TELEONCOLOGY FOR THE DELIVERY OF ONCOLOGY CARE
IN CENTRAL MONTANA

by

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A Scholarly Project submitted in partial fulfillment
of the requirements for the degree
of
Doctor of Nursing Practice
in
Family and Individual

MONTANA STATE UNIVERSITY
Bozeman, Montana

January 2017
DEDICATION

This DNP Scholarly Project is dedicated to my husband and daughter, for their ceaseless encouragement and love. Thank you for being my reminders to live each day to the fullest and to never give up in the pursuit of what sets my soul on fire.
ACKNOWLEDGEMENTS

This DNP Scholarly Project would not have been possible without several colleagues and faculty members at Montana State University.

I am grateful to Dr. Bryan Martin and his staff for being on the other end of these telemedicine appointments and assisting me with the survey development. Dr. Martin’s dedication to improving care for rural oncology patients is inspirational.

Thank you to the staff at the local Critical Access Hospital (CAH) for their dedication and assistance in collecting data for this project. A special thanks to Barb, Dena, Colleen, and Gen in the Visiting Physician Suite. Disseminating these project results at the CAH was a highlight of this project.

I am especially grateful for the guidance throughout this project from my committee chair, Teresa Seright, PhD, RN as well as my committee members, Polly Petersen, PhD, RN; Julie Pullen, DNP, GNP, NP-C; and Jean Shreffler-Grant, PhD, RN. It is clear these faculty and staff members at Montana State University are dedicated to shaping the minds of every student they work with in order to be the best they can be.
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ABSTRACT

Around the globe telemedicine is being explored as a viable type of healthcare delivery for rurally located oncology patients. Telemedicine for oncology patients (teleoncology) is available for rural Central Montana patients through visiting oncologists. Despite this availability of teleoncology, there is no local evidence for the levels of patient or provider acceptability or satisfaction with teleoncology. The purpose of this project was to explore a practice change initiative for teleoncology practices in Central Montana through the gathering of baseline information from both outreach oncology patients and rural healthcare providers’ satisfaction with teleoncology care. Two sample groups of oncology patients were surveyed, including: participants in face-to-face (F) appointments (N=21), and participants in telemedicine (T) appointments (N=21). Local primary care providers who refer to the visiting oncologist were also surveyed (N=12; 92% response rate). Two survey tools were used, *Local Provider Survey of Satisfaction with Teleoncology* and *Patient Survey of Satisfaction with Outreach Oncology Clinic*. Both patient groups were administered the same survey following appointments to compare results. Descriptive statistics and two-sample T-Tests were used to analyze the survey results. There were no significant differences in satisfaction with the care delivered when comparing the T and F patient groups, indicating teleoncology visits are comparable to face-to-face visits. Eighty-one percent (81%) of T patients reported being satisfied. There was an overall lack of awareness of the availability of teleoncology amongst all those surveyed; 93% of F patients, 46% of T patients, and 42% of providers were not aware teleoncology was available prior to the survey. Although providers reported neutral answers on the survey, the majority (58%) have no experience with teleoncology but 80% of providers denied concerns with this type of appointment. Overall, Central Montana patients report satisfaction with teleoncology as an augmenter to rural oncology care. Providers have minimal concerns with the current state of teleoncology despite limited experience with this modality of care. The evidence was disseminated to the local healthcare community and publicly in Central Montana.
INTRODUCTION

Background

Telemedicine

*Telemedicine* is a broad term that incorporates a large range of technological interventions from the transferring of radiographic images to live video conferencing with patients or other providers. In overview, the American Telemedicine Association (2012) defines telemedicine as, “The use of medical information exchanged from one site to another via electronic communications to improve a patient’s clinical health status” (para. 1). The terms telemedicine and telehealth are often used interchangeably.

Telemedicine was first introduced in the 1970’s and has since been recognized as a way to decrease the difference in health care people experience when they are rurally located, or at a distance from specialty care (Dinevski, Dugonik, & Kelc, 2011). The three most basic branches of telemedicine as summarized by Gatti, Pravettoni, and Capello (2015) are:

- Collection and distribution of information (commonly referred to as ‘store and forward’ as is done with radiographic images).
- Remote monitoring of patients through the use of health applications or other telecommunications tools.
- Videoconferencing services (live, interactive, and real-time encounters can be completed between two or more providers, or between a provider and patient).
Telemedicine has been used in a variety of clinical settings as an adjunct to care delivery. The United States Department of Veterans Affairs (VA), a well-known pioneer in telehealth, uses real-time telemedicine in a variety of specialties, including: mental health, trauma, rehabilitation, surgical consultations, cardiology, and neurology. Many of the 700+ VA clinics are located in rural locations across Montana ("VA Telehealth Services," 2015). In general, telemedicine is valued as a tool to augment care provided in a variety of clinical settings (Thomas & Capistrant, 2015). Widespread telemedicine networks are located in the Central-Midwest region of the United States along with more localized networks throughout the west.

Teleoncology

*Teleoncology* is an encompassing term for telemedicine interventions as applied to the specialty field of oncology. Teleoncology has been explored by many rural health care systems across the world as a viable method for the delivery of oncology care to geographically isolated residents (Ferrer-Roca, Garcia-Nogales, & Peloez, 2010). Although several technologies and communication techniques are encompassed by teleoncology, the most widely utilized is real time videoconferencing (Hazin & Qaddoumi, 2010). Teleoncology has been put to use throughout the world in a variety of rural settings to deliver oncology care to rural populations (Hazin & Qaddoumi, 2010). Several countries have implemented teleoncology, including: Norway, Scotland, Germany, United States, Japan, Australia, New Zealand, Canada and India. Video conferencing can be used in the assessment, monitoring, management, and supportive
care of oncology patients (Collie et al., 2007; Hazin & Qaddoumi, 2010; Kitamura, Zurawel–Balaura, & Wong, 2010).

Nurse informaticists, Mastrian and McGonigle summarize the goal of telehealth interventions, including video conferencing telemedicine, is to provide the same level of care to patients at any type of visit, regardless of the distance between patient and provider (Mastrian & McGonigle, 2015). The opportunity for equal care, despite distance, is a large consideration for the delivery of healthcare Montana, especially in specialty areas such as oncology.

Montana Considerations

According to the United States Census Bureau (2010), the term rural, “Encompasses all population, housing, and territory not included within an urban area” (para. 3). An Urban Area has greater than 50,000 people and an Urban Cluster has between 2,500 and 50,000 people (United States Census Bureau, 2010). The Montana Department of Public Health and Human Services (DPHHS) describes that 45 of Montana’s 56 counties are designated ‘Frontier,’ and 10 counties are considered ‘Rural’: only one Montana county is ‘Urban’ (DPHHS, 2011). ‘Frontier’ counties have a population density less than 6 people per square mile; ‘Rural’ counties have a higher population density between 6-50 people per square mile (DPHHS, 2011). Approximately 76% of Montana’s population lives in a ‘Rural’ or ‘Frontier’ area (DPHHS, 2011).
Montana Telehealth Networks

Multiple telehealth networks are available to decrease some of the isolation rural dwellers in Montana experience when located at a distance from healthcare. These networks include, Partners in Health Telemedicine, Eastern Montana Telemedicine, and The REACH Montana Telehealth Network noted in this project. Other national networks cross Montana’s borders as well and the VA has many rural telehealth satellite clinics in Montana.

Legislation was passed in 2013 in Montana that mandates the coverage of telemedicine under private health insurance plans. The mandate covers a variety of health care facilities and providers, including critical access hospitals (American Telemedicine Association, 2013). U.S. Medicare Code § 1395m (1990) explains the coverage of telemedicine, which has been equivalent to face-to-face consultations for patients under Medicare for over 25 years. Montana’s Department of Public Health and Human Services (DPHHS) (2005) explains the state’s Medicaid coverage of telemedicine services is treated equivalent to in-person services long before the 2013 mandate for private health insurance companies. Montana is currently one of only 13 states with a full telemedicine parity law mandating equivalent reimbursement regardless of the type of visit. Thomas and Capistrant (2015) gave Montana a high grade in comparison to other states on current telemedicine legislation noting that telemedicine and in-person requirements are the equivalent in all aspects except prescribing medication.

REACH Montana Telehealth Network. “Realizing Education and Community Health” (REACH) Montana Telehealth Network is operated by Benefis Health Systems
of Great Falls, Montana. The REACH network covers ‘Frontier’ counties in north-central Montana by linking providers with video technology that is both live and interactive ("Benefis REACH Montana Telehealth Network," 2013). REACH Network sites include Big Sandy, Chester, Chinook, Choteau, Conrad, Cut Bank, Fort Benton, Havre, Lewistown, Rocky Boy, Shelby, Benefis East and West Campuses (including Sletten Cancer Institute in Great Falls), White Sulphur Springs, Great Falls City County Health, and Center for Mental Health ("Benefis REACH Montana Telehealth Network," 2013).

The United States Department of Health and Human Service’s Office for the Advancement of Telehealth (OAT) is located in the Federal Office of Rural Health Policy and focuses on promoting telehealth technologies in rural settings to promote education, healthcare delivery, and other health information exchange (HRSA, 2015). The REACH Network received a grant from OAT in 2004 to expand on previously installed tele-radiology cables (used to store and forward radiological images). This expansion allowed REACH to connect through the Internet with IP-Network technology (B. Christensen, personal communication, March 23, 2015). This Internet-based connection allows expanded applications for telemedicine, including real-time videoconferencing. In north-central Montana, telemedicine video conferencing as we know it has been available for use with patients since 2004 (B. Christensen, personal communication, March 23, 2015).

Teleoncology in Central Montana

Rural dwellers in Central Montana have access to oncology appointments via telemedicine at a local CAH through the REACH Montana Telehealth Network. This
local CAH has a “Manufacturer” style of PolyCom Unit that was covered financially by the same 2004 grant from the OAT.

It should be noted, the CAH in this project currently has telemedicine video conferencing available for both oncology and emergency room patients. Telemedicine was previously available at the facility for mental health services, but is not currently available. Other sources for telemedicine in the Central Montana area include a local mental-health center and a VA clinic.

Central Montana. The setting of choice for this DNP scholarly project is central Montana. This region of Montana has one larger town of approximately 6,000 people. This town has a Critical Access Hospital (CAH) with an attached medical clinic. This larger town is surrounded by numerous smaller communities with economies dominated by farming and ranching. The USDA notes that 10.7% of Montana’s employment is in the agriculture, forestry, fishing, hunting, and mining industry compared to the United States average of only 5.6% in this industry (Cromartie, 2000). In addition, the elderly population over age 65 is 16.7% of central Montana’s population, higher than the United States 14.5% of population over 65 years old ("State & county quick-facts," 2014). DPHHS (2011) anticipates that by the year 2025, this number will grow with a quarter of Montana’s population will be over 65 years old. In Montana, cancer is the top rated cause of death at 22.3% versus cardiovascular disease, the top overall cause of death in the United States (DPHHS, 2011).

The CAH in central Montana is the largest medical facility in a four-county area. All of the counties included in central Montana region are considered ‘Frontier’ counties
(See Appendix E for map). For oncology patients in central Montana, this CAH serves as a medical home; from the laboratory and radiology departments, to the infusion department where trained oncology nurses can administer chemotherapy and biotherapy, patients are able to receive most of their cancer care locally. The only services the facility is unable to provide to oncology patients include PET CT imaging and radiotherapy.

**Local Teleoncology Procedures.** At present, teleoncology appointments at the local CAH are conducted in the Visiting Physicians’ Suite of the clinic. Prior to a teleoncology appointment, patients check in at the admitting office to have an account registered in the CPSI computer system. This allows the nurses at the local facility to chart on the encounter. Patients are billed a $25 co-pay to cover the expense of the room and nurse’s salary. At the current point, only three registered nurses of the CAH clinic are trained to conduct the telemedicine visits.

The Poly-Com telemedicine cart is moved from its storage closet to an available room in the clinic where it is connected to the router and turned on. Patients fill out a symptom form, and this form, a summary of lab results, and other diagnostic reports if previously ordered, are faxed to the oncologists’ home office in a nearby city. The appointment is conducted when the oncologist is available, which may be behind the scheduled time due to unforeseen appointment delays at the visiting oncologist’s home office.

Scheduling a teleoncology appointment is typically accomplished in advance in order to plan for nurse coverage of the appointment. The current process allows both a local receptionist in the CAH’s Visiting Physician’s Clinic or staff at the visiting
oncologist’s office to schedule patients for these types of visits. A registered nurse (RN) trained with the telemedicine unit accompanies the patient in the exam room in order to assist the physician with the objective exam by placing the stethoscope in the correct areas or adjusting the camera for better visualization during the exam. A RN can additionally write verbal orders if needed for further patient care. There have been instances of no RN being available for these appointments due to scheduling discrepancies or an add-on appointment. In these instances, the Visiting Physician’s Clinic Secretary sets up the unit and assists with the appointment despite not being trained.

**Purpose of Project**

The purpose of this DNP Scholarly Project was an exploration of a practice change initiative for teleoncology practices in the Outreach Oncology Clinic at a local CAH in central Montana. The goal of this project was to gather baseline information about the current use of teleoncology in central Montana to gain understanding of both outreach patients and rural healthcare providers’ satisfaction with care delivered by teleoncology. Once data were gathered about the teleoncology practices at the local CAH, some of the strengths and weakness of the program were analyzed to drive a future practice change regarding teleoncology utilization. The culmination of this project was a presentation to the local healthcare community and the community at large about the results and implications the findings have on changing teleoncology practice.
Significance of the Project

Local Telemedicine Considerations

To explore a practice change initiative for the teleoncology practice in the local CAH’s Outreach Oncology Clinic, it was first important to have an understanding of the current state of telemedicine for oncology patients. The potential change initiative revolved around improving the utilization of teleoncology if it was indeed valued as a tool to augment care provided in the Outreach Oncology Clinic.

Teleoncology appointments have been in place at the CAH in Central Montana since 2014 (B. Martin, personal communication, February 23, 2016). At this CAH, there has been a recent influx in interest for telemedicine interventions by department managers. According to ER manager N. Gerdrum (2015), telemedicine in the Emergency Department has the capability to better provide neurology services with the “Stroke-Doctor” telemedicine unit (N. Gerdrum, personal communication, May 10, 2105). Emergency telemedicine services at the CAH recently expanded to include pediatric emergency services. Similarly, the facility’s current Chief Nursing Officer anticipates an increase in the need to provide specialty care through telemedicine as it is becoming increasingly difficult to recruit and retain qualified providers in rural areas like central Montana (D. Duffy, personal communication, July 1, 2015). Nurse informaticists Mastrian and McGonigle (2015) expanded on the beliefs shared by the local healthcare team, noting an aging demographic in the United States, nursing and healthcare worker shortages, increased rates of chronic conditions or diseases, high healthcare costs, and
increased consumer education are key factors influencing this expected influx of telemedicine interventions.

**Rural Oncology Patients’ Perspectives**

This project was significant because it identified rural oncology patients’ perspectives on satisfaction with teleoncology compared to patients who have not used teleoncology. No evidence of current levels of satisfaction with this mode of oncology care delivery was available for the REACH Network in central Montana. This revealed potential barriers and the stances of acceptability of teleoncology while being able to compare and analyze discrepancies in the care between face-to-face and telemedicine appointments for rural oncology patients. Additionally, by identifying patients’ unique perspectives, the rural healthcare community gained understanding of the implications of oncology care delivered via telemedicine.

**Rural Healthcare Providers’ Perspectives**

This project was also significant because it identified the rural healthcare provider’s experiences with telemedicine for patients they have referred to the Outreach Oncology Clinic. This not only evaluated the current level of awareness of the available technology, but also the satisfaction with the telemedicine process while identifying concerns surrounding teleoncology.

The dissemination of findings to both the local healthcare community and the general public of central Montana was important to share understandings gained from this project. Other specialties of care, including cardiology and urology, have expressed
interest in telemedicine for the delivery of care to rural patients. Findings of this study may have implications for these specialties.

The DNP student compiled local evidence of the current teleoncology processes and developed a fishbone analysis diagram in order to examine and identify potential barriers impacting the utilization of teleoncology at central Montana’s CAH *(See Appendix B for Fishbone Diagram)*. Meetings with key stakeholders were a part of the initial data gathering process and the DNP student observed multiple telemedicine appointments.
REVIEW OF THE LITERATURE

A review of the literature was conducted to assess the implementation and utilization of teleoncology, particularly in rural areas, along with patient and provider satisfaction with teleoncology services. Databases included in the review of literature of scholarly articles were Cochrane, CINAHL, PubMed, Web of Science, and Google Scholar. Articles from 2001-2015 were found using the following search terms (or related terms): telemedicine, teleoncology, telehealth, videoconferencing, rural, frontier, distance, travel burden, specialist care, oncology access, healthcare access, satisfaction with telemedicine/teleoncology, acceptability of telemedicine/teleoncology, telemedicine programs, and implementation of telemedicine.

From the original search, the DNP student included 37 articles based on the articles’ applicability to the above search terms and the design of the scholarly project. Of these articles, only two were large randomized controlled trials, four were systematic reviews, three were quasi-experimental, eight cohort studies, eight case studies, two expert opinions, and ten background articles were used. Newer articles uncovered during the course of the project were also incorporated, thus reflecting the constant developing nature of evidence surrounding telemedicine. The limited number of large scale studies on telemedicine is an identified gap in the evidence noted by multiple authors.
Teleoncology

Purpose of Teleoncology

Teleoncology can be used to manage oncology care at a distance and incorporates the diagnosis, prognosis, treatment plan, and follow up care (Maserat, 2008). In some rural areas, teleoncology has been implemented to address the physician shortage in addition to overcoming obvious geographical challenges (Brigden, Minty, Pilatzke, della Vedova, et al., 2008). In general, the goal of telemedicine, including teleoncology is to improve clinical access to services that would otherwise be too expensive, problematic, or not offered in other ways for healthcare consumers, including patients, caregivers and healthcare providers (Armfield, Edirippulige, Bradford, & Smith, 2014).

Teleoncology Satisfaction

Teleoncology has high levels of satisfaction from patients and has been shown to positively impact patients by decreasing travel time and increasing both access and timeliness to oncology consultations (Ferrer-Roca et al., 2010; Sabesan, Simcox, & Marr, 2012). Shalowitz, Smith, Bell, and Gibb (2015) note successful and satisfactory implementation of a rural health model by combining in person consultations and virtual teleoncology appointments for rural gynecologic oncology patients. According to Brigden and colleagues (2008), teleoncology has potential to improve the delivery of oncology care to rural and remote areas and with high levels of patient and staff satisfaction.
Quality of Life

The quality of life of rural oncology patients is an indicator to consider for the implementation of teleoncology systems. Communication was seen as equal when comparing telemedicine to an in-person consultation and the decreased wait time has substantial effects on patient’s stress (Agha, Schapira, Laud, McNutt, & Roter, 2009). Waiting for information or unmet information needs can hinder adjustment to a diagnosis or illness due to the increased emotional distress, anxiety, and depression (Mesters, Van den Borne, De Boer, & Pruyn, 2001).

The utilization of an electronic health information support system via videoconferencing was shown to increase quality of life in a variety of quality of life dimensions for head-and-neck cancer patients (Van Den Brink et al., 2007). Furthermore, a telehealth intervention was found to decrease oncology patients’ utilization of inpatient and outpatient services and was noted to increase quality of life (Chumbler et al., 2007).

If patients located distantly from their oncology specialist have something go wrong at home, the increased use of the local emergency room with a potential flight transport to a larger facility compounds financial and emotional stress for the family (Vaughn, 2015). In particular, it is important to establish trust and rapport with the specialist to increase satisfaction with a telemedicine model of care, as suggested by Sabesan and Kelly (2014).

Reducing Geographical Isolation

Telemedicine is noted to benefit both rural patients and rural providers by increasing the speed of consultation with specialists that are otherwise sparsely available
Teleoncology enhances rural access to specialist oncology services in many diverse geographical areas while increasing continuity of care and reducing isolation of isolated areas (Sabesan et al., 2013; Sabesan et al., 2012).

In general, low and middle-income countries have found a need for telemedicine across their entire area while higher-income countries apply telemedicine to underserved areas (Saliba et al., 2012). Patients in rural Northern Sweden expressed satisfaction with teleoncology as it reduced waiting time for specialist consultation, provided increased access to specialist care, and reduced travel time from isolated areas (Johansson, Lindberg & Söderberg, 2014a). Similarly, 80% of rural Columbian patients were satisfied with telemedicine; over half of respondents agreed telemedicine provided a positive effect on time, cost-savings, and medical care improvement (López, Valenzuela, Calderón, Velasco, & Fajardo, 2011). Healthcare providers in the Ontario Telmed Network, Canada, reported high levels of satisfaction with the current teleoncology service they provided to a number of outreach clinics across the widespread geographical area (Brigden, Minty, Pilatzke, della Vedova, et al., 2008).

A 2014 pilot study in Sweden reveals a high percentage of (92.4%) rural residents are willing to travel for specialist care and many (68.2%) reported they never failed to receive care even if travel was necessary; however, 35.2% expressed considering using videoconferencing if it would decrease travel time (Johansson, Lindberg, & Söderberg, 2014). Closer to home, 23% of Montana participants responded they would be comfortable using telemedicine for convenience and an additional 29% would be willing
to participate in telemedicine despite being somewhat uncomfortable or unfamiliar with this form of appointment (Call et al., 2015).

**Travel Burden.** Travel burden is noted as an increased stress for rural oncology patients on both quality of life and out-of-pocket financial expenses (Baldwin & Usher, 2008; Zucca, Boyes, Newling, Hall, & Girgis, 2011). In particular, the travel burden is increased for rural patients requiring chemotherapy infusions at a major cancer center (Shalowitz, Smith, Bell, & Gibb, 2015). The term *travel burden*, takes into consideration miles traveled or time traveled, and the expenses involved. From 2003-2013, only seven percent of Montana oncology patients traveled less than 5 miles for healthcare, 21% travelled five to nine miles, 17% traveled 10-24 miles, 12% travelled 25-49 miles, 14% travelled 50-99 miles, but a striking 26% travelled 100 or more miles ("National Cancer Data Base Benchmark Reports," 2016).

![Figure 1. Distance Travelled by Cancer Patients. This graph from National Cancer Data Base of Distance displays the distance travelled by Montana patients with cancer for their healthcare services. This includes all age ranges and all cancer diagnosis types.](image)
Rural Healthcare System Considerations

The positive impact of teleoncology extends beyond the recipients of care; patients’ families and the rural health care system as a whole can also benefit from teleoncology through decreased travel and increased utilization of local resources (Sabesan & Kelly, 2014). A successful telehealth model of healthcare delivery depends upon “motivated providers, an adequate workforce, and sufficiently resourced remote facilities” (Sabesan, Roberts, Aiken, Joshi, & Larkins, 2014).

Local healthcare workers reportedly recognize the capabilities of telemedicine in providing patient-centered healthcare, but agree it is imperative to evaluate costs, resources, and the training needed (Johansson, Lindbery, & Söderberg, 2014b). Training on skills and communication between the local healthcare workers and the specialist (oncologist) are imperative for the successful and safe delivery of teleoncology care (Mooi, Whop, Valery, & Sabesan, 2012). Additionally, the success of telemedicine for gynecologic oncology patients depends on the established trusting relationship between local providers and oncology specialists (Shalowitz et al., 2015).

Financial Considerations

Many telemedicine models emphasize the shared care between local and specialists’ teams that work to deliver care to local residents closer to home (Mooi, Whop, Valery, & Sabesan, 2012). Teleoncology care at-the-doorstep can additionally benefit rural communities and local healthcare facilities through increased utilization of local laboratory and pharmacy charges from oncology patients, decreased expenses by
paying for telemedicine instead of an in-house specialist’s salary, and decreased time away from work for travel (Whitacre, 2011; Shalowitz et al., 2015).

Additional emotional and financial stress can occur for rural cancer patients, therefore, it is imperative to take into account these considerations and the local economy when providing healthcare to this population. According to Long and Weinert’s foundational research on Rural Nursing, rural persons often define health as their ability to carry on their work (1989). Therefore, taking less time from work to travel has been shown to benefit not only individuals’ self-efficacy and independence, but also the local economy (Whitacre, 2011). Vaughn (2015) notes that a trend for patients in rural Kansas is to delay consultation with an oncologist until the completion of their seasonal harvest, often meaning that the cancer is diagnosed at a later stage. In addition to agricultural seasons, rural dwellers of central Montana face other challenges of long winters and intense wind, similar to those in Canada as noted by Brigden and colleagues (2008).

Education

In rural settings, telemedicine has also been used to conduct regional tumor board meetings and physician-to-physician consultations to help rural providers keep up to date on evidence based recommendations for providing high quality healthcare (Donnem et al., 2012). These virtual tumor boards are noted to increase continuity of care by coordinating care when chemotherapy is planned at a rural site (Shalowitz et al., 2015). Tele-education and tele-presence are two additional in-depth applications for video-conferencing (Dinevski et al., 2011). Consulting with stem cell transplant specialists is
available to medical oncologists and their patients via telemedicine through St. Vincent’s Frontier Cancer Center in Billings Montana (Vaughn, 2015).

Acceptability of Teleoncology

Although Montana has access to telemedicine, it is important to consider acceptability and sustainability of telemedicine when evaluating telemedicine as a viable mode of healthcare delivery in rural areas. Montanans found to be more amendable to telemedicine had a higher educational attainment, a history of prior Internet use, and lived in rural areas (Call et al., 2015). Residents in highly rural areas were particularly inclined to be amendable to telemedicine, partially due to the understanding of limited access to a face-to-face visit (Call et al., 2015). Although Montana has multiple extensive telemedicine networks, only 1.7% of respondents to a statewide survey had actually participated in a telemedicine appointment (2015).

The slow uptake of telemedicine by the public is something that needs to be considered for the public adoption of this technology. Beyond reducing the limits of distance and geography, it is important to evaluate telemedicine on multiple levels, taking into consideration technological, organizational, and social innovations involved with this modality of care (Bashshur, Reardon, & Shannon, 2000). Similarly, it is imperative that patients’ acceptability and initial reluctance is understood before implementing non-traditional modes of healthcare delivery (Kleihoer et al., 2010). Tuning in to the public’s awareness during the trial and adoption of telemedicine is critical for healthcare systems
to examine as this lends information on the willingness of patients to participate in an unconventional mode of healthcare delivery (Call et al., 2015).

**Elderly Patients**

Overall, older residents who utilized telemedicine had higher opinions of the local healthcare system (Nesbitt, Marcin, Martha, & Cole, 2005). However, elderly Montana patients tend to be only situationally amendable to utilizing telemedicine technology (Call et al., 2015). *Situationally amendable* was described as being open to participating in telemedicine when visits with specialists in person would be considered inconvenient, as in situations of inclement weather. In general, those who are amendable to telemedicine were those with higher educational attainment, Internet users, and highly rural residents (Call et al., 2015). Despite the inconveniences of weather, long distances to travel, or general difficulties of in-person appointments with specialists, 43% of Montana respondents answered they would be unwilling to participate in telemedicine consultation (Call et al., 2015).

**Theoretical Constructs**

The key concept of “outsider versus insider” from Long and Weinert’s body of research on Rural Nursing was applied as the specific guiding principle and construct for this DNP Scholarly Project.
Outside versus Insider

Outside versus insider is a key concept that health care providers must keep in the forefront of their mind when providing health care to rural dwellers via teleoncology. According to Long and Weinert, this concept is very applicable to nurses and health care professionals gaining acceptance and trust in a rural community as “rural dwellers are self-reliant and resist accepting help or services from those seen as ‘outsiders’” (1989, p. 263). In response, Lee and McDonagh pose the following question as a way to further explore rural dweller’s behaviors: “Are rural dwellers more accepting of “outsiders” if they are health care professionals working in partnerships with the rural community and local health professionals?” (2013, p. 29).

The current teleoncology practice at central Montana’s CAH partners the visiting oncologist with local nurses to examine and treat rural patients while keeping their care centered within the local facility. It is important to evaluate the acceptance and awareness of telemedicine interventions in rural settings, because as Bashur, Reardon, and Shannon (2000) state, “The mere fact that electronic information can serve as an adequate substitute for physical presence may not be sufficient to overcome the inertia of comfort and familiarity of the personal encounter, even in consultant care” (pp. 617).

Lee and Winters further expanded research on Rural Nursing to conclude that collaboration between specialists at a distance and local healthcare providers is essential for rural patients and caregivers (2012). Participants of the study revealed personal concerns with anonymity and confidentiality, which needs to be carefully maintained in a rural environment (Lee & Winters, 2012). For example, before any diabetic self-care
interventions can be established in a rural community, cultural differences must be understood in a rural group before successful research can be completed (Utz, 2008). Conger and Plager (2012) further examined the ‘insider-outsider’ status in their study of advanced practice nurses in rural areas and found telemedicine to be very influential in the connectedness of providers.
METHODS

A survey was conducted to collect data on the current levels of patients’ and local healthcare providers’ satisfaction and awareness of availability with teleoncology at the local CAH. As the purpose of this DNP Scholarly Project was an exploration of a practice change initiative for teleoncology practices in the Outreach Oncology Clinic of central Montana, it is important to have baseline information about the current use of teleoncology in central Montana to gain understanding of both outreach patients and rural healthcare providers’ awareness of teleoncology availability and satisfaction with care delivered by teleoncology.

IRB Approval

Approval from Montana State University (MSU) Institutional Review Board (IRB) was obtained and patient and provider consent forms approved on August 18, 2015. At the local level, the project was reviewed with the HIPPA Compliance Officer, and was approved for application to the local CAH in this project.

Participants

Data were collected for three different groups related to teleoncology, including: 1) current teleoncology patients (n=21); 2) rural healthcare providers referring to an oncology/hematology specialist (n=12); 3) survey of prospective teleoncology patients (n=21). Patients and providers were recruited using snowball-sampling technique: RNs
and the visiting oncologist in the Outreach Oncology Clinic at the CAH identified eligible survey participants.

**Patient Groups.** The patients from the CAH’s Outreach Oncology Clinic from October 2015 to February 2016 were invited to participate in a survey to determine their level of satisfaction with care, willingness to use telemedicine, understanding of telemedicine availability, and acceptability of this mode of care. Both teleoncology patients and rural patients who have only had face-to-face appointments (prospective patients), were given the same survey so data could be analyzed for discrepancies between the two groups. The survey included a space for patients to offer free text about ways to improve the services provided.

The following is a list of the inclusion and exclusion criteria for both of the patient groups.

**Inclusion Criteria for Teleoncology patients:**
- Adult patients > 18 years old
- Current patients of visiting oncologist at the CAH who have used teleoncology at least once in the last one year

**Inclusion Criteria for Prospective patients:**
- Adult patients > 18 years old
- Current patients of visiting oncologist at the CAH

**Exclusion Criteria for either teleoncology or prospective patients:**
- Patients subjectively reporting being too ill to participate
- Patients suffering from confusion or dementia at the time of the appointment
Local Providers. Local healthcare providers were surveyed in January and February 2016 to obtain baseline information of their perceptions and satisfaction with teleoncology for patients they have referred for oncology care. The visiting oncologist to the local CAH, stated that it is important to understand how local doctors perceive telemedicine care and identify gaps in care in order to better the services provided by teleoncology for rural Montanans (B. Martin, personal communication, April 14, 2015).

Inclusion Criteria for Local Providers

- All Primary Care Providers currently practicing in central Montana who refer to visiting oncologist/hematologist

Exclusion criteria for Local Providers

- Providers excluded: Emergency Room Physicians, Pediatric specific providers, or those affiliated with the VA system who have their own telemedicine network available in the area.

Design and Procedure

The following two survey tools were used in this DNP Scholarly Project. These tools were identified in the literature review as applicable surveys to the goal of this DNP scholarly project. The DNP student contacted the researchers via email to correspond about using each researcher’s developed tool.

Patient Survey of Satisfaction with Outreach Oncology Clinic. Permission was obtained to use and modify a survey from Dr. S. Sabesan, Patient Satisfaction Survey of Video Linked Clinics to Mt Isa (Sabesan, 2012b). Dr. Sabesan’s instrument was selected
as it includes questions that measure and identify patient perspectives of satisfaction and acceptability of teleoncology in a rural environment. The DNP student edited the survey slightly to remove some of the demographic data and re-format the questions for improved readability. This edited survey was administered to both teleoncology patients and prospective teleoncology patients who have only had face-to-face appointments with the oncologist.

The instrument included questions about demographic information including age, gender, race, type of visit (telemedicine or face-to-face), description of visit (new consult, routine follow-up, or pre-chemo check), cancer type/reason for seeing specialist, place of residence, and approximate miles from the clinic at the CAH and from the oncologist’s home office in the city. Following the demographic information, there were 14 questions relating to satisfaction and preferences with response options on a 5-point Likert scale from “strongly agree” to “strongly disagree.” There were two short answer questions addressing things that need to be improved or concerns. In addition, there was one yes/no question inquiring if patients knew about the availability of telemedicine for oncology patients at the CAH. There were no patient identifiers on the survey to protect patient confidentiality (See appendix A for copy of Survey).

Local Provider Survey of Satisfaction with Teleoncology. Permission was obtained to use and modify a survey developed in 2008 by Dr. M. Brigden and colleagues, *Survey to evaluate rural healthcare providers’ satisfaction with teleoncology services* (Brigden, Minty, Pilatzke, Della Vidova, et al., 2008). The DNP student edited the survey by removing four repetitive questions and adding one yes/no question on
awareness. Dr. Bridgen approved the edited survey July 22, 2015. This instrument was selected for use in this DNP Scholarly Project as Dr. Bridgen has worked with rural providers throughout Canada to evaluate implemented teleoncology systems.

The instrument included a total of 10 short questions. There was one yes/no question inquiring about awareness of telemedicine for oncology patients at CMMC. There were eight questions concerning satisfaction and acceptability of teleoncology with response options on a 5-point Likert scale ranging from “strongly agree” to “strongly disagree.” There was one final yes/no question for concerns with the telemedicine process, with space to write in concerns or comments related to the teleoncology process. There was no identifying information on the survey for provider confidentiality (See Appendix A for copy of survey).

No information about the reliability or validity was available for either of the above survey instruments. Lack of validated studies in telemedicine research has been noted as a limitation by other researchers, including Sabesan (2012).

Consents. Eligible patients were invited to voluntarily participate. If the patient expressed interest, written consent was obtained explaining the project’s purpose, procedures involved, and voluntary participation. Local providers were provided a packet with a brief written explanation of the project, a consent form, a copy of the survey, and a self-addressed envelope for convenience to return the consent and survey. This packet was given to the providers’ nurse or office staff in respect to their time and busy office hours.
Procedures for Teleoncology and Prospective Patients. After completing the consent, patients were asked to complete the survey after their appointment but prior to leaving the office. If patients were willing to participate but could not stay to complete the survey, they were provided with a self-addressed envelope to the DNP student and asked to mail the survey upon completion. Completed surveys were collected and placed in a separate locked file from the consent in the Visiting Physicians Suite until the end of data collection. Consents and surveys remain in separate locked files to which only the DNP student has access.

Procedures for Local Providers. Providers’ nurses or office staff offered the survey to the providers at what they deemed a convenient time for the provider. The DNP student collected completed consent forms and surveys via mail from the self-addressed envelopes. Consents and surveys remain in separate locked files to which only the DNP student has access.

Analysis

Data from the collected surveys were manually entered into Microsoft Excel 2016 for analysis. The Likert-scale answers to the surveys of teleoncology patients, prospective patients, and rural healthcare providers were given a score by the DNP student for statistical analysis. Free comments and suggestions were analyzed individually. Demographic data (including distance traveled, cancer type, and appointment type) were analyzed using descriptive statistics.
Statistics were analyzed according to recommendations of Dr. Mark Greenwood and with the assistance of MSU Statistical Graduate Students J. Johnson and K. A. Espinoza. Dr. Greenwood prepared a power analysis in February 2016 to guide the required sample size to determine statistical significance: statistical significance would be observed for 90% power for a difference of 2 between the medians, $p$ value < 0.05 (Greenwood, personal communication, 2016). A two-sample t-test was used to compare the means of the two patient groups surveyed in this DNP Scholarly Project (Greenwood, 2016), (see Appendix C). Bean Plot Graphs were built to depict results of questions 1-9 and 11-14 to represent the distributions and medians for Face-to-Face and Telemedicine patient groups. Medians were used for the Bean Plot analysis instead of mean as this more accurately represented the tendency for high-value responses (J. Johnson & K. A. Espinoza, personal communication, March 29, 2016), (see Appendix D). Mean score, however, was used to calculate $p$ value when conducting the t tests. The DNP student used StatPlus and statistical analysis software within Excel to calculate two-sample t-test and $p$ values for each question to allow for unequal variance, and to run descriptive statistics on the remaining information as appropriate.

Missing data were handled by deletion which altered the sample size per question. The face-to-face group had the tendency not to answer all of the questions on the second page of the survey, which was not realized by the RN and staff administering the survey until patients had left the Outreach Oncology Clinic.
OUTCOMES

Patient Survey of Satisfaction with Teleoncology

During the project period, 21 telemedicine patients and 21 face-to-face patients agreed to participate in the survey (total N = 42).

Age, Gender, Race

Demographic information was included on the survey including age, gender, and race of patients surveyed. The average age of patients seen via telemedicine was 70 years old, which included 13 females and 8 males. The average age of the patients seen face-to-face at the Outreach Oncology Clinic was 69 years old, which included 13 males and 7 females: one patient did not specify gender. All respondents were Caucasian. Cancer type or reason for seeing oncologist was included in the demographic information.

Table 1. Cancer Type or Reason for Seeing Oncologist

<table>
<thead>
<tr>
<th>Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast</td>
<td>4</td>
</tr>
<tr>
<td>Leukemias/Malignant Hematology</td>
<td>5</td>
</tr>
<tr>
<td>Gastrointestinal Malignancies</td>
<td>7</td>
</tr>
<tr>
<td>Benign Hematology</td>
<td>5</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>4</td>
</tr>
<tr>
<td>Melanoma</td>
<td>2</td>
</tr>
<tr>
<td>Multiple Myeloma</td>
<td>6</td>
</tr>
<tr>
<td>Genitourinary Malignancies</td>
<td>2</td>
</tr>
<tr>
<td>Unspecified</td>
<td>7</td>
</tr>
</tbody>
</table>

Note. Cancer types were combined when appropriate (for example; colon, rectal, and esophageal were combined for the joint category Gastrointestinal Cancer).
Place of Residence

The majority of patients seen by both face-to-face and telemedicine were from the larger town in central Montana, home to the critical access hospital (27 of total 42 surveyed patients). The remaining majority of patients seen were from smaller surrounding communities (Town A-E). One patient travelled much further from northern MT (Town F). One patient did not specify where they reside.

![Place of Residence for Surveyed Patients](image)

Figure 2. Place of Residence for Surveyed Patients

Distance Traveled

On average, all patients of the CAH’s Outreach Oncology Clinic traveled just over 13 miles to get to the outreach clinic. This average includes an outlier of 140 miles: minus this outlier, the furthest patient away from the CAH was 40 miles. Therefore, the median distance traveled to the CAH is a much shorter distance of 2 miles.
When compared to the distance to travel to the oncologist’s home office, patients were saved a one-way median of 107 miles. The furthest patient was 175 miles away from the oncologist’s home office. Based on these averages, there was a round-trip savings of 214 miles. At the United States Federal Reimbursement Rate of $0.19 per mile for medical purposes, this equates to $40.66 saved per trip (IRS.gov, 2015).

Type of Appointment

Of the 21 telemedicine visits, 20 patients described their appointments as “routine follow-up” while 1 denoted the appointment as a “pre-chemotherapy check.” Similarly, 15 of 21 face-to-face visits were described as “routine follow up” while 2 were denoted as “new consultations”; 4 face-to-face patients did not specify the type of appointment.

![Figure 3. Type of Appointment](image)

Awareness of Telemedicine

An overwhelming 93% (n=13) of face-to-face patients were not aware telemedicine was available at the CAH for oncology patients; only one respondent in the
face-to-face category delineated they were aware this technology was available. Of those telemedicine patients who responded, 46% (n=6) did not know telemedicine was available at the CAH for oncology patients prior to participating in a telemedicine appointment.

Survey Questionnaire

Patients were asked to rate their response to 14 questions on a Likert scale with five choices; strongly agree, agree, neutral, disagree, and strongly disagree. For analysis purposes, scores were assigned to each category of the Likert scale: strongly agree (5), agree (4), neutral (3), disagree (2), and strongly disagree (1). If a question pertained only to telemedicine, face-to-face patients were instructed to write n/a. Table 2 displays survey questions with corresponding calculated median scores for face-to-Face (F) and telemedicine (T) sample groups.

Table 2. Patient Survey Results

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Median Responses &amp; N=# of Respondents</th>
<th>Stats</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Face-to-Face (F)</td>
<td>Telemed (T)</td>
</tr>
<tr>
<td>1 I could talk to the Oncologist easily and openly.</td>
<td>5 (n=20)</td>
<td>5 (n=21)</td>
</tr>
<tr>
<td>2 I felt like I could ask my Oncologist questions.</td>
<td>4.5 (n=20)</td>
<td>5 (n=21)</td>
</tr>
<tr>
<td>3 I did not feel that anything important was missed during my visit with my doctor.</td>
<td>4 (n=18)</td>
<td>5 (n=21)</td>
</tr>
<tr>
<td>4 I understood what the Oncologist told me.</td>
<td>4 (n=18)</td>
<td>5 (n=21)</td>
</tr>
<tr>
<td>Survey Question</td>
<td>Median Responses &amp; N= # of Respondents</td>
<td>Stats</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------</td>
<td>----------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>I felt that the doctor and the nurse answered all my questions and concerns.</td>
<td>Face-to-Face (F) 4.5 (n=18) Telem (T) 5 (n=21)</td>
<td>P Value 0.22 Med. diff. 0.5</td>
</tr>
<tr>
<td>I felt the Oncologist was able to understand my situation and provide satisfactory care.</td>
<td>5 (n=19) 5 (n=19)</td>
<td>0.97 0</td>
</tr>
<tr>
<td>I felt my privacy and confidentiality were preserved during my visit with my doctor.</td>
<td>5 (n=18) 5 (n=21)</td>
<td>0.53 0</td>
</tr>
<tr>
<td>It is important to have the local nurse with me when my Oncologist is consulting.</td>
<td>3 (n=19) 5 (n=21)</td>
<td>&lt;0.05 2.0*</td>
</tr>
<tr>
<td>I would rather travel to Great Falls to see my Oncologist than participate in a video consultation again.</td>
<td>2 (n=4) 1.5 (n=21)</td>
<td>0.42 0.5</td>
</tr>
<tr>
<td>I had no difficulty seeing or hearing through the telemedicine system.</td>
<td>N/A 5 (n=21)</td>
<td>--- ---</td>
</tr>
<tr>
<td>I would consider video consult with my doctor now rather than have to wait for a few weeks to see him/her in person.</td>
<td>4 (n=12) 4 (n=21)</td>
<td>0.60 0</td>
</tr>
<tr>
<td>I believe that being able to video consult with my doctor is convenient and/or can save me time and money.</td>
<td>4 (n=12) 4 (n=21)</td>
<td>&lt;0.05 0*</td>
</tr>
<tr>
<td>I am getting satisfactory care from the Oncologist.</td>
<td>5 (n=11) 5 (n=21)</td>
<td>0.75 0</td>
</tr>
<tr>
<td>I was able to take medications safely after the consultation with the oncologist.</td>
<td>4 (n=9) 4 (n=21)</td>
<td>0.67 0</td>
</tr>
</tbody>
</table>

A difference greater than or equal to two displays statistical significance in this sample size (Greenwood, 2015). Question eight is statistically significant when comparing means ($p < 0.05$) and displays a difference in median score of 2. It should be
noted, however, that face-to-face patients did not have a local nurse with them during their appointment. Question 12 is statistically significant ($p < 0.05$), when comparing means ($M_{\text{Telemed}} = 4.3, M_{\text{Face-to-Face}} = 3.7$) but the two groups have equal median scores of 4. Question 10 was not applicable to face-to-face patients, therefore only the median response in the telemedicine group is displayed. Besides these three questions, the remaining 11 questions have either equal median scores, only small differences in median scores (0.5-1.0) or $p$ values > 0.05.

The median scores and range of each answer were displayed on the Bean Plot Graphs (Appendix D). These statistical graphs helped the DNP student conceptualize the data. To increase readability in comparing the median scores, the following graph was built. This comparison of Telemedicine to Face-to-Face patients allows visualization of the similarities of answers between the two groups for the majority of questions.

Figure 4. Comparison of Median Scores. Median Scores from 1 (strongly disagree), 3 (neutral), to 5 (strongly agree).

![Figure 4: Comparison of Median Scores](image-url)
In addition to the 14 Likert-scale questions, there were two questions on the survey open for a free text response. These questions were open for both F and T patients to answer, but answers were obtained primarily from the T group.

When asked, “Anything you feel important that we need to address to improve?,” 81% (17 of 21) of patients denied needing any general improvements. Only one patient expressed dissatisfaction by responding, “I felt more disconnected from the doctor than usual and felt he was looking more at his computer screen than at me.”

When asked, “If you’ve used telemedicine, please tell us how we could improve the services via the telemedicine,” a wide range of responses were noted with 17 of 21 patients reporting being satisfied with the service with nothing to improve. Some of the responses included, “I feel this was very satisfactory,” “It worked well for us,” “Works good,” “Everything ok,” and “It’s great!” Three patients responded that although they were satisfied, they would prefer face-to-face visits. One patient explained, “I would use this service in routine follow up, but would need to evaluate if the prognosis was dire. At that point, I may need to have the face-to-face meeting.”

Only three of the patients responded with suggested improvements or concerns. One patient reported being cold during the appointment stating, “A warm blanket would be nice!” One patient expressed concern about the lack of palpation of lymph nodes and spleen by the physician during the physical exam via telemedicine. The final patient suggested the doctor look more at the patient than the chart, or that he explain what he was looking at in the chart to decrease the feeling of ‘disconnection.’
One face-to-face patient’s wife responded in the survey’s blank space, “[My husband] has never done a telemed. He would prefer ‘face-to-face’ visit, but would be willing to try telemed due to inclement weather or scheduling conflicts.”

**Provider Survey of Satisfaction with Teleoncology**

*The Provider Survey of Satisfaction with Teleoncology* was distributed to thirteen local primary care providers who make referrals to oncologist (5 APRNs, 6 MDs, and 2 DOs). Overall, there was a 92% response rate (n=12). Only 58% (n=7) local providers knew telemedicine was available for oncology and hematology patients.

**Survey Questionnaire**

Providers were asked to rate their responses on a Likert scale considering the information received about their patients’ Oncology Telemedicine consults and subsequent therapeutic plans. Similar to the patient survey, the Likert scale included five choices; strongly agree, agree, neutral, disagree, and strongly disagree. For analysis purposes, scores were given to each category of the Likert scale: strongly agree (5), agree (4), neutral (3), disagree (2), and strongly disagree (1). Missing data was handled by deletion which altered the sample size per question. Only six providers responded to the eight, Likert-scale questions and the yes/no question for concerns. One provider only responded to one of the Likert-scale questions. The majority of the providers without experience with telemedicine for oncology patients passed over these questions and offered an explanation in the free-response area asking for any concerns. Three of the
providers without experience with teleoncology explained they answered “neutral” on all the questions.

Table 3. Provider Survey Results

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Median</th>
<th>N</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I am generally satisfied with Oncology Telemedicine appointments.</td>
<td>3</td>
<td>6</td>
<td>[3-4]</td>
</tr>
<tr>
<td>2. I generally feel that my patients are satisfied with their Oncology Telemedicine sessions.</td>
<td>3</td>
<td>6</td>
<td>[3-4]</td>
</tr>
<tr>
<td>3. Telemedicine consultations for Oncology are often beneficial with regard to initiating treatment earlier.</td>
<td>4</td>
<td>7</td>
<td>[3-5]</td>
</tr>
<tr>
<td>4. I am well informed about the outcomes of my patients’ Telemedicine referral consultations.</td>
<td>3</td>
<td>6</td>
<td>[2-5]</td>
</tr>
<tr>
<td>5. I am satisfied with the timeliness of consultation/appointment reports I receive from the Oncologist after telemedicine.</td>
<td>3</td>
<td>6</td>
<td>[2-4]</td>
</tr>
<tr>
<td>6. I believe that the post-telemedicine communication process between referring provider and consulting oncologist can be improved.</td>
<td>3</td>
<td>6</td>
<td>[3-4]</td>
</tr>
<tr>
<td>7. I would use the Telemedicine service again for Oncology.</td>
<td>3.5</td>
<td>6</td>
<td>[3-5]</td>
</tr>
<tr>
<td>8. I would recommend the use of telemedicine for Oncology to colleagues.</td>
<td>3.5</td>
<td>6</td>
<td>[3-5]</td>
</tr>
</tbody>
</table>

As the results of the survey show, the median of local providers’ responses are neutral to the questions on telemedicine. The range of scores for all questions shows agreement by most respondents to all the questions. The wider range on questions 4 and 5 indicates some disagreements by providers on being well informed on the outcomes of telemedicine referral consults and satisfied with the timeliness of reports following telemedicine appointments.
Provider Concerns

Providers were asked to circle yes or no to the question, “Do you have any concerns about the current telemedicine process for oncology patients?” Of those who responded (n=6), 80% denied concerns about the current telemedicine process answering ‘no,’ with only one respondent answering positively.

Finally, providers were asked to explain any concerns in a free-response area. Two-thirds (n=8) of the surveyed providers used this free-response area as an opportunity to explain their experience with telemedicine. Two providers specified they have had no experience with telemedicine process. Similarly, three more providers noted they were not aware if their patients had participated in oncology telemedicine visits, despite having several patients see the oncologist when he is in town.

Three of the providers who were aware of the availability of teleoncology offered explanations that although they knew the service is available, they do not know of any of their patients using telemedicine. One explained, “…I’ve seen one note from [the oncologist] alluding to a telemed appointment from a patient in the future, but haven’t seen or heard anything else.” Another provider offered he or she had not heard any complaints or concerns from patients if they had indeed participated in telemedicine, unbeknownst to the provider. The final provider summarized, “I have not needed to use [telemedicine] yet.” One provider offered the suggestion that it would be helpful to send out a protocol for the appropriate use of telemedicine for oncology patients.
DISCUSSION

This project fulfilled the original goal to gather baseline information about the current use of teleoncology in Central Montana to gain understanding of both outreach patients’ and rural healthcare providers’ satisfaction with care delivered by teleoncology. Fulfilling this goal, the strengths and weakness of the teleoncology program were then able to analyze to drive a future practice change regarding teleoncology utilization.

General Findings

In general, satisfaction among telemedicine patients and face-to-face patients was consistent. The majority of telemedicine patients noted they were satisfied with the service and did not have any suggested improvements. Despite satisfaction with this form of healthcare delivery, however, there was a lack of awareness of the availability of telemedicine among all Outreach Oncology patients.

The survey of local providers similarly reveals a general lack of awareness or experience with telemedicine for rural oncology patients. The majority of providers indicated being neutral to teleoncology, however, this includes three of six providers who marked “neutral” to all answers despite noting no experience with telemedicine for oncology patients. Providers who indeed had experience with telemedicine had a general agreement of satisfaction on most of the questions.
Patient Considerations

**Satisfaction.** As evidenced in this project, rurally located oncology patients in Central Montana are satisfied with the care provided by the Outreach Oncology Clinic through both face-to-face and telemedicine appointments. Patients strongly agree they are able to talk to the oncologist easily and openly and could ask the oncologist questions regardless of the type of visit. Similarly, patients in both F and T groups agreed all of their concerns were answered, nothing important was missed, and they could understand what the oncologist was telling them. Both groups strongly agreed the oncologist understood their situation and was able to provide satisfactory care. All patients strongly agreed their privacy and confidentiality were preserved during their various appointment types and that overall they were getting satisfactory care by the oncologist. There were no differences between the two groups that both agreed they could take medications safely following their appointment.

**Presence of Local Nurse.** There was a statistically significant difference in the responses between the two patient groups on Question 8, “It is important to have the local nurse with me when my oncologist is consulting.” Face-to-face patients answered neutral to this question while the telemedicine group strongly agreed ($p < 0.05$). This is an expected difference as the local nurse is typically not with the oncologist during face-to-face appointments, but is needed for assistance with the physical exam during the telemedicine appointments. This question should have been omitted for face-to-face patients.
Acceptability to Telemedicine. Patients in both groups disagreed with the statement, “I would rather travel to Great Falls to see my Oncologist than participate in a video consultation again.” This parallels the findings in a later question that the majority of patients agree they would consider video consult with the oncologist now rather than waiting to see him/her in person. Although there is a statistically significant difference ($p < 0.05$) in the mean responses between the two patient groups on Question 12, “I believe that being able to video consult with my doctor is convenient and/or can save me time and money,” the median responses are equal with a score of 4. Considering the majority of patients agreed with this statement, it is therefore more representative of the data to emphasize the median score. The money savings of this question could be applied to vehicular expenses (wear and tear, gas, etc) as well as loss of productive time for the patient or family members that may accompany the patient to an appointment.

These questions in particular display there is acceptability to telemedicine for central Montana oncology patients. Patients surveyed were all from frontier counties classifying central Montana residents as highly rural (*Appendix F*), (DPPHS, 2011). This project’s results mirror Call and colleagues (2015) findings that residents in highly rural areas are more likely to be open to using telemedicine.

Similarly, some patients responding to the survey noted they prefer face-to-face although telemedicine is appropriate in certain situations like that of inclement weather. One of the days during the study period the visiting oncologist was scheduled to travel to the CAH for a scheduled Outreach Clinic day but the winter weather did not permit travel. All patients were seen via telemedicine this day. Many of the patients verbalized
off-handedly that this was much better than having their appointment cancelled because
the doctor was unable to get to town.

Provider Considerations

**Awareness.** Providers’ willingness to participate in the survey (92% response
rate) is very encouraging of the commitment to the evaluation and improvement
processes of the local healthcare team. Despite this interest in the improvement process
however, there is an overall lack of awareness and understanding of the extent of services
capable of being offered through the Outreach Oncology Clinic at the local CAH. With
only 58% of providers reporting being aware telemedicine is available for oncology
patients, this reveals a need for further education to the local healthcare team.

**Satisfaction.** Overall, providers median scores were primarily neutral in regard to
their experiences for patients using telemedicine. When examining the range of answers
for each question, however, more information about providers with experience can be
extracted from each question. For those providers with experience, the scores indicate
general agreement or satisfaction with most answers. The one question indicating patient
agreement with a median score of four was in regards to teleoncology being helpful in
initiating treatment and a plan of care earlier. Although this DNP scholarly project did
not mirror Brigden, Minty, Pilatzke, Vidova, Sherrington, and McPhail’s 2008, survey
results displaying satisfaction among physicians related to the quality of the service,
valuable information was gleaned from the provider survey. As Brigden and colleagues
(2008) note, it is important to consider each telemedicine program individually rather
than generalizing results due to the unique geographic and demographic needs of each telemedicine service.

Relation of Project to Theoretical Constructs

Long and Weinert’s key concept “outsider versus insider” from their body of research on Rural Nursing was the guiding principle for this project. First and foremost, the DNP student sought to first understand the local culture in this project and collect evidence from rural residents in Central Montana, which is key to Rural Nursing. Furthermore, rural providers’ opinions were collected, as they are key players in the delivery of healthcare to rural populations.

Overall, the evidence gathered by this project displays that telemedicine and face-to-face patients both agreed their confidentiality and privacy were maintained. Similarly, the team approach of care was noted to be important to telemedicine patients by having the local nurse present. This helps validate Lee and Winters’ research on Rural Nursing highlighting the importance of collaboration between specialists at a distance and local healthcare providers as essential for rural patients and caregivers (2012). This project highlights that rural oncology patients are satisfied with a modality of care that might be deemed as ‘different’ or one they may have never tried. These results verify Lee and McDonagh’s (2012) question that rural dwellers may indeed be accepting of outsiders if they are in partnership between the rural community and the local healthcare professionals. This is precisely the way the Outreach Oncology Clinic is designed to
operate, utilizing both in-person face-to-face consultations and adjuvant telemedicine visits.

**Dissemination**

The DNP student conducted an educational presentation to the local healthcare community on the results of the project on July 26, 2016. The visiting oncologist, local providers, local nurses involved with oncology, and clinical managers, were invited to the 30-minute presentation. This presentation took place at the Tumor Board meeting, which occurs monthly when the visiting oncologist comes to the CAH. Approximately 20 people were present for the presentation.

This presentation focused on the review of the literature for the applications of teleoncology, the purpose of the DNP scholarly project, the demographic information of patients surveyed, the results of the patient survey and the results of the provider survey. The evidence from the survey displayed some of the strengths of the application of telemedicine to rural oncology patients. The CAH’s PolyCom Telemedicine Unit was available on display and for demonstration during the presentation. Following the conclusion of the presentation, a question and answer period with an informal discussion was held. This session generated several questions such as how to increase the utilization of the technology and how to examine further the financial savings specific to central Montana through the use of teleoncology.

The high turn-out for this presentation is a testament to the degree of local stakeholder investment in continually evaluating and improving care for rural dwellers in
central Montana. There was a wide range of local healthcare team members present, including; nurses, the oncologist, other physicians, medical students, the clinical nursing manager, and even the CEO. Nurses who were dedicated to assisting the DNP student in the data collection for this project were present and willing to voice their opinions during the informal discussion period.

**Community Dissemination**

The local newspaper and radio station were invited to the DNP student’s presentation by the CAH’s Personnel Department and the DNP student in order to gain publicity on the availability and overall satisfaction with teleoncology. After the presentation, a reporter from the newspaper interviewed the DNP student one-on-one for further clarification on the project and what the findings mean for rural residents. An article in the local paper ran on July 31, 2016 recapping the presentation (*See Appendix F for digital copy of the article*). A 30-second radio spot was aired on the local AM/FM radio station with a short summary of the presentation and definition of teleoncology.

Following both the article and radio spot, the DNP student received an influx of interest from several sources, including members of the local healthcare team who were unable to attend the presentation, and multiple prospective telemedicine patients who approached the DNP student with questions regarding the technology. Similarly, patients who had participated in the survey verbalized they were interested to read of the results. One of these patients told the DNP student, “I just think it is so great we have another option, and I’m glad more people are going to find out about [telemedicine] now!”
Recommendations for Practice

As the purpose of this DNP scholarly project was to explore a practice change initiative, the data collected regarding the teleoncology practices at the local CAH are critical to consider moving forward in changing teleoncology utilization and practice. Understanding the levels of patient satisfaction and comparability between telemedicine and face-to-face visits leads to well-informed and individualized interventions for improving teleoncology care at the local level.

As suggested by one of the providers in their survey, the use of a guiding protocol for telemedicine use at the local CAH would likely be beneficial for both patients and referring providers to the Outreach Oncology Clinic. Furthermore, other visiting specialists to the clinic have expressed interest in utilizing telemedicine to conduct consultations with rural patients. The development of a telemedicine specific protocol is one practice change to consider based on the evidence from this project. Another consideration is to cross train other nurses to be proficient in using telemedicine.

Limitations

As noted by other evidence included in the review of the literature, the primary limitation of this study is the small sample size. The size of the telemedicine group was greatly increased due to one day of inclement weather during the study period. Without this day, the telemedicine group’s sample size would likely have been significantly smaller.
Another limitation was the decreased responses on the second page of the survey by the face-to-face patients. The small sample sizes for the telemedicine patients, the face-to-face patients and the local provider groups all contribute to the lack of generalizability of this project. It is important, however, to consider that this is the first local evidence generated for telemedicine use for rural oncology patients in Central Montana.

Future Considerations

There is a need for further investigation into the evidence of differences in patient outcomes between face-to-face and telemedicine groups. In addition, calculating specific cost savings for the patient could strengthen the argument for the use of telemedicine as a tool to augment care provided by outreach specialists. According to central Montana’s CAH and clinic CEO, in a critical access hospital calculating specific savings and reimbursements for both the facility and the patients are of prime consideration as so much revolves around the ‘bottom line’ (M. Dowdy, personal communication, July 2016). Additional patient demographic information on patients’ level of education, insurance type, and history of internet use (including video technology programs such as Skype or FaceTime) could lead to increased understanding of those patients’ correlation with these factors and their willingness to participate in telemedicine.

Conclusions

Telemedicine for rural oncology patients is a viable option for the delivery of healthcare to Central Montana Patients. Patient satisfaction among Outreach Oncology
Clinic patients in central Montana’s CAH is essentially the same between patients experiencing face-to-face visits and visits via telemedicine. Overall, patients reported high levels of satisfaction with minimal areas for improvement. Among local providers there were generally neutral answers, but this was impacted by the lack of experience with telemedicine for their oncology patients.

There is a large lack of awareness of the availability of telemedicine for this population among both patients and providers. This lack of awareness likely contributes to the low utilization rate of teleoncology. Considering the widespread satisfaction and acceptability of telemedicine for oncology patients at the local CAH, this is an important area to address for a practice change.
REFERENCES CITED


Special payment rules for particular items and services. 42 U.S. Code § 1395m. (1990).


APPENDIX A

PATIENT AND PROVIDER SURVEYS
### Patient Survey of Satisfaction with Outreach Oncology Clinic

<table>
<thead>
<tr>
<th>Age:</th>
<th>Sex:</th>
<th>Ethnicity:</th>
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<tbody>
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</table>

Visit *(Please Circle One)*:  
Telemedicine* or Face-to-Face *(if you have had both please complete survey based on your Telemedicine visit)*  
Cancer Type or Reason for seeing Oncologist:  

**Type of Visit (Please Circle One):**
- New Consult
- Routine Follow Up
- Pre-Chemo Check

**Place of Residence:**

**Approx Miles from Great Falls:**

**Approx. Miles from CMMC Clinic:**

<table>
<thead>
<tr>
<th>Please place an 'x' in the appropriate column</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I could talk to the Oncologist easily and openly.</td>
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<td>2. I felt like I could ask my Oncologist questions.</td>
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<td>3. I did not feel that anything important was missed during my visit with my doctor.</td>
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<td>4. I understood what the Oncologist told me.</td>
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<td>5. I felt that the doctor and the nurse answered all my questions and concerns.</td>
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<td>6. I felt the Oncologist was able to understand my situation and provide satisfactory care.</td>
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<td>7. I felt my privacy and confidentiality were preserved during my visit with my doctor.</td>
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<td>8. It is important to have the local nurse with me when my Oncologist is consulting.</td>
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<tr>
<td>9. I would rather travel to Great Falls to see my Oncologist than participate in a video consultation again. <em>(or write NA if you have not done telemed before)</em></td>
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<td>10. I had no difficulty seeing or hearing through the telemedicine system.</td>
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<td>11. I would consider video consult with my doctor now rather than have to wait for a few weeks to see him/her in person.</td>
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<td>12. I believe that being able to video consult with my doctor is convenient and/or can save me time and money.</td>
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<td>13. I am getting satisfactory care from the Oncologist.</td>
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<td>14. I was able to take medications safely after the consultation with the Oncologist.</td>
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Anything you feel important that we need to address to improve?

If you’ve used telemedicine, please tell us how we could improve the services via the telemedicine.

If you’ve NEVER used telemedicine, did you know it is available at CMMC for oncology patients? *(Please Circle)*

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
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*Adapted from survey by Dr. Sabe Sabesan, 2012. Permission for use of the above survey with necessary modifications granted April 2015.*
# Local Provider Survey of Satisfaction with Teleoncology

1. Are you aware that there is telemedicine available for oncology and hematology patients at CMMC? *(Please Circle)*
   - YES
   - NO

<table>
<thead>
<tr>
<th>Considering the information you receive about your patient's Oncology Telemedicine consult and subsequent therapeutic plans, to what extent do you agree with each of the following statements? <em>(Place X in column)</em></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
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<tr>
<td>2. I am generally satisfied with Oncology Telemedicine appointments.</td>
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<td>3. I generally feel that my patients are satisfied with their Oncology Telemedicine sessions.</td>
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<td>4. Telemedicine consultations for Oncology are often beneficial with regard to initiating treatment earlier.</td>
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<td>5. I am well informed about the outcomes of my patients' Telemedicine referral consultations.</td>
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<td>6. I am satisfied with the timeliness of consultation/appointment reports I receive from the Oncologist after telemedicine.</td>
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<td>7. I believe that the post-telemedicine communication process between referring provider and consulting oncologist can be improved.</td>
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<td>8. I would use the Telemedicine service again for Oncology.</td>
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<td>9. I would recommend the use of telemedicine for Oncology to colleagues.</td>
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<tr>
<td>10. Do you have any concerns about the current telemedicine process for oncology patients? <em>(Please Circle)</em></td>
<td>YES</td>
<td>NO</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

If yes, please explain:

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Adapted from original survey by Dr. Malcolm Bridgen and colleagues, 2006. Permission for use of the above survey with necessary modifications granted April 29, 2015 and approval of final edited survey granted July 22, 2015.
APPENDIX B

FISHBONE ANALYSIS OF TELEONCOLOGY PROCEDURES AT CMMC
Quick summary of power analysis for Heidi Linhart (2/8/2015) prepared by Dr. Mark Greenwood

In the study, the patient satisfaction ratings for in-person vs teleconference are to be compared. The ratings on the questions in the provided instrument are 7-pointLikert scale and all the responses are assumed to be independent. Analysis using a two-sample t-test that allows for unequal variances is a reasonable assumption if the scale can be assumed to have similarly meaning differences in the steps of the scale and the distributions of the responses are approximately normal.

Using this test and assuming that a one-point increase in the average will be a modest change and a two-point change in the mean as big as might be expected, we can perform a preliminary power analysis assuming equal group sizes but with a couple of different potential variances for scores on the Likert scale.

The following figure contains the power of the two-sample t-test to detect either a difference of 1 (red lines) or 2 (blue lines) units between the two groups. Three different standard deviations are assumed based on the largest possible SD where observations are only observed at 1 or 5 (SD=2.05), the SD of a discrete uniform where all 5 points on the scale are equally likely (SD=1.4), and the SD that might be observed if the response probabilities in the 5 points on the scale are related to cutting up a normal distribution (SD=1.0). If only parts of the scale are observed, the variation could be even smaller and the power higher.

Based on these results, to get 90% power for the tests, the require sample size per group is somewhere between 22 and 90 with a difference of 1 in the means between the groups. For a difference of 2 between the groups, the required sample size is between 7 and 23 per group depending on the potentially observed variation.

With unequal sample sizes, the size of the smaller group can be used with the previous result to provide a conservative estimate of power. In other words, adding extra observations into one of the groups would enhance power although not at the same rate as adding observations equally to both groups.

Given that the data collection is mostly completed, hopefully this will still provide some insight into expected results in the data set once analyzed.

Further consultations with the Department of Mathematical Sciences Statistical Consulting Seminar in Spring 2016 will allow for assessment of assumptions of this procedure once data are available and some comparisons to other potential analysis techniques. Additionally, the development of an aggregated score across the items will be considered in this process.
APPENDIX D

BEAN PLOT GRAPHS DISPLAYING DISTRIBUTIONS
We chose to compare medians rather than means, due to the fact that people tended to give high (3-5) value responses, and that the responses didn't seem very symmetric. We elected to display the data using beanplots in R. There is one plot for each of the Likert ranked questions on the Patient survey. If the two groups had similar responses, we would expect to see "pods" that are roughly symmetric, and the bold lines close to one another (keep in mind that the scale changes on the plots, but we can work to get them all on the same scale).

These beanplots compare the median response for the Face-to-Face ("F") group to the Telemed ("T") group for a particular question. The thick black lines indicate the individual medians for each group. For instance, on the first plot, the bold black line on the left indicates the median response for the Face-to-Face group for Question 1, and the other bold line is the median response for the Telemed group. The dotted line is the overall median across both groups. When the dotted line is not visible, it is because it is being overlapped by the over two medians, which would mean the median for Face-to-Face is equal to the median for Telemed.

In a quick review of these plots, you can observe that, with the exception of Question 8, all of the differences between the two medians is 1 or less. Question 8 shows a difference of 2.

Also, it should be noted that later problems had a high rate of nonresponse, for the Face-to-Face group in particular. For Question 10, there were only two responses for the Face-to-Face group, so comparing the median here may not mean a lot.
APPENDIX E

MAP OF MONTANA COUNTIES
APPENDIX F

COPY OF LOCAL NEWSPAPER ARTICLE
Looking for a way to fulfill the needs of the rural community, Hobson native Heidi Linhart is taking on an ambitