tend to be so busy that people often don't bill it because it's not that much and they don't want to take the time, so they just do it for free" (M-23-10-06, Page 34, Line 1). This radiologist mentioned that any telephone call from a BC physician has an associated fee, whereas a nurse's call does not have any related cost. The former is through a billing service to the government, if physicians have time or are willing to record it. He said that he does not believe that different kinds of software help to minimize costs for physicians in furthering their professions. He mentioned, "My hunch is that [Telehealth] is more expensive, so if I were private and had to pay for this, it would be very expensive" (M-23-10-06, Page 36, Line 1).

A female pharmacist believed that even though usage of technology has become less difficult, it cannot advance very quickly in the pharmaceutical field, "not for another decade or so." She added that the field of pharmacy is not as fortunate as other medical fields in receiving reimbursement for Telehealth. She simply stated, "We don't get reimbursed" (F-04-04-07, Page 43, Line 17). She frequently uses fax and telephone at work, and there is no system in place to cover these costs. She mentioned that telepharmacy and Telehealth still need to progress because of computerized programs that are not yet interconnected. For example, she said:

A lot of doctors now have electronic prescription systems; they're not transmitted electronically, but have an electronic filing system. It's not transmitted to us electronically, unfortunately, they have to print it (F-04-04-07, Page 45, Line 8).

Conversely, it seems that reimbursement for telephone consultation is not as bad as some physicians mentioned. A surgeon informed that in their field "there is some compensation for telephone consultation nowadays. There never used to be; it's a fairly recent change" (M-40-10-09, Page 52, Line 12).

An on-call nephrologist with fifteen years of experience in his field, using Telehealth frequently, strongly believed that Telehealth and different kinds of software help to minimize costs for physicians in furthering their professions. He postulated that Telehealth brings huge flexibility to the world of medicine and nowadays, physicians, colleagues and patients can reach each other more easily and quickly. He believed the government needs to focus on allocating money on services that are not redundant. For instance, while he and his colleagues are present as on-call specialists to field calls, the government wrongly initiated another plan unnecessarily. He repeated himself and said that the value of technology implementation matches its initial cost,

stating, “I think we’re getting reasonable value for the money for it” (M-15-15-13, Page 70, Line 14). He explained that in his job, he continuously phones his patients and phones again and again to follow up with them. Before, he wasn’t able to receive money for this service, but he never stops using it. To him, at that time, it was worthwhile to do so in a way that saves much more money in areas such as travelling, fuel, parking, time off work, emotional impacts and family separation for both physicians and patients. He added that there are environmental benefits as well due to reduced fuel consumption. He was opposed to the idea some physicians have of not receiving remuneration these days for Telehealth because he is able to receive money now using a fee guide for MSP in BC, as articulated in the following excerpt:

It's MSP's guide to billing and it's a physician billing guide and it has several fee codes for Telehealth. When you have Telehealth, they [physicians] fill that and then you get reimbursed.” Contrary to the aforementioned female pharmacist, he even said that he receives money for enrolling in DCME, claiming “we're required to [get reimbursed] and it's something we can document and so you can use your app for a main port for Continuing Medical Education classes (M-15-15-13, Page 70, Line 20).

A cardiologist mentioned that he receives reimbursement for telephone conversations and he is very prepared to embrace videoconferencing technologies in his office as well, if Telehealth advocates for itself and facilitates the process of installation, maintenance and technical support.

A specialist pharmacist believed that the value of Telehealth technology matches its initial start-up and maintenance costs. He disagreed with other physicians who think that there is a need to re-direct those costs towards other fields in health care, as indicated by the following statement:

One of the current issues right now that's new in the health region is that we are moving towards an Electronic Health Record [and Telehealth's implementation] and there's been enormous resources poured into it; for us, I think it's around 200 million dollars, and there's been some complaints from medical staff about the functionality of it and the safety of it, and some feel that when that amount of funding does not produce a safe, effective computer system, that is revenue or funds that are diverted away from providing clinical care, like increasing knee and hip replacements or surgeries, but I think maybe within our health region and other health regions, that some of the traditional funding directed towards surgical procedures and clinical care is being diverted towards computers, but we do know it's a necessary investment but there is competition among those two areas for health care money (M-28-20-15, Page 84, Line 4).

He added:

I believe that the value matches its initial cost. There are always start-up costs involved in implementing technology and then there's maintenance, significant maintenance costs for it, but it's required for the efficiency of the system (M-28-20-15, Page 85, Line 6).

This specialist pharmacist acknowledged that he didn't receive any reimbursement for half of his patients that he visited per day via Telehealth, but he believed still that the overall benefits of Telehealth make it worthwhile. He knew that some physicians receive reimbursement and the fee code guide has progressed to cover more areas in the medical field. He stated:

Well, I think certainly, it enables you to be more efficient and even though I am not in a fee-for-service arrangement with the health region, for those who are, obviously if it's

more – if they're more efficient, they can actually see or deal with higher volumes of patients, which of course, if you're fee-for-service, will be off-set by reimbursement for it (M-28-20-15, Page 85, Line 1).

A female cardiologist hadn't any problem with receiving money for her Telehealth sessions, as revealed by the following lines:

The telecodes, the billing codes for telecardiology, changed completely two or three years ago, so there is a billing code for telecardiology.... They do [reimburse], absolutely.... I'd get the same money for a follow-up in person visit as I would for a Telehealth visit (F-11-06-12, Page 65, Line 18).

In these interviews, 75% of participants agreed that access to Telehealth and different kinds of software help to minimize costs for physicians in furthering their professions. A female family physician who was quite opposed to this notion added more and said that using technology is less difficult and more user-friendly than it used to be; however, there are some grey areas due to the development and advancement of complicated computerized programs and apps. She mentioned:

As technologies advance, then the systems you're using are becoming more complicated as well, so, you know, whereas before, there was just a simple computer with, you know, limited options, now you have a computer that has all kinds of options and apps and different settings to go in to fix this and that, so that's becoming more complicated for the average user (F-07-07-18, Page 98, Line 15).

She did not specifically get paid for her Telehealth visits, since they are done within her working hours in the hospital, which is addressed in her following words:

When you spend your extra time for [consulting about] patients [with others], you just receive a fixed amount of money per month. Basically, when I'm consulting other physicians, it's during my work hours, which I do get paid for an hourly wage, so it's encompassed within my time at work. I do get paid for it.... We have a different contract with the hospital, but fee-for-service physicians, which most physicians are, that's the way it works, but for hospitalists, we have an hourly wage. We don't bill MSP (F-07-07-18, Page 99, Line 5).

A thoracic surgeon believed embracing Telehealth for him was not easy in the beginning. He wanted other physicians to know that videoconferencing is not easy for the first time because both parties tend to feel a bit awkward and stiff initially, but he noted that their comfort levels improve with time, so that a videoconferencing session becomes very much like a normal in-person conversation. With videoconferencing, patients' companions become courageous enough to chime in from time to time. He said that, for many physicians who use Telehealth, there is no fee code or guide. Most of them use Telehealth through "the kindness of their hearts, without pay" (M-21-13-20, Page 111, Line 21). He and his colleagues did not receive any money for that; they are practising according to being paid on salary. They did this to provide the best possible care for their patients.

He added that many physicians are very confused about the reimbursement process. He reiterated that such physicians, including him, work based on salary, not fee-for-service. There is no other option or preference for them. He said:

I go to lectures, I go to meetings, I go do stuff online, I do a lot of my own practice reassessments, which are done through my own records and charts and things like that, so

I do a little bit of everything, so I wouldn't say I have one preference or another service person billing privately, then it would be like billing an office visit and so it's the same; we still have to generate a letter; we still have to do all the responsibilities that we would if we were seeing a patient in the office, and so people that are fee-for-service get paid for that versus those that are on salary. We are not paid for it directly, but it's encompassed under our fee, so, but we don't get extra money because we go over to the hospital to do this and in fact you actually get, no I think it's actually the same fee as an office fee. A phone conversation is less (M-21-13-20, Page 112, Line 13).

He restated that, in spite of this particular problem, many physicians are very eager to help their patients regardless of not being paid, and they continue to find Telehealth to be extremely useful. This surgeon and many more that use hospitals' facilities for their Telehealth visits have a serious and common concern. They are constrained with timeframes for Telehealth appointments because they have to align with the hospital's needs. That is, the videoconferencing room needs to be available at a specified time for him and his patient. He did not want to personally purchase the equipment and put it in his own office because he did not have enough Telehealth patients to offset the initial costs, as articulated in the following lines:

I certainly don't spend a lot of money investing in equipment, then I see whatever, 13, 14% of my patients, you know, to do that, so I think it will probably stay at the hospital at least for the near future (M-21-13-20, Page 113, Line 12).

A high-ranking female anesthesiologist revealed that she tried to get Telehealth set up for that department. She stated, "We [in the anesthesiology department] love Telehealth" (F-33-33-23, Page 123, Line 9). She added that, in her field, they do not have that much information regarding

the cost of setting up Telehealth for their department and the other necessary information a physician needs to have. She stated, “I don't know if there's any financial aid out there and I don't know what it costs to set up... I am not aware of any” (F-33-33-23, Page 123, Line 9). Her major concern was that they want Telehealth, but it is not available to them.

An internal medicine physician who is an expert in Telehealth said that people involved with the Medical Services Plan BC need to revise fee codes, a point which is indicated by his following words:

There are a few issues. First of all, I think that every single fee code should have a partner telehealth fee code, all of the ones that have to do with patient interaction; my specialty, for example, there are a number of fee codes that do not have a Telehealth partner fee code and in those situations, even though I could easily do it by Telehealth, I end up having to bring the patient down or else I can't bill the activity. Most of the time, you can do that through distance, but because there is no fee code and there is no reimbursement, you're forced to ask your patient to travel (M-11- 7-24, Page 128, Line 18).

He confessed that it is hard for him and his colleagues to cooperate when there is no money for services, which he explained when he said:

There are a number of different types of follow-up visits. In general internal medicine and in other specialties that are not covered by complimentary Telehealth codes, including one of our major consult codes and so people that have those – they would be billed through those and as a result, even if I want to follow them up by Telehealth, I have to

bring them to my clinic. I mean, it's no inconvenience to me to have people come to me, it's just a pain for the patients (M-11- 7-24, Page 129, Line 7).

This internist added that using some systems is not easy. He made it clear that it is dependent upon the system being used. He said it is difficult to schedule Telehealth using the Island Health Polycom system. He and several additional physicians believed that competing for a Telehealth room can compromise its use. It seems that Telehealth can reduce waiting lists for patients, but if there are not sufficiently many sites for Telehealth, patients and physicians need to wait for the Telehealth room to become available at both ends.

This participant went on to express his concern that sometimes the equipment doesn't function properly and that another challenge is getting the patient to the correct location for Telehealth. He mentioned that he prefers the direct-to-patient method using any system that provides direct video link; as mentioned in section three, he explained that limited bandwidth can be a significant hurdle, especially in remote northern communities that are most in need of Telehealth. He further expressed his concerns about security, which we will learn more about in section ten. It seemed that many physicians' greatest concern, besides financial aspects, is security.

