Understanding Telehealth Mediated Cancer Care in Northern BC First Nations Communities: Health Professionals' Perspectives

by

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B.Sc., University of British Columbia, 2002
B.Tech., British Columbia Institute of Technology, 2009

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ABSTRACT

Objective

The use of telehealth to provide health service delivery to rural and remote First Nations populations Canada-wide has greatly increased in recent years. Telehealth provides a mechanism for these disadvantaged and underserved communities to access timely healthcare services that would otherwise be expensive, delayed or unavailable due to geographic and resource limitations. There are numerous benefits, challenges and cultural issues that must be understood from a healthcare professional perspective when providing telehealth care to First Nations communities. Once educated with respect to these issues and experienced in providing care, healthcare professionals are well poised to provide feedback with respect to improving telehealth mediated health care delivery. This thesis examines these issues in the context of using telehealth for patient care, specifically cancer care.

Methods

This thesis is divided into two phases. Phase one is a literature review assessing the use of telehealth, specifically in rural and remote First Nations communities in Canada. Phase 2 is a study using a survey to assess healthcare professionals who provide telelehealth mediated patient care (in particular cancer care) to Northern BC First Nations communities. The participants were contacted through the use of an online survey tool to assess their perceptions of benefits, challenges, and cultural awareness when providing patient care. The survey population consisted of onsite health professionals and urban health professionals providing patient care to Northern BC First Nations communities via telehealth. Specific participant groups of interest were (1) onsite cancer care professionals, (2) onsite other (non-cancer) care professionals, (3) urban cancer care professionals, and (4) urban other (non-cancer) care professionals.

Results

The participant population of 45 was too limited a sample size for inferential statistics to be conducted. Therefore our survey data was interpreted by comparing the mean composite scores of the participants groups within each category. Our survey data implied that onsite cancer care providers found fewer benefits and more challenges with respect to telehealth than the other participant groups. We did not see any differences between the participant groups with respect to cultural awareness.

Conclusion

Based on the literature we reviewed telehealth can reduce costs and extend health care services in a timely manner while at the same time complement conventional care to build stronger health care community relationships. Despite these positive benefits found in literature, our survey found onsite cancer care professionals did perceive fewer benefits and more challenges regarding telehealth use. Specific issues raised by our survey participants that need to be addressed are the physical disconnect associated with telehealth and the perception that telehealth is a replacement for conventional care.

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Most importantly I wish to dedicate this work to my wife who has had to endure an absent husband during our first years of marriage due to my school and work obligations.

-Bobby Sidhu

CHAPTER 1: INTRODUCTION

Background & Motivation

First Nations communities are typically an underserved and disadvantaged component of Canadian society (Reading & Wien, 2009). Their social, health care and community infrastructure challenges are similar of those normally found in developing countries. Many of these First Nations communities exist on reserves in rural and remote regions of Canada geographically isolated from urban centers. First Nations communities also suffer from socio-economic, drug and alcohol dependency as well as infectious and chronic disease issues (such as cancer) (Reading & Wien, 2009). These health care issues require effective and timely access to social and health related resources that are not always readily available. Historically, cancer has not been a major health care issue in First Nations populations (Marrett, Jones & Wishart, 2004). However, this has changed considerably in recent years as cancer rates have increased dramatically in some First Nations communities in Canada (Marrett, Jones & Wishart, 2004). Social determinants of health including income, access to health care, lifestyle choices, such as tobacco use and unhealthy diet, have all played a role in this increasing trend (Marrett, Jones & Wishart, 2004; Reading & Wien, 2009). There are unique challenges in terms of understanding First Nations populations and their cancer care needs. For example in BC cervical cancer amongst First Nations women is a larger concern than the general population. Similarly, breast cancer screening for First Nations women occurs later than in the general population. Therefore challenges regarding providing health care services to First Nations populations need to be understood in order to improve cancer care outcomes.

The First Nations and Inuit Health Branch funds health services to First Nations communities. Actual health services are provided by provincial health authorities such as Northern Health (Lavoie, 2011). Thus providing equitable and timely healthcare to First Nations communities presents challenges due to geographic, socio-cultural and jurisdictional issues. This is true not only for cancer care but across all healthcare domains.

Health information technologies (HIT) can be used to facilitate the exchange of health information. These systems can be used to improve healthcare services to underserved populations (Jennet, Hall, Hailey, Ohinmaa, Anderson, Thomas, Young, Lorenzetti & Scott, 2003). Studies have shown that equitable and timely healthcare services can be delivered to First Nations populations when the patients reside in the community and the healthcare provider is at an external urban healthcare center. (Kennedy & Yellowlees, 2003; Health Canada, 2005a). First Nations communities promote a community driven holistic approach to healing. Keeping an individual in the community when it is not absolutely necessary to move them for treatment has a positive effect on both the social wellbeing of the community and family members. As importantly is the positive effect it has on the mental wellbeing of the patient (Health Canada, 2005a). Though telehealth may in theory be an effective method of extending health service delivery, trained health professionals who understand First Nations cultural uniqueness are needed to successfully facilitate its use.

My decision to conduct this thesis was motivated by my experiences with First Nations' communities and through the guidance of Jeff Barnett, thesis co-supervisor. I

previously worked in environmental health information technology training, system implementation and data management targeted at health professionals employed in rural BC. These experiences showed me the benefits of health information technologies, specifically telehealth, in providing effective and timely healthcare service delivery to First Nations communities. My initial review of literature piqued my interest as it showed that the information communicational technology (ICT) infrastructure on which telehealth systems are implemented can be used as medium for community development as well. Telehealth can be used to link First Nations communities to each other, to the wider Canadian context and the world. In reviewing literature I found extensive research regarding patient specific telehealth systems but a gap in research specifically in telehealth use and the health professional perspective in First Nations communities. Discussions with Jeff Barnett then steered this thesis to involving both Northern Health (NH) and the Northern Cancer Control Strategy (NCCS) to evaluate the use of telehealth by health professionals for cancer care in First Nations communities in Northern BC. The goal of this thesis is to contribute to addressing this knowledge gap and provide meaningful recommendations to NH and NCCS regarding the topic.

Northern Health and the Aboriginal Health Program

As mentioned prior, health service delivery to First Nation's communities in BC is provided by the regional health authorities and in the case of northern British Columbia by NH. NH has jurisdictional boundaries that cover nearly two-thirds of BC. NH is separated into 3 operational areas referred to as health service delivery areas (HSDA). NH provides service to approximately 300,000 individuals of which nearly 17.5% are

First Nations. NH has implemented the Aboriginal Health program to specifically address the unique needs of this population. The NH Aboriginal Health program is a focused initiative whose goal is to improve the health of First Nation's populations in Northern BC. It has five key objectives, as per the Aboriginal Health Services Plan 2007 – 2010 (Tabobondung, 2007):

1. *"To improve engagement with Aboriginal communities.*
2. *To improve cultural competency within Northern Health.*
3. *To increase effective service delivery.*
4. *To increase investment in the Aboriginal Workforce.*
5. *To develop monitoring and evaluation mechanisms for Aboriginal health systems."*

The geographically isolated nature of Northern BC First Nations communities put them in an excellent position to benefit from incorporating HITs, such as telehealth, to achieve their core health service delivery objectives.

Specifically for Objective 1, telehealth can improve engagement with Aboriginal communities by facilitating communication between NH and Aboriginal Health Improvement Committees (AHIC). This is accomplished by making these interactions site independent through the use of ICTs such as teleconferencing and videoconferencing.

Regarding Objective 2, telehealth systems can be used as a training medium for NH healthcare workers. This allows them to engage with Aboriginal presenters and elders to become more 'culturally aware' of the unique social needs of First Nations populations. Furthermore NH facilities may be environments that do not exist in a cultural atmosphere that is in tune with the needs of some First Nations clients (ie the availability of traditional foods or allowance for social/family traditions in a healthcare setting). Telehealth may be used for health service delivery without removing the

individual from the home or community setting. Removing the individual from their home could increase anxiety and negatively affect both the individual's and their family's mental and social wellbeing.

For Objective 3, increasing effective health service delivery is an inherent benefit of telehealth as it can be used to increase accessibility to geographically isolated populations. Chronic disease management, electronically supported self-care and improved client transition are all components of the Aboriginal Health Services Plan that can be directly supported by telehealth.

In reference to Objective 4 the effect of telehealth in increasing investment in the Aboriginal workforce is primarily two-fold. Telehealth systems can act as a medium to provide distance education programs for First Nations individuals who cannot leave their own communities to pursue educational opportunities. As a result newly trained local First Nations health professionals can facilitate interactions with off-site specialists. This approach works to remedy both the shortage of health professionals in First Nations communities as well as improving access to culturally appropriate care.

Finally in regards to Objective 5 monitoring and evaluating mechanisms for First Nations health systems, telehealth can again be used as a medium for facilitating communication between the various NH and Northern BC First Nations groups involved. By using HITs such as telehealth, NH and the Aboriginal Health program can better align their service delivery objectives to provide accessible, equitable and timely healthcare to Northern BC First Nations communities.

Northern Cancer Control Strategy

NCCS is a collaborative initiative between the BC Cancer Agency, Northern Health and the Provincial Health Services Authority. The primary objectives of the NCCS as per the NCCS Overview are (NCCS, 2012a):

- *"Decrease the incidence of cancer*
- *Increase survival from cancer*
- *Improve the quality of life*
- *Improve access to services for Northerners"*

Taking in consideration of the projected increase in cancer diagnoses in Northern BC from 1061 in 2007 to 1219 in 2012, a business plan was developed to propose enhancements to the existing cancer care services (NCCS, 2009). With respect to enhancements to enablers the business plan states (NCCS, 2009).

"An improved Telemedicine Infrastructure in the North and in Vancouver will enhance services at existing Community Cancer sites and Prince George Regional Hospital. Hired schedulers will facilitate telemedicine meetings between patients and healthcare providers, and registered nurses who will act as Telehealth Site Coordinators will facilitate telemedicine sessions with patients."

The subsequent business plan update in January 2010 further outlines the role of telehealth in using Vancouver based specialists to provide support to patients living in Northern communities. For example patients requiring appointments with medical oncologists can use telehealth to access them. Furthermore NCCS is continually looking at new ways that telehealth can be incorporated to improve health service delivery in Northern BC.

The purpose of this chapter was to introduce the reader to the thesis topic. Discussion here provides a background to the topic and the aim of the thesis. Included in this chapter is an overview of the two partner agencies involved in the thesis, namely

Northern Health and the Northern Cancer Control Strategy. In the body of this paper the term ‘thesis’ will refer to the project as a whole while ‘study’ will refer to the survey I conducted.

Aim of the Thesis

The purpose of this thesis was an exploratory study to examine whether health professionals supporting Northern BC First Nations communities perceive benefits, challenges and cultural issues with respect to telehealth mediated health care, specifically in the context of cancer care. The goal of assessing these issues was to determine if health professionals who used telehealth to deliver patient care appreciated its benefits, or whether challenges with respect to telehealth use dominated their perceptions of its value. Further studies can determine what change management strategies could be implemented to better facilitate telehealth use from the health professionals’ perspective. This thesis focused on the perceptions of Northern Cancer Control Strategy (NCCS) and Northern Health (NH) health professionals with respect to telehealth technologies for cancer care. The primary objectives of the thesis were:

1. To conduct a literature review regarding the use of telehealth systems to provide health service delivery to resource limited, underserviced and disadvantaged rural and remote First Nations communities.
2. To conduct a study in conjunction with NH and the NCCS under the supervision of Jeff Barnett (British Columbia Cancer Agency - BCCA) and Abdul Roudsari (University of Victoria - UVic). The study assessed onsite healthcare professionals who use telehealth services in the First Nations communities for patient care

(particularly cancer care) and external urban health care professionals with respect to their perceptions of telehealth with regards to benefits, challenges, and cultural awareness. Though not primary objective of this study a technology assessment regarding comfort levels with varying information communication technologies was also a component of the study.

3. To assess whether the use of telehealth technologies is a feasible approach to extend health service delivery for cancer care by examining health resource use in context of both the service provider and service user.
4. To determine if health professionals believe the use of telehealth can facilitate better social interactions, accessibility to healthcare and timely health service delivery to First Nations communities in Northern BC.

The aim of the research was to determine if there is a perception gap between the target groups with respect to the aforementioned issues and telehealth.

Overview of the Thesis Chapters

This thesis is divided into five chapters excluding the Abstract, namely; Introduction, Literature Review, Methods, Data Analysis & Discussion, and Conclusion.

In Chapter 1 the Introduction sections describes the First Nations populations in Northern BC in the context of HITs such as telehealth. This section provides a background to the thesis as well as my motivation for conducting it. Telehealth in the context of this thesis refers to ICTs that are used to provide patient care, with a specific interest in cancer care. The discussion then expands to the aims of the study listing

specific goals. Included in this chapter is an overview of the organizations integral to the thesis, namely NH and NCCS.

Chapter 2 is a literature review regarding the use of telehealth in extending health service delivery to resourced limited rural or remote First Nations communities. This section incorporates previous and current research regarding this topic and presents it to the reader to help them understand the issues regarding telehealth use in Northern BC First Nations communities, specifically in the context of cancer care. Lessons learned from the various sources of literature reviewed can help to determine what pitfalls to avoid in using telehealth to extend health service delivery to First Nations communities in BC.

Chapter 3 outlines the methods with respect to the study portion of the thesis. The study consisted of a survey questionnaire to capture health care professionals' perceptions on using telehealth to provide health service delivery to First Nations communities in Northern BC. This section covers the materials and methods, survey design, and data collection that I conducted during the study portion of the thesis.

Chapter 4 refers to the analysis of the data collected during the study. Descriptive statistics are focused on population demographics, perception of benefits, perception of challenges, cultural awareness and technology use. These results are discussed in context of existing literature in the Discussion section of this Chapter.

Chapter 5 draws from the whole thesis to provide a conclusion with respect to the perception of telehealth use for First Nations communities in Northern BC from the health professional's perspective, specifically in the context of cancer care. Recommendations regarding telehealth use in First Nations communities in Northern BC

are then presented to the reader. These recommendations are drawn from the literature reviewed, participants' comments and the analysis of the survey data.

CHAPTER 2: LITERATURE REVIEW

Telehealth and First Nations Communities

This review of literature was conducted to describe the use of telehealth in rural and remote First Nations communities in Canada; and to provide insight with respect to successful telehealth initiatives and barriers when implementing telehealth systems as a method of extending health service delivery to First Nations populations.

Methods – Literature Search Strategy

Published and grey literature regarding telehealth use in First Nations communities was identified using keyword searches in online journals, databases, government websites, other theses, First Nations websites, and online search engines. Specific journals and databases included MEDLINE via PubMed, EBSCO Host, UBC Library Catalogue, Journal of Telemedicine and Telecare (JTT) and the National Center for Biotechnology Information (NCBI), amongst others.

The search strategy focused on articles which included the keywords: ‘rural’; ‘telehealth’; ‘telemedicine’; ‘eHealth’, ‘First Nations’, ‘Aboriginal’; ‘cancer’; ‘teleoncology’. Article abstracts were then inspected for applicability to the research topic. Then, the relevant articles were reviewed. Articles included in the literature review were not restricted by publication date but were limited to the English language. One hundred and six sources were identified for inclusion in this literature review. Article information was also entered into citation machine, a reference manager, to verify reference formatting (Warlick, 2012).

Articles on rural, remote, First Nations, and aboriginal populations in US, Latin America and Australia were also included in the literature review to provide context on issues faced by jurisdictions with similar population demographics as Canadian First Nations. Furthermore, articles assessing benefits and challenges of telehealth in developing countries were also included for the insight they provided in implementing telehealth in resource limited settings such as those found in geographically isolated First Nations communities.

Introduction

Telehealth (also known as telemedicine) is *"the transmission of images, voice and data between two or more health units via Telecommunications channels, to provide clinical advice, consultation, education and training services"* (Health Canada, 2004a). Rural and remote First Nations communities in Canada have historically lacked the focused healthcare infrastructure available in major urban centers. These First Nations communities, which are generally underserved and disadvantaged populations existing in geographically isolated resourced limited settings, can leverage telehealth systems to improve health service delivery to their populations (Selinger, Ho, Lauscher & Bell, 2008; Perley & O'Donnell, 2006). A 2011 report 'Telehealth Benefits and Adoption Connecting People and Providers Across Canada' commissioned by Canada Health Infoway found that as of 2010 (Canada Health Infoway, 2011)

"Canada had in place more than 5,710 Telehealth systems in at least 1,175 communities. Many of these systems serviced the 21% of the Canadian population who live in rural or remote areas, one-third of whom identified themselves as being of Aboriginal heritage. This included 284 First Nations communities and 46 Inuit communities served by

Telehealth"

According to Health Canada, for over 35% of Aboriginal communities the nearest physician is over 90 kilometers away (Muttit, Vigneault & Loewen, 2004). Nearly 18% of these communities are not accessible by road access and rely on scheduled flights only. 3.5% of the communities have no regular flight access, road access and limited telephone or radio communication services (Muttit, Vigneault & Loewen, 2004). Limitations with respect to healthcare service delivery imposed on these communities due to geographic isolation and access to transport infrastructure are a driving force in their health status disparity when compared to other Canadian communities (Health Council of Canada, 2005b). This theme of geographic isolation and its effects on health service delivery are predominant throughout literature regarding telehealth and First Nations communities.

Challenges with respect to access to care imposed by geography can be mitigated through the use of ICTs to implement HITs such as telehealth systems. Some of the known benefits of telehealth include better access to chronic disease management programs, access to specialist care not otherwise available in rural and remote communities, reduced costs associated with travel and time off work, and an increased frequency of communication between patients and specialists. ICTs used to implement telehealth systems include telephone networks, cellular networks, broadband connections, WiFi technologies, and satellite communication services (Ng, Sim, Tan & Wong, 2006; Lacal, 2003; Shu-Tim, Davies, Smith, Marsh, Sherrard & Keon, 1998). With the range of ICTs available those implementing telehealth systems must take into consideration the demographics of the community, the relative costs of the ICTs available and nature of the

telehealth system to be implemented. Once telehealth systems are in place the ICT backbone they are built upon can provide added benefits to rural and remote First Nations communities in that can be used for educational initiatives as well as administrative purposes which may not be otherwise available to the local healthcare professionals (Lamb & Shea, 2006; Perley & O'Donnell, 2006; Health Canada, 2004b). These administrative and educational opportunities show the versatility of telehealth ICTs in their ability to open information pathways to First Nations communities. Further research needs to be conducted to determine in what other ways ICTs built for telehealth systems can be used to support First Nations communities.

ICTs are only part of the equation for implementing successful telehealth systems in First Nations Communities. A study conducted by Ho, Jarvis-Selinger, Do, Sharman, Steele, Carty, Lauscher, and Gunsingham in 2004 found that in addition to investment in ICT infrastructure, telehealth systems must also be driven at the community level, must be scalable to changing technology, be built within a proper legal framework, must be implemented in conjunction with culturally appropriate training, take into account the social determinants of the First Nations populations, and incorporate a holistic approach to healthcare service delivery (Ho, Jarvis-Selinger, Dow, Sharman, Steele, Carty, Lauscher, and Gunsingam, 2004). Therefore the drivers for successful telehealth systems in First Nations communities are manifold. Each of the issues discussed by Ho et al. (2004) represent research areas that need to be studied to determine how to better provide telehealth services to First Nations communities.

Furthermore, in First Nations communities the adoption of telehealth systems can be hampered by issues ranging from high staff turnover, lack of existing ICT infrastructure, lack of funding to support implementation and upkeep, a lack of community involvement, and socio-cultural issues (Health Canada, 2004b). Despite these challenges there are many benefits that arise in the realms of patient outcomes, healthcare costs, and socio-cultural stability when telehealth systems are used for health service delivery. Telehealth systems can be used to equitably allocate health resources while at the same time be built upon to create a health service network to link end user communities with off-site specialist care professionals, hospitals, and each other. Some of these benefits and challenges as seen in literature will be discussed in this literature review.

Information Communication Technologies

Videoconferencing, teleconferencing, store-and-forward modalities and telemonitoring are just a few of the methods that telehealth systems have been implemented for First Nations communities (O'Donnell, Perley, Walmark, Burton, Beaton & Sark, 2007). Healthlink BC is an example of an easy use telephone based program that allows BC residents to access health information on a wide range of topics (Ministry of Health, 2011). Healthlink BC is accessed via the reserved number 811 that has been set aside by the Canadian Radio-Television and Telecommunications Commission for the provinces to use to provide non-emergency health information to their residents (CBC News 2008; Ministry of Health, 2011). Teleconferencing is a well-established ICT method for geographically distant individuals to communicate. This method is not only

limited to healthcare but is well used in business environments, educational and government organizations. The use of teleconferencing can greatly extend health service delivery leading to the creation of efficient telehealth systems that reduce healthcare costs. From April 2000 to March 2001 a telepsychiatry pilot project conducted in by the Keewaytinook Okimakanak (KO) First Nations Tribal Council in Northern Ontario servicing 6 First Nations communities for a total population of approximately 2800 individuals was undertaken. Using both videoconferencing, teleconferencing and digital technologies the project resulted in the following benefits (Keresztes & Shaw, 2002):

- Reduction of travel time resulting from the clients being able to receive a 2 hour consultation in their home communities versus an escorted 300km average commute involving local air travel (36 hours of patient time and escort time both for a 1 hour psychiatric consultation).
- Overall reduction of costs from an average of $2,716 per patient to $710 per person, the latter which incorporates the costs of ICT infrastructure and network charges.

Since the initial pilot project, the KO Telehealth network has expanded the services it delivers beyond telepsychiatry to other community based medical and health education services. It has subsequently grown to include 26 communities in rural and remote northern Ontario including the Métis Nation of Ontario (Walmark, 2004; KO Telemedicine, n.d.). The progression of this project shows how telehealth systems can grow over time to greatly extend health service delivery to First Nations communities.

Teleconferencing projects such as Healthlink BC and KO Telehealth show that an

established ICT like telephones shouldn't necessarily be disregarded in favour newer ICTs. In fact considering the limited or bandwidth restricted nature of some newer ICTs in remote settings, telephone based telehealth systems continue to be a viable medium for health service delivery. Though ICT infrastructure is expected to improve in these communities, it may be better to implement telephone based telehealth as the first stage of systems that can grow to incorporate other ICTs as local human resources and infrastructure develops over time, similar to the KO telehealth project.

Videoconferencing is an ICT well suited to health service delivery. In situations where face-to-face interactions or visual information regarding health issues are necessary, videoconferencing may be an acceptable alternative to the patient and provider being in the same physical location. Examples include situations that require the expertise of off-site specialists through an onsite intermediary, chronic diseases that require visual assessment for treatment, telepsychiatary consultations, and healthcare educational programs to name a few (Harris, Smith & Armfield, 2007; Pesamma, Ebeling, Kuusimaki, Winbald, Isohanni & Moilanen, 2007; Moehr, Schaafsma, Anglin, Pantazi, Grimm & Anglin, 2006). O'Donnell et al found that in the First Nations context videoconferencing was an effective medium for *"health and wellness, education and learning, culture and language, information and communication technology, and economic and community development"* (O'Donnell et al., 2007). Videoconferencing as an alternative to patient transfer to specialist healthcare sites has been shown to reduce costs both for the health service provider and the patient, measured both as direct costs (ie travel costs) and indirectly (ie patient time away from work) (Lewis, Trante & Axford,

2009; Keresztes & Shaw, 2002). The two telehealth modalities of teleconferencing and videoconferencing have the added benefit for First Nations context in their ability to easily connect different communities allowing for coordinated socio-economic development, further telehealth system implementation, and community development without the issues created by the limiting constraints of distance and travel (McKelvey & O'Donnell, 2009). An amazing example of the benefits of these technologies in the public health sphere found in literature include the use of videoconferencing by a telehealth worker to help deliver a baby under the guidance of off-site physicians, without whose support she would have been unable to do so successfully (McKelvey & O'Donnell, 2009). The reviewed literature has shown that videoconferencing is well suited to deliver health services to First Nations as well as promote community development. The challenge with videoconferencing is the physical disconnect that users can feel when using this medium. A current gap in research is how health professionals perceive this disconnect in comparison to patients who are generally welcoming of telehealth systems. Specific areas of research that need to be explored are the use of hybrid telehealth delivery models where videoconferencing is complemented with face to face interactions.

Store-and-forward health ICTs can be used as an asynchronous method of transmitting health information. Particular health subspecialties that benefit from store-and-forward telehealth systems are those where on-demand communication or real time data transfer is not necessary, for example when transmitting patient data for teledermatology (skin images), teleradiology (xrays, mammograms etc), or teleophthalmology (retinal images) (Baba, Seckin & Kapdagli, 2005). Store-and-forward

telehealth systems have been shown to be a cost effective and viable method of health service delivery when ICT infrastructural limitations or costs prevent real time communication (Bonnardot & Rainis, 2009; Health Canada, 2001; Moreno-Ramirez, Ferrandiz, Ruiz-de-Casas, Nieto-Garcia, Moreno-Alvarez, Galdeano & Camacho, 2009; Wootton, Menzies & Ferguson, 2009). For First Nations in particular store-and-forward systems have been found to be a cost effective approach to chronic disease management using telehealth modalities ranging from telediabetes management, teledermatology, telepediatric services, teleradiology, and teleotoscopy consultations (Lavoie, 2011). Store and forward systems are a well-established method of transmitting health data as research shows. Examples such as Picture Archiving and Communication System (PACS) are in extensive use throughout the world. The First Nations context does provide challenges with respect to both limited broadband connectivity and access to local medical imaging equipment when implementing store and forward systems. There is a need for diagnostic equipment in these communities to make store and forward viable. The development of mobile clinics to conduct diagnostic imaging, discussed later, is a feasible approach that needs to be further explored.

Telemonitoring (and telehomecare) allows for off-site monitoring of patients that may include periodic or continuous collection of patient health data that can be transmitted to a health professional or telemonitoring center (NAHO, 2005; Paré, Moqadem, Pineau & St-Hilaire, 2010). Telemonitoring for chronic disease management has also been used to reduce costs, improve patient outcomes, and improve existing healthcare systems (Torok, Kovacs & Doszpod, 2000; Bratan, Clarke, Jones, Larkworthy & Paul, 2005; Cradduk,

2002). In June of 2008 a telediabetes blood sugar monitoring pilot project was conducted in New Brunswick. This diabetes project, which is known health concern amongst First Nations populations in Canada (Health Canada, 2004c), included the Oromocto First Nation community (Chaulk & Fuller, 2009). Though First Nations participation in the study was limited due to factors such as the availability of human resources to support the project, the study found that with telediabetes monitoring the level of improvement in helping patients manage their blood sugar levels was greater than found in patients attending diabetes clinics alone (Chaulk & Fuller, 2009). Telemonitoring systems are novel in that their preventative in nature as compared to the traditional approach of government funded medicine which acts to cure a disease. Though the telehealth systems found in literature show the potential benefits of telemonitoring, First Nations communities have limited resources with which to successfully launch and support such systems. Furthermore it is conceivable that the social determinants of health typical of rural First Nations communities would negatively influence any long-term telemonitoring system implementations. Further research is required with respect to the viability and appropriateness of preventative strategies when educational and basic health services are already lacking in these communities.

These range of technologies discussed all provide viable alternatives or can act to complement face to face consultation when time, travel and costs concerns are factored. The key barriers with respect to implementing these respective technologies are in regards to a lack of existing infrastructure, a lack of trained staff to implement and maintain the telehealth systems in rural and remote settings First Nations communities

and as will be discussed in a subsequent section, the lack of overall funding to initiate telehealth projects in these communities (Lavoie, 2011).

First Nations Digital Divide

Indigenous populations worldwide are typically found in geographically isolated communities situated in accordance with their hereditary lands, such as the case of First Nations populations in Canada. ICT infrastructure in these populations is typically lacking or underdeveloped when compared to their urban counterparts. A lack of ICT infrastructure can limit the accessibility to health services at a distance thereby limiting effective health service delivery resulting in negative patient outcomes. In an developing country example 70% of India's population lives outside urban centers in rural settings while 60% of specialist healthcare professionals are located in those geographically distant urban centers (Ramkumar, 2003). Translating care to such a large portion of the population that lives away from the centers responsible for providing the health services creates large barriers to effective health service delivery to rural and remote populations. Approximately 26% of BC's Aboriginal population lives in rural settings away from health centers and access to specialist health services. Improving ICT infrastructure in First Nations communities also faces challenges with respect to geographic isolation, the cost of the technologies themselves, and a lack of expertise in the respective communities (Bredin, 2001). As late as 2008 only 40% of First Nations communities in BC had broadband access (MacLeod, 2010). The province of BC is targeting to provide broadband access to 84% of First Nations communities by the end of 2012, whereas

province wide in 2011 93% of British Columbians had high speed broadband access (Hui, 2012; Macnaughton, 2011). The remaining 7% constituted those in rural and remote areas, such as First Nations communities. Therefore though there is an improving trend in First Nations communities, they are still lagging behind other BC communities with respect to broadband access. Implementing effective telehealth networks for First Nations communities cannot succeed without a greater emphasis on network infrastructure to provide a backbone for the systems. Recognizing the need for greater ICT infrastructure in these communities, in 2009 the government of BC committed $30.8 million to help develop ICTs so as to improve health, education and community development for BCs First Nations population (Duffus, 2009). The development of infrastructure in these communities will improve their educational and economic opportunities. An area of research that needs to be explored is the socio-economic effect of improved ICT infrastructure on First Nations communities versus those with similar geographical demographics but without advanced ICTs.

Other jurisdictions in Canada have already struggled with similar challenges. In Manitoba an early push to bridge the First Nations digital divide occurred in the form of the "Aboriginal Single Window" initiative, a web services portal used to provide Aboriginal populations, such as First Nations, access to government services (Bent, Kernaghan & Marson, 1999). Furthermore, the Assembly of First Nations has been working with its own communities to not only put in policies to address the implementation of ICT initiatives, but also to focus on continued funding to sustain the ICT networks once in place (Perley & O'Donnell, 2006). Though First Nations leaders as

well as the federal and provincial governments of Canada have all recognized the need for improving ICT infrastructure in First Nations communities throughout Canada, only through sustained funding coupled with political will can the digital divide be overcome. The next step for health service providers when considering the recent improvements in broadband access is the development of government and non-government projects to better leverage the advances in improved access. Specifically improving local human resources to support telehealth systems has been identified as a need in these communities. This can be accomplished through the very ICTs that future telehealth systems will be built upon. Future studies can study the use of ICTs to provide education and train onsite care providers within First Nations communities themselves.

Financial Considerations

In Canada, though government healthcare is not a profit driven enterprise, financial considerations due play an important role with respect to how healthcare resources are allocated to communities. A key benefit of telehealth systems are they have been consistently shown to reduce patient related travel costs. In Ontario a videoconferencing telehealth system based on the WiMAX wireless-network standard results in a yearly travel related cost savings of approximately $8 million to the government (Paolini, 2009). The Keewaytinook Okimakanak (KO) Telehealth project travel related cost savings are now estimated to save approximately $4.2 million a year (Hogenbirk, Ramirez, Ibanez, Pong & Hardy, 2006). Overall savings, taking into account the use the telehealth in addition to travel, are projected to be $7.4 million a year (Hogenbirk et al., 2006). Since patients do not need to travel for care, not only does the

care provider save money with respect to those subsidized travel related costs, but the patient also has reduced costs in the form of less time away from work, as well as costs for meals and accommodations which are no longer incurred (Schaafsma, Pantazi, Moehr, Anglin & Grimm, 2007). The greatest financial challenge with respect to telehealth systems in First Nations communities though is the lack of funding available to implement them. For isolated communities in particular the costs associated with transporting equipment and resources to setup a telehealth system can account for nearly 40% of the total cost (Muttit, Vigneault & Loewen, 2004). Unfortunately, it has been found that though a telehealth system may reduce the overall cost associated with treating an individual, costs to the community may rise. The KO Telehealth pilot project found that costs to the client's home community were expected to "*increase, from about $170 to between $305 and $580 per client-sesson"* (Keresztes & Shaw, 2002). In this example though the overall cost savings realized by Health Canada – First Nations and Inuit Health Branch can be reallocated to the communities in question to offset these added client-session associated expenses. A gap in literature is an assessment of whether such programs merely reduce health care costs or whether those savings are reinvested into the communities they are drawn from as well. A contentious issue regarding telehealth is users may believe that telehealth systems are a replacement for funding care within the communities themselves. If cost savings are not reinvested into communities this assertion may be perceived as valid. Further research into how telehealth systems affect health authority funding models need to be done as such studies may promote community buy in if the cost savings and reinvestment can be shown to improve patient outcomes.

Telehealth systems can only be successful if they provide savings to the healthcare system by augmenting existing patient-provider interactions or providing an equivalent alternative to the interactions themselves when the costs for training staff and implementing infrastructure are factored in. In First Nations communities telehealth systems can also be used as a medium to facilitate educational initiatives, as well as administrative, government and legal interactions. By using the telehealth infrastructure for these other purposes system throughput is maximized and thus the burden for recouping the associated cost for implementation and maintenance is divided amongst the other usage paradigms (Muttit, Vigneault & Loewen, 2004). An indirect but important benefit of a telehealth system is the educational opportunities that open up through distance education that were not previously available to the community. Further benefits to using ICT infrastructure as a training medium will be discussed later. Thus telehealth systems are more cost effective alternatives to live onsite consultations once system use reaches sufficient workload requirements to recoup capital costs for the technology investment (Persaud, Jreige, Skedgel, Finley, Sargeant & Hanlon, 2005). Determining what this break-even point is though is difficult to quantify as telehealth cost savings focus on travel and time related considerations and not capital costs which can vary system to system. Lacking in literature is a structured framework for assessing the overall economic costs (ie capital costs) of a telehealth system implementation in First Nations communities in relation to the financial and patient outcome benefits.

The long term financial benefits of telehealth use though are well described in literature and appreciated by the users of the system. An area of further research with

respect to financial considerations is whether health professionals perceive telehealth a financial boon, or whether they regard the use of telehealth as a replacement for conventional care. Though patients may appreciate the financial savings associated with telehealth, both patients and health professional may perceive the 'savings' as budget cuts to their health services, especially if those savings are not reinvested into the communities they are drawn from. This thesis evaluates the perception of benefits and looks at outcomes regarding this issue from the health professional perspective.

Telehealth in Other Jurisdictions

When looking at other jurisdictions with similar issues Australia provides an analogy for the Canadian experience for telehealth systems in that it is also a nation with a large geography, has many rural and remote communities, and a substantial Aboriginal population in need of healthcare services. An evaluation of a store-and-forward based telehealth system in western Australia used for the diagnosis treatment of Aboriginal children suffering from ear disease in remote settings was expected to result in an economic benefit of $72 million over a 25 year period and over $700 million over 25 years if the service was expanded to all children in western Australia (Eikelboom, Craemer, Ellis, McManus, Larson & Atlas, 2010). The economic benefit here is realized through reduced travel costs, less time off work for parents and guardians, the long term effects of the disease, less hospitalization costs and increased long term quality of live and productivity for the children as a result of the early diagnosis and treatment (Eikelboom et al., 2010). In Queensland Australia a telepaediatric system using a single telehealth coordinator as a point of contact for referrals between Novemeber 2000 and

April 2001 not only prevented 12 unnecessary patient transfers but reduced travel and accommodation costs by $18,000 (AUS) (Smith, Isles, McCrossin, Van der Westhuyzen, Williams, Woolett & Wootton, 2001). Similarly another Australian telepaediatric system providing telehealth services with respect to burns to rural and remote communities in Western Australia not only reduced costs to the healthcare system but also had a patient satisfaction rate of 93% (McWilliams, Gilroy & Wood, 2007). Patients also reported that they experienced less stress using the telehealth system as compared to live onsite interactions with the specialist (McWilliams et al., 2007). These systems in Australia provide models for improved resource allocation and patient outcomes through telehealth.

Latin America similarly provides a model for rural telehealth implementations. Latin American implementations have been shown to be effective in extending reliable and useable access to health care, reducing costs with respect to patient transfers, and reducing the effects of professional isolation (Martinez, Villarroel, Seoane, & del Pozo, 2004; Lopez, Valenzuela, Calderon, Velasco, & Fajardo, 2011; Keane, 2007). Another benefit seen in research was a reduction in the feeling of professional isolation increasing opportunities for knowledge transfer. The ability to access telehealth was also shown to inspire confidence in rural health professionals when providing patient care. Interestingly health professional participants in a successful implementation in rural Peru who had no university education were able to successfully learn to use ICTs such as email and radio to support patient care within a short training schedule (Martinez, Villarroel, Seoane, & del Pozo, 2004). Other implementations in Latin America showed the value of telehealth

as a method to provide health education services (Joshi, Novaes, Iyengar, Machiavelli, Zhang, Vogler, & Hsu, 2011; Gundim, & Wen, 2009). These findings are typical of other telehealth implementations found in this literature review. A limitation in assessing literature in Latin America was that articles from journal sites like the Latin American Journal of Telehealth were written in Spanish which excluded them from this literature review.

Australian and Latin American implementations focusing on aboriginal and rural communities show that irrespective of nation and population, telehealth when implemented with resource support and strong leadership can greatly benefit disadvantaged and underserved communities. Further research in the Canadian context needs to be done to regarding translating the knowledge from these foreign telehealth implementations to create similar successful telehealth systems for Canadian First Nations communities. Developing knowledge transfer tools to re-create existing successful telehealth implementations found in literature should be a goal of further research.

Role of the Health Professional

As mentioned prior, the geographic isolation of First Nation communities creates barriers with respect to timely and equitable access to healthcare professionals and services when compared to the urban Canadian population. In the case of health emergencies the lack of health service accessibility can have serious consequences for patients. Furthermore the lack of regular contact with healthcare professionals can result

in health issues that maybe treatable in the early phase, if properly screened, becoming serious health concerns that incur greater costs to the healthcare system and negative outcomes for the patient when diagnosed later. A real life example of telehealth use in an emergency involved a First Nations child experiencing abdominal pain and respiratory distress (John Rowlandson & Associates, 2005). Previously, assessing these types of health concerns was done over the phone with an onsite intermediary speaking to the offsite physician. The telehealth system used videoconferencing allowing the physician to more thoroughly assess the child and recommend a medevac airlift to the main care facility (John Rowlandson & Associates, 2005). The finding of this example is that assessment and response occurred in a timely manner with the onsite telehealth coordinator being awoken at 2:00 AM, the system networked to the urban facility by 2:15 AM, the offsite physician interacting with the patient by 2:20 AM and the child medevac'd to the main care facility by 4:00 AM (John Rowlandson & Associates, 2005). In this case a transfer was necessary, but in the cases where a patient transfer would be detrimental to the patient's health but care is also necessary, telehealth use can be used to properly balance which is more important, the necessity to move the patient to an healthcare center or whether a telehealth mediated health exchange can be used in place of transfer to accomplish an equivalent level of care.

The true benefit of an onsite professional as an intermediary between the patient and an offsite specialist arises in the fact that specialists providing health service delivery to these remote communities do not typically reside in those communities. As such it may be the case that clients must interact with a different rotating health professional during

every consult. Here the onsite intermediary health professional can act as a familiar and comfortable bridge thru which the offsite specialists can interact with the patients. Where direct intervention is not immediately necessary the onsite health professional can act as an observer that can help to facilitate any issues that arise during the consult (Gibson, O'Donnell, Coulson & Kakapetum-Schultz, 2011). This is especially beneficial when the onsite health professional is a First Nations individual as well as a member of the community. Having a trusted community member facilitate interactions with an outside health provider would add a level of comfort during the exchange for the patient. Though in some literature it was found to indicate that at least in the case of telemental health, clients found it easier to disclose personal issues to specialists outside their tight knit community, where daily interaction with onsite care providers who would be aware of their person psychological and mental challenges is unavoidable (Gibson, O'Donnell, Coulson & Kakapetum-Schultz, 2011). The appropriateness of using onsite care professional as intermediaries between offsite specialists or observers thus is health intervention specific. Another benefit of telehealth is reducing the travel required for not only the patient, but the specialist professional as well. This allows for better scheduling of the specialist's time and therefore being available to see more clients improving the efficiency of the local healthcare network (Health Canada, 2004a). Thus professionals whether onsite or offsite, play an active role in extending care and providing specialist health services that were previously inaccessible to the First Nations population (McKelvey & O'Donnell, 2009; Jennett et al., 2003).

As broadband internet to First Nations communities becomes more accessible,

telehealth use is expected to become more prevalent by health professionals such as family practice to specialist physicians, nurses, nurse practitioners, dieticians, and pharmacists to name a few. This thesis explores the role of these health professionals with respect to their perceptions of telehealth. In reviewing literature regarding the role of health professionals, an area of further research is assessing the interaction between First Nations and non-First Nations health professionals (across the professionals listed above) specifically. There is a definite need for further research in the role of health professionals in using HITs in First Nations communities as there is a lack of literature describing this topic.

Chronic Disease Management

In developed nations there is a well-established association between socioeconomic status and the risk factors for the development of chronic diseases (Yack, Hawkes, Gould & Hofman, 2004). First Nations populations in Canada are a socio-economically disadvantaged segment of society and as such suffer from a host of risk factors for chronic disease such as alcohol use, tobacco use, obesity, intravenous drug use, unemployment and abusive relationships to name a few (Gracey & King, 2009). Furthermore, First Nations populations living on reserves have a lower life expectancy, greater infant mortality (1.5x), youth mortality rate (4x), twice the suicide rate, greater number of sexually transmitted diseases, twice the smoking rate, lower completion of high school and a greater unemployment rate when compared to the general (non-First Nations) Canadian population (Marrett, Jones & Wishart, 2004). Therefore, First Nations populations are in dire need of social and health care investment to improve the standard

of care and health status of their populations. Unfortunately complicated, longterm and expensive treatments for chronic disease management for First Nations populations place a greater burden on local healthcare systems. In these situations telehealth systems can be used to move care from primary to community or homecare settings. The primary benefits of using patient monitoring at home or in the community versus frequent visits to primary care settings include reduced travel related costs, reduced healthcare costs through earlier treatment, greater patient sense of self-empowerment, and most importantly patient outcomes can be improved as patients can be continuously monitored. This allows for earlier health interventions as opposed to relying on intermittent snapshots of the patient's health state that occur when the patient must visit a care provider for their health assessments (Scheffler & Hirt, 2005; DelliFraine & Dansky, 2008; Bensink, Hailey & Wootton, 2006; Klapper & Kuhne, 2010). In the case of First Nations populations the duration between these specialist visit snapshots can be quiet long again due to the remote nature of the population as well as the financial and time related costs associated with travelling to see a specialist. A review of literature with respect to telemonitoring and telehomecare shows that patients can have positive outcomes with specific examples having been found in the realms of teleasthma, telediabetes, telehealth based COPD management (Gelfand, Geffken, Halsey-Lyda, Muir & Malasanos, 2003; Cai, Hebert, Cowie & Meadows, 2006; Hooper, Yellowlees, Marwick, Currie & Bidstrup, 2001; Polisena, Train, Cimon, Hutton, McGill, Palmer & Scott, 2010). These patient outcome studies, which are not specifically targeted to First Nations communities, focus on the effectiveness of home based telemonitoring for chronic disease management. In my opinion, telehealth for home care of chronic diseases

could be extended to First Nations populations with positive outcomes similar to those shown in the reviewed literature. Where chronic disease management has been shown to be effective for First Nations communities is in the use of telediabetes management as mentioned earlier. *Screen for Limb, I-Sight, Cardiovascular and Kidney* (SLICK) was a joint project between Alberta First Nations, Health Canada, and the University of Alberta from December 2001 to July 2003. It involved two mobile clinics where patients could be given a number of screening tests for diabetes (Health Canada, 2004c; Virani & Datta, 2004). The mobile clinics conducted screening tests in all of Alberta's forty-four First Nations communities (Health Canada, 2004c). Data gathered from the clinics could then be transferred to specialists, such as teleophthalmologists for assessment of digital retinal photographs for diagnosis. The mobile clinics were found to have reduced costs associated with screening the target population but according to the study it is still too early to assess whether the project reduced complications from diabetes in First Nations communities (Health Canada, 2004c). In April 2010 a similar teleophthalmology project involving mobile clinics was launched on Vancouver Island BC for 51 rural and remote First Nations communities (Canada Health Infoway, 2010; Lavoie, 2011; Canada Health Infoway, 2010b; Canada Health Infoway, 2010c). This teleophthalmology project involves the use of Topcon cameras to take retinal scans of patients which are then transmitted to specialists based in Victoria for assessment (Canada Health Infoway, 2010c). Therefore literature shows that mobile clinics improve access to health care for First Nations communities and reduce costs. Further research is necessary to determine if they also improve health outcomes. The benefits typically derived from earlier detection of a disease would warrant investment in such a study to build a case for further such

mobile chronic disease assessment projects.

Literature focused on chronic disease management shows health care challenges due to the severe scope of chronic diseases in First Nations communities which are further complicated by their remoteness. Studies have shown that initiatives like mobile clinics can bring about positive health outcomes. Though telemonitoring projects have improved patient outcomes, the ability to translate this knowledge to sustained healthcare programs in First Nations communities needs to be explored. Specifically, future research needs to determine if there are challenges, beyond the ones found in literature so far, with respect to creating sustained chronic disease management telemonitoring programs for First Nations communities.

Telehealth and Cancer Care (Teleoncology)

With respect to the use of teleoncology for cancer care in First Nations communities I found minimal information with respect to telehealth initiatives in Canadian literature. In the context of the US, historically infectious disease has been a greater concern in American Indian and Alaska Native (AI/AN) populations, but now cancer has become a major cause of death (Espey & Paisano, 2005). The Alaska Federal Health Care Access Network (AFHCAN) provides a range of telehealth services to AI/AN communities, including cancer support services (AFHCAN, 2011). The Native People Cancer Control (NPCC) organization specifically provides educational services, guest speakers, and support services facilitated through the AFHCAN telehealth network (Doorenbos, Kundu, Eaton, Demiris, Haozous, Towle & Buchwald, 2011). The NPCC

network has shown that telehealth can be used as an effective medium to provide *"delivering real-time, interactive cancer education to multiple rural sites"* network (Doorenbos et al., 2011a). The use of telehealth by AI/AN populations to connect cancer survivors for support group purposes was also found to be beneficial to the participants (Doorenbos, Eaton, Haozous, Towle, Revels & Buchwald, 2010). Another American study regarding the use of telehealth to manage cancer associated pain in rural AI/AN populations found telehealth an effective medium for the delivery of pain management educational information as well as way of improving the competence of rural health professionals in treating cancer related pain (Haozous, Doorenbos et al., 2010). In 2011 Doorenbos et al. developed a Native cancer control network that focused on providing a mechanism for facilitating *"cancer education presentations, case conferences, and cancer survivor support groups*" (Doorenbos, Demiris, Towle, Kundu, Revels, Colven, Norris, Buchwald, 2011). This network functioned better than the researchers expected with respect to providing cancer support services to the target population. Findings with respect to implementing the network found key success criteria *"included gaining provider and community acceptance, working closely with respected tribal members, understanding tribal sovereignty and governance, and working in partnership with cultural liaisons"* (Doorenbos et al., 2011b). It should be noted that these success criteria in a Native population are all socio-cultural in context as opposed to infrastructural or financial. When financial and infrastructural needs are met Native (and First Nations) communities therefore still have challenges that are social, cultural, and political in nature that must be overcome before a telehealth system can be successfully implemented. With respect to the Canadian context, a specific implementation through Ontario's Telehealth

Network provides telemammography for First Nations at the Weeneebayko Health Ahtuskaywin on James Bay (Assembly of First Nations, 2009). In this project the onsite *"system allows digital mammograms to be sent by computer to a radiologist in Timmins who is also available for consultation"* (Assembly of First Nations, 2009). Currently in BC telehealth for cancer care is underutilized according to the Assembly of First Nations Access to Cancer Screening and First Nations report (Assembly of First Nations, 2009). Though this is currently the case, BC First Nations communities are working with their provincial and federal counterparts to improve the use of HITs, such as telehealth, throughout BC. Specific case studies of existing BC telehealth based cancer care systems are necessary to determine the root cause of this underutilization.

Some telehealth systems used for cancer care include the American systems I just discussed and Ontario based telemammography example discussed earlier as well. Beyond these instances I could not locate many articles regarding the use of telehealth in supporting or managing cancer in First Nations communities. Therefore non-First Nations telehealth systems will be reviewed in this section to provide scope with respect to the potential of using similar telehealth systems for this purpose in First Nations communities. Rural and remote communities throughout the developed and the developing world provide an excellent analogous setting for telehealth system implementation for First Nations communities. Patients in rural and remote communities have been shown to more susceptible to cancer related death than those in urban centers. A study in Australia showed that rural cancer patients were 35% more likely of dying within 5 years of diagnosis in comparison to those living in urban centers (Smith, 2012).

Australian aboriginal populations showed a higher rate of cancer death as well (Smith, 2012).

A 2009 study for isolated populations using symptom management algorithms for cancer care via a tele-messaging system found that the system was well accepted and used by the patients. The authors stated that further analysis of the study data would be necessary to assess the statistically significant effectiveness of the system to improve care with respect to symptomatology (Head, Studts, Bumpous, Gregg, Wilson, Keeney, Scharfenberger & Pfeifer, 2009). Patients responses with respect to the system were positive in regards to reminding them to take their medication, reporting their symptoms, reinforcing mental well-being, learn more about their symptoms and how to manage them, and provided them with expectations regarding their condition (Head et al., 2009). In the context of this study these patients, similar to rural First Nations populations, did not have routine access to a care provider and as such could suffer both in their health and mental well-being due to this lack of access. For them telehealth for cancer care has had the benefit of providing a sense of patient-empowerment to better manage their symptoms. Another study regarding using telehealth for pain management and treatment of depression for cancer patients found statistically significant improvements with respect to the use of telehealth for health care services in the telehealth group versus usual care in both urban and rural settings (Kroenke, Theobald, Wu, Norton, Morrison, Carpenter & Tu, 2010).

With respect to cancer, a particular benefit of telehealth is its ability to enhance

care by allowing individuals to remain in their communities and amongst their families. This benefit is one that First Nations communities are well suited to take advantage of and will be discussed later in this literature review. In the case of a childhood cancers a study in Australia regarding attitudes towards a videoconferencing based teleoncology system, parents selected *"contacted between separated family"* as the highest rated benefit of the implementation (Goodenough & Cohn, 2004). This study also found attitudes weren't based on the type of cancer or which region the participants were from, implying that the benefits of telehealth for cancer care are appreciated by patients across varying healthcare paradigms (Goodenough & Cohn, 2004). Telehealth in this way can be used to improve both patient and family quality of care (DeVany, Alverson, D'Iorio & Simmons, 2008). In the case of patients that require transfer to a cancer care facility, telehealth systems can allow them to maintain contact with their loved ones in their home communities, ie through teleconferencing or videoconferencing.

There are many studies that show the financial benefits of telehealth use for cancer care similar to those discussed earlier in this thesis, namely with respect to reduced travel costs and improved access to care. A particular example reviewed was a study of a telehealth system used for cancer care in India, namely ONCONET-India. The system resulted in cost savings with respect to using the system while at the same time it improved information access, allowed for easy transfer of cytology images to specialists for consultation, an online method of booking appointments, allowed for early detection and medical air lift where required, and as discussed prior improved real-time patient accessibility to specialist care providers (Sudhamony, Nandakumar K, Binu & Niwas,

2008). India provides an example of a setting similar to First Nations populations, though on a larger scale, with respect to limited resources, infrastructural issues and the distribution of culturally unique rural and remote populations. Literature has shown that telehealth systems providing cancer care for rural, remote and aboriginal populations in Australia as well as developing countries such as India provide excellent examples of successful systems that can be used to reduce costs for cancer care support and management (McGonigle, Purdy & Wright, 2006; Royer, 2011; Hailey, Paquin, Casebeer, Harris & Maciejewski, 2006; Weinerman, Kazanjian, den Duyf, Loyola, Fyfe, Ashworth, Stephen & Macpherson, 2008; Sudhamony et al., 2008). These implementations provided better care through more frequent contact between providers and patients, better monitoring strategies, and reduction in travel costs, travel time and a reduced sense of patient isolation.

A unique instance where telehealth was not found to be favourable for service delivery was respect to genetic counselling (cancer genetics) for patients in comparison to a face-to-face modality, though this study stated that the system could be beneficial to isolated communities who had limited options for counselling otherwise (Hilgart, Hayward & Iredale & 2011). In particular a finding not found by me in other literature reviewed was the statement "*focus groups emphasized the importance of patient choice when developing new models of service delivery*" (Hilgart, Hayward & Iredale, 2011). This study shows that though there are numerous benefits to telehealth, its appropriateness must be assessed prior to full system implementation as it may not be the most effective or accepted modality for health service delivery for the target population.

To summarize, the benefits of telehealth systems with to respect cancer care are specifically in regards to improved accessibility to care, patient empowerment, patient familial well-being, and financial benefits such as reduced costs for travel (Yunus, Gray, Fox, Allen, Sachdev, Merkel, Chambley, Yunus & Waters, 2009). These benefits are concordant with the general benefits discussed earlier with respect to telehealth systems. As such I believe that telehealth can be used to improve care and reduced costs across many healthcare domains including, but not limited to, cancer care.

As discussed earlier there is a lack of literature regarding teleheath use for cancer care in First Nations communities. This gap in knowledge needs to be addressed through further research specifically in this domain. The existing literature provides excellent models of research projects that could be carried out in First Nations communities such as assessing acceptance of telehealth as a medium for keeping cancer patients connected to their families, assessing store and forward systems for diagnostic imaging, or assessing the usefulness of telehealth for genetic counselling (family planning) to name a few. This thesis specifically addresses the gap in this area of research by studying how telehealth use amongst cancer care health professionals is perceived.

Current State of First Nations Telehealth in BC

Building a stronger telehealth network in BC to increase access with respect to the health service delivery is a goal of the BC First Nations communities. In BC one of the key components of the November 2006 First Nations Health Plan Memorandum of Understanding between The First Nations Leadership Council and the governments of

Canada and British Columbia with respect to health services is the development of a *"fully integrated clinical telehealth network"* (Government of Canada, 2006; National Collaborating Centre for Aboriginal Health, n.d.). As a result BC currently has 6 Telehealth Infoway projects targeting First Nations communities underway (Lavoie, 2011). These projects include telehealth systems focusing on teleoncology, teleophthamology, telethoracic, telehomecare, and telewoundcare, teleradiology and clinical telehealth services to name a few (Lavoie, 2011; Health Canada, 2005b). The BC First Expansion Project in particular involves 51 First Nations communities with the goal of building infrastructure capacity in the respective communities to support HITs, human resources and socio-cultural acceptance, as well as developing and expanding clinical programs with the goal of fully integrating the network through an *"eHealth Network Gateway"* (Sommerfield, Yu & Aitken, 2009). Through these various initiatives and projects BC First Nations communities are taking a pro-active approach to creating a eHealth network, and specifically telehealth networks, to support health service delivery. Currently the Northern Cancer Control Strategy has installed videoconferencing ICT in 15 northern communities including all 10 oncology clinics in the north (NCCS, 2012b). Regarding system use Dr. Robert Olson, a radiation oncologist in Northern Health states *"An elderly First Nations lady was in the telemedicine consultation room with six other people, this is unheard of in an in-person consultation and everyone was asking questions that she may not have thought to ask. Her support system was able to hear firsthand about her cancer diagnosis and treatment options. It was great."*

This example shows how well suited telehealth is as a medium for providing care

to First Nations communities considering their unique social needs. Though there has been a push to build telehealth infrastructure in BC, many different organizations and jurisdictions are involved. A gap in understanding the current state of telehealth in BC is a lack of a telehealth inventory that captures what projects are currently underway throughout the province. The benefit of such an inventory would be that it would prevent 'reinventing the telehealth wheel' across the province, provide model programs that could be implemented throughout different communities and allow programs to service other communities as knowledge of them is disseminated.

The Cultural Divide

In conducting this literature review I chose to focus on the issues regarding telehealth service in rural and remote First Nations communities as opposed to rural and remote communities in the broader context. One of the reasons for this approach was the unique cultural challenges that affect health service delivery in First Nations populations. Indigenous populations worldwide, including the First Nations populations of Canada, to this day are working to recover from the effects of colonialism (Gracey & King, 2009; Big Sisters of BC Lower Mainland, n.d.). The long term consequences colonialism had in disrupting the First Nations way of life included but were not limited to (Gracey & King, 2009; Big Sisters of BC Lower Mainland, n.d.):

- Change to nuclear family homes from communal living
- Sexual abuse of First Nations children in residential schools
- Introduction of alcohol and other drugs to the population
- Loss of traditional beliefs and language

- Judeo-Christian religious system was imposed

Despite the above described social issues affecting First Nations they have retained a strong sense of cultural uniqueness and in have been re-establishing their cultural identity. In implementing telehealth systems for First Nations populations their linguistic and cultural uniqueness must be taken into consideration otherwise human driven barriers prevent acceptance. First Nations populations believe in a holistic and natural approach to healing focusing on emotional and spiritual wellbeing while placing the individual as a member of the greater community (Assembly of First Nations, 2006; O'Donnell et al., 2007). This is quite different than the traditional western approach to healthcare that focuses on specifically treating the disease of the individual:

"Throughout the history of First Nations people, the definition of health evolved around the whole being of each person-the physical, emotional, mental and spiritual aspects of a person being in balance and harmony with each other as well with the environment and other beings. This has clashed with the western medical model which, until very recently, has perpetuated the concept of health as being "the absence of disease" (National Round Table on Aboriginal Health and Social Issues & Canada, 1993)

Recognizing the First Nations populations in Northern Health require a care paradigm different than conventional western care, NCCS has supported the development of the Aboriginal Cancer Care Strategy (ACCS). A group under the NCCS, ACCS works with programs to ensure they are culturally appropriate *"from prevention through to patient supportive care ... with the goal of improving access to care closer to home"* (NCCS, 2012). Leaving their communities to acquire specialist care from the colonial society that so negatively affected First Nations people can be a negative emotional and psychological experience for individuals receiving care and their families as well. An added benefit of telehealth is that the social support network of the patients (such as

family and friends) isn't separated from the patients as they are receiving health care services. (McKelvey & O'Donnell, 2009; Jennett et al., 2003). The value of this approach is particularly relevant in the case of providing health services to First Nations Elders. Elders bring a wealth of traditional knowledge and so must be involved in the design of telehealth systems to ensure that their traditional role as healers is incorporated (Assembly of First Nations, 2006). Traditional medicine plays an important role in First Nations communities, especially with older portions of the population (O'Donnell et al., 2007). With respect to healthcare service delivery to Elders, the use of telehealth keeps Elders in their communities during treatment decreasing stress for families and prevents the Elder from being isolated away from their community in an unfamiliar urban care facility setting (KO Telemedicine, n.d.). This is especially important when the Elders' primary language is not English and they have trouble communicating outside their native tongue. Cultural awareness with respect to understanding the First Nations holistic approach to healthcare builds trust between patients and providers allowing for culturally appropriate telehealth systems to succeed in their goal of extending health service delivery to these otherwise disadvantaged communities (Mah, 2011).

As discussed prior an added benefit of the ICT infrastructure necessary to implement telehealth systems is that it can be used for other purposes such as linking First Nations communities allowing youth, families, and elders to connect socially improving cultural development (KO Telemedicine, n.d.). Specific examples include the ICT infrastructure being used to connect communities for purposes such as Elder's teaching youth their native language and cultural traditions or to connect First Nations

artists and craftsman so they could work together to create pieces that could be marketed throughout the world without leaving the community (First Nations Technology Council, 2011). Earlier I discussed how telehealth systems can be used as a method of providing distance education. Using telehealth to train local First Nations community members has benefits with respect to the individuals acting as intermediaries between the patient and offsite specialist; understanding the patient's cultural mindset. Furthermore it becomes easier to involve family members, community based care, and traditional medicine through the use of telehealth (Lavoie, 2011). Educating First Nation's individuals to be telehealth coordinators in their own communities has economic benefits with respect to creating jobs as well. Therefore education as a form of empowerment is another indirect benefit of implementing ICT infrastructure for telehealth systems. A particular example was evident in the KO telehealth where the First Nations operated telehealth network conveys a sense of ownership to the communities that use it. This in turn promotes the uptake and use of the network which would be difficult to accomplish if it were operated by a non-First Nations organization (Walmark, O'Donnell & Beaton, 2005). The ICT infrastructure on which telehealth systems are built can be used to open educational opportunities for First Nations youth that did not previously exist. A particular example of the use of ICT to improve education opportunities includes a pilot eMentoring program initiated by Dr. Sandra Jarvis-Selinger (UBC) for First Nations youth to link them with positive role models who can promote them to pursue higher education (Jarvis-Selinger, 2008).

The cultural divide poses both challenges and provides opportunities for the use

of telehealth. As discussed in literature the challenges stem from the different views what health is. The western model follows that health is the absence of disease. First Nations though believe health is a holistic activity that involves the individual and their community. The gap between this holistic and western model needs to be explored further in research. Specifically further work needs to be done in BC regarding training more on site healthcare professionals, who are from the communities themselves, to be telehealth facilitators who can act as a bridge between holistic First Nations medicine and the western model of health care. Training on site care professionals from within these communities can therefore be used to address the challenges associated with the cultural divide and gives opportunities for these communities to improve employment, education and health related human resources.

Conclusion

The 106 sources included covered a spectrum of issues related to telehealth use in First Nations communities ranging from:

1. Information communication technology use (12 articles)
2. The First Nations digital divide (25 articles)
3. Financial considerations (5 articles)
4. Telehealth in other jurisdictions (9 Articles)
5. Role of the health professional (5 articles)
6. Chronic disease management (16 articles)
7. Teleoncology (20 articles)
8. The current state of telehealth in BC (5 articles)
9. The First Nations cultural divide (9 articles)

The articles reviewed within each section included discussion as to the gaps in the research and what future work could be conducted in topic areas listed above. I have seen from the literature that First Nations communities in Canada represent rural and remote

populations with distinct geographical, infrastructural, economic and cultural barriers to ICT adoption for implementation of telehealth systems. Despite these barriers, across Canada First Nations communities are working in coordination with the federal and provincial governments to develop ICT infrastructure to implement telehealth systems meant to extend health service delivery into their communities.

The review of literature found various ICT modalities in use ranging from teleconferencing, videoconferencing, store-and-forward implementations and telemonitoring for telehomecare. The greatest barrier found to the implementation of telehealth systems was the funding required to purchase, transport, implement, and to train human resources to sustain the systems within the communities. Training First Nations community members to be responsible for operating and maintaining the telehealth systems has succeeded in creating effective and sustainable projects that have grown to support their communities. The most apparent benefit of telehealth sysems are the cost savings directly associated with reduced travel. An indirect benefit of telehealth systems are the educational and community development opportunities that can result due to the availability of ICT network infrastructure. Finally, though difficult to quantitatively qualify, the use of telehealth systems in First Nations communities can have an important quality of life impact. First Nations communities place a large emphasis on the role of community in treating the individual. The use of telehealth can keep a patient in their home community during treatment or alternatively in contact with their families while away for treatment. This is a unique strength of telehealth systems in First Nations communities as it can be used to reinforce community relationships. It is an important

aspect in showing the promise of telehealth systems to provide equitable and accessible health service delivery to this segment of Canadian society.

The benefits of using telehealth for First Nations health care service delivery as well as the challenges brought about by the social demographics of these communities have been discussed in this literature review and summarized in this conclusion. The aim of my thesis was to assess the overarching themes of the literature review, specifically information communication technologies, benefits of telehealth use, challenges with using telehealth and First Nations cultural awareness, as they are perceived by health professionals providing patient care to these communities. This was accomplished in the context of the literature review sections discussed prior. The role of health professionals is important to the success of telehealth systems. Though many studies to date have reviewed telehealth systems through the perspectives of the patients, my study hopes to address the gaps in knowledge regarding the role of health professionals. In addressing this area of research I hope to determine what changes or support can be given to this group in order to bring about telehealth acceptance and through that better patient care for Northern BC First Nations communities.

CHAPTER 3: METHODS

Research Question

This thesis was split into 2 distinct phases, namely a literature review and the survey based study.

Phase 1 was a literature review regarding the use of telehealth, specifically in the context of First Nations communities. The literature review had an emphasis on evaluating the benefits and challenges found in such implementations. Refer to Chapter 2 for the respective information.

Phase 2 was a survey of healthcare professionals using telehealth systems to provide care to Northern Health First Nations communities, specifically those who use telehealth from within those communities (either as intermediaries or observers) and those who act as external urban healthcare professionals. The goal of the survey was to determine the perspective of these groups in understanding the benefits, challenges and cultural needs regarding providing patient care to First Nations communities, specifically in the case of cancer care (See Appendix 3). A technology assessment was also conducted.

The study was conducted to assess (in Northern BC):

1) Whether cancer care healthcare professionals using telehealth to provide patient care are comfortable with using HITs as a method to deliver healthcare services.
2) The perceived benefits and challenges in using telehealth systems to provide health service delivery to First Nations communities?
3) Healthcare professionals' awareness of the role of First Nations culture in

facilitating healthcare service delivery.

The objective of this section is to provide the reader with an understanding of the research design and methods used to gather and interpret the data for the thesis.

Hypotheses

Null Hypothesis 1: External urban health care professionals perceive similar benefits regarding telehealth for patient care as onsite healthcare professionals in First Nations Communities.

Alternate Hypothesis 1: External urban health care professionals do not perceive similar benefits regarding telehealth for patient care as onsite healthcare professionals in First Nations Communities.

Null Hypothesis 2: External urban health care professionals perceive similar challenges regarding telehealth for patient care as onsite healthcare professionals in First Nations Communities.

Alternate Hypothesis 2: External urban health care professionals do not perceive similar challenges regarding telehealth for patient care as onsite healthcare professionals in First Nations Communities.

Null Hypothesis 3: External urban health care professionals are as aware of First Nations culture with respect to patient care as onsite healthcare professionals in First Nations Communities.

Alternate Hypothesis 3: External urban health care professionals are not as aware of First Nations culture with respect to patient care as onsite healthcare professionals in First Nations Communities.

Participant Inclusion and Exclusion Criteria

Healthcare professionals providing health service delivery to First Nations communities (specifically in the context of cancer care) were potential participants. This included healthcare professionals such as nurses, nurse practitioners, physicians, dieticians, and telehealth coordinators among others. This may include healthcare professionals who act as intermediaries for telehealth mediated interactions between external healthcare professionals and patients or observers during interactions between these two groups.

Healthcare professionals from urban care centers outside of First Nations communities providing health service delivery to First Nations communities (specifically in the context of cancer care) were potential participants. This included healthcare professionals such as nurses, nurse practitioners, physicians, dieticians, or specialists care professionals who provide health service to a First Nations patient either directly or through an intermediary on-site health professional.

Telehealth technologies can include emails, teleconferencing/telephone, videoconferencing, store and forward, mobile applications, and remote monitoring equipment.

The 3 hypotheses were analyzed by dividing the subjects into 4 participant groups namely (1) Onsite cancer care professionals (2) Urban cancer care professionals (3) Onsite other care (non-cancer) professionals (4) Urban other care (non-cancer) professionals.

Subject recruitment was done in conjunction with the BC Cancer Agency, NHA and

NCCS. Survey dissemination strategies are discussed in the following section.

Standard Methods

The survey tool developed by me consisted of Likert-type questions. Data analysis was conducted on the survey question categories of benefits, challenges, and cultural awareness as well as a technology assessment. This data is presented in Chapter 4. Assessing health professional acceptance in HIT adoption is as important as determining if new HITs are cost effective, extend service delivery or the level of adoption. This is especially true for a skilled labour group such as healthcare professionals. If this group does not accept a technology they will not use it even if it results in better patient outcomes.

I chose two approaches to gathering data from the four study groups namely; telephone interviews and online surveys. Therefore survey participants required access either to a telephone or an internet capable computer. The two approaches were proposed to maximize data collection from the target population and at the same time keep costs associated with data collection to a minimum. An online survey tool was chosen as the primary method of data collection for the following reasons:

- The ubiquitous nature of email in the modern healthcare context.
- Ease of end user data entry
- Standardization with respect to survey questions
- Consistency with respect to responses
- Access to email lists to target larger sample sizes efficiently with limited costs

(Lefever, Dal & Matthíasdóttir, 2007).

- Short turnaround times for dissemination and response (Lefever, Dal & Matthíasdóttir, 2007)
- Incurs limited costs respect to study data collection

Online surveys have been found to be well suited for populations that vary widely in geographic distribution (Lefever, Dal & Matthíasdóttir, 2007). The primary benefit of online data capture is the instantaneous nature of data entry and recovery. Research has also shown that online survey methods can have improved response rates when compared to other methods (Lefever, Dal & Matthíasdóttir, 2007). Specifically, research has shown that online data collection can be as effective as self-administered mailed surveys while at the same time requiring less effort to recruit and follow-up (marginally) with participants (Ritter, Lorig, Laurent & Matthews, 2004). A potential limitation of using online surveys via email is the end users perception that the survey maybe junk mail. Other limitations found in studies include inaccurate email lists and a lack of participation from the target population (Lefever, Dal & Matthíasdóttir, 2007). A requirement of using online methods is that the user must have basic computer skills and internet access. This may limit entry of certain individuals to the study. Since this thesis includes a technology based study I would want participants who have access to ICTs, specifically those robust enough in nature to support telehealth systems. Therefore I can infer that online surveys are well suited as a data collection method to reach my target audience.

Telephone interviews were also selected to augment data collection since they

were a low cost alternative for the researcher. Therefore to reach potential participants a standard telephone interview approach was planned to be used in conjunction with online surveys. The telephone interviews were standardized with interview scripts to maintain a consistent approach between subjects in the study (See Appendix 1 & 5). Other benefits of telephone surveys include that they have higher response rates than mailed surveys and cost less but have equivalent or better effectiveness of in person surveys (Fenig, Levav, Kohn & Yelin, 1993). The limitation of the telephone interview method is that the investigator may unintentionally affect data collection resulting in bias. An example of this in health care surveys is acquiescence bias, where subjects tend to agree with the investigators questions (Hall, 1995). I had planned to use the aforementioned scripts as a method of keeping the survey structure standardized in an effort to minimize bias. Those participants contacted by telephone preferred that the survey weblink be emailed to them. As a result all of the survey responses were through the web survey method.

Alternate Methods

Alternate methods of data collection include dissemination of the survey via methods such as self-administered surveys sent by conventional mail, in person onsite interviews, or faxed surveys.

In the past, mailed surveys have been an effective method of data collection in clinical studies (Littenberg, Partilo, Licata & Kattan, 2003). Mail surveys were not chosen primarily due to the reasons of cost and turn-around time. Research by Yun and Trumbo (2000) found that in a hierarchy of costs web surveys are the cheapest followed

by email and regular mail being the most expensive. The cost disparity particularly grows as the number of subjects participating in the survey increases (Yun & Trumbo, 2000). With respect to turn-around time Esslemont and Pickering (1991) found due to issues involving postal times, mail surveys can have long turnaround times of up-to eight weeks or more with three weeks minimum. In the context of this thesis, the geographically isolated nature of the target population made mailed surveys an unsuitable fit for data collection.

In person onsite surveys similarly were not chosen due the costs and time involved in data collection. Going to Northern BC First Nations communities to survey onsite health professionals would have been costs-prohibitive for me due to financial considerations with respect to travel. Though I was willing to invest the time to call and conduct surveys over the phone, the added cost of travel to visit urban health care professionals would involve driving to numerous urban sites in the lower mainland, interior or northern BC was not feasible either. Other limitations of in person interviews include the difficulty in matching meeting schedules to conduct the interviews with subjects and difficulty associated with travelling to certain locations (Fenig et al., 1993)

Survey Design

The survey and its associated research consent cover letter and script used in this study can be found in the Appendices section, namely;

Appendix 1: Telephone Script
Appendix 2: Invitation to Participate
Appendix 3: Research Survey
Appendix 4: Research Consent Form

Appendix 5: Verbal Script
Appendix 6: Implied Consent

I designed the perception survey by taking multiple sources of information into consideration. These included the literature review (see Chapter 2), specifically research in line with the thesis topic, and with the input of from the following to verify face and content validity:

- A Northern Health First Nations recognized expert in the health domain,
- A BC Cancer Agency research facilitator,
- A Northern Health Telehealth Manager (study sponsor).
- Thesis supervisors

For each of the categories of technological assessment, benefits, challenges and cultural awareness a series of 5-6 questions were created to assess the participants' perception of each category topic. These questions were derived from the aforementioned sources. Within each category, when taken together, these questions are meant to represent a participant's perception of that category topic. This method was used to relate the survey questions to the category topic and each category topic to the research questions outlined in Chapter 3: Methods - Hypotheses. Specifically the benefits category and questions map to null / alternate hypothesis 1, the challenges category and questions map to null / alternate hypothesis 2 and the cultural awareness category and questions map to null / alternate hypothesis 3.

For example the questions in the benefits category focus on potential the benefits of telehealth for First Nations that were identified, namely;

- Cost savings with respect to travel
- Time savings with respect to travel

- Effectiveness relative to face to face interactions
- Potential to facilitate educational opportunities
- Potential to share cultural knowledge through telehealth

After the initial design the survey was then submitted to each of the previous listed individuals for feedback and revision. Both thesis supervisors were also provided copies of the survey throughout the development process for review and feedback prior to beginning the ethics review and data collection portion of the study. The survey was also vetted through the University of Victoria and Northern Health Human Research Ethics Review committees prior to dissemination. At this point changes were made to comply with recommendations regarding ethical concerns. After resubmission ethical approval was granted and the study data collection began on May 15, 2012 ending on July 31st 2012.

The research consent form in Appendix 4 discusses the purpose of the study and invited the subjects to participate. The research consent form contains information participants needed to be aware of such as purpose, subject inclusion criteria, risk, benefits, confidentiality, subject responsibilities and other study information that subjects are required to know.

The survey (see Appendix 3) was divided into 2 parts, namely; demographics and study questions. The data types within the survey consisted primarily of nominal and ordinal data as well as free form text. The demographics section contained non-identifying questions that were used to categorize the study population. The study question section was divided into four categories, namely; Technology Assessment,

Benefits, Challenges, and Cultural Awareness. A majority of the questions in these sections were Likert-type questions that provided a statement and then asked the subject to rate how strongly they agree or disagree with that statement (Boone & Boone, 2012).

For Example:

I feel comfortable using email as a communication technology for patient care?	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

Ethical Considerations

Research is kept anonymous to prevent harm to the participants if their identity is known (Committee on Native American Child Health and Committee on Community Health Services, 2004) or when knowing their identity has no material benefit to the study results. The survey disseminated in this study did not request any identifying information such as names, addresses, email addresses or telephone numbers of the participants. Though this method will effectively make survey responses confidential, it does have the drawback of preventing follow-up for specific surveys. Finally since the surveys responses per question were used to create composite scores for the categories mentioned earlier, individual question responses were not known during analysis, except for open ended response questions. Ethical approval from the University of Victoria Human Research Ethics Board and Northern Health was obtained for this thesis.

Data Collection Strategy

Data collection occurred between May 15th and July 31st of 2012. Once ethics approval was obtained from both the University of Victoria and Northern Health

Authority I approached participant recruitment via four methods:

- The Northern Health First Nations recognized expert provided contact information for the Aboriginal Cancer Care Advisory Committee contact list.
- The BC Cancer Agency research facilitator provided me a list of Northern Health Community Cancer Clinics.
- The Northern Health Telehealth Manager provided contact information for telehealth professionals.
- I reviewed websites, conducted online searches and met with content experts regarding Northern Health First Nations and telehealth related initiatives.

This contact information gathered from the above listed sources was used to email or telephone potential participants to provide them with research consent information, inclusion and exclusion criteria as well as the survey link (See Appendix 4: Research Consent Form). During the 2.5 month data collection process 45 participants who met inclusion and exclusion criteria consented to participate in the survey via the online method. One individual was contacted me via telephone, but did not meet inclusion criteria. Further information regarding participant population descriptive statistics can be found in the Chapter 4.

Data Analysis Rationale

The text responses, nominal and ordinal data from the demographics, technology assessment, benefits, challenges and cultural awareness portions were used to quantitatively and qualitatively describe the study population in Chapter 4. The survey tool developed by me consisted of Likert-type questions on the basis of which composite

scores were developed. Within each category participants answered the questions creating a score for each question that was summed to create a composite score for each category. The means of these scores were compared to assess whether a difference exists between the participant groups regarding their perception of telehealth. For example a subject would answer each of the 5 questions in the benefits section and receive a score from 1 to 5 for each question. The 5 scores would then be summed to create a composite score where the lowest possible score of 5 implies strong agreement with benefits questions and the highest possible score of 25 implies strong disagreement with the benefits questions (See example below). After data collection is determined that the participant population of 45 was too limited a sample for inferential statistics to be conducted to assess for statistically significant differences between the participant groups. See Chapter 4 for further information regarding the interpretation of the data.

	Benefits Category						
	Question 1	Question 2	Question 3	Question 4	Question 5	---->	Composite Score
Participant	2	3	2	2	1		10

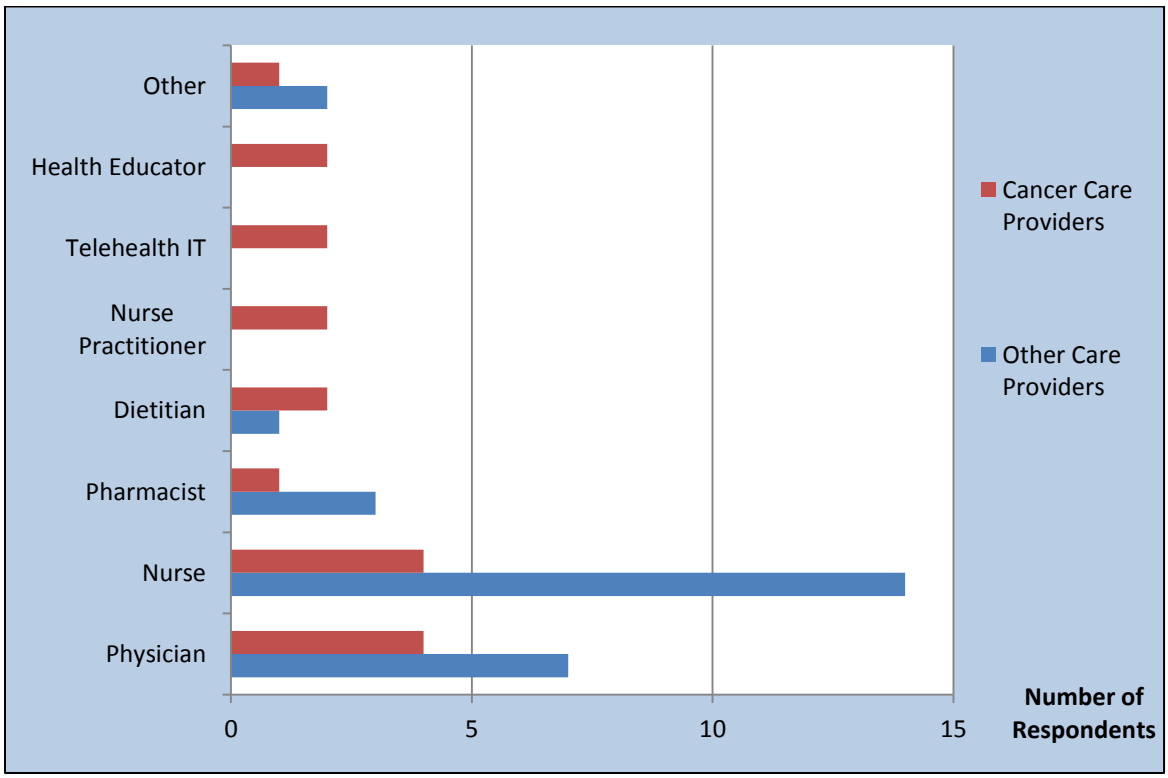
CHAPTER 4: DATA ANALYSIS AND DISCUSSION

Descriptive Statistics

This section will describe the findings of the text responses, nominal and numerical data from the demographics section and technology assessment portion of the survey. As mentioned prior there were 45 consenting participants that completed the survey. Participants that did not meet the inclusion criteria, did not answer at least one of the study question sections completely or did not consent were removed from the study dataset. If data was missing a pairwise deletion strategy was used. See the survey (Appendix 3: Survey Questionnaire/Data Collection Instrument) for the questions applicable to the respective tables below.

Descriptive Statistics – Demographic Data

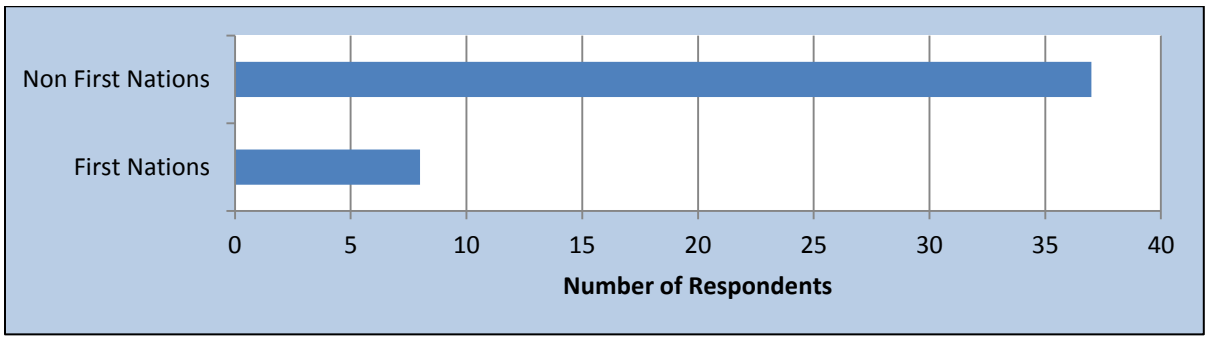
Figure 1 – Health Professions



The Health Professions figure shows that 40.0% (18 out of 45) of the participants

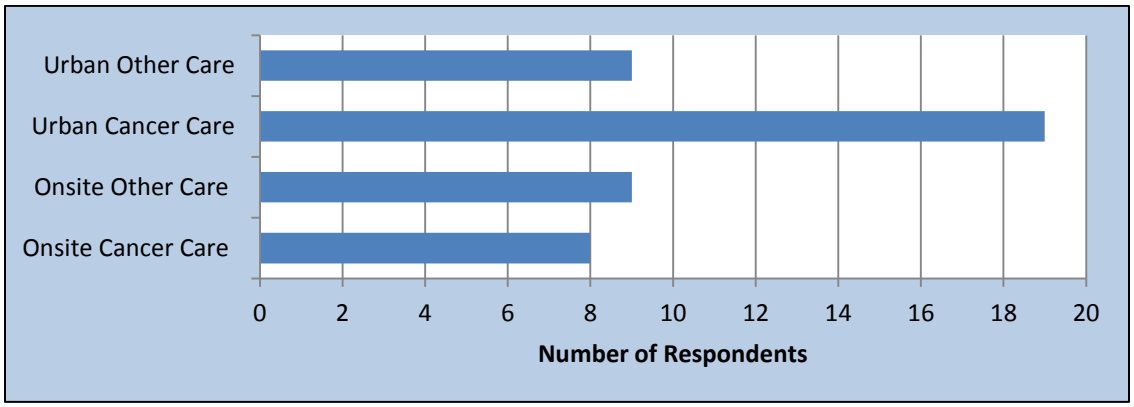
identified themselves as nurses while 24.4% (11 out of 45) of participants identified themselves as physicians. The remaining categories comprise 4-8% each of the remaining participants.

Figure 2 – First Nations Status



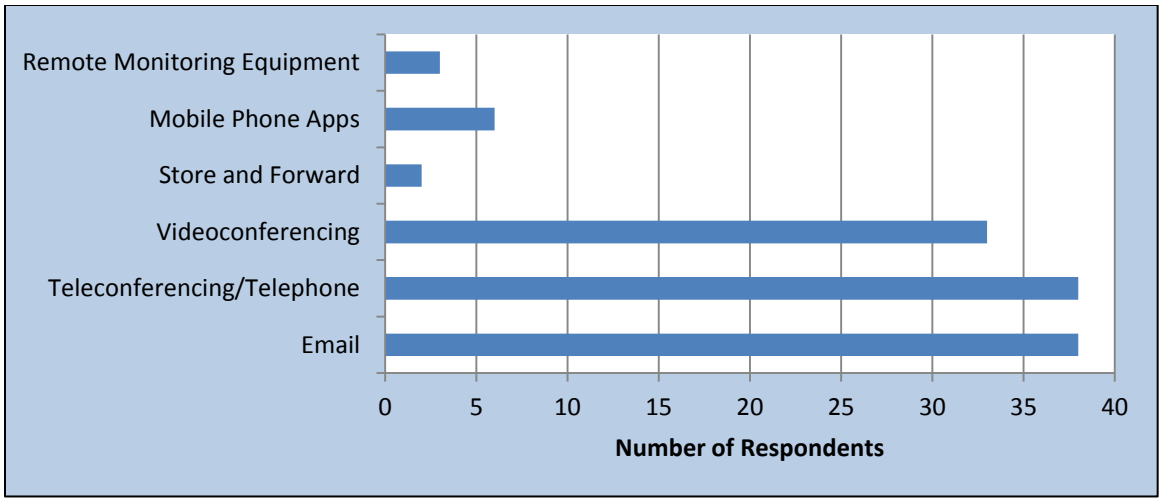
The First Nations Status figure shows that the participants were predominantly non-First Nations health professionals at 82.2% (37 out of 45) with First Nations health professionals comprising the remaining 17.7% (8 out of 45) of the study population. Lastly of the 8 First Nations participants only 1 was an urban heath care professional.

Figure 3 - Study Groups



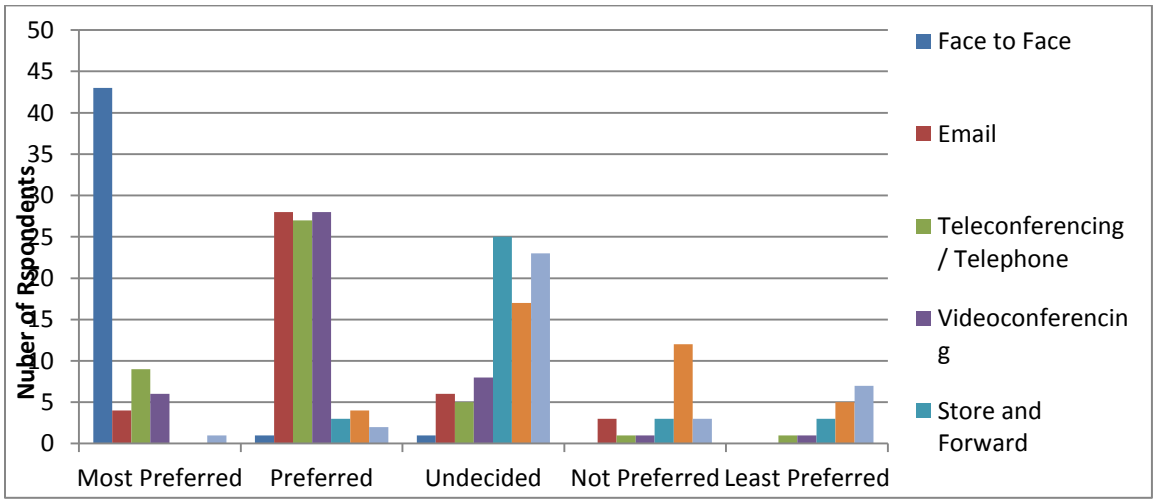
The Study Groups figure shows that urban cancer care professionals were the largest participant group at 42.2% (19 of the 45) of all responses with the remaining groups accounting for roughly 17-20% each of the remaining responses.

Figure 4 - Technology Use



The Technology Use figure shows that Teleconferencing/Telephone and Email were the most used telehealth mediums. 84.4% (38 out of 45) of the participants selected those technologies methods as the ICTs they use in order to support patient care. Videoconferencing was used by 73.3% (33 out of 45) of the participants and the remaining ICTs have a much more limited use at 4-13% each for the remaining ICTs. The level of use was also assessed in the survey with results presented later on within the demographics section.

Figure 5 - Technology Preference



The Technology Preference figure shows that:

Most Preferred:

- Face to Face - 95.5% (43 out of 45) of participants chose Face to Face interactions as their **Most Preferred** method for interacting with patients or other health care professionals.

Preferred:

- Email was **Preferred** by 65.1% (28 out of 43) of participants
- Teleconferencing/Telephone was **Preferred** by 62.7% (27 out of 43) of participants
- Videoconferencing was **Preferred** by 63.3% (28 out of 44) of participants

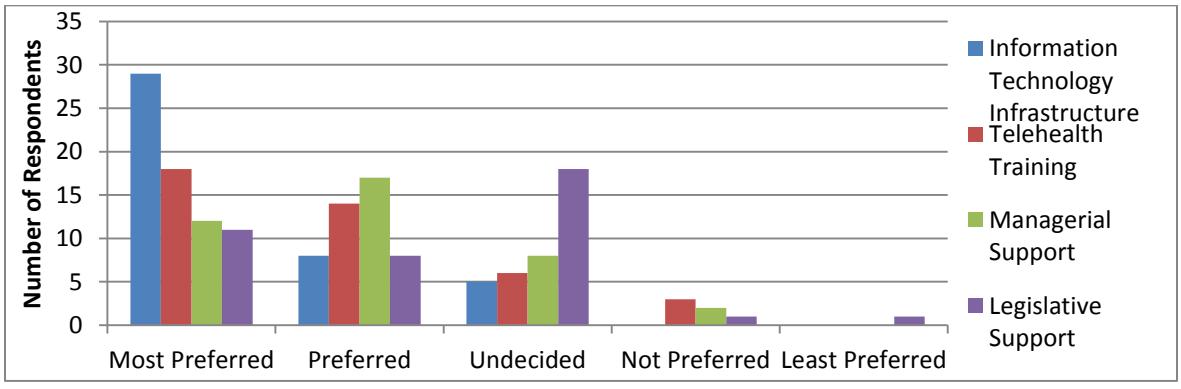
Undecided:

- 73.5% (25 out of 34) of participants were **Undecided** about Store and Forward
- 63.9% (23 out of 36) of participants were **Undecided** about Remote Monitoring
- 44.7% (17 out of 38) of participants were **Undecided** about Mobile Phone Apps

Not Preferred:

- Mobile Phone Apps for telehealth had 31.5% (12 out of 38) of the participants choosing it as a **Not Preferred** method of interaction.

Figure 6 - Telehealth Provisions



The Telehealth Provisions figure shows that:

Most Preferred:

- 69.0% (29 out of 42) of participants chose improvement in information technology as the provision **Most Preferred** to assist a health care professional in using telehealth to provide patient care.
- Telehealth training was chosen by 43.9% (18 out of 41) of participants as the **Most Preferred** provision.

Preferred:

- Telehealth training was chosen by 34.1% (14 out of 41) of participants as a **Preferred** provision.
- Managerial support was chosen by 43.6% (18 out of 39) of participants as a **Preferred** provision.

Undecided:

- Legislative support was the provision that showed the least perceived value amongst many participants with 46.2% (18 out of 39) being **Undecided** about it's worth.

Greater provisions were generally preferred as only a small percentage of the participants had any **Not Preferred** or **Least Preferred** provisions.

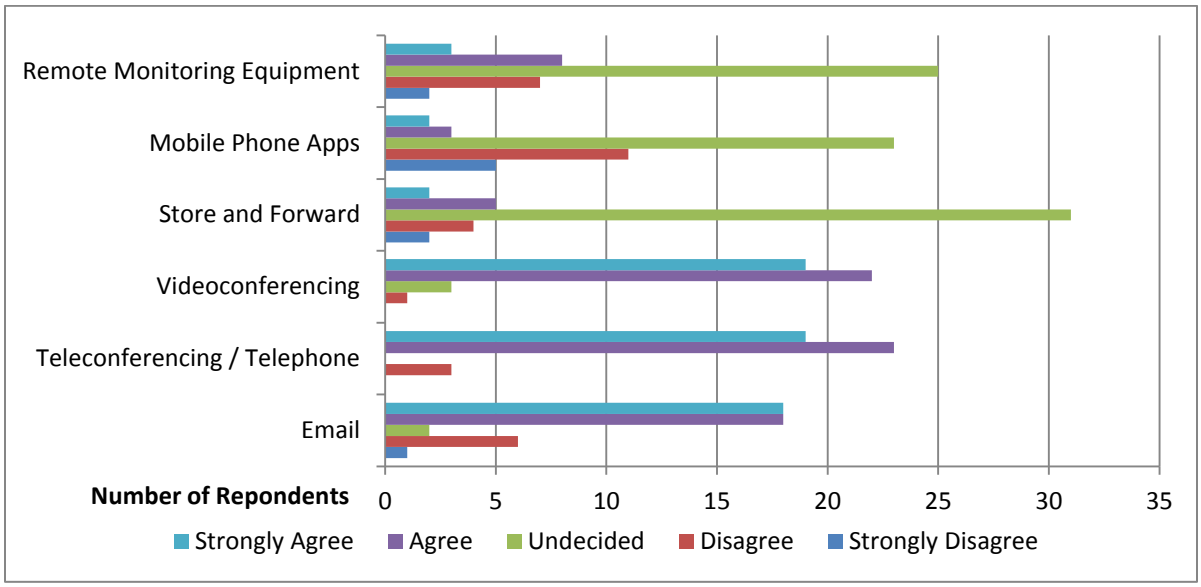
Some participants also provided further feedback regarding provisions that would help improve telehealth based patient care. The responses included:

- *Better acceptance and organizationl practices 'upstream'at the tertiary care level*
- *Knowing who we could use over videoconferencing (specialists)*
- *Other health care professionals belief in value*
- *All health care systems of communications must be on one system. Too many*

systems in the health care sectors.

- *Important to understand that individual technology needs to be matched with specific circumstances. Sometimes face to face is best. Sometimes VC'ing sometimes email. The answer to question 10 is, it depends*
- *Small focus groups face to face*

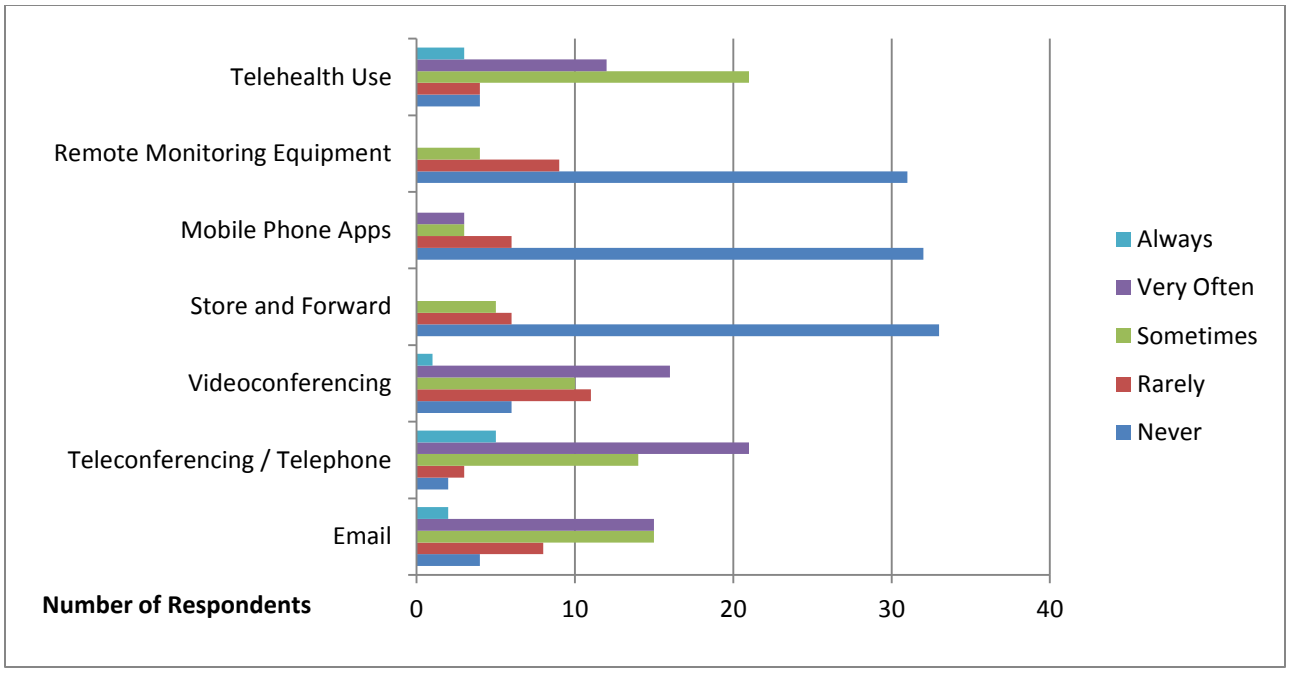
Figure 7 - Technology Comfort Assessment



The Telehealth Comfort Assessment figure shows that

- Participants were quite comfortable with Videoconferencing, Teleconferencing / Telephone, and Email mediums, with those who **Strongly Agree** with being comfortable representing 42.2% (19 out of 45), 42.2% (19 out of 45) and 40% (18 out of 45) respectively of the study population.
- In comparison participants were much less comfortable with Remote Monitoring Equipment, Mobile Phone Apps and Store and Forward Technologies with 55.5% (23 out of 44), 52.3% (25 out of 45) and 70.4% (31 out of 44) respectively stating they were **Undecided** regarding their comfort level with these technologies.

Figure 8- Technology Level of Use



The Telehealth Level of Use figure shows that in self-assessing how often they use specific telehealth technologies:

- Teleconferencing and telephones were the medium that were used **Very Often** as selected by 46.7% (21 out of 45) of participants. Videoconferencing and Email were similarly selected as mediums that were used **Very Often** by 36.4% (16 out of 44) and 34.1% (15 out of 45) of participants respectively.
- Not surprisingly less familiar mediums such as Store and Forward, Mobile Phone Apps, and Remote Monitoring Equipment were selected as **Never** being used by 75% (33 out of 44), 72.7%, (32 out of 44) and 70.4% (31 out of 44) of the participants respectively.
- Overall telehealth technology use ranged from **Very Often** for 27.3% (12 out of 44) of the participants and **Sometimes** for 47.7% (21 out of 44). These values do not quantify daily, monthly or weekly the level of use but are instead subjective

interpretations of how participants perceive their use of telehealth.

Participant Feedback

Throughout the survey participants were given the opportunity to provide feedback with regards the section topics. The freeform text responses to the questions **"In your opinion…"** and **"Are there any other comments…"** for the respective sections generated contextually rich information that can be reviewed to understand the mindset of teleheath users within the study population. Some key responses of interest as selected from the study data are listed below. All the responses below were gathered from the web survey participant data.

Participant Feedback – Technology Assessment

In your opinion how can telehealth systems be used to improve patient care?

- *"It brings the care to the patients community - avoids travel, lessons wait times, improves access, provides support for care providers in the community from outside health care providers*
- *More availability of systems. Most of the time the room is booked where the system is so I can't access it for use for an appointment with a person.*
- *The system needs to be expanded so that there is much more available via telehealth. When I worked in Northern ON years ago, we could access almost any specialty via telehealth for our remote community. BC is way behind in technology and support for telehealth. This is detrimental to all people who live in the North or other areas where access to specialties is limited.*
- *Need far more administrative support to make arrangements to set something up. Need more specialists interested and available for consultations of this nature."*

Are there any other comments regarding information communication technologies you would like to make?

- *"I would also think our site should have internet access. Unlimited. Our site also has many sites blocked. Access to up to date health care information is blocked or denied access.*
- *Telephone and connecting with the south is important and even having those from urban centers visit the North. This helps get an idea of the environments that the nurses, other health care professionals and people are living in.*
- *It is not supported by all health authorities which is a shame*
- *Telehealth to me is mostly just using phones and emails to talk to clients"*

Participant Feedback – Benefits of Telehealth

In your opinion what makes telehealth a positive technology for patient care?

- *"Improving access to health care not available in home community in a more timely manner*
- *Increased access to specialty medicine. Saves time and money. Removes barriers for access to care. Increases communication. Improves follow up.*
- *Easier access to specialists in remote areas. Can partially pick up on patients body language during discussion.*
- *The biggest benefit to telehealth in FN communities, is the ability to have a large family attend the consult, when in person consults usually only have one support individual. Culturally, this is very important to my FN patients.*
- *Less travel--this is a big issue for our community, often people miss appts, can't afford it etc*
- *Within a counselling setting in remote communities - patients have access to a specialist as well as the anonymity and confidentiality is more secure. The delivery needs to be in a manner that is consistent with the cultural interactions*
- *In my opinion, the interpersonal skills of the physician can make or break a videoconference' success*
- *Patient's enjoy using it. I find I can communicate with a patient better when there is a video link. Their facial expression tells me whether they are understanding what I say"*

Are there any other comments regarding the benefits of telehealth you would like to make?

- *"We use it in a remote first nation community to communicate with their primary care md - the patients love it!!*
- *Numerous - the benefits are minimized if patients interactions within the telehealth setting are not conistant with cultural interactions (ie too formal, no relationship building or story telling allowed, highly educated wording etc).*
- *A health care worker who knows the person should be present and then there is better understanding of the plan and actions needed*
- *Regular time set for delivery of telehealth and consistant....plus follow-up with a real person...to get feed back that the delivery and education of service is working not only for the health professionals but client's too"*

Participant Feedback – Challenges of Telehealth

In your opinion what are the challenges in using telehealth for patient care?

- *"Setting up the consultation appt, getting the IT connections made (requires too many phone calls and participation of too many participants on each end).*
- *It's about practice and continued use for my patients. once they we get used to the technology I think the ease of use will get better.*
- *Confidentiality and repeated follow up (email etc can get lost in the email abyss)*

- *Relying on someone else's physical exam*
- *Need more infrastructure support. Need more services available by telehealth. Need a central list of who will provide telehealth services across the province."*

Are there any other comments regarding the challenges of telehealth you would like to make?

- *"Complementing it with physical interactions helps buy in I think as it seems less like a replacement physical interactions*
- *Under used and utilized at the tertiary level due to physical location and poor scheduling practices*
- *In person visits are preferred, but, on balance, due to distance, a lot of interactions can be done by telelink. There are times when in-person visits will be required.*
- *Access for physicians to equipment and quality telecommunications infrastructure in or near their offices"*

Participant Feedback – Cultural Awareness

Are there any other comments regarding First Nations cultural awareness you would like to make?

- *"When First Nations people need to travel, their level of anxiety is increased substantially. They are removed from everything they rely on for support, strength, health. They are often bewildered and overwhelmed.*
- *The historical model of healthcare training works against the relationship building in FN communities*
- *Mainstream medicine needs to open its eyes to traditional medicine and respect it, and learn to use it.*
- *I think that the trust that is built in these communities comes from living and experiencing it not via telehealth so I really feel that telehealth cannot meet cross cultural competencies."*

Interpretation of Survey Results

Since the sample size of the population was 45 participants an inferential statistical analysis could not be conducted on the data gathered during the survey. Instead an interpretation of the data gathered in the benefits, challenges, cultural awareness and technology assessment categories of the survey is presented here with respect to the mean composite scores of the participant groups per category. The results presented here are an

interpretation of the data and as such are not statistically significant. Recall that a mean composite score of 5 implies the strongest agreement with a category's questions while a mean composite score of 25 implies the strongest disagreement with the category's questions. A mean composite score that trends towards 15 would imply the participant is either undecided or has strong opinions with respect to both agreement and disagreement regarding specific questions within the category.

Research Question 1

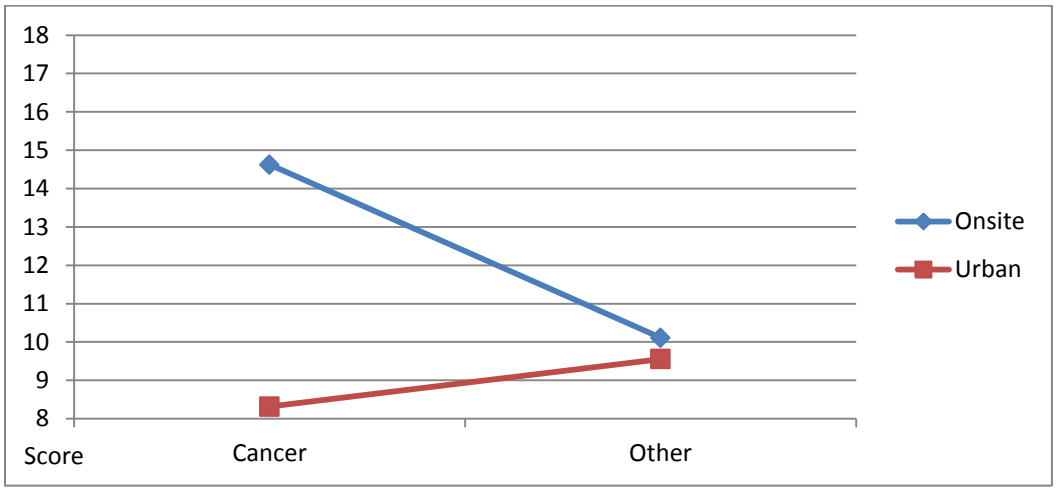
Null Hypothesis 1: External urban health care professionals perceive similar benefits regarding telehealth for patient care as onsite healthcare professionals in First Nations Communities.
Alternate Hypothesis 1: External urban health care professionals do not perceive similar benefits regarding telehealth for patient care as onsite healthcare professionals in First Nations Communities.

With respect to the null hypothesis that there is no difference between the groups, the data gathered in the benefits category shows the mean score of the onsite cancer care group (14.625) trends toward more disagreement regarding the benefits of telehealth when compared to the urban cancer care (8.315), onsite other care (10.111) and urban other care groups (9.555) (See Figure 9 – Benefits Category Analysis)

Regarding the substantially higher composite score of the onsite cancer care group in relation to the other 3 groups I speculate that this group perceives fewer benefits to telehealth than the other 3 groups which are comparable in their mean composite scores. Other care providers are more similar in their perception of telehealth benefits regardless of whether they are onsite or urban. Urban cancer care professionals (8.315)

were the most favourable with respect to their perception of telehealth benefits amongst the 4 participant groups.

Figure 9- Benefits Category Analysis



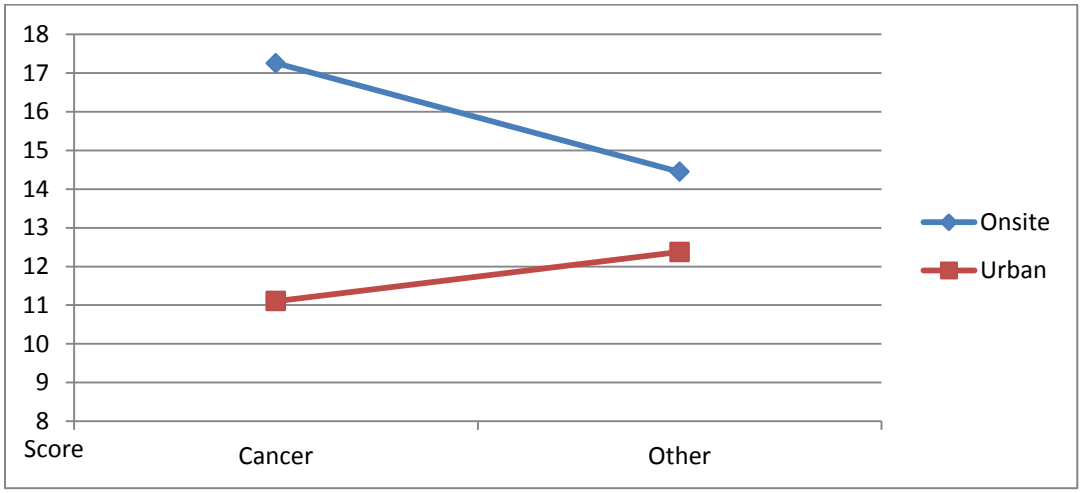
Research Question 2

Null Hypothesis 2: External urban health care professionals perceive similar challenges regarding telehealth for patient care as onsite healthcare professionals in First Nations Communities.
Alternate Hypothesis 2: External urban health care professionals do not perceive similar challenges regarding telehealth for patient care as onsite healthcare professionals in First Nations Communities.

With respect to the null hypothesis that there is no difference between the groups, the data gathered in the challenges category shows the mean score of the onsite cancer care group (17.25) trends toward more perceiving more challenges regarding telehealth use when compared to the urban cancer care (11.105), onsite other care (14.444) and urban other care groups (12.375). With respect to the challenges category disagreement with the questions implies that the participant perceives more challenges. Therefore a higher score implies a perception of greater challenges with telehealth use. (See Figure 10 – Challenges Category Analysis)

Regarding the substantially higher composite score of the onsite cancer care group in relation to the other 3 groups I speculate that this group sees more challenges to telehealth use than the other 3 groups. Other care providers are somewhat similar in their perception of telehealth challenges whether they are onsite or urban. Urban cancer care professionals (11.10526) perceived fewer challenges regarding telehealth use than the other 3 groups.

Figure 10- Challenges Category Analysis



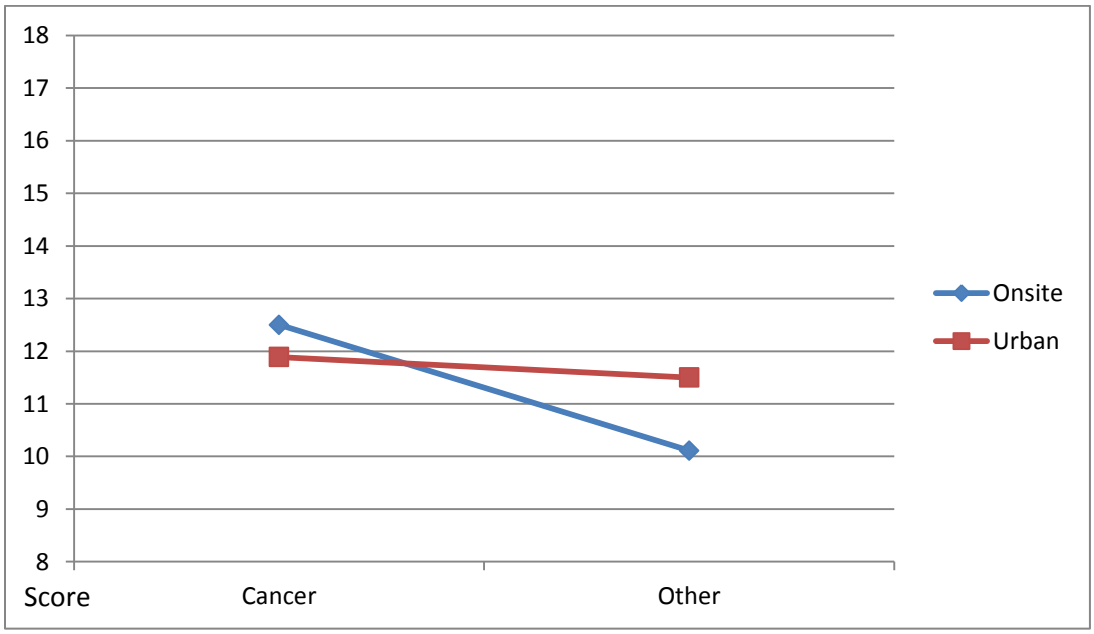
Research Question 3

Null Hypothesis 3: External urban health care professionals are as aware of First Nations culture with respect to patient care as onsite healthcare professionals in First Nations Communities.
Alternate Hypothesis 3: External urban health care professionals are not as aware of First Nations culture with respect to patient care as onsite healthcare professionals in First Nations Communities.

With respect to the null hypothesis that there is no difference between the groups, the data gathered in the cultural awareness category shows the mean scores of all four groups are relatively similar; onsite cancer care group (12.5), urban cancer care (11.889),

onsite other care (10.111) and urban other care groups (11.5). Therefore the similar scores imply there is no difference between the groups regarding cultural awareness. (See Figure 11 – Cultural Category Analysis)

Figure 11- Cultural Awareness Category Analysis



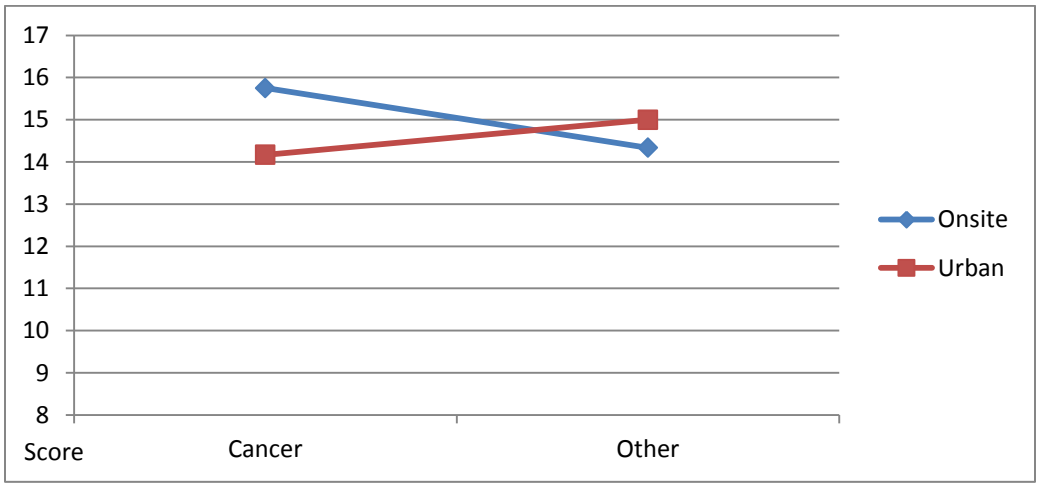
Technology Assessment Analysis

A technology assessment regarding comfort with the use of ICTs has been touched upon in this study. Though I am interested in asking participants questions regarding technology comfort it was not a core research question of the thesis. As such we have not developed a hypothesis regarding technology comfort. Since the data was collected from the participant population though, an interpretation of the results is provided here.

The data gathered in the technology assessment category shows the mean scores

of all four groups are relatively similar; onsite cancer care group (12.5), urban cancer care (11.889), onsite other care (10.111) and urban other care groups (11.5). Therefore the similar scores imply there is no difference between the groups regarding cultural awareness. (See Figure 12 – Technology Assessment Category Analysis)

Figure 12- Technology Assessment Category Analysis



Discussion

Telehealth as a medium for providing health service delivery is an established practice for countries with First Nations and Aboriginal populations such as Canada (Hailey, 2001; Muttitt, Vigneault and Loewen, 2004). The need for equitable and timely health service delivery is a driving factor in the adoption of telehealth technologies in rural and remote settings where limited access to health professionals and specialist health services necessitates alternative methods of patient care.

The aim of this thesis was to assess the perceptions of health care professionals regarding telehealth benefits, challenges and cultural awareness. The findings indicate that onsite cancer care providers do not appreciate the benefits as well, and perceive

greater challenges with respect to telehealth use than their onsite other care and urban counterparts. There was no difference between any of the groups regarding First Nations cultural awareness or comfort with using ICTs. These research findings as they relate to telehealth specific literature reviewed are discussed in the following sections

Information Communication Technologies

Telehealth at its simplest is communicating health related information over a distance through technology. The variety of information communication technologies available today have opened the door through which telehealth can be used to connect onsite health professionals with their urban health professional counterparts. Accessible technologies such as email, teleconferencing and videoconferencing have been the ICTs most commonly used to extend health care service delivery (O'Donnell et al., 2007). Similarly, this thesis found that these three ICTs were both the most dominant implementations in use and most comfortable for care professionals to use. Other technologies were not as well used or preferred by the participants. Though these other technologies are in use in Canada (Lavoie, 2011; Chaulk & Fuller, 2009), this thesis found only a small percentage of the study population (4-13%) used remote monitoring, store and forward or mobile applications. My interpretation of the technology assessment survey data found onsite and urban care professionals were similar with regards to how comfortable they felt with these technologies. Though rural First Nations communities, and rural communities in general, lack equitable access to ICTs (MacLeod, 2010), this lack of urban rural disparity in perceived comfort would imply that technology use is not an issue. In fact, the thesis found that improved ICT infrastructure with specific training

on how to leverage ICTs for telehealth, were the most preferred provisions for improving the use of technology. In the Canadian context, these findings are supported as improved low cost infrastructure (Jennet & Andruchuk, 2001) and telehealth training (Penny, Watson & Watanabe, 2000) have both been found to be important to enabling telehealth providers.

Analysis of Benefits

When looking at the benefits category survey data, my interpretation of it is that onsite cancer care professionals did not perceive telehealth benefits as positively when compared to the other participant groups. Interestingly studies of patients in rural and urban settings have found no meaningful difference with respect to attitudes toward care delivered by telehealth (Grubaugh, Cain, Elhai, Patrick & Frueh, 2008; Young & Irenson, 2003). The key difference in these studies is that they show a patient perspective versus a health professional perspective. In these studies patients were more accepting of telehealth mediated care and in some cases they preferred the telehealth model over conventional care (Sulzbacher, Vallin & Waetzig, 2006). A private general practice physician providing services to First Nations communities contacted during this thesis (see Chapter 4 – Secondary Discussion) stated that First Nations individuals find *"telehealth less threatening while at the same time [telehealth] lends itself well to their communication style."* In trying to understand this outcome, key issues identified were a lack of face to face interaction and physical contact between health professionals and patients.

These issues regarding interaction and contact were more of a concern for onsite professionals, specifically cancer care professionals, rather than urban professionals. Therefore choosing the correct ICT for the interaction can help mitigate these issues as stated in a participant response regarding videoconferencing. A pharmacist participant stated "*facial expression tells me whether they are understanding what I say."* Literature supports the assertion that videoconferencing can help minimize the physical disconnect associated with telehealth mediated care (Winters & Winters, 2007). Interestingly the onsite other care professionals did not show a difference between any of the groups. This lack of difference is indicative that telehealth 'buy in' is stronger outside the onsite cancer care health professional population. Further research focusing on onsite cancer care health professionals is necessary to determine the reason for the differences found in the thesis, however the survey responses by two nurses highlighted concerns regarding telehealth being perceived as a *"workaround"* or *"way to divert the dollars to other resources".* Positive comments by participants with respect to the benefits of telehealth were consistent with existing literature, namely; telehealth systems save travel time, provides access to health care (tertiary), and provide cost savings (Lewis, Trante & Axford, 2009; Keresztes & Shaw, 2002).

Analysis of Challenges

When looking at the challenges category survey data, my interpretation of it is that onsite cancer care professionals perceived greater challenges with respect to telehealth when compared to the other participant groups. Existing studies show that personal preferences can affect the attitudes regarding telehealth use (Goodenough and

Cohn, 2004). Particular concerns regarding telehealth included a lack of training, a lack of physical interaction; perceptions of patient comfort and the suitability of the local ICT infrastructure to support the telehealth mediated interaction. Regarding the attitudes towards challenges there was a difference between onsite cancer care professionals and urban cancer care professionals, but not onsite or urban other care professionals. As stated prior, there can be a belief that telehealth in rural communities is a replacement for spending health care dollars on conventional care (Jennett, Jackson, Healy, Ho, Kazanjian, Woollard, Haydt and Bates, 2003). An insightful suggestion for overcoming these challenges regarding telehealth made by a nurse participant was that "*complementing it with physical interactions helps buy in I think as it seems less like a replacement physical interaction."* Complementing face to face interactions with telehealth further extends its usefulness in providing consistent care. Such models successfully exist in Canadian First Nations communities such as Keewaytinook Okimakanak Telemedicine in Ontario BC (Lavoie & Williams, 2009). An existing model in BC reviewed during the course of this thesis was that of a private general practice physician and is discussed in the Secondary Discussion section.

Other concerns found when assessing challenges were:

1. Underutilization and upkeep of the ICTs involved.
2. Complexity required in coordinating a telehealth exchange between patients, offsite and onsite health professionals.
3. Acceptance amongst the patients.

Underutilization of telehealth systems is a known issue found throughout literature (Day, Demiris, Oliver, Courtney & Hensel, 2007; Whitten & Holtz, 2008).

Underutilization could be mitigated by a technological inventory of telehealth systems available, metrics regarding use, or incentives to promote use (Walker & Whetton, 2002). Incorporating telehealth training in order to integrate the technology with existing workflows could work to overcome both underutilization and issues regarding complexity coordinating telehealth sessions. Studies have shown workflow, organizational practice, and individual preference issues need to be considered when implementing telehealth (Walker & Whetton, 2002; Moehr et al., 2006). As mentioned prior, studies have shown patients are generally accepting of telehealth. Continued use of telehealth systems within these NH communities should continue to build acceptance amongst participants. However studies have generally shown acceptance in patient populations as discussed in the telehealth literature review (see Chapter 2).

First Nations Cultural Awareness

First Nations communities are a culturally unique component of Canadian society. Therefore, culturally appropriate care is critical in successful health service delivery (Jennett et al., 2003). My interpretation of the cultural awareness category survey data found that found the participant groups were similar with respect to First Nations cultural awareness. This lack of difference between the groups supports the assumption that Northern Health healthcare professionals are equivalent in their relative perception of First Nations culture. Comments regarding perception showed participants were aware of the importance of the holistic approach to First Nations health care found in literature (Assembly of First Nations, 2006; O'Donnell et al., 2007). A key comment by a physician

supported by literature was that *"mainstream medicine needs to open its eyes to traditional medicine and respect it, and learn to use it.*"

Telehealth can also be used as a mechanism to drive communication between health care professionals and First Nations communities improving relationships. Studies with Aboriginal populations have shown that telehealth can be used as a mechanism to help reduce cultural bias (Eriks-Brophy, Quittenbaum, Anderson and Nelson, 2008). The importance of specific training for improving cultural awareness was a reoccurring theme in responses from the participants. Literature supporting this position goes beyond just simply understanding that First Nations are different. From traditional medicine to understanding their communication styles, literature shows that language and culture play an important role in shaping the world view, values and the health of First Nations (Moffatt & Cook, 2005). A First Nations onsite cancer care nurse participant stated *"I think the physicians and nurses are doing better to understand us culturally.*" The statistical outcome and participant responses show that though cultural awareness must be kept in the forefront, health professionals who participated in the study felt competent regarding understanding the cultural uniqueness of First Nations communities. Finally, First Nations cultural competency training can itself be delivered through telehealth systems improving utilization as suggested by a participant.

Secondary Discussion

In conjunction to the study portion of the thesis, I also contacted individuals and organizations currently involved in First Nations telehealth based healthcare delivery. These groups provided insight and contacts for potential participants. A list of key groups spoken to include:

- A telehealth specialist with the First Nations Health Council
- The Saint Elizabeth Foundation which is a non-profit organization that provides staffing, consulting, tele-education and integrated care solutions for rural and First Nations populations amongst others
- A private general practice physician who uses telehealth for First Nations health care service delivery.

The telehealth specialist with the First Nations health council provided the researcher with insight into the direction First Nations health services are headed in British Columbia. Specifically in BC a new health authority, the First Nations Health Authority, is being developed and is expected to provide health services to 200 First Nations communities by 2013. The First Nations Inuit Health Branch is leading the initiative and is in the process of deploying videoconferencing units in 100 First Nations communities to support the First Nations Health Authority. These units will be primarily used for wellness, education and administration. Future uses can potentially be acting as a basis for ICT infrastructure that can be used to provide primary care services to the communities. The telehealth specialist also provided contact information for potential participants for the study in Northern BC.

The representative of the Saint Elizabeth foundation provided insight with respect to the role of non-government agencies in providing health services and education to First Nations communities. Saint Elizabeth's current telehealth based education services provides educational sessions to communities with respect to chronic disease management, home care and professional development. The representative stated that *"the more telehealth is used the more it becomes preferred"* by First Nations communities (Saint Elizabeth, 2012).

The private physician interviewed is based in the Fraser Valley but his practice is the delivery of primary care (GP) to remote Northern BC First Nations communities via telehealth. This physician lives one week a month in Northern BC First Nations communities while the remaining three weeks of the month patient care is delivered via telehealth from the Fraser Valley. By living in the reserves his patients are from, the physician *"builds a social relationship with the community dining, fishing and participating in cultural events"*. This exceptionally unique telehealth based general practice physician implementation in BC is a ground breaking paradigm as no similar implementations were discovered during this thesis. This physician stated that merging face to face interactions with telehealth mediated care was the key to the success of his practice. This model of having face to face interactions (a familiar face) to complement and promote health care service delivery is supported in literature (Strachan, Gros, Yuen, Ruggiero, Foa & Acierno, 2011; Doorten, 2010).

Limitations

During the course of the thesis certain issues and limitations may have affected the outcomes, namely:

Applicable Literature: The literature review and discussion literature focused on patient interactions and telehealth. Though there is existing literature on health professionals and telehealth use, literature regarding this target group and First Nations communities is not as well developed.

Sample Size: The study population consisted of 45 participants which may limit generalizability. I attempted to maximize responses by sending out routine reminders. I actively searched for potential participants through web resources and lists provided by

Northern Health Contacts. Study information and research links were also placed within the *'Aboriginal Health Northern Health Update - May 2012'* as well as on the Northern Cancer Control Strategy Telehealth main page. Due to the small sample size a inferential statistical analysis on the data could not be completed.

Response Modes: The data collection methods for the study consisted of two methods, web survey and telephone survey. Those participants contacted by telephone preferred that the survey weblink be emailed to them. Only 1 person called to participate through the telephone method however, and they did not meet inclusion criteria.

CHAPTER 5: CONCLUSION

In conclusion for this thesis I conducted a literature review of telehealth use in First Nations communities (Phase 1) and used an anonymous online survey tool to assess health professionals using telehealth to support First Nations communities (Phase 2). The survey assessed the technological comfort, perceived benefits, perceived challenges and cultural awareness of rural and urban healthcare professionals with respect to cancer care and other (non-cancer) patient care in northern BC's First Nations communities. The aim of the research was to determine if there is a perception gap between the target groups with respect to the aforementioned issues and telehealth in the context of First Nations communities and health professionals (see Chapter 1: Aim of the Study), specifically looking at:

- Perceptions with regards to benefits, challenges, and cultural awareness.
- Examining health resource use in context of both the service provider and service user.
- Determining if health professionals believe that the use of telehealth can facilitate better social interactions, accessibility to healthcare and timely health service delivery.

Data collection and analysis relating to the aims of the study found the following:

1. Information communication technology use was not found to be an issue amongst the participant groups. Conventional technologies such as email, teleconferencing/telephone and videoconferencing were most favoured by the participants regarding both use and comfort. Less conventional technologies such as remote monitoring equipment, mobile apps and store and forward technologies were limited in use and participants felt uncertain regarding their use. Though technology use was not an issue, participants still felt that greater technology infrastructure for supporting telehealth as well as telehealth training were

provisions that would most support their needs as telehealth users. As Northern Health continues to build its telehealth network to support health care service delivery to First Nations communities, the health authority should work to ensure that broadband and hardware infrastructure is in place to support the needs of the health care professionals. Though participants are familiar with ICTs, training specific to telehealth mediated exchanges must still be in place so users can fully leverage the potential of these ICTs.

2. An analysis of benefits found that onsite cancer care professionals were less positive regarding the benefits of telehealth when compared to the other participant groups. The concern of participants within this group was with respect to telehealth acting as a replacement to conventional care. In rural and remote settings the loss of health care resources is an ever present worry for both the community and local health professionals. Northern Health needs to invest resources to provide health professionals education regarding the overall benefits of telehealth, such as cost and time savings to patients in rural communities. At the same time reassurance is required to professionals that telehealth is not a mechanism to replace conventional care, rather it can act as an asset to help extend health care where it is currently unavailable.
3. An analysis of challenges found that onsite cancer care professionals had more challenges with respect to telehealth than the other participant groups. The common concern found in this portion of the study was that of the perceived physical disconnect with telehealth. This concern can be mitigated with an approach that incorporates face to face interactions to build relationships between

patients coupled with telehealth mediated exchanges at other points to maintain continuity of care. Other concerns were underutilization of telehealth systems, complexity of telehealth setup, and acceptance by patients. These issues must be overcome by monitored use, developing workflows that incorporate telehealth and telehealth training.

4. Cultural awareness of First Nations was not perceived to be an issue of amongst participant groups. Participants were aware of the importance of traditional medicine in First Nations communities as well as their challenges with respect to socio-cultural issues and their social determinants of health. Cultural competency courses and education were suggested by participants in order to maintain a consistent level of awareness amongst health care professionals.

It is a credit to the current telehealth inititaives in NH that participants had a favorable perception of the benefits of telehealth such as cost savings, time savings, telehealth effectiveness for patient care, and educational opportunities through telehealth. Telehealth for rural and remote First Nations communities is an effective way to extend access to health care and reduce costs. Therefore, health professional buy in is an important criteria for success in telehealth use. Urban care professionals perceive themselves better prepared for telehealth use and adoption. Thus, onsite cancer care professional group should be targeted for education, training, and workflow integration regarding telehealth to improve health care service delivery.

Recommendations

Specific recommendations from the thesis are as follows:

1. A structured telehealth training program for health professionals, specifically in the case of onsite cancer care providers, regarding how to effectively use telehealth systems for patient care. Components of the program could include:
    a. A specific component designed to address the concern of health professionals regarding the physical disconnect associated with telehealth use. This module should include scenarios that highlight how to overcome concerns that arise when interactions are not face to face.
    b. A specific cultural awareness component that educates health professionals regarding First Nations. This module should include the importance of traditional medicine & the holistic view of First Nations, the social determinants that affect First Nations health status, and the importance of social support with respect to patient care.
    c. Peer to peer training that provides examples of successful implementations could be an effective model for health professionals to emulate in their regions. Peer mentoring or 'Superusers' can be act as resources for new or inexperienced sites. The outcomes of this thesis show that onsite cancer care providers in particular should be targeted for peer based training to improve acceptance and knowledge of telehealth.
2. Develop educational and promotional marketing and communication initiatives within the health authority, which should specifically target at onsite cancer care providers, showing the value of telehealth. Important telehealth benefits to communicate to professionals are cost savings to the health authority, improved

access to care for patients and the greater continuity of care that telehealth provides to patients. The goal of these programs is to facilitate change management with respect to telehealth acceptance amongst care providers. Highlighting existing successful implementations is a key strategy to use in these promotional programs.

3. NH should identify what other non-NH ICT infrastructure and telehealth systems that maybe in place such as non-government organizations or private systems. Building relationships with other successful telehealth paradigms such as those of Saint Elizabeth, the First Nations Health Authority or private groups (ie physicians) can create opportunities for sharing of knowledge and extending existing programs in other organizations for use in NH First Nations communities.
4. Develop programs that complement telehealth mediated care with physical interactions between patients and care providers. A hybrid model of telehealth that involves health professionals visiting their patient populations would be a more effective approach to deal with the social and human interaction (a lack thereof) challenges that arise from the use of telehealth systems.

Future Work

The content presented in this thesis has raised many questions with respect to the gaps in current research regarding telehealth use in First Nations communities. The survey portion has raised further issues that should be addressed in future work. The following is a list of future studies derived from this thesis that could be conducted:

- Conduct a further assessment of the onsite cancer care group. A replication or modified version of our study with a larger sample size could allow for an inferential statistical analysis to determine if there truly is a statistically significant difference between the participant groups.
- Conduct a further assessment of the other care group. This assessment could look at various health domains individually to determine if these groups truly do not perceive the same issues with telehealth that onsite cancer care health professionals do. Further assessment can determine the acceptability of telehealth in a variety of health domains.
- Create a model for telehealth mediated primary care based on the work of the primary care physician discussed in Chapter 4 – Secondary Discussion. A model for telehealth based primary care that could be placed into other primary care or walk-in clinics in the lower mainland could greatly increase the availability of general practitioners to Northern BC First Nations communities.
- Conduct a study to assess the benefits of using telehealth ICT infrastructure for community development for First Nations communities. This includes using ICTs to provide education, administrative support, connecting the communities to the world at large and interconnecting the communities themselves.
- Create an inventory of current telehealth implementations in BC occurring at the federal, provincial, First Nations, health authority, non-profit and private level. By determining what projects are already in place around the province we can better use health authority resources and save costs if other implementations can be leveraged or replicated.

- Conduct a study focused on the assessing the physical disconnect associated with using telehealth and the benefits of hybrid models of tehealth based health service delivery in overcoming this issue.

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APPENDICES

Appendix 1 – Telephone Script

Thank you for agreeing to participate in this survey. I will begin with the demographic questions. I will ask you a question and provide possible responses. Please choose single best answer or if you do not prefer any answer please say 'No Response'

Informed Consent Question

Do you Consent to participate in this research study

A: Yes or No?

Demographics Section

Q1: Do you identify yourself as a First Nations Individual?

A: Yes or No?

Q2: Do you use telehealth to provide cancer care to patients

A: Yes or No?

Q3: What is your gender?

A: Male or Female?

For the following demographic questions please provide your own responses

Q4: What is your healthcare profession?

A:

Q5: Do you use telehealth technologies to provide care **primarily from within First Nations communities** to communicate with offsite individuals (Ie an onsite telehealth coordinator in a rural First Nation's community)
OR
Do you do use telehealth technologies **primarily from urban centers** to communicate with patients or health professionals in First Nations communities (Ie and offsite specialist in Prince George)

A:

Primarily from within First Nations Communities	Primarily from urban centers

Q6: How old are you?

A:

Q7: How long have you been working as a health care professional?

A:

For this last demographic question please select all that apply from the responses.
Q8: Which information telehealth mediums do you use to in order to support patient care?

Email	Tele-conferencing/ Telephone	Video-conferencing	Store and Forward	Mobile Apps	Remote Monitoring

					Equipment

Secion1: The next section is the technology assessment. Please Rate the following statements.

Q1: I feel comfortable using email as a communication technology for care

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

Q2: How often do you use email as a form of communication for patient care

Always	Very Often	Sometimes	Rarely	Never

Q3: I feel comfortable using teleconferencing as a communication technology for patient care

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

Q4: How often do you use teleconferencing as a communication technology for patient care

Always	Very Often	Sometimes	Rarely	Never

Q5: I feel comfortable using videoconferencing as a communication technology for patient care

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

Q6: How often do you use videoconferencing as a communication technology for patient care

Always	Very Often	Sometimes	Rarely	Never

Q7: I feel comfortable using store-and-forward technologies as a communication technology for patient care

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

Q8: How often do you use using store-and-forward technologies as a communication technology for patient care

Always	Very Often	Sometimes	Rarely	Never

Q9: I feel comfortable using mobile phone apps as a communication technology for patient care

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

Q10: How often do you use using mobile phone apps as a communication technology for patient care

Always	Very Often	Sometimes	Rarely	Never

Q11: I feel comfortable using computers and new technologies

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

Q12: I enjoy using telehealth to provide patient care

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

Q13: I believe there are sufficient information technology resources available for telehealth based patient care

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

For the following technology assessment questions please provide your own responses

Q14: In your opinion how can telehealth technologies be used to improve patient care?

A:

Q15: Are there any other comments regarding information communication technologies you'd like to make?

A:

Q16: Rank the following from 1 to 6 using the numbers 1-Most preferred to 6-Least Preferred
Which is your preferred method for interacting with health care providers outside your community for patient care?

Email	Tele-conferencing / Telephone	Video-conferencing	Store and Forward	Mobile Apps	Face to face interactions

Q17: **Rank the following from 1 to 5 using the numbers 1-Most preferred to 6-Least Preferred**
Which of the following, if greater provisions were provided, do you believe would best assist you as a healthcare practitioner in using telehealth to provide patient care

Information Technology Infrastructure	Training	Managerial Support	Legislative Support	Other If Selected Please specify

Other:

Q18: How often do you use telehealth systems to provide patient care to your patients?

Always	Very Often	Sometimes	Rarely	Never

Section 2: The next section is on perception of benefits. Please rate the following:

Q1: The costs savings for clients with respect to travel makes telehealth a good alternative for patient care

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

Q2: The time savings for clients with respect to travel makes telehealth a good alternative for patient care

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

Q3: I believe telehealth is as effective as face to face interactions for patient care

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

Q4: I believe telehealth can be used to improve educational opportunities with First Nations communities.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

Q5: I believe telehealth can be used to share cultural knowledge with First Nations communities.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

For the following benefits questions please provide your own responses
Q6: In your opinion what makes telehealth a positive technology for patient care?

A:

Q7: Are there any other comments regarding the benefits of telehealth you'd like to make?

A:

Section 3: The next section is on perception of challenges. Please rate the following:

Q1: I feel I am adequately trained to use telehealth to provide patient care

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

Q2: I feel a lack of physical interaction is not a major issue with telehealth for patient care

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

Q3: I feel it is not difficult to act as an intermediary between my patients and external healthcare providers when using telehealth

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

Q4: I believe my patients feel comfortable using telehealth to access healthcare services

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

Q5: I believe the local communication infrastructure is developed enough to support telehealth for patient care

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

For the following challenges questions please provide your own responses
Q6: In your opinion what are the challenges in using telehealth for patient care?

A:

Q7: Are there any other comments regarding the challenges of telehealth you'd like to make?

A:

Section 4: The Next Section is on cultural awareness
The Following questions are intended to gauge the cultural awareness of health practitioner's, specifically non-First Nations, regarding the unique facets of First Nations society, with regards to health service delivery, that they may not be otherwise aware of.
Please Rate how strongly you agree or disagree with the following statements

Q1: I perceive that the First Nations patients I work with accept telehealth as a method of patient care

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

Q2: I am aware of the role of traditional medicine in healthcare

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

Q3: I am aware of the role Elder's play in First Nations society

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

Q4: I am aware of the holistic community driven approach to healthcare preferred by some First Nations communities

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

Q5: I am aware of the historical socio-cultural challenges in First Nations communities

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

Q6: I am aware that First Nations communities are challenged by social determinants of health

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

For the following cultural awareness question please provide your own responses
Q7: Are there any other comments regarding the cultural awareness of telehealth you'd like to make?

A:

Thank you for your time in participating in this survey. The results will be provided to Northern Health after data analysis. If you would also like a copy of the results you can provide your email address now.
Email:

Appendix 2 - Invitation to Participate

Study: Understanding Telehealth Mediated Cancer Care in Northern BC First Nations Communities: Health Professionals' Perspectives

This is an invitation to participate in a research study conducted with the University of Victoria and Northern Health. The study is entitled 'Understanding Telehealth Mediated Cancer Care in Northern BC First Nations Communities: Health Professionals' Perspectives.

The purpose of this study is surveying the perceptions of health professionals with respect to what benefits and challenges there are to the use of telehealth for patient care in First Nations communities. We are also looking for information in the context of patient care, specifically cancer care. The study is trying to determine the extent of telehealth use, how comfortable you are with using it, and whether you are aware of the cultural uniqueness of First Nations communities. For example are health professionals who use telehealth aware that the telehealth systems can be a medium to share cultural knowledge between First Nations communities. It is the goal of this study to understand the role of health professionals who use telehealth in Northern Health First Nations communities from their perspective.

You are being asked to participate in the study because you are either:

a) A health professional in First Nations community in Northern BC who uses telehealth to provide health care for patients in Northern BC First Nations communities from within those communities

OR

b) A health professional in Urban Healthcare center (such as Prince George or Vancouver) who uses telehealth to provide health care for patients in Northern BC First Nations communities from outside those communities

Telehealth technologies can include emails, teleconferencing/telephone, videoconferencing, store and forward, mobile applications, and remote monitoring equipment.

Though there are no direct benefits for participants, benefits for participating in the study are in regards to understanding the gaps in the effective use of telehealth for patient care in First Nations communities in Northern Health. Participation in this study is voluntary. You can decline to participate or withdraw from the study at any time without any negative consequences to yourself.

The survey will take approximately 15 minutes online. To participate in this study online please click the link below. If you'd like to participate over the phone (20-30 minutes), please call Bobby Sidhu at 604-765-6591 or email at bobsingh@uvic.ca to schedule a time to participate.

<Survey Link>
Should you have any questions regarding your rights as a participant please contact the

University of Victoria human research ethics board.
HREB (Uvic)
Phone: 250-472-4545
Email: ethics@uvic.ca
Fax: 250-721-8960

Researcher:
Bobby Sidhu
MSc Candidate
University of Victoria
Phone: 604-765-6591
Email: bobsingh@uvic.ca

Co-Supervisor:
Jeff Barnett
Adjunct Associate Professor
Department of Health Information Science , University of Victoria
Phone: 250-519-5519

Appendix 3 – Survey Questionnaire/Data Collection Instrument

Understanding Telehealth Mediated Cancer Care in Northern BC First Nations Communities: Health Professionals' Perspectives

This survey is being emailed to health professionals in Northern BC First Nations Communities to assess their understanding of the use of Telehealth with respect to benefits, challenges, cultural awareness and possible improvements to the technology.						
Demographics Section						
Do you Consent to participate in this research study				_Yes	_No	
Do you identify yourself as a First Nations Individual				_Yes	_No	
Do you use telehealth to provide cancer care to patients				_Yes	_No	
What is your Gender?				_Male	_Female	
What is your healthcare profession						
Do you use telehealth technologies to provide care **primarily from within** First Nations communities to communicate with offsite individuals (Ie and onsite health practitioner in a rural First Nation's community) **OR** do you do use telehealth technologies **primarily from urban centers** to communicate with patients or health professionals in First Nations communities (Ie and offsite specialist in Prince George)				_Primarily from within First Nations Communities	_ Primarily from urban centers	
How old are you?						
How long have you been working as a health care professional?						
<u>Which information telehealth mediums do you use to in order to support patient care?</u> **<u>Click all that apply</u>**	__ Email	__ Tele-conferencing/ Telephone	__ Video-conferencing	__ Store and Forward	__ Mobile Apps	__ Remote Monitoring Equipment

Study Section					
1. Technology Assessment – Rate the following statements					
I feel comfortable using email as a communication technology for patient care	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
How often do you use email as a form of communication for patient care	Always	Very Often	Sometimes	Rarely	Never
I feel comfortable using teleconferencing as a communication technology for patient care	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
How often do you use teleconferencing as a communication technology for patient care	Always	Very Often	Sometimes	Rarely	Never
I feel comfortable using videoconferencing as a communication technology for patient care	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
How often do you use videoconferencing as a communication technology for patient care	Always	Very Often	Sometimes	Rarely	Never
I feel comfortable using store-and-forward technologies as a communication technology for patient care	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
How often do you use using store-and-forward technologies as a communication technology for	Always	Very Often	Sometimes	Rarely	Never

patient care					
I feel comfortable using mobile phone apps as a communication technology for patient care	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
How often do you use using mobile phone apps as a communication technology for patient care	Always	Very Often	Sometimes	Rarely	Never
I feel comfortable using computers and new technologies	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
I enjoy using telehealth to provide patient care	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
I believe there are sufficient information technology resources available for telehealth based patient care	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
In your opinion how can telehealth technologies be used to improve patient care?					
Are there any other comments regarding information communication technologies you'd like to make?					

Rank the following from 1 to 6 using the numbers 1-Most preferred to 6-Least Preferred						
Which is your preferred technology for interacting with health care providers outside your community for patient care?	__ Email	__ Tele-conferencing	__ Video-conferencing	__ Store and Forward	__ Mobile Apps	__ Face to face interactions
Rank the following from 1 to 5 using the numbers 1-Most preferred to 6-Least Preferred						
Which of the following, if greater provisions were provided, do you believe would best assist you as a healthcare practitioner in using telehealth to provide patient care	__ Information Technology Infrastructure	__ Training	__ Managerial Support	__ Legislative Support	__ Other If Selected Please specify	
How often do you use telehealth systems to provide patient care to your patients?	Always	Very Often	Sometimes	Rarely	Never	

2. Perception of Telehealth Benefits - Rate how strongly you agree or disagree with the following statements					
The costs savings for clients with respect to travel makes telehealth a good alternative for patient care	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
The time savings for clients with respect to travel makes telehealth a good alternative for patient care	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
I believe telehealth is as effective as face to face interactions for patient care	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
I believe telehealth can be used to improve educational opportunities with First Nations communities.	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
I believe telehealth can be used to share cultural knowledge with First Nations communities.	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
In your opinion what makes telehealth a positive technology for patient care?					

Are there any other comments regarding the benefits of telehealth you'd like to make?	

3. Perception of Telehealth Challenges - Rate how strongly you agree or disagree with the following statements					
I feel I am adequately trained to use telehealth to provide patient care	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
I feel a lack of physical interaction is not a major issue with telehealth for patient care	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
I feel it is not difficult to act as an intermediary between my patients and external healthcare providers when using telehealth	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
I believe my patients feel comfortable using telehealth to access healthcare services	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
I believe the local communication infrastructure is developed enough to support telehealth for patient care	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
In your opinion what are the challenges in using telehealth for patient care?					
Are there any other comments regarding the challenges of telehealth you'd like to make?					

The Following questions are intended to gauge the cultural awareness of health practitioner's, specifically non-First Nations, with regarding the unique facets of First Nations society with regards to health service delivery, that they may not be otherwise aware of.

4. Cultural Awareness and Telehealth - Rate how strongly you agree or disagree with the following statements					
I perceive that the First Nations patients I work with accept telehealth as a method of care	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
I am aware of the role of traditional medicine in healthcare	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
I am aware of the role Elder's play in First Nations society	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
I am aware of the holistic community driven approach to healthcare preferred by some First Nations communities	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
I am aware of the historical socio-cultural challenges in First Nations communities	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
I am aware that First Nations communities are challenged by social determinants of health	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Are there any other comments regarding the cultural awareness of telehealth you would like to make?					

Appendix 4 – Research Consent Form

Understanding Telehealth Mediated Cancer Care in Northern BC First Nations Communities: Health Professionals' Perspectives

Principal Investigator: Bobby Sidhu 604-765-6591
bobsingh@uvic.ca
Study Coordinators: Jeff Barnett (BCCA, UVic)
Abdul Roudsari (Uvic)

Invitation:
The investigators would like to invite you to take part in this research study. Prior to deciding whether to participate, it is important for you to be informed on why the research is being conducted and what will be involved on your behalf. Please take some time to review the information contained herein and discuss it with others if you so wish. Please contact the study investigator if you would like any clarification or further information.

What Is the Purpose of the Study?
The purpose of this thesis project is an exploratory study to examine the perceptions of health service practitioners using telehealth systems for health care in rural and First Nations communities with respect to benefits, challenges, cultural awareness, and suggested potential improvements when providing health service delivery to First Nations communities for chronic disease management, specifically cancer care.

Why are you being invited to be a participant?
You are being asked to participate in the study because you are either:

c) A health professional who uses telehealth to provide health care for patients in Northern BC First Nations communities from within those communities

OR

d) A health professional in an urban healthcare center (such as Prince George or Vancouver) who uses telehealth to provide health care for patients in Northern BC First Nations communities from outside those communities

Telehealth technologies can include:

a) **Emails** – to communicate with patients or other health professionals
b) **Teleconferencing / Telephone** – to communicate with patients or other health professionals
c) **Video conferencing** – to communicate with patients or other health professionals
d) **Store and forward** – of clinical data (ie XRays, ultrasounds, MRIs) between First Nations communities and urban centers
e) **Mobile applications** – to provide information or self report
f) **Remote monitoring equipment** – for chronic disease management such as Cancer, COPD, diabetes, depression etc

Do you have to take part?
It is your decision to decide whether to take part in this study. By providing verbal

consent (for telephone interviews) or checking consent on the online form (for the online version) you can consent to take part in this study. If you choose to, you may withdraw at any time during the study without providing a reason.

Can you be asked to leave the study?
If any participant fails to comply with the study requirement or for any other reason deemed appropriate by the investigator, they shall be withdrawn from the study.

What will you need to do to take part?
Please read this research consent form then click on the link below to complete the survey questions. The study duration is short and can be completed within 10-15 minutes.

What are the risks and benefits of taking part?
There are no direct risks or benefits to the survey participants. The investigators perceive there will be societal benefits with respect to understanding the use of telehealth in Northern BC First Nations communities from the practitioner/provider perspective as well as understanding their insights with respect to technology. The survey tool (Survey Monkey) is located in the United States and as such the responses maybe accessed without knowledge or consent by the US government in compliance with the US Patriot Act. As stated, since there is no identifiable information gathered in the forms the use of Survey Monkey does not pose any risk to the participants.

While my involvement be kept confidential?
All the data gathered for this research project will be kept confidential. At no time are you asked to identify yourself by name, address, or other method that a reasonable person could use to determine who you are. Data collected will be analyzed at an aggregate level and kept anonymous through the use of non-identifying participant IDs and as such it will not be possible to reconstruct identity information after the study has completed.

Where will this research be used?
The information generated from this study will not be used for any commercial purposes. The information generated be used for this thesis research project and forwarded to BC Cancer Association, Northern Health, and Northern Cancer Control Strategy for research purposes. There are not conflicts of interest with respect to the investigator, the research project and the possible outcomes.

How can I contact the investigator for study results or further information?
Please email the study coordinator at bobsingh@uvic.ca for further information. Once the study has completed the coordinator will make the study results available to the participants via email if provided or via the submission of the thesis paper in the UVic Health Informatics department.

Has this study received ethical approval?
This study has been designed under the requirements of UVics Human Research Ethics guidilines. Ethics approval is currently pending.

I've already answered this survey, should I do it again?
No. Thank you for participating in this research project. Only one response per subject is required.

Why are you agreeing to this Research Consent form?
I have read and understood the research consent form. I understand that my participation this research is completely voluntary, and that I can request further information now or in the future and that I may refuse to participate or withdraw at any time. By completing this study YOUR FREE AND INFORMED CONSENT IS IMPLIED. This indicates you understand the conditions regarding participating in this study and you have both reviewed the material contained within this research consent form and had an opportunity to ask any questions pertaining to the study from the researcher.

IF YOU AGREE TO CONSENT PLEASE CLICK THE LINK BELOW TO BEGIN THE SURVEY
<Survey Link>

Appendix 5 – Verbal Consent Script

Study: Understanding Telehealth Mediated Cancer Care in Northern BC First Nations Communities: Health Professionals' Perspectives

Introduction

Hello, my name is Bobby Sidhu and I am a graduate student at the University of Victoria in the Health Informatics department. I am conducting a research project studying the perceptions of health professionals with respect to the use of telehealth for patient care in the context of chronic disease management, specifically cancer care, in Northern BC First Nations populations. Your contact information was provided by Northern Health as a likely participant because you are a health care professional who uses telehealth to provide patient care to First Nations communities.

Is this a convenient time to discuss the survey?
1 – Yes Go to -> Purpose of the Study
2 – No Go to -> A Better Time

A Better Time

The survey will last about 25 minutes. Can I arrange a better time that would be convenient for your schedule? Is there a time I could contact you again?
1 – Yes -> Schedule an appointment
2 – No -> Thanks for your time
End

Purpose of the Study

The purpose of this study is to assess what benefits and challenges there are to the use of telehealth for patient care in First Nations communities. As well we trying to determine the extent of telehealth use, how comfortable you are with using it, and whether you are aware of the cultural uniqueness of First Nations communities.

Participant Selection

You are being asked to participate in the study because you are either:

e) A health professional who uses telehealth to provide health care for patients in Northern BC First Nations communities from within those communities

OR

f) A health professional in an urban healthcare center (such as Prince George or Vancouver) who uses telehealth to provide health care for patients in Northern BC First Nations communities from outside those communities

Telehealth technologies can include emails, teleconferencing/telephone, videoconferencing, store and forward, mobile applications, and remote monitoring equipment.

Methods and Length

The study consists of a telephone survey where you will be asked questions regarding

your perceptions of the use of telehealth. The survey should not take longer than 25 minutes. The survey begins with some demographic questions. This is followed by study specific questions which are mostly scale type such as Strongly Agree, Agree, Undecided, Disagree, or Strongly Disagree. There are also some open ended questions for you to provide feedback. Your open ended comments will be summarized and transcribed by the researcher.

Participants will not directly benefit from this research study. You will not be paid for participating in the research study. Benefits for participating in the study are in regards to understanding the gaps in the effective use of telehealth for patient care in First Nations communities in Northern Health. Information from this study will not be disclosed for any other purpose. There are no risks associated with participating in this study.

Confidentiality
The data you provide will be recorded in an excel file on a password protected PC and online in the password protected web based data capture application. The data will be maintained until the end of the study at which time it will be deleted from both data sources and the online web survey account will be closed. In the end the report will contain only aggregate level non-identifiable information. Only the researcher will have access to the information for this duration. At no time will information that can identify you directly be recorded. Participant confidentiality will be maintained throughout the course of the study.

Withdrawal
You can choose to withdraw from the study any time prior to the end of the study. After completing the survey but prior to the end of the study if you decide you do not wish for your responses to be included please contact the researcher and provide the date and time you participated and your information will be removed. After the study ends only the aggregate level analyzed data is available and no individual response data is present to be removed and as such your data cannot be removed from the study.

Dissemination of Results
After the study has been completed research results will be available through the thesis paper of the researcher and the paper will be provided directly to Northern Health. Please contact the researcher at any time after the research has completed (target date of December 2012) for a copy of the results via email.

Voluntary Consent
Participation in this study is voluntary. You can decline to participate or withdraw from the study at any time without any negative consequences to yourself.

Would you like to participate now, at a later time or if you have an email address you can participate online. If you'd like to participate later can we schedule a time that is convenient for you?
1 – Participate -> Begin Survey
2 – Participate Later -> Yes -> Schedule an appointment

No -> Thanks for your time
End

Begin Survey
By answering the following research questions that I will ask, this means that you are consenting to participate in this research study.

Should you have any questions regarding your rights as a participant please contact the University of Victoria human research ethics board.

Go to -> **Telephone Script**

HREB (Uvic)
Phone:250-472-4545
Email:ethics@uvic.ca
Fax: 250-721-8960

Feel free to contact the principal investigator or faculty supervisor if you have any questions or concerns regarding the research study.
Researcher:
Bobby Sidhu
MSc Candidate
University of Victoria
Phone: 604-765-6591
Email: bobsingh@uvic.ca

Researcher:
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Email: abdul@uvic.ca

Appendix 6: Implied Consent Letter

This is an invitation to participate in a research study conducted with the University of Victoria and Northern Health. The study is entitled 'Understanding Telehealth Mediated Cancer Care in Northern BC First Nations Communities: Health Professionals' Perspectives.

Please open the attached 'Research Consent Form' to review the details of the study and click on the link below to begin the online survey. Your completion of the online survey is implied consent. The purpose of this study is surveying the perceptions of health professionals with respect to what benefits and challenges there are to the use of telehealth for patient care for chronic disease management in First Nations communities, specifically in the context of cancer care. As well we trying to determine the extent of telehealth use, how comfortable you are with using it, and whether you are aware of the cultural uniqueness of First Nations communities. It will take about 10-15 minutes to complete the survey online.

You are being asked to participate in the study because you are either:

a) A health professional who uses telehealth to provide health care for patients in Northern BC First Nations communities from within those communities

OR

b) A health professional in urban healthcare center (such as Prince George or Vancouver) who uses telehealth to provide health care for patients in Northern BC First Nations communities from outside those communities

Telehealth technologies can include emails, teleconferencing/telephone, videoconferencing, store and forward, mobile applications, and remote monitoring equipment.

Though there are no direct benefits for participants, benefits for participating in the study are in regards to understanding the gaps in the effective use of telehealth for patient care in First Nations communities in Northern Health. The only inconvenience or discomfort for you regarding this survey is from the amount of time taken to complete it.

Any information gathered from this survey and study cannot identify you directly and will remain confidential at all times. You can decide not to participate or choose to leave the study at any time without reason. The survey tool (Survey Monkey) is located in the United States and as such the responses maybe accessed without knowledge or consent by the US government in compliance with the US Patriot Act. As stated, since there is no identifiable information gathered in the forms the use of Survey Monkey does not pose any risk to the participants.

Should you have any questions regarding your rights as a participant please contact the University of Victoria human research ethics board.

By completing this study YOUR FREE AND INFORMED CONSENT IS IMPLIED. This indicates you understand the conditions regarding participating in this study and you

have both reviewed the material contained within this research consent form and had an opportunity to ask any questions pertaining to the study from the researcher.

After reviewing the attached research consent form, Please click on this link to begin the <Survey Link>

HREB (Uvic)
Phone: 250-472-4545
Email: ethics@uvic.ca
Fax: 250-721-8960

Feel free to contact the principal investigator or faculty supervisor if you have any questions or concerns regarding the research study.

Researcher:
Bobby Sidhu
MSc Candidate
University of Victoria
Phone: 604-765-6591
Email: bobsingh@uvic.ca

Co-Supervisor:
Jeff Barnett
Adjunct Associate Professor
Department of Health Information Science ,
University of Victoria
Phone: 250-519-5519
Email: Jeff.Barnett@bccancer.bc.ca

Co-Supervisor:
Dr. Abdul Roudsari
Director
Department of Health Information Science
University of Victoria
Phone:250-721-8576
Email: abdul@uvic.ca

Appendix 7 – Study Data Summary

Participant	Occupation	1 = First Nations Participant 2 = Non First Nations Participant	1 = Telehealth For Cancer Care 2 = Telehealth For Non Cancer Care	1 = onsite Care Professional 2 = Urban Care Provider
1	Nurse	2	1	1
2	Pharmacist	2	1	1
3	Nurse	2	1	1
4	Physician	2	1	1
5	Nurse	2	1	1
6	Nurse	1	1	1
7	Physician	2	1	1
8	Nurse	1	1	1
9	Nurse	2	2	1
10	Nurse Practitioner	2	2	1
11	Physician	2	2	1
12	Dietitian	2	2	1
13	Nurse Practitioner	2	2	1
14	Nurse	1	2	1
15	Nurse	2	2	1
16	Health Educator	1	2	1
17	Health Educator	1	2	1
18	Nurse	2	1	2
19	Nurse	2	1	2
20	Pharmacist	2	1	2
21	Other Health Professionals	2	1	2
22	Nurse	2	1	2
23	Dietitian	2	1	2
24	Nurse	1	1	2

Participant	Occupation	1 = First Nations Participant 2 = Non First Nations Participant	1 = Telehealth For Cancer Care 2 = Telehealth For Non Cancer Care	1 = onsite Care Professional 2 = Urban Care Provider
25	Nurse	2	1	2
26	Nurse	2	1	2
27	Physician	2	1	2
28	Physician	2	1	2
29	Pharmacist	2	1	2
30	Physician	2	1	2
31	Nurse	1	1	2
32	Nurse	2	1	2
33	Nurse	2	1	2
34	Physician	2	1	2
35	Other Health Professionals	1	1	2
36	Physician	2	1	2
37	Dietitian	2	2	2
38	Pharmacist	2	2	2
39	Physician	2	2	2
40	Physician	2	2	2
41	Telehealth IT	2	2	2
42	Telehealth IT	2	2	2
43	Physician	2	2	2
44	Nurse	2	2	2
45	Other Health Professionals	2	2	2

	Which information communication technologies do you use in order to support patient care? Click all telehealth systems that apply					
Participant	Email	Teleconferencing/Telephone	Videoconferencing	Store and Forward	Mobile Phone Apps	Remote Monitoring Equipment
1	1	2				
2	1	2	3			
3	1	2				
4	1	2	3		5	
5	1	2				
6	1	2				
7	1	2	3			
8	1	2	3			6
9		2	3			
10	1	2	3		5	
11	1	2	3			
12	1	2	3		5	
13	1	2	3			
14	1	2				
15	1	2	3			
16	1			4		
17	1	2	3			
18			3			
19	1	2	3			
20	1	2	3			
21	1	2	3			
22			3			
23	1	2				
24		2				

Note: Any value in the data cell counts as a selection. There is not value inherent to the numbers beyond their position in the question options

	Which information communication technologies do you use in order to support patient care? Click all telehealth systems that apply					
Participant	Email	Teleconferencing/Telephone	Video-conferencing	Store and Forward	Mobile Phone Apps	Remote Monitoring Equipment
25	1	2	3			6
26	1	2	3			
27	1	2	3		5	
28	1	2	3		5	
29	1	2	3			
30	1		3			
31	1	2				
32	1	2	3			
33	1	2	3			
34	1	2	3			
35	1	2	3			
36	1	2	3			
37	1	2	3			
38		2				
39	1	2	3	4	5	
40	1	2	3			
41	1	2				
42			3			6
43		2	3			
44	1	2	3			
45	1	2				

Note: Any value in the data cell counts as a selection. There is not value inherent to the numbers beyond their position in the question options.

	Which is your preferred technology for interacting with patients or health care professionals? (1 Strongly Agree - 5 Strongly Disagree)						
Participant	Face to Face Interactions	Email	Teleconferencing / Telephone	Videoconferencing	Store and Forward	Mobile Phone Apps	Remote Monitoring Equipment
1	1	2	1	2	3	5	3
2	1	2	2	2	3	3	4
3	1	2	2	3	5	5	5
4	1	2	2	3		4	
5	1	2	2	2	3	4	3
6	1	2	2	3	3	5	4
7	1	2	2	2	3	4	5
8	1	3	2	3			
9	1	4	2	2	4	4	3
10	1	2	3	2	3	3	3
11	1	2	1	2	3	3	3
12	1	2	2	2	3	2	3
13	1			2			
14	1	2	2	2	3	4	3
15	1	2	4	2	3	3	3
16	1	1	1	3	2	4	2
17	1	2	2	3	4	4	5
18	1	5	2	2	3	3	3
19	1	3	2	2	4	4	3
20	1	2	2	1	3	3	4
21	2	2	2	1	5	5	5
22	1	5	3	1	3	3	3
23	1	2	2	2	3	3	3
24	1		2				

	Which is your preferred technology for interacting with patients or health care professionals? (1 Strongly Agree - 5 Strongly Disagree)						
Participant	Face to Face Interactions	Email	Teleconferencing / Telephone	Videoconferencing	Store and Forward	Mobile Phone Apps	Remote Monitoring Equipment
25	1	2	1	1			3
26	1	2	2	2			
27	1	1	1	2		2	5
28	1	4	2	2		2	
29	1	2	2	2			
30	1	3		2	3	4	3
31	1	2	1	2	2	2	1
32	1	2	1	1	5	5	5
33	1	2	2	2	3	3	3
34	1	2	3	3	3	3	3
35	1	1	1	1	3	4	3
36	1	2	2	2	3	3	3
37	1	2	2	4	3	3	3
38	1	3	2	2		3	3
39	3	3	3	3	3	3	3
40	1	2	3	2	3	3	3
41	1	2	2	2	3	3	3
42	1	4	2	2	2	3	2
43	1	3	2	2	3	4	
44	1	2	5	5			
45	1	1	1	2	3	4	5

	Which of the following, if greater provisions were provided, do you believe would best assist you as a health care professional in using telehealth to provide patient care? (1 Strongly Agree - 5 Strongly Disagree)			
Participant	Information Technology Infrastructure	Telehealth Training	Managerial Support	Legislative Support
1	1	1	1	1
2	1	2	4	4
3	1	1	1	3
4	1	3	2	2
5	1	1	2	3
6	1	2	2	3
7	1	2	2	5
8	3	3	1	1
9	1	1	1	1
10	1	2	2	1
11	2	2	3	3
12	2	1	3	3
13	1			2
14	2	1	1	2
15	2	1	1	1
16	1	1	1	1
17	2	1	2	2
18	3	3	3	
19	2	2	2	3
20	1	2	3	3
21	1	3	3	3
22				
23	1	1	2	2
24				

	Which of the following, if greater provisions were provided, do you believe would best assist you as a health care professional in using telehealth to provide patient care? (1 Strongly Agree - 5 Strongly Disagree)			
Participant	Information Technology Infrastructure	Telehealth Training	Managerial Support	Legislative Support
25	1	3	3	1
26	3	2	2	3
27	1			
28	1	2	3	3
29	3	3	3	3
30	1	4	1	2
31	1	1	1	1
32	1	1	1	1
33	1	2	2	2
34	1	1	4	3
35	1	1	2	3
36	2	4	2	3
37	3	4	2	3
38	2	2		
39	1	1	1	1
40	1	2	2	3
41	1	2	2	3
42	1	1	2	2
43	1	1	1	1
44		1		
45	1	2	2	3

	How often do you use the following ICT as a form of communication for patient care? (1 = Always - 5 = Never)						
Participant	Email	Teleconferencing/Telephone	Videoconferencing	Store and Forward	Mobile Phone Apps	Remote Monitoring Equipment	Telehealth Systems in general
1	3	1	5	5	5	5	2
2	2	1	4	5	5	4	1
3	4	2	5	5	5	5	4
4	2	1	4	5	4	5	3
5	3	3	4	5	5	5	3
6	2	2	5	5	5	5	3
7	2	2	2	5	5	5	2
8	4	3	3	3	4	4	5
9	2	3	2	5	3	4	3
10	4	3	2	5	5	5	2
11	3	2	3	5	5	5	3
12	2	2	4	5	3	5	3
13	3	2	3	5	4	3	2
14	1	2	4	4	5		3
15	4	4	5	5	5	5	4
16	4	4	5	3	5	4	5
17	2	2	3	4	5	5	4
18	5	3	2	5	5	5	2
19		2	3	5	5	5	3
20	3	2	2	4	4	4	2
21	3	2	2	5	5	5	2
22	5	5	2	5	5	5	2
23	3	2	4	5	5	5	3
24	5	2	4	5	5	5	2

	How often do you use the following ICT as a form of communication for patient care? (1 = Always - 5 = Never)						
Participant	Email	Teleconferencing/ Telephone	Videoconferencing	Store and Forward	Mobile Phone Apps	Remote Monitoring Equipment	Telehealth Systems in general
25	2	2	2	5	5	4	3
26	2	2	2	5	5	5	2
27	2	2	2	5	3	5	3
28	2	2	2	5	4	5	3
29	2	3	2	5	5	5	3
30	3	3	2		5	4	3
31	1	1	3	3	2	3	3
32	2	2	2	4	5	5	2
33	2	3	2	5	5	5	3
34	3	3	3	5	5	5	
35	3	3	3	5	5	3	3
36	2	2	2	5	5	5	2
37	4	4	4	5	5	5	4
38	3	2	4	5	5	5	5
39	3	1	1	3	2	5	1
40	3	3	3	4	4	3	3
41	5	5	5	5	5	5	5
42	4	3		4		4	1
43	4	2	3	5	5	5	3
44	3	3	4	3	2	4	3
45	3	3	4	5	5	5	3

Participant	Technology Comfort - Composite Score	Benefits - Composite Score	Challenges - Composite Score	Cultural Awareness - Composite Score
1	16	21	22	12
2	10	9	13	13
3	22	19	20	12
4	13	10	18	12
5	18	12	16	11
6	18	12	14	7
7	15	11	10	11
8	14	23	25	22
9	12	14	15	8
10	21	5	11	10
11	12	15	20	14
12	12	10	14	11
13	10	5	8	10
14	13	9	16	13
15	18	7	15	8
16	16	14	15	10
17	15	12	16	7
18	18	6	11	15
19	12	5	9	13
20	15	10	12	14
21	14	5	5	10
22	22	10	12	
23	15	10	14	12
24	19	10	10	12

Participant	Technology Comfort - Composite Score	Benefits - Composite Score	Challenges - Composite Score	Cultural Awareness - Composite Score
25	11	9	11	13
26	15	11	16	12
27		7	8	7
28	13	12	12	13
29	12	8	10	15
30	15	6	11	14
31	8	8	11	7
32	15	6	9	12
33	14	8	11	11
34	15	12	16	13
35	10	9	13	12
36	12	6	10	9
37	14	17	14	11
38	15	7	14	15
39	6	5	5	6
40	13	10	11	13
41	16	10	18	13
42		5		
43	14	5	7	6
44	24	16	19	14
45	18	11	11	14

Note: Any empty cell in the composite scores denotes that all the category questions were not completely answered by the respective participant. Therefore the composite data for that category cell is not available.