A physician said that for many of us, Telehealth is not the best option. It might come from the fact that some health authorities or policymakers do not advocate and support Telehealth the way it deserves, in the opinion of several physicians, to be supported. He stated that doing a hard job and later trying to find ways to be reimbursed is not worthwhile. He added:

In our job, you can only do one person at a time, whether you do it in person or over an audio or video bridge. You can only do one thing at a time and you only want to work so

many hours in the day, right? So I understand that there are fees [for Telehealth] that are roughly equivalent to an in-person meeting. So they have extra fees given to physicians to be encouraged to do that. If it's to spend time doing something uncomfortable, which is what an audio thing is to do a consultation for me anyways with somebody who's in the far north, who couldn't possibly get that care, one could consider doing that, there's nothing wrong with that [with receiving extra money for audio or videoconference], but if I'm going to talk to somebody who's one mile in that direction in their house, that's not worthwhile to me (M-20-10-16, Page 91, Line 9).

Obviously, it is difficult for a physician to turn away from traditional ways of practising, which they used to do for many years prior to using Telehealth. Moreover, physicians constantly are told that it is difficult to afford and maintain Telehealth. It is difficult for them to embrace it, while others who are using it complain about problems they are facing most of the time. To non-users of Telehealth, it is not just money or low numbers of patients who are committed to this kind of visit. In fact, there are lots of grey areas and unknowns. It is unnerving for them to feel that they are forced to use Telehealth methods wherein there are few policymakers, health authorities, advocates and supporters associated. The next section explores Telehealth's influence in communication and perceptions about who benefits from Telehealth.

10. Telehealth's influence in communication and who benefits from Telehealth

There is no doubt that the advancement of technology has made communication easier and more effective. A long time ago, physicians only had the ability to use handwritten or typewritten letters and landline phones as the only means of communication. Nowadays, smartphones, computers and different modalities and apps have given them the ability to communicate with their colleagues despite their geographical locations. In medicine, an accurate and timely fashion of communication for solving patients' health problems plays a huge role. Quick and efficient Telehealth communications (via tele- and video-conferencing, email, texting and sending of diagnostic images and lab results) with experts have decreased waiting times and reduced complications for patients. Telehealth has helped physicians to find each other easier, particularly when a specialist is required for consultation.

The question is: who will benefit from Telehealth? Many believe that besides patients and their families, physicians, specialists, pharmacists and health care providers who benefit directly from Telehealth, other sectors of the community, such as medical and pharmaceutical companies, Telehealth companies (such as Medio, GoToMeeting, et al.), Internet line providers, electrical companies, health authorities, government and many more profit from it.

In these interviews, one hundred percent (100%) of interviewees mentioned that they consider patients and their families, physicians, specialists, pharmacists and health care providers, and government as major stakeholders. Some physicians mentioned that they never thought that other sectors of the community can be considered to be stakeholders. Looking at interviewees' perspectives in the continuing paragraphs will reveal their insights regarding the above topic.

A participant said that Telehealth made a huge positive change in his job. Now he can communicate with other colleagues faster and also can access plenty of information regarding patients online. He stated:

It is much faster, oh yeah, very fast... I guess the providers, umm, physicians or pharmacists or other health care providers and the patients or the general public are, all yes, yes they all are stakeholders (M-21-00-01, Page 2, Line 15).

A radiologist stated that he doesn't connect to patients directly. He communicates to other health care providers, specifically physicians, specialists, and nurses; he speaks to over 840 of them per year using Telehealth. He believed that because of Telehealth, he was and is able to manage his communications and job easier than before. He went on to conclude that Telehealth heavily influences his communication with colleagues, adding that every sector of the community is a potential stakeholder.

A psychiatrist mentioned that texting enables more convenient, rapid communication between colleagues, physicians, and patients. He said:

Texting, much like Twitter, provides bite-sized packets of information, which is really about managing worry or concern or small issues that are administrative in nature or, like my prescription ran out, that kind of thing that I don't necessarily need to spend an entire appointment for (M-15-15-04, Page 24, Line 10).

Texting without providing confidential, identifying, or sensitive patient information allows physicians to assure continuity of care and makes the process of communication speedy.

Regarding stakeholders, he mentioned that he believed everyone in the population is an investor, as indicated in the following quote:

Everyone's a patient, every provider stands to benefit from this because it's going to allow us to get the lowest cost provider to go and deliver the care that's needed in the community, keeping people out of the hospital, having more access and preventing problems and it allows the specialists and the people who know the information to be in a hub where they can communicate with a team; they can communicate with their patients and disseminate that knowledge, that experience and that action (M-15-15-04, Page 25, Line 9).

A pharmacist acknowledged that Telehealth communication between pharmacists and doctors is mostly via fax because a lot of physicians don't have time to talk directly to pharmacists. This pharmacist noted that in his eight hour shift, he spends two or three hours on the phone or using the fax machine. It's the way education and consultation stream between pharmacists, physicians and patients, not forgetting the fifty percent of patients who come to the pharmacy to receive their medication and take advantage of face-to-face meetings. This pharmacist mentioned that some of these patients are patients who have English language barriers or are not physically restricted for moving and some tend to be highly sociable. This pharmacist revealed that he talks to about one thousand people per month and half of them are distance conversations. He added that communication between pharmacists, physicians and patients is a three-fold, useful triangle. Pharmacists are the vertex connecting patients and physicians. Pharmacists read doctors' prescriptions and exchange knowledge with them and transfer this knowledge to patients. He continued and said:

We have a lot of deliveries, so you need two facilities and we need to talk to them about their medication, explain the various side-effects to be looking for and things like that, make sure that they take the correct dose (M-41-41-05, Page 30, Line 3).

To him, electronic devices have made communication easier. He believed that in the pharmaceutical field, companies are the major stakeholders.

Another radiologist said:

We mostly talk to physicians or nurses.... Some of my phone conversations are two minutes long and some are fifteen minutes (M-23-10-06, Page 33, Line 7).

Approximately, he communicates with about ten to fifteen physicians a day via telephone and some nurses from the ward additionally who ask about patient lines, NG tubes, pneumothorax follow-up procedures, etc. Since this radiologist has interventional radiology as his subspecialty, he sometimes communicates with his patients directly. He stated some of his patients email him; that is, the patients who are out of town. Emailing helps patients educate themselves regarding their health complications. He is happy to help patients, but he added that "that's not really a proper record-keeping system," (M-23-10-06, Page 36, Line 7) since nobody accesses his private email. In the radiology department, he added that they don't have their own administrative staff and they don't keep records of emails. He added that in the absence of Telehealth (email, telephone), he wasn't able to communicate with nearly as many individuals. To him, patients and the government are the major stakeholders. He said that the government is a primary stakeholder, "especially for hospital-based positions, they're going to have to be the ones who pay for it" (M-23-10-06, Page 37, Line 4).

A female pharmacist was not as positive as other participants generally are regarding a major change in Telehealth communications in her field. She believed that usage of technology has become less difficult, but it cannot advance very quickly in the pharmaceutical field. As previously mentioned, she said that the change is small and slow and she did not expect any serious alterations to happen very soon in her field, "not for another decade or so" (F-04-04-07, Page 42, Line 11). To her, there is no blatant revolution in the field of pharmacy communications due to Telehealth. In accord with quite a few of the participants, she stated that everybody is a stakeholder in Telehealth.

A female cardiologist was extremely happy with the positive and constructive impact of Telehealth and communication in her practice. As you read before, she and her team, through videoconferencing, have helped many physicians and their patients in small cities and remote areas as well as larger cities. Theoretically, she and her team are in the centre of a big circle, and other small health care centres, which are residing in this circle's circumference, can reach them quickly and easily. It is akin to her being present in all these locations simultaneously. She stated that looking at the governmental statistics shows that Telehealth is beneficial in saving money. She voiced that "government benefits from Telehealth; they always report the decreased greenhouse effects and so that affects the government" (F-25-06-11, Page 60, Line 11). She added that government, as a major stakeholder, should dedicate more money and promote Telehealth further.

A forty-seven-year-old male surgeon believed that one of the stakeholders of Telehealth is the health authorities. To him, they are an arm of the government, but they can take action independently. For example, the Vancouver Island Health Authority (VIHA) works with the government to deliver safe, efficient, and appropriate care to patients. If VIHA, which has a stake in the health care sector, wants to change and advocate for the health care system, it does not work under the government's supervision. Autonomously, VIHA can advocate and facilitate the installation and adoption of Telehealth. For this surgeon, Telehealth has facilitated his communication and has made his job easier. He wants to have access to Telehealth to a greater extent than he has currently.

A specialist pharmacist mentioned that he spends about thirty hours per week on the phone providing advice to patients or speaking with colleagues. He believed the doctors in remote areas need back up and support and Telehealth has the ability to provide this, as expressed in the following quote:

We take a lot of phone calls as well from physicians in other geographical areas where we are providing them with clinical support, so we get numerous telephone calls and it'll be about a particular patient. The physician calling us might be in Courtenay or Comox or somewhere and then we can go in to the power charts and look at the clinical information available to help us advise on decision-making (M-28-20-15, Page 80, Line 3).

He mentioned that the text messaging aspect of Telehealth is a very important form of communication for him. Referring to his many years of experience, he points out that if patients know they can access their physicians through multiple modes of Telehealth, they will feel empowered, as revealed in the following excerpt:

Patients are sometimes frustrated that there's barriers to them accessing their specialist; you know, they try to phone the office, there's a firewall there that prevents access, they get very frustrated, they get recorded messages and so on and I find that because I'm one of the few people that will actually accept text messages from patients, that, from the patient's perspective, I feel that it gives them a sense of increased access to their health care providers (M-28-20-15, Page 85, Line 5).

To him, this close connection had an immense impact in their recovery. Clearly, nowadays, any form of communication between patients and physicians is benefited due to Telehealth's presence.

A male specialist with duties as an administrator and a program director (undergraduate and postgraduate) strongly believed that teleconferencing made his job much easier than before he implemented its use, which is indicated in the following statement:

I don't have to go over there [to Vancouver] every month and it saves time, trouble and money. To have to go to Vancouver twice a month to attend an undergraduate education committee and residency training committee meeting would take a lot of my time and effort (M-20-10-16, Page 89, Line 1).

He also added that, in the last eight years, he, regarding his patients, many times communicated with colleagues via email and phone. He acknowledged that, apart from patients and physicians, the other stakeholders will be private corporations like Medio. He explained:

Medio is a private company that charges a fee for providing highly encrypted private access between one physician and one patient and there are physicians who will spend

their entire day just doing video consultations, giving advice, whatever.... This [Medio] is a for-profit corporation and they charge a fee to the physicians for doing that; they don't charge a fee to the patient, so they're a stakeholder because there's money to be made (M-20-10-16, Page 91, Line 4).

A female family house physician (practising inside a hospital) with a postgraduate Doctorate said that she mostly communicates with her colleagues through patients' charts or Electronic Health Records. She rarely uses email and she uses the telephone to discuss patients' situations with other colleagues. She said that this technology impacted the way she practises and technology makes it faster to exchange information. She mostly uses Telehealth for the purpose of exchanging administrative, academic and medical knowledge with colleagues, who are in different hospitals, about two times a week. She believed that these virtual rounds are very beneficial and besides upgrading everybody's knowledge, they inform them about what is happening in other places.

A surgeon who likes communicating with colleagues and patients via Telehealth stated that he thinks that the communication in Telehealth is the same as if the patient and doctor communicated in person, or very close to it. By this, he meant that the quality of audio and visual Telehealth visits, no matter if they are with another colleague or a patient, is very high. He continued:

Like I said before, I think that there may be a mild decrease in communication. People have pretty short answers initially but I think as their comfort level improves, then they're more likely to communicate as they would [in person]. I don't think that Telehealth makes

people communicate any more than they would be in person. I think it just allows us to [eventually] communicate as a normal visit would be (M-21-13-20, Page 112, Line 20).

The researcher defends this surgeon's perspective regarding the quality of audio and visual Telehealth during visits. She herself, as an operating room nurse, witnessed several of these sessions and the quality was amazing.

In these interviews, about 40% of participants with a long history of performing Telehealth visits strongly believed that Telehealth opens a new door to physicians' communication and practices and they believe people, companies, and the government are major stakeholders. Participants of this interview highlighted that all the stakeholders (the ones mentioned in the opening of this section) need to cooperate and take advantage of Telehealth's presence in this century and help its growth and development. They believed that Telehealth is not perfect and, like the traditional method of visiting patients, it has its own disadvantages and deficiencies. They wanted other physicians to focus on the benefits Telehealth has brought to the field and to be realistic about it. They wanted their colleagues to educate themselves regarding Telehealth and to forecast the near future where the growth of the population will increase the demand of more care.

Lastly, it is clear from this study's participants' answers that the power of Telehealth in facilitating communication is very bold. No one can ignore its impact, but still some do not appreciate it as much as the facts and statistics suggest it warrants. Unfortunately, weak support from important stakeholders such as the government, health authorities, and policymakers and several ignorant physicians has made the process of Telehealth's growth and expansion slow. As Terry Pratchett said, "They say a little knowledge is a dangerous thing, but it's not one half so bad as a lot of ignorance."

In the next section, we will discuss Telehealth in relation to privacy issues. We will explore one of the most often used subterfuges by non-users of Telehealth and some users who have conservative mindsets.

11. Telehealth and privacy issues

Whoever accesses the patients' information is the most important concern of many community members, including physicians. In fact, it is a very reasonable question until it turns into an obsessive-compulsive interest. When it comes to using Telehealth services and security issues, being too disconcerted or too unconcerned is not acceptable. Undoubtedly, protecting patients' rights is the main mandate of the health care system and for many years now, engineers have tried their best to design software which meet this need. Fortunately, the teamwork between health care members and engineers ended up establishing very high quality and secure connecting lines. Telehealth now can proudly be part of the care system and its development and progress will continue as research around ways of its progress is constant. In this study, a hundred percent (100%) of participants believed that patients' support through secure Telehealth provides reassurance and peace of mind, which is essential for the process of healing and treatment. They voiced that policymakers need to find more security and privacy for Telehealth users in order to prevent a barrier for physicians and patients to take advantage of Telehealth.

In the following lines, you will be introduced to some essential concerns of many physicians, which are referred to by them as "system security" or "patients' privacy and confidentiality." As you may notice, some physicians who participated in this interview did not have any concerns whatsoever.

When asked about privacy concerns and potential problems with Telehealth, a radiologist who uses large hospital facilities stated, "Well, with how I use it, none [I have no concerns]" (M-26-15-03, Page 12, Line 10). Likewise, a nephrologist with fifteen years of experience using

Telehealth in various forms said, "I haven't had any privacy concerns." He added that "when the government says the privacy is okay, it's okay in my opinion" (M-15-15-13, Page 71, Line 3).

He advised other physicians not to be persnickety about Telehealth and its related privacy issues.

A psychiatrist who used Telehealth for many years in his private office believed that Canadian privacy protection laws are outlandish and outdated, particularly in BC, which makes the implementation of Telehealth more difficult and time-consuming, as described in the subsequent excerpt:

We have privacy laws here that are so archaic and out-of-step with reality.... The ability of people to implement systems to meet those laws, even though they're crazy laws, takes so much longer and I know because I was in charge of all of it and we had stuff in the hoop for a year and a half before we could just pass it; meanwhile, I'm just going ahead and using Medio and things, which meet all the Canadian privacy protection laws (M-15-15-04, Page 20, Line 8).

He added that in spite of this, "the adoption [of Telehealth] has gone quite well right now" (M-15-15-04, Page 21, Line 3).

A pharmacist said that privacy is a huge concern in the pharmacy field. Medications are private and if the wrong person receives it, it is a blatant breach of confidentiality. He said that after many years of working in a pharmacy, you can tell which patient you're speaking to over the telephone by their voice; however, he went on to state:

We prefer to call them, not vice-versa [to make sure it is the correct number and nobody mimicked the patient's voice]. For physicians' offices, we prefer fax and some patients

have fax machines in their homes, too. Unfortunately, sometimes the fax goes astray, to the wrong people, and they usually fax it back to us stating that it is the wrong number. That kind of infrequent error is unavoidable (M-41-41-05, Page 30, Line 16).

A radiologist believed that when it comes to videoconferencing and the attendance of different people, the privacy issues are more serious. He said it is not only about the security of lines; other factors are involved too, which is explained in the following lines:

Who's present if you're talking about patients specifically, who's present in your room, who's present in the other room, you may be conferencing, does everybody there have – should they all have access to that information? (M-23-10-06, Page 37, Line 6).

A young pharmacist stated apprehensions about patient privacy and confidentiality in the following quote:

Privacy is definitely something that's always a big concern for us. As far as patient confidentiality, that's always a big, high priority for the pharmacy, umm, when you're getting, say we're faxing something to the physicians' office, we need to feel confident that it's going to a private location where people who don't work in the office don't have access to it. Same thing when they're sending us transmissions; we need to be sure that we're the intended recipients. If there's no mention of us, we have to clarify and make sure; otherwise, that was potentially a breach of confidentiality (F-04-04-07, Page 45, Line 12).

She added that in the pharmacies that are very tight quarters and do not have a private consultation room, she has to be conscious of nearby people when speaking over the phone to a

patient, particularly if the topic is sensitive in nature. She avoids using any identifying information such as names.

A specialist stated that he and most of his colleagues feel comfortable speaking over the telephone, but texting over an unsecured network has always been an issue for him and his colleagues. He commented:

Being on the phone is, umm, in many ways probably not that different than being in a room with somebody, from a privacy perspective. If you're, uhh, talking about using texting features on phones and that sort of thing, there are more issues there, if it's not a secure network (M-15-15-13, Page 71, Line 7).

A male cardiologist did not believe the previous opinion and said that text messaging is as applicable and useful as the telephone. He added that they (physicians) use it and they are careful not to mention their patients' names. He elaborated by saying:

I mean, if you're doing information transfer by text messages, leaving telephone messages, you have to avoid any identifying features, so we try not to have any descriptive features, either the patient's name or anything that can identify them on a message or in any text messages. Other than that, I mean, videoconferencing – the rules of confidentiality apply in the teleconference, the same rules apply as if everyone were in the same room (M-18-18-14, Page 76, Line 4).

Even though a specialist pharmacist relies heavily on Telehealth and believes it is a revolutionary tool for addressing present health care demands, he did not undermine the privacy concerns surrounding it, as his following words expressed:

We are hearing all the time about hackers getting in to information systems, getting a hold of sensitive data, credit card information, banking identity theft, so there are some real concerns around Telehealth and I even wonder about the security of databases when they're in other countries. A lot of people talk about the Patriot Act and how the authorities – if the server is in the United States, they can access that information, so I think that that's one of the biggest challenges (M-28-20-15, Page 86, Line 5).

A female cardiologist confessed that privacy in the medical field is an immense concern, as communicated in the following excerpt:

In our clinic, we are aware of the importance of it and we advocate for our patients by making sure that we're using a secured method, putting signs on doors, shutting off the electronic devices when we do not use them and asking for permission when a resident attends in a session (F-25-06-11, Page 60, Line 13).

She elaborated by saying:

It's not Skype that we do it through, it's an approved secure method and the other thing is we have both a volume and mute button on the teleconferencing and we also have the camera, so it is our policy when we sign out of a telecardiology session, we always mute it; we always shut the camera off because that is a clinical room, there is always the possibility that when I'm in here, that room, perhaps on a different day seeing a patient, that somebody could, by mistake, dial in to our room.... If we're having any residents come, we just say, 'Hi, this is Dr. X, Y, and Z who's working with me today, umm, would it be okay if they listen in on the appointment?' and patients either say yes or no, and we

also have a sign on the door that says, 'Telecardiology appointment in session' (F-25-06-11, Page 61, Line 3).

A female pharmacist explained that privacy for patients is an important part of her job. She tries her best not to speak loudly when patients are present in the outpatient clinic and she refrains from mentioning anyone's name when she speaks on the phone. She could not say which method is more private, which she elaborated on in the following lines:

They both have those privacy concerns, so I think sometimes people feel more comfortable talking to you over the phone because they, umm, because it's private for them, you know what I mean? Nobody sees them interacting with you.... If you do not speak with both face-to-face and Telehealth groups quietly and discreetly, you may reveal their identity and medical situation (F-31-31-17, Page 94, Line 16).

A female family physician believed that confidentiality is a major hurdle to the use of Telehealth, as articulated in the following quote:

I could probably use my devices more often if there wasn't the fear of breach of confidentiality in a non-secured site.... I think confidentiality is a priority because I mean, when you're within the hospital and you're emailing within the hospital system, it's guarded by security, but outside of that, like text messaging, which is becoming more popular, leaving phone messages on people's cellphones, emailing outside of the hospital system, faxing outside of the hospital system is unsecured and there's potential for breach of patient confidentiality, so I think developing a secure system that can be used outside

of the hospital system is a priority and then, as I'm talking further, that actually is one of the barriers, I think, to use (F-25-06-11, Page 61, Line 2).

An ophthalmologist believed that privacy is highly important, as indicated by his subsequent words:

Safeguards have to be put in place for appropriate encryption and in particular, if there's any stored information, that is something that already exists and using the existing infrastructure in place, along with encryption of data and avoiding storage off-site and that can be dealt with (M-20-15-19, Page 104, Line 3).

He stated that he has no issues or concerns with security.

A surgeon believed that nowadays, it's not exactly clear where the lines regarding confidentiality are drawn. When he sits in the hospital room, which is equipped with videoconferencing, and the patient is at a specific site, he is one hundred percent confident in the system's privacy and confidentiality. He mentioned that over the last few years, the policymakers have allowed physicians to have telephone conversations with their patients. He said, "We call patients and give them results and sometimes have discussions with them or family members" (M-21-13-20, Page 113, Line 21). He was unsure where the limitations are or where the lines are supposed to be drawn. He would like to have more information regarding the expectations of him as a physician when it comes to privacy concerns.

An internist who is also involved in administrative tasks believed that privacy and security of the system, especially medical ones, according to policymakers are good and reliable. He explained,

I'm told that the video and audio bridges, particularly the commercial ones, are highly encrypted and confidential and I'm willing to accept that, so under the right electronic circumstances, I'm not worried too much about confidentiality. I know that security measures are probably in place, so that 99% of the time when I would be doing something, it would be confidential (M-20-10-16, Page 90, Line 1).

Regarding administrative communications, he added:

I'm not so sure about the administration meetings, how confidential they are, whether they're encrypted or not, I don't actually know. They're not that private. We're not talking about clinical patient information; we're talking about the workings of the problem. Some of the things are confidential but I don't think there's a big problem there (M-20-10-16, Page 90, Line 5).

Like other physicians, a female anesthesiologist believed that privacy is a big concern in the medical field, as encompassed in the subsequent quote:

Well, umm, I guess we always have concerns about privacy, don't we? It doesn't matter if it's Telehealth or anything else, there's always concerns about privacy (F-33-33-23, Page 123, Line 12).

Another physician, who is a general surgeon, has the same comment. He is a frequent user of Telehealth. He said that the possibility of stealing something from patients' charts is equal to stealing that online. He added that he has problems understanding people who are against Telehealth usage. He mentioned that Telehealth practice is not as insecure and worrisome as it alleged to be by some.

A thirty-four-year-old male physician with seven years of experience with Telehealth had serious concerns regarding the privacy of a system, which his proceeding words expressed:

I have a lot of concerns with privacy. My patients don't have concerns with privacy. Edward Snowden basically laid out exactly what those concerns are: everything that's said over telephone, over videoconferencing, over the Internet, over email is recorded by the United States National Security Agency, by the Chinese National Security Agency, probably by the Russians and possibly by persons that are not national actors and it's American foreign policy to do that – it was laid out in clear detail by Edward Snowden in 2013 and I have a huge problem with that but interestingly, patients do not have a problem with that and so it is what it is. They would rather be seen by Telehealth than drive two, three, four hours and they're the ones that are demanding this, so I'm happy to provide it. I tell them in detail what is happening with the information, but I have concerns, I have huge concerns with the United States Patriot Act. I have huge concerns with the National Security Agency but patients don't care, they just don't care, at least most of them (M-11- 7-24, Page 127, Line 8).

A male thoracic surgeon had no concerns regarding system security. He mentioned that he mostly sits in the dedicated room in hospital and does videoconferencing in a very private setting. If any students are present, he just simply informs his patient and asks for permission. He said:

I have not in any way felt any concern with that [privacy issues] and we've actually had students sit with us and we always introduce the student, make the patients at the other end of the link aware that there's somebody listening in and there's never been a problem (M-46-12-25, Page 135, Line 20).

Summing up what we read in this and former sections, one notices that privacy for some participated physicians is a major hurdle to the use of Telehealth, especially if they need to use their own electronic devices out of the hospital, such as their smartphones. For these physicians, ignoring other disadvantages of Telehealth may be easy, but dismissing the privacy part of it is not possible at all. More importantly, physicians need to have more information regarding the expectations of them. For interview participants the question was: what exactly is the correct action regarding protection of patients' privacy? What is specifically incorrect regarding protection of patients' privacy? To some of them, it was not exactly clear where the lines regarding confidentiality are drawn by policymakers. For some other physicians, the privacy was not an important matter at all. They simply trust the system, use it and enjoy being optimistic. Others were aware of potential dangers and are very conscientious; however, they could not resist their patients' desire for having online visits. In the next section, we will read about physicians' comments and suggestions regarding avenues for improving Telehealth and the adoption of it.

12. Avenues for improving Telehealth and adoption of Telehealth

To many physicians and patients, who are clients of Telehealth services, public awareness is the key to Telehealth's improvement and adoption. Many of the participants of this study voiced that unfortunately, besides the general public, many health care providers, including some physicians, need to learn more about Telehealth. Acknowledgement, educating, and training are mandatory. False accusation regarding heavy costs and uncooperative governmental financial manners needs to be addressed. Physicians need to speak more highly about the positive aspects of Telehealth and encourage other fellow colleagues to adopt Telehealth. Facing the unknown and fears regarding the shift from traditional ways of medicine to Telehealth requires courage and speaking openly about problems demands strength. Physicians need to know that until they do not speak aloud about their concerns, no one can or will come to help solve their problems.

In this study, when questioning a physician regarding any suggestions for improving the Telehealth system, unfortunately about 25% did not have any recommendations. About 40% felt that it is fine the way it is. Only about 35% gave very good suggestions in the researcher's opinion, such as: 1) encouraging and supporting aged physicians, 2) training the staff in Telehealth clinics or offices to help physicians, 3) educating physicians and nurses, 4) developing a secure system that can be used outside of the hospital system, 5) increasing the number of Telehealth sites, 6) seeking media support, 7) distributing of smartphones with high security for 24/7 physician usage, 8) dedicating money to research and the development of Telehealth, 9) pre-setting systems without imparting responsibility on physicians, 10) performing yearly conferences and educational sessions for all the health care providers, 11) developing clear policies and procedures regarding limitations, 12) publishing clear guidelines regarding

Telehealth by policymakers for physician, and 13) addressing language and cultural barriers in using Telehealth. Some of these suggestions were embedded in previous sections, while others are interwoven in what you are going to read in following paragraphs.

One of the participants believed that there are many avenues for improving Telehealth, as articulated in the following quote:

Firstly, we need to make the public aware of it. Secondly, we must advocate Telehealth to make it more public and accessible to many more patients. The public isn't very aware of [Telehealth] at this point (M-21-00-01, Page 5, Line 4).

He continued:

Most of the general public is surprised to hear that there is such a thing. I should think it matters most in remote areas, because if somebody lives in a big population centre, then Telehealth usually isn't needed because there's enough specialists nearby (M-21-00-01, Page 5, Line 7).

However, some participants believed that to avoid unnecessary travelling and save a lot of money and time, even a resident of a big city can use the nearest Telehealth site to connect to their physician.

A participant believed that “publicization” is necessary, as the following excerpt indicated:

I don't think the general public has to be advertised to about Telehealth upfront, but if we get the message out clearly to all the first-line health care workers that the public are going to ask about health problems, and if all those people know how to refer someone to

Telehealth, that sounds like the most important level of publicization (M-21-00-01, Page 5, Line 20).

He said that the publicization of Telehealth through health care providers will improve the adoption of Telehealth.

As mentioned, 40% of physician participants think that Telehealth is fine the way it is. One of them said:

I think it [Telehealth], from my view of it, it works just fine. I don't think there's anything we could dramatically do to change it, otherwise we probably would have done it already (M-26-15-03, Page 13, Line 5).

One avenue for improving Telehealth according to a participant is setting up a network of clinics with appropriate Telehealth staff to guide patients and assist physicians, which he explained in the subsequent quote:

We man the units and we just have the people come in and then we train the staff in those clinics to do it, so for example, when I have been away the last two weeks, the patients come in just as normally. They come to the meeting room, they sit down, our staff walk them in and they sit down at my chair and they look at my screen and the staff turn it on and there I am and seamlessly, without any issues whatsoever because they don't have to touch the technology, they start to communicate and then one of our staff will say, 'If you can't hear, turn up the speakers. If you can't do this, here's the thing' and you know what? They just adapt. They immediately do it because to them, it's normal that they're communicating and they see me, so having had that connection with me first and then

having them come in where they aren't responsible for any operating things, they could rely on somebody to be there. They feel comfortable, and once they've done that, then they can lead to the next thing, which is using their own technologies, so I think that's a good process (M-15-15-04, Page 20, Line 18).

A participant believed that promoting the usage of Telehealth needs to break down the stigmatization regarding heavy costs and unsupportive governmental financial attitudes. This is the only way that physicians will be encouraged to embrace Telehealth and minimize concerns. This physician was firm in his belief that Telehealth "is probably one of the wisest investments the government could make" (M-15-15-04, Page 23, Line 11). He believed that policymakers and those in charge need to overcome their misconceptions regarding how Telehealth affects the number of patients seen during a particular time period. Commonly, people erroneously think that Telehealth enables doctors to see more patients overall; however, this is not the case. Physicians simply reduce the amount of time allotted to each patient, while seeing an equivocal number of patients as they would face-to-face with Telehealth. He added that quicker patient visits will reduce complications and prevent hospital visits. This is a fact that the government needs to focus on and support. He added that, in order to improve Telehealth and reduce patients' waiting times, physicians need to overcome legislative, legal, political, interdisciplinary, bureaucratic, financial, turf war and technological issues in future.

A male pharmacist believed that the Telehealth system itself works fine and that its biggest challenge involves the people who use it, as expressed in the following quote:

I guess the fallacy where the system falls down is the response time to it.... We don't hear back for 24 hours, sometimes 48 hours – it's too long a lag time. We can't accommodate our patients with those lag times (M-41-41-05, Page 30, Line 20).

He suggested that the presence of a good IT support team 24/7 will encourage health care teams to adopt Telehealth openly and quickly with no concerns.

A female participant mentioned that faxing is the major means of using Telehealth for pharmacists, as indicated in the subsequent excerpt:

It [faxing] is convenient and secure but it doesn't seem environmentally prudent since the pharmacists type the document, print it and then fax it in lieu of simply faxing it online, without the need to print (F-04-04-07, Page 39, Line 2).

To her, developing software which does it and the presence of direct networks between pharmacists and physicians is the most essential promoter for Telehealth usage. She added that Telehealth can be improved by expanding it in general. She explained, "Electronic prescriptions would be a really big step for the whole health care system" (F-04-04-07, Page 46, Line 1).

This pharmacist continued to say that language is definitely a barrier for some patients, as revealed in her following statement:

We have a number of Hindu and Punjabi-speaking patients at this pharmacy and I don't speak those languages, so I have staff who are fluent in it. I always worry about something being lost in translation but it's definitely a little hard (F-04-04-07, Page 41, Line 12).

She believed that since Canada is a multicultural country, Telehealth can play a role in these situations by providing translators via telephone or videoconference in rural areas or pharmacies that don't have the advantage of having multilingual employees. Adding this possibility of on-call translators, such as the nursing hotline, will hugely assist all the physicians and other users of Telehealth and will encourage non-users to adopt Telehealth. (For more information about the nursing hotline, please visit the following website: <https://www.healthlinkbc.ca/services-and-resources/about-8-1-1>). The researcher believes that one of the positive aspects of Telehealth is the possibility of bringing in a third-party translator more easily via networking rather than in a face-to-face visit.

One very important avenue for improving Telehealth is for physicians to encourage one another to make use of it. A pathologist believed Telehealth is beneficial and it can change the future of health care delivery, considering the fact that it makes reading and learning faster and skyrockets communication. It opens a new window and opportunity for health care members. He suggested other mature physicians see the positive aspects of that, and that they not worry about the privacy and confidentiality issues. He sent the message for his colleagues that "consolidating our knowledge is quicker and more convenient" (M-40-10-09, Page 51, Line 3) and encouraged everyone to embrace Telhealth. He elaborated that buying Telehealth devices will compensate for their cost because they are worth the price in usefulness. He thought that the more knowledgeable a physician is, the more he could benefit his patient. He claimed that Telehealth "breaks the barrier of isolation and helps physicians become less insular" (M-40-10-09, Page 52, Line 1).

An experienced specialist postulated that there are many avenues for improving Telehealth and the adoption of it. The one that he strongly believed is beneficial is not complicating Telehealth with bureaucracy; that is, instead of a “corridor consult”, a physician can simply pick up the phone and reach the same conclusion as would be found face-to-face via traditional ways over a coffee or lunch in the physician’s lunch room. He mentioned that if policymakers inadvertently register duplicated or unattainable rules, they make things more difficult than before. As he mentioned, the simplicity is the key to success. Physicians all are the same team members and they can communicate with no rules or regulations. He highlighted that delaying communication makes patients’ medical conditions worse. He advised that everyone know that and adopt Telehealth as soon as possible.

A male cardiac surgeon suggested that a means of improving Telehealth relates to ease and accessibility of use, as explained in his following words:

If you had more places where you could use it and it was more easily accessible or you didn't have to coordinate ahead of time with the IT department to book a room, to set it up, if you could just do it from any monitor that you had, if they all had cameras on them in the hospital, you could just do a Telehealth conference wherever you are (M-18-18-14, Page 76, Line 9).

One means of improving Telehealth suggested by a female cardiologist is more frequent videoconferencing visits and training of specialist nurses through various sites. She said:

We are limited in the amount of Telehealth, teleconferencing we have – we’re allowed three visits on a Wednesday afternoon. The downfall, of course, is there's places that we'd

like to have a telecardiology site, but we don't have the resources at the other end to do their weights and blood pressure and put the stethoscope on their chest (F-25-06-11, Page 62, Line 14).

An ophthalmologist believed that technology needs to become more mature, software and apps need to be more user-friendly, and IT support needs to be expanded. He added that physicians and patients need to receive more training and exposure to the technology, as expressed in the subsequent excerpt:

The technology is not mature, so that it causes problems and it would be better if each practitioner, during the course of training, had exposure to this technology and then they would feel comfortable with the use of that technology when they come into clinical practice. After the exposure and training, they also have to have these available tools available to them at the point of care, wherever that is going to be, so in their office, from their home living room and similarly, the patient who is used to seeing some interaction with the physician has to have the ability and comfort level to be able to say that it's better for them if they can get sooner access, rather than waiting six months for an in-person consultation and also they can have quick, easier access rather than having to travel six hours, so both for the patient and the clinician, the existing technology has sort of limited itself for its usefulness (M-20-15-19, Page 104, Line 7).

Another avenue for improving Telehealth proposed by a surgeon is that dedicating more resources, money and research into developing secure software could enable doctors and patients to communicate via distance from wherever they happen to be without the inconvenience of

having to travel to a specific site and without having to worry about breaching confidentiality.

This participant added that Telehealth brings lots of advantages to the delivery of patient care and health authorities need to be aware of the benefits of Telehealth to the public. He continued by saying that much advocating from authorities needs to empower the growth of Telehealth. All the stakeholders need to be equally informed about the progress of Telehealth and need to understand that physicians and patients are very ready to embrace Telehealth. He pointed out that the teamwork of all stakeholders will be beneficial to the stronger implementation and establishment of Telehealth in the near future.

A male family physician believed that if we want to use Telehealth more vastly, we need to educate nurses and patients. If nurses are trained through physical assessments, then they can bridge the gap and need for doctors to be present in person, and a Telehealth visit can ensue. He added that reimbursement is a huge issue for physicians. He believed that billing MSP for Telehealth and dedicating more funding will improve it. He said that he and his colleagues will be more willing to adopt Telehealth if they have more training, resources (regarding policy and procedure, including “do’s and don’ts”), funds and encouragement by their other colleagues.

A participant strongly believed that the revision of Telehealth code fees would encourage physicians to practice more through distance, as indicated in the following quote:

As I mentioned before, there's a few issues.... Every single fee code should have a partner telehealth fee code... ones that have to do with patient interaction. There are a number of fee codes that do not have a telehealth partner fee code (M-11- 7-24, Page 128, Line 17)

If Medical Services Plan BC does not revise fee codes, physicians cannot receive money and their patients are forced to travel to their offices. He also wanted a more serious look at security and privacy issues by policymakers and engineers. He is a great advocate on patients' behalfs and he is very satisfied with Telehealth, since using it, he can treat his patients faster and prevent more complications from happening.

Hopefully, the above mentioned suggestions, as avenues for improving Telehealth and the adoption of it, can be scrutinized closely by the people and organizations in charge, and action should be taken strongly as soon as possible. Telehealth is still a toddler, needing support and growth. Any effort to helping its progress will be appreciated by the benefits that it will not only bring to health care, but also to the globe.

CHAPTER 5: DISCUSSION AND CONCLUSION

1. Explanation of Results and References to Previous Research

The application of Telehealth in the practice, upgrading of knowledge and communication of physicians with their colleagues is very clearly exhibited in the results portion of this paper. The majority of the Canadian participants in this study applied Telehealth in their practice, education of themselves and their peers and those they are treating, administrative duties, and when communicating with their colleagues and patients. The sociological impact of Telehealth is undeniable. This study's research strongly supports this, as does published research (Jaatinen et al., 2002).

In 1906, Telehealth began with an electrocardiogram being transmitted telegraphically. Since then, as costs were reduced for using technology, Telehealth exploded into different domains. Part of the initial resistance to the use of Telehealth was fiscal in nature; however, technology becomes less expensive as it becomes much more common, so as time went on, Telehealth becomes cheaper, making it more widely available and practical.

There were 85,000 teleconsultations in 2002 in the US (Craig & Patterson, 2005). Numbers such as these are increasing constantly as Telehealth brings together nations from across the globe.

Walji (2015) believes that the ability to access the expertise of medical colleagues from around the globe is incredible through Telehealth. Telehealth entails "virtual multidisciplinary teamwork" (Axford et al., 2002) and allows physicians to learn from like-minded peers.

Telehealth works in many branches, as seen in the literature and the results sections of this thesis; for example, it is used for telestroke in rural areas because immediate action is required (Harris

et al., 2015). Still, some physicians remain skeptical and unaccepting of Telehealth, even as the need for it becomes more pressing. As stated in the literature, “If clinicians wanted to use Telehealth, they would make themselves available” (Wade et al., 2014, p. 687), and some simply do not, although none of this study’s participants seem to exemplify this doubtful attitude towards Telehealth. This research touches upon why some physicians are reluctant to use Telehealth, mainly from the perspective of those who use it regularly.

This study’s results indicate that a low rate of participants still do not have a clear definition of Telehealth and they are unaware of the fact that they use it in various forms. Interestingly, they consider themselves non-users of Telehealth, even when using at least one modality of Telehealth on a daily basis. Among this subset of physicians and pharmacists, a common misconception is that Telehealth is exclusively videoconferencing with a patient at a distance. As acknowledged in the literature review section of the paper as well as in the results part of this study, Telehealth, in fact, in addition to videoconferencing, includes the use of telephone, fax, email, and text messaging, whether this is between patients and physicians or physicians and their colleagues, regardless of location (urban or rural, in the same building or two different areas of one city).

Participants of the study in this thesis, as with other clinicians, use Telehealth to communicate, educate, do follow-ups, perform assessments, manage pain and addiction, conduct research and execute administrative and organizational duties. Through educational Telehealth sessions, senior physicians educate junior physicians as well as patients and their families. This study’s results reflect that Telehealth has been used for many years to reduce patient waiting lists, to empower patients, and to create a shift towards patient-centric care. As with the literature, many physicians indicate first and foremost through interviews that Telehealth saves patients and physicians alike

time and money. Barlow et al. (2012) noted that Telehealth will save expenditures such as travel, parking, child care, food, fuel, accommodation, and time away from work, and this study's participants discuss this too. In one study, telesurgery saved families an average of \$88 and 2.6 hours per consultation (Raison et al., 2015), and this is a potential for Telehealth that this study's participants emphasized.

Additionally, as mentioned by this study's participants, Telehealth can prevent family separation, reduce hospital visits, prevent nosocomial infections due to faster hospital discharge, avoid environmental degradation (for instance, spare trees because of the shift towards electronic documentation and electronic prescriptions rather than using paper), and speed connections by making communication fast and simple. Telehealth can offer a carbon-neutral offset (Yellowlees, 2010) and since delaying communication with health care providers makes patients' conditions worse, Telehealth is an excellent means for the primary prevention of illness. Telehealth support groups are yet another benefit of Telehealth. Telehealth also can reduce the stress associated with relocating for one's job, even internationally.

As reflected in this study's results, 100% of participants in this study dismiss the notion that gender has an impact on the adoption of Telehealth, while 80% of participants feel that age is irrelevant to the inclusion of Telehealth. Among those who believe that age plays a role, there is a fairly even distribution of individuals who emphasize the physician's age versus the patient's age as a key factor. A few participants maintain that physicians near retirement have no motivation to acquire new computer skills or adapt their personal offices to Telehealth, although balancing this opinion, in hospital, the opinion was expressed that elderly physicians are eager to learn how to face challenges regarding technology, particularly when there is IT support available.

Due to the ongoing growth of the population that leads to an imbalanced physician: patient ratio and people stranded in rural areas that lack specialist physicians, the advancement of computerized technologies and the consequent possibility of Telehealth visits have become an increasingly common means of solving these issues. Telehealth improves diagnostic accuracy, something which is implied by some of this study's participants when they explain that they can use Telehealth to quickly and easily connect with specialists for their opinion on a patient's case. The good thing about electronic resources is accessibility of them from anywhere. For instance, two doctors simultaneously can look at a patient's power chart, discuss the patient's case together, and the more knowledgeable specialist can advise the other to make a correct decision or more accurate diagnosis. In medicine, areas of expertise are vast and in any single physician's professional life, there are unavoidable moments of needing colleague help (Walji, 2015). Telehealth provides an efficient way for physicians to receive advice and opinions from colleagues when needing help with a patient, and this is something that is emphasized by this study's participants.

As you read in the literature, BC, with its many rural areas, is benefitted by Telehealth. Telehealth appears to be the only obvious remedy that can address the higher proportion of seniors in rural areas versus in cities (Statistics Canada, 2007). As seen in the results section of this study, several physicians and pharmacists have as high as a 50%-50% proportion of in-person versus Telehealth visits. Some physicians clarified that they visit 1 000s of patients per year through distance. Many participants were eager to use Telehealth more in their practices, but expressed that their only reason for not doing so is one of lack of availability. Security concerns, financial scarcity, or lack of resources (for instance, physicians' need to compete for Telehealth rooms in hospital or lack of full IT support) also were concerns voiced by participants in this

study. A vast minority of computer-illiterate physicians, based on the literature studies, indicated that they or their colleagues fear the unknown regarding technology, causing them to reject the use of Telehealth, while none of this study's participants expressed this technophobia.

Chan et al. (2015) pointed out that by 2030, about half of Americans will be age 65 or older, many of whom will suffer from chronic diseases. This type of population trend will be generally reflected worldwide and the global physician shortage will be an increasingly serious matter in the near future. This indicates, as did this study's results, that supporting Telehealth is becoming crucial.

As mentioned before, Telehealth is not a "silver bullet" to solve everything; it is a supplement for health care rather than a complete alternative. Critics need to be fair in their evaluation of Telehealth and they need to avoid overemphasizing its downfalls (for instance, in cases like environmental disaster).

Please note also that if a natural disaster were to occur, both in-person and distance visits would likely be affected, so Telehealth is not less desirable in such cases, and in fact, if this disaster were due to extreme weather, Telehealth would be preferable to face-to-face visits due to the travel associated with the latter.

This study's results and literature review both indicate that the concept and usage of Telehealth are gaining acceptance more and more over time. Nowadays, stronger marketing and cheaper pricing for Telehealth's private users are helping its expansion, so that more former critics of Telehealth are beginning to embrace it. This study's results implicate that strong marketing and advertisement for Telehealth is needed.

The only practical reason (that was found to be logically valid based on research) not to use Telehealth reported in this study's results pertains to the physicians who absolutely need to perform a complete physical assessment on a patient, albeit it was later determined that the presence of a trained nurse could overcome this shortcoming. One example of this is telehome care, which saves an abundance of money for the health care system and shifts the patient care towards family members and direct caregivers.

This study's results strongly reflect those found in the literature when addressing the major advantages and disadvantages of Telehealth. The majority of participants' perspectives on Telehealth were highly positive. They believed that a computerized system enables them to view a much broader amount of information in a quick and easy way. For instance, one handy use of Telehealth is the cheap means of communicating vital patient information to colleagues by using text messaging in the Emergency Department, a practice which is becoming more and more common among young physicians. The predominating opinion among participants was that Telehealth is extremely convenient for patients as well as physicians and pharmacists; in particular, this study's results indicated the benefits for patients with limited mobility, impaired vision, dementia, driving concerns, and mental health complications. To exemplify Telehealth's convenience, consider having to drive for four hours in order to attend a short five-minute in-person doctor's appointment – is this practical? Telehealth can circumvent this need to commute.

When speaking about the few disadvantages of Telehealth, considering it a “necessary evil” that can “maintain close communication ties” (as described by a participant), rejecting Telehealth is no longer functional and reasonable, especially in a country such as Canada with a large population and many rural areas. As read in the literature, Aboriginal people in Canada, due to a

lack of clean water, overcrowding, and inadequate housing, are more prone to infectious diseases. These rural areas tend to lack a sufficient number of physicians to address these diseases (Gordon et al., 2015; Mashru et al., 2016). Telehealth greatly helps to address this issue.

As many physician participants in this study believed, Telehealth helps patients' family members collaborate with physicians regarding patients' health concerns, so that a unanimous treatment plan can be reached. Another advantage that this study's results emphasize is that Telehealth can save time and energy for physicians, so that their professional and personal lives are bettered, particularly for older physicians and patients with more limited energy. Telehealth can reduce the extent to which physicians experience "compassion fatigue" as well, aiding them in performing their job duties better. Furthermore, based on extensive research and this study's results, physicians who are nearing retirement commonly have trouble finding successors. The overall number of available, experienced physicians is then reduced and junior physicians require more support from senior physicians through Telehealth.

Summarily, this study's results show that the majority of participants believed Telehealth's advantages much outweigh its disadvantages. The satisfaction rate regarding Telehealth, based on this study's results, among participants and their patients was indicatively high and showed that the advantages discussed supersede any minor drawbacks. Furthermore, problems surrounding Telehealth will become more and more minor as up-and-coming generations with more computer expertise come into power (Terschuren et al., 2012), and as devices and software become more advanced and user friendly.

Studies by Young et al. (2007) and Chan et al. (2014), as well as many others, back up satisfaction rates of Telehealth by patients' willingness to use it directly from their own homes,

while taking care of their loved one(s) in cases such as asthma and diabetes, and post-surgically. One astute participant notes that he evaluates the functionality of Telehealth based on his patients' willingness to use it.

The study's results show that the specificity of IT support is key in terms of a physician's willingness to use Telehealth. Participants who use hospital-based IT support, particularly in the Radiology department, had a higher rate of overall satisfaction with Telehealth than do those who depended on a more general IT team. Regarding private offices, one participant highlighted that a system with an initially good set-up functions with no complexity. Using such tools as Medio and GoToMeeting for several years, he can attest to the fact that this can be "as easy or as complicated as [one] want[s] to make it" (M-15-15-04, Page21, Line 20). He also mentioned that, paying just \$150 per month for Medio and \$50 per month for GoToMeeting, these are very reasonable and cost-effective methods of communication.

Overall, the major complaint about Telehealth with respect to system maintenance is the potential for lag time, not issues with the actual IT support once they arrive. Cost is yet another (although less forceful) reason for rejection, since funding IT support in a private office can be pricey and time-consuming. IT support, user-friendly software, the availability and affordability of tools, and little-to-no intervention required by physicians (Marchibroda, 2015) make Telehealth more desirable to physicians according to literature and this study, as expressed by many participants here. The health care system is focusing on less expensive devices and more affordable means, making it easier than ever for individuals to use Telehealth.

The majority of this study's participants who use Telehealth regularly in hospital appreciated IT personnel for pre-setting the system and creating a "painless experience" for them, particularly

when all the user needs to do when something goes awry is make a phone call to ask for troubleshooting. The researcher, as a practising nurse in BC hospitals, finds IT team members very keen and the quality of audiovisual technology to be top-notch, a point that has been reiterated by many of this study's participants.

This study's results did not reflect literature findings that Telehealth requires only moderate storage capacity as the shift from paper-based to digital documentation progresses (Borycki et al., 2005; Kushniruk et al., 2005; Lapointe et al., 2006). As seen in the literature as well as this study's results, people tend to have good bandwidth nowadays and it's getting better in rural areas which tend to be lacking compared to metropolitan regions.

For many years now, DCME has found its place within the medical field, since it's not restricted to any particular geographical location and can be done from anywhere at one's own pace. Most of this study's participants made it clear that they would like to have DCME as their primary source for their requirement to upgrade their knowledge and licensing frequently, especially when these classes are financially reimbursed, and they would like to have this learning consolidated by a short proceeding hands-on session. This majority of participants did not underestimate the convenience of DCME in their busy schedules. DCME enhances physicians' sensitivity towards their roles, increasing multi-disciplinary connections, leading to greater cohesion and support among colleagues, as discussed in the literature review.

This study's results, along with some of the literature reviewed in this paper, were surprising in that they showed that, contrary to popular belief, age doesn't hugely impact the preference for DCME versus traditional methods of learning. What is important is one's personal characteristics and motivation. To exemplify this, a seventy-two-year-old physician made it clear that he prefers

DCME over traditional ways of learning, whereas a thirty-four-year-old internist with many years of Telehealth experience, on the other hand, indicates a preference for traditional methods. On the surface, this may seem unexpected. However, this study's results highlight the fact that you "can't judge a book by its cover;" that is, you cannot predict results based upon the age, gender, or computer literacy of participants.

This study's results support the notion that the older the health care provider is, the stronger his/her intention to use Telehealth becomes. These results conflict with Gaggioli et al. (2005)'s study in Milan, Italy, which found the opposite; namely, that older physicians had no interest in Telehealth and its usage.

Even for the minority of this study's participants who stated that they prefer traditional methods of learning, they confessed that this is no longer practical and realistic when compared to how quickly and easily you can surf the Internet or watch online videos to enhance learning and skills, so they acquiesced to the necessity of DCME. Fortunately, nowadays, the curriculum in university has changed, so that Telehealth is used instead of traditional methods of learning now, making future generations even more at ease with the concept of Telehealth (Lemley et al., 2009). Several young participants in this study made this clear by explaining their need to enrol in DCME and to attend lectures at a distance.

For some physicians in this study, concerns such as financial support, reimbursement, following prescribed policies and procedures, confidentiality and security, fear of the unknown propagated by pessimists, as well as the aforementioned IT support, and the establishment and maintenance of Telehealth are discussed here as some deterrents to the use of Telehealth.

Most participants in this study, including Telehealth users in hospital, mentioned that they have no concerns about privacy and confidentiality within the hospital, although they mentioned that they wish they could have a clearer understanding of the correct policies, procedures, and expectations of them regarding Telehealth in their practices.

As mentioned, MSP is a billing service that has expanded its domains recently to cover physicians' fee-for-service methods of reimbursement. It now includes Telehealth partner fee codes that previously did not exist, and based on physician demand, as mentioned by this study, policymakers have been asked to create more of these fee codes in order to prevent patients from needing to travel unnecessarily, when it's possible to do Telehealth visits at a distance. It seems that many of this study's participants were happy that nowadays, they can receive full compensation for their Telehealth services, and they were hoping that in future, more such support will be put into action. A few of this study's participant acknowledged that there have even been changes made to telephone-only forms of Telehealth, so that there is now compensation for this service, with the exception of the field of Pharmacy. It is a testament to the usefulness of Telehealth that in the past, when no compensation for Telehealth services occurred, practitioners still used it frequently "out of the goodness of their hearts" because it is so beneficial to patient care, the environment, budgets, and emotional health (for instance, families being able to spend more time together in the home). In recent times, telecodes for billing Telehealth have become better and better, as noted by a cardiologist in this study's results. A few of the physicians in this study, unlike those who are fee-for-service, work under a fixed pay contract (salary) and are happy to use Telehealth despite the fact that there is no allotted remuneration specifically for it.

Most participants in this study believed that Telehealth technology matches its initial start-up and maintenance costs. About 75% of participants made it clear that Telehealth helps to minimize costs for physicians in furthering their professions. There is competition among different fields of medicine for health care money based on participants involved in Telehealth treatments, but it is, for the government, a very “necessary investment” since it pays for its initial costs in usefulness.

Overall, many of this study’s participants encouraged others to take a risk by using Telehealth, even though it admittedly takes some getting used to. These concerns discussed were not so concerning that the worried participants felt that Telehealth should be renounced.

This study’s results show that, as one participant put it, “everyone is a potential stakeholder.” Every sector of the community, including patients, their families, physicians (including specialists), pharmacists, health care providers, sponsors, universities, medical students, professors, and the government, can communicate through and benefit from Telehealth.

The overwhelming majority of participants in this study seemed to have a very clear understanding of who benefits from Telehealth, and 100% of participants accepted that Telehealth revolutionizes the health care industry, especially with regards to its potential for quick and easy communication. In particular, the government acts as a stakeholder in hospital settings, based on the predominant opinions of participants. Since Telehealth undoubtedly prevents and shortens hospital visits and aids the environment (as previously discussed), it saves the government substantial money.

Despite Telehealth having many stakeholders, support from some of these stakeholders is weak and lacking, as some of this study's participants pointed out. For instance, the government, it is said by several participants, does not do its fair part in contributing financially to Telehealth, and a significant portion of the general population is totally unaware of Telehealth's existence, and therefore cannot fairly advocate for its usage.

100% of participants in this study felt that secure Telehealth is pivotal in its role in treating and healing patients; however, several participants expressed concern about potential breaches in confidentiality and security. These concerns cannot be easily dismissed, although some physicians practising in hospital stated that they have no such concerns whatsoever. The participants who use Medio (which meets all the Canadian privacy protection laws) all had absolutely no distress regarding using it in their private offices. Several participants stated that they cannot trust using a server in another country because, for example, the US Patriot Act infringes upon patient privacy.

Based on this study's interviews, physicians generally wanted to have a greater possibility of devices being made secure to use outside of the hospital setting, and they wanted to have transparent expectations of them as determined by policymakers regarding privacy and confidentiality of patients. Participants would like to know how to resist patients' demands to overlook their own privacy and confidentiality when using Telehealth; as a few participants said, they care a great deal about breaches in privacy and confidentiality, but their patients simply seem not to care. How can these opposing views on security co-exist functionally?

This study's results also highlight avenues for improving Telehealth suggested by participants, an area of this paper that leads to implications for future research. Some of the ways in which Telehealth can be improved, according to participants, include: 1) the need to better educate the public as well as physicians about Telehealth, 2) the need to support aging physicians in using Telehealth (although this is debatable, and many participants feel that age is irrelevant to the adoption of Telehealth), 3) the need to increase funding for Telehealth, 4) increasing IT support, 5) making clearer policies and procedures, 6) increasing security (making computerized systems highly encrypted, for instance), 7) addressing language and cultural barriers, 8) decreasing stigmatization (for instance, unsupportive governmental attitudes), 9) increasing accessibility (that is, by increasing the number of Telehealth sites inside and outside of hospitals), 10) increasing the allotted time for Telehealth visits in clinical settings by physicians (devoting more days per week to Telehealth), and 11) making reimbursement easier for physicians.

The fact that 25% of participants had no recommendations for improving Telehealth, while 40% are content with Telehealth as it is, suggests a lack of education and awareness on behalf of otherwise well-educated physicians and pharmacists regarding Telehealth. Only 35% exhibited a deeper understanding of Telehealth by offering excellent suggestions for improving it, in the researcher's opinion.

Chan et al. (2015) state that telepsychiatry apps enable language translation technologies to allow different communities to communicate with practitioners despite a language barrier. In this way, a major hurdle to using Telehealth can be overcome. This study also emphasizes the importance of language and cultural barriers to the practice of Telehealth.

The greatest barrier to implementing Telehealth is the lack of knowledge and the dissemination of information (El-Mahalli et al., 2012). According to the literature and this study's results alike, authors feel that more workshops, seminars, symposia, conferences, and so forth are needed to emphasize Telehealth's benefits. If the gap in knowledge and the dissemination of information regarding Telehealth is alleviated, better clinician acceptance worldwide will be achieved. This would be the biggest step towards success with Telehealth. The second step would be to discover the enablers (worldwide) and to address more barriers to Telehealth's usage. Next, including health care champions in the use of Telehealth can significantly add to its success and sustainability (Muttitt et al., 2004). More sharing of expertise between medical doctors and engineers is also critical to the future of Telehealth.

2. Study's strengths and limitations

This study, like all others, has its own unique assets and deficits. Below, we identify these strengths and limitations, then explore the nature of these attributes and, given these, we justify the researcher's decisions for using the research processes selected. Finally, we investigate ways in which the research at hand could be improved in the future.

A. Study's Strengths

This study has sufficient strength to outweigh its weaknesses and offers new research into Telehealth. Some of these strengths include 1) the variety of sources contributing to the literature reviews and inclusion of an interview study, 2) the diversity among participants, 3) the design of the interview questionnaire, 4) the experienced backgrounds of both the researcher and her supervisor and frequent communication between the two, 5) the methods used to gather data (including audio recording), 6) the researcher's clarification of both questions and answers, and 7) selecting an appropriate method of recruiting participants.

First of all, the study is strong in that it relies on a foundation of a growing amount of knowledge – both published and anecdotal – on the topic. The researcher read numerous reliable articles, watched many videos on the subject, and discussed with many colleagues and physicians working within the same hospital as her about Telehealth in its many forms.

Another key strength of this study relates to the fact that participants were diverse in age, specialties within different medical departments (including both private and public practitioners), backgrounds, geographical locations, educational levels, and their experience and familiarity with Telehealth. As such, the researcher feels that despite a relatively low sample size (discussed

in the upcoming paragraph under study limitations), these participants were well-selected and fairly representative of the larger population of potential participants. They successfully reflected the broad range of professional opinions and experiences of both frequent and infrequent users of Telehealth exhibiting a great variety of levels of knowledge in Telehealth. Therefore, the results can be extrapolated to the broader community with reasonable confidence.

There are several aspects to the interview's questionnaire used in this study which make it well-targeted. A) The questionnaire is based upon many years of study and even some practice of Telehealth by the researcher and her colleagues. Its foundation is based on a large number of reliable sources in published literature. The researcher's aforementioned supervisor is highly knowledgeable in this area of study and was able to show the researcher how to advantageously revise the original interview's questionnaire in order to make it more understandable and succinct, yet detailed; B) the interview's questionnaire touches upon many aspects of Telehealth and does not neglect any obvious subtopics apparent to the researcher. The focus of the study is strong because it avoids being overly narrow in scope. It is well-designed and carefully constructed to cover a multitude of topics pertaining to Telehealth, and C) the style of the interview's questionnaire is simple, straightforward and understandable, circumventing the use of technical jargon. It is able to be comprehended by laymen and academics alike and assumes a naive audience.

The supervisor of this research, Dr. Andre Kushniruk, having broad knowledge and experience in the field of Telehealth, provided patient guidance and expert advice to the researcher, which was a great asset to this study; furthermore, the researcher's background in engineering and nursing, as well as her previous presence in many educational and clinical videoconferencing sessions in

different hospitals and clinics as a registered nurse during the course of her practice in BC, was very beneficial to the study's design, resulting in its comprehensive nature.

This study also is strong in the accuracy and detail of its results, thanks to the opportunity to audio record all of the interviews for repeated later review. The method by which the data was gathered ensured reliable, accurate and thorough results and enabled consistent levels of accuracy in their further analysis. Quotes used throughout the results section of this paper were word-for-word because the researcher was able to re-play the responses to her satisfaction to ensure they were accurate.

Further contributing to the detailed nature of the study's results, the researcher was very conscientious about asking for clarification when she felt she was given vague, redundant, unclear, or ambiguous responses by participants. As well, she ensured that if any participants seemingly misunderstood a question, she in return elaborated and clarified it for them.

The way interviewees were selected evolved somewhat over time, resulting in a high rate of response from people familiar with Telehealth. The researcher used the snowball sampling method, beginning with her supervisor introducing the first physician. The snowball sampling method's use can be justified because it allowed her to connect with populations that would be difficult to reach using other sampling methods. It is inexpensive, simple, and affordable. This method enabled her to reach at least some people who use Telehealth, rather than exclusively those who do not use it or have no knowledge of it, so this sampling method provided more opportunities to elicit physicians' elaboration on the advantages and disadvantages of Telehealth and their insights into other issues relating to Telehealth in order to suggest future ways of solving identified problems.

B. Study's Limitations

Some limitations to this study include: 1) small sample size, 2) limited time (only approximately thirty allotted minutes for each interview), 3) the sometimes conservative, naive, or bureaucratic responses of some participants, 4) the fact that the participants who voluntarily enrolled didn't have enough time to think about the questions being asked (in order to prevent bias, and some answers seemed very awkward and irrelevant, leading the researcher to attempt to bring the responses back on track at these times), 5) the fact that some of the participants that arranged a time for the interview themselves seemed distracted due to the busy nature of their jobs, and 6) it might have been prudent to complement the sampling method by sending several preliminary questions regarding Telehealth or even some background information on Telehealth in advance, in order to generate some forethought into Telehealth prior to the interview. These points will be explained in more depth in the following paragraphs.

First of all, due to a lack of responses to invitations and a lack of willingness to participate in the study, as well as the unavoidable wait of many months' duration for participants to volunteer, a larger pool of participants was not feasible. Saturation occurs when additional data collected no longer adds further information to previously collected data, but rather, reaffirms data already obtained (Strauss & Corbin, 1998; Jackson & Verberg, 2007). Repetition among participants in their responses meant that the saturation level was reached at a relatively low number of interviews, meaning that no further insight into the matter was occurring with the addition of participants to the study. Thus, saturation was the key determinant of sample size in this study (Elder & Miller, 1995; Jackson & Verberg, 2007). Ideally, many more participants would have

been interviewed, and interviews would have gone into more depth by allotting more than only thirty minutes per interview or by incorporating multiple interviews for each participant.

A few participants answered in what seemed to be a politically slanted manner, may not have been straightforward due to covert motivations, were ignorant on the subject matter, were conservative, or were misinformed about Telehealth. Some adamantly held rampant misconceptions regarding Telehealth. This meant that some responses were not as useful and insightful as others, and did not greatly contribute to a more advanced and progressive understanding of the nature of Telehealth, although these did offer insight into common stereotypes and false impressions about Telehealth, which could be valuable in addressing future concerns. It is possible that, had all physicians been better-informed about the current state of Telehealth and its uses, and had they felt free to be completely candid in describing their practice and that of their colleagues, the results might have been stronger and more helpful in contributing to the body of knowledge surrounding the use of Telehealth.

The researcher wishes she could have had even more diversity among participants; however, participants had to voluntarily agree to an interview, so she was unable to obtain the opinions regarding Telehealth of those who were unwilling to participate, thus skewing the results.

Additionally, some participants either did not seem to grasp the importance of dedicating enough time to their answers, or were too busy to do so; so answers were limited in length in some cases due to time constraints or lack of knowledge on the topic.

Despite their graciousness in agreeing to such interviews, the busy schedules of some participants were a deterrent to their patient, vigilant contemplation of their responses. Due to a shortage of physicians in general, many seemed overwhelmed, exhausted, and unable to fully

focus on the matter, thus compromising the integrity of their answers and the integrity of the study on the whole. Perhaps the perfectionistic researcher had unrealistically high expectations of others. Altogether, she feels that the totality of results gathered was strong, and that it is apparent that many participants did, in fact, respond with a high standard of quality.

Another potential solution for improving the study might have been to give half of the participants preliminary questions and background information on Telehealth in advance (that is, prior to being interviewed) and to compare these responses to those given by the half of participants with no preparatory information or questioning. However, it is likely that this would only reveal whether advance preparation led to more detailed answers, and considering physicians' lack of time, it is conceivable that few would have even taken the time to read the preparatory material.

In order to prevent bias, the researcher did not send the questionnaire associated with the study to the participants prior to being interviewed. However, doing so would have provided participants with more time to consider their responses in detail, rather than having to answer on the spot or on impulse. Also, sending preliminary questions about Telehealth prior to the interview process may have enabled participants to better educate themselves on the nature of Telehealth. Doing so would therefore have enabled participants to more clearly understand the questions being asked and would have prevented irrelevant or ignorant replies.

Finally, the researcher ideally would have used a mixture of sampling methods in order to make her results more generalizable and transferable and in order to avoid the lack of control over the study due to the snowball sampling method. The snowball sampling method caused the

researcher to have no knowledge of the true distribution of the population and of the sample used. Also, adding another sampling method would alleviate the bias involved in this study.

3. Suggestions for Future Research into Telehealth (Deduction)

These aforementioned strengths and limitations have led to important suggestions for future research into Telehealth. These recommendations include 1) the use of different methods of recruitment and 2) the possibility of applying incentive for volunteer participants. Due to time and fiscal restraints, these suggestions are not best applied to a solitary Master's student, but rather to collaborating researchers who would be able to put far more time and monetary resources into a project on Telehealth than could a single person.

One way to potentially expand future research into Telehealth would be to alter or broaden the inclusion and/or exclusion criteria relating to participant selection; for instance, nurses and patients could be involved in the study in order to enrich the data collected. Further, potential sponsorship (e.g., media advertising) could provide many more resources for the study and could reach a much larger audience of prospective candidates. As a specific example, a social function could be held in which prospective participants are selected through various means.

The researcher has deduced that improving marketing and managerial problems for Telehealth would help in its expansion and acceptance. Wade et al. (2014) describes the need to make physicians interested in using Telehealth because money is not the savior of everything – the players need to be interested!

Additionally, public recognition for participation could enhance the research and motivate participants to put more time and effort into their responses. Other motivational factors, such as job promotion, educational advancement (e.g., providing course credits for participation), or awards (a medal of honour or certificate of appreciation) could improve the willingness of

participants to enrol and participate to the best of their knowledge and ability. Again, please note that all of these suggestions for future research require ample money and time, and would require the work of many individuals rather than only one student. These suggestions for the future delving into Telehealth are best suited to a collaboration of multiple individuals with an abundance of financial resources and time.

4. Conclusion

As emphasized throughout the duration of this document, Telehealth is a field which benefits primary physicians, health care workers, junior mentees, patients, and the community at large. The overarching theme and purpose of Telehealth is to take advantage of today's technology to facilitate communication between medical practitioners, bring together junior physicians with mentors, and communicate with patients. Considering the global population expansion combined with the critical shortage of physicians felt worldwide, using technology to address medical care issues in the form of Telehealth can provide extensive solutions to addressing many concerns, as highlighted throughout this report. This includes providing the highest quality of care to residents in rural areas. Physicians can additionally upgrade their knowledge in a timely and cost-effective way, and precedence in the literature supports physicians' and patients' positive experiences and expectations with Telehealth. Applying Telehealth in the practice of upgrading knowledge and communicating with fellow expert physicians as well as patients is vital in reducing medical expenditures relating to travel and saves valuable time during which the physicians may engage elsewhere. In some cases (i.e., telepsychiatry), administering care over audiovisual networks is preferable to in-an-person consultation and permits both the patient and physician to communicate regardless of geographical location. While several reasonable barriers to the approving and implementing Telehealth remain, it is the author's firm belief that Telehealth can bridge the gap between nations in the role of health care and can improve health-related communication and exchange of knowledge and expertise around the world.

While technological advancements have vastly improved the quality of our lives, it is also important to address the downside of technology: social isolation, health problems as a result of sedentary lifestyles, and overindulgence in technology. As such, while Telehealth is a vital resource, it is not a “silver bullet” and cannot solve all the world’s health care problems. In order to extract the true benefits of Telehealth, the consciousness of humanity as a whole must evolve at a pace congruent with technology, since when it comes to technology, using is not simply equal to abusing. We therefore must emphasize that it is perhaps erroneous to completely suggest using technology as a means to avoid true social interaction, since we are a social species and we typically benefit from in-person interpersonal relationships. We must also understand that each community and culture will address the health needs of the community in a unique way suitable to its cultural beliefs, and caution is advised in posing judgment on what others choose to practice, even if it means choosing not to implement Telehealth.

The researcher concludes that the most important question derived from this study is how to expand and globalize the use of Telehealth; specifically, the most important focus for enhancing the future of Telehealth is how to make the general public more aware of its existence in the first place. The results conclude that even some highly educated physicians are not clear on what Telehealth entails. If even practising physicians who use Telehealth daily are confused about the nature of Telehealth, how can we expect the public to accurately know about it? Then, once the public has been made aware of Telehealth, it is important that they next become acquainted with the many advantages Telehealth has to offer.

The application of Telehealth in the practice, upgrading of knowledge and communication of physicians with their colleagues is qualitatively described in this study. Most participants use a

variety of modalities of Telehealth, sometimes without the awareness that they are using it. This paper concludes that Telehealth technologies connect health professionals and patients worldwide, facilitating collaboration among experts to quickly and accurately diagnose and assess disease, take medical histories, reduce waiting lists, and prescribe therapy and medication. New Telehealth projects connecting health care providers and patients are emerging and evolving rapidly, yet much of the public is nonetheless unaware of Telehealth's existence, an issue which needs to be addressed by future research into this domain. Generally, physicians seem very ready to embrace Telehealth. It is time for ministries of health, system implementers, guideline implementers, vendors, providers, researchers, and academic to take action and facilitate the usage of Telehealth worldwide. With these parting words, the author hopes to foresee positive changes in the future role of Telehealth in uniting people with one another all across the planet to change the way health care is administered.

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APPENDICES

1. Appendix A

Script for interviewer to recruit participant suggested through snowball sampling (emailed to potential participant referred to by snowball sampling)

Invitation to Participate in Research Study

Hello, my name is Irandokht Vahedi. I am a University of Victoria Master's student in Health Information Science, and I would like to offer you a chance to participate in my research project “Applications of Telehealth in the Practice, Upgrading of Knowledge, and Communication of Physicians with their Colleagues and Patients in Canada”.

The study I am doing involves interviewing practicing physicians like yourself, to see if they currently use Telehealth, or may use it in the future. The research will be of importance to help determine who is using Telehealth in the province, what it is used for, and also if there are any barriers or facilitators to its use.

If you wish to participate in this study attached is a written consent form which you may sign, scan and email back to me. Alternatively consent may be obtained over the phone verbally.

Please email to the address given below, or phone the number given below, if you are interested in participating in the study. The study will involve a 30 minutes audio recorded phone interview about use of Telehealth. All information will be kept confidential and anonymous.

If you are interested please send me your phone number and a time can be set up at your convenience for a 30 minutes phone interview.

Irandokht Vahedi

Email: *****

Phone number: ***-***-***

2. Appendix B



**University
of Victoria**

Participant Consent Form
Health Information Science

Consent form (to be printed and signed before the interview for written consent emailed back to investigator, or alternatively read over the phone for obtaining verbal consent)

“Applications of Telehealth in the Practice, Upgrading of Knowledge, and Communication of Physicians with their Colleagues and Patients in Canada”

You are invited to participate in a study entitled “Applications of Telehealth in the Practice, Upgrading of Knowledge, and Communication of Physicians with their Colleagues and Patients in Canada” that is being conducted by Irandokht Vahedi.

Iranokht Vahedi is a Master’s student in the department of Health Information Science at the University of Victoria and you may contact her if you have further questions via Email: *****

As a graduate student, I am required to conduct research as part of the requirements for a Master degree in Health Information Science. It is being conducted under the supervision of Dr. Andre Kushniruk . You may contact my supervisor at 250-472-5132 or email him Email: andrek@uvic.ca

Purpose and Objectives

The purpose of this research project is to:

The purpose of the research is to better understand Telehealth in BC, and in particular its current or potential use by physicians in the province. This will involve reviewing the published literature and conducting qualitative telephone interviews with practicing physicians regarding advantages and disadvantages of Telehealth.

Importance of this Research

This study will explore the benefits of using Telehealth from the perspective of practicing physicians, and outlines the positive and negative aspects of its implementation. Also, due to the significance of the topic, this research will serve to detail the pros and cons, providing evidence supporting the impact of introducing Telehealth, in professional, and educational medical settings in the form of a Master's Thesis.

Participants Selection

You are being asked to participate in this study because you are practicing physician who may currently, or may in the future, use Telehealth methods, tools or strategies in your practice.

What is involved?

If you agree to voluntarily participate in this research, your participation will include participating in phone interview. Upon giving written and verbal consent to the interviewer, your answers to a series of questions will be audio recorded and later transcribed. The data will be used for the purposes of the researcher's Master's research. The phone interview will take about 30 minutes.

Inconvenience

Participation in this study should not cause any inconvenience to you.

Risks

There are no known or anticipated risks to you by participating in this research.

Benefits

The potential benefits of your participation in this research:

There are no short-term benefits to the participants, but eventually they and others will benefit from improvements made to Telehealth due to research and examinations of practice such as this. The state of knowledge about Telehealth will be enriched and society members will benefit.

Compensation

There is no compensation in this study.

Voluntary Participation

Your participation in this research must be completely voluntary. If you do decide to participate, you may withdraw at any time without any consequences or any explanation. Your data will then be destroyed.

Researcher's Relationship with Participants

There is no relationship between them

On-going Consent

There is no on-going consent. One time interview (30 minutes)

Anonymity

In terms of protecting your anonymity

In order to protect anonymity of participants in the study, code names will be used for removing names from data collected.

Confidentiality

Your confidentiality and the confidentiality of the data will be stored in a password protected computer file, which is only accessible by the researcher (Irاندokht vahedi). The audio recordings of the interviews will be stored in a locked filing cabinet in the researcher's home until six months after the degree is completed, upon which time, all tapes and transcripts will be destroyed.

Dissemination of Results

It is anticipated that the results of this study will be used in the form of a thesis (Irاندokht Vahedi's thesis), presentations at scholarly meetings and in the form of a published article, chapter, or book.

Disposal of Data

Data from this study will be disposed of six months after the thesis degree requirements are completed. The electronic data will be erased and the paper copies will be shredded.

A copy of this consent will be left with you, and a copy will be taken by the researcher.

This study is approved by Human Research Ethics board (HREB): # *****

3. Appendix C – Interview Questions

The demographic questions were asked by interviewer:

- 1-How old are you?
- 2- What is your gender (Male or female)?
- 3-What is your education level and what is your specialty?
- 4-In what year did you get your medical degree?
- 5-How long have you been a practicing doctor?
- 6-In which city do you practice? Do you practice mostly in clinic or hospital?
- 7-How many years have you used Telehealth technology?

More Questions:

- 1- How would you define Telehealth?

For the purposes of this study we define Telehealth as:

Telehealth is the delivery of health care services remotely at a distance. Telehealth also provides wellness and education using information and communications technology and real-time interactive videoconferencing. Telehealth encompasses a broad variety of technologies and tactics to deliver virtual medical, health and education services.

- 2-Do you use Telehealth? If so describe how you use it

If participant said “No” then interviewer continued with questions at “Section A”

- 3- How many years of experience do you have working with Telehealth, for what purpose, educational/clinical and what equipment have you in the past or do you currently use, i.e. videoconferencing, phone, fax, or Web?
- 4- In your opinion does your age or gender influence your usage of Telehealth?
- 5- Approximately how many hours per week do you use Telehealth in your practice, education, consultation and communication with your colleagues and patient? Please explain.
- 6- Describe how you use Telehealth, including type of Telehealth technology and applications used, and type of patients involved?
- 7- Can you give the number of patients that you visit over distance versus in the office?

8-What are the major advantages and disadvantages to using Telehealth based on your personal experiences?

9- Do you think that computer literacy and technophobia influence the adoption of new technologies and are there any particular skills or competencies that you feel enhance one's ability to use Telehealth?

10- What has your experience been with technical support, system maintenance or system installation? Is it costly, time-consuming, effective, or ineffective?

11- Is using Telehealth technology nowadays more or less difficult? Who is facing more challenge, health professionals or learners? Do patients have problems with Telehealth technology? If so, describe.

12- Have you ever enrolled in any distance CME classes (Continuing Medical Education) and were these classes more convenient and effective than traditional classroom methods?

13- Is there any financial support available for the implementation of Telehealth in your daily life as a physician, and do you believe the value of this technology matches its initial cost?

14- How do you get reimbursement for using Telehealth visit? Do you get reimbursement for each visit? Has that been an issue?

15- Would you agree or disagree that access to Telehealth and different kind of software helps to minimize costs for physicians in furthering their profession?

16- How does Telehealth influence communication between patients and physicians? Can you give examples of how such communication was influenced, from your personal experience using this technology?

17- Who are the stakeholders and what will they gain from implementing Telehealth in the education and practice of physicians in British Columbia Canada? What challenges might they face?

18- Have you had any concerns about privacy using Telehealth? If so what are they?

19- Do you have any suggestions for improving the Telehealth system? If so, please explain.

“Section A”

Questions to use if participant said “No” to question 2 above (i.e. participants don’t use Telehealth)

- 1- Why don’t you use Telehealth?
- 2- Would you use Telehealth in the future? When might you use it, or why not?
- 3- Do any of your colleagues use Telehealth, if so for what?
- 4- What do you see Telehealth being useful for in medical practice and for medical education?
- 5- Do you think Telehealth could be a part of your practice or education? If so, describe how you might see it used
- 6- What do you think are the potential problems with Telehealth?
- 7- What do you think are the potential advantages of Telehealth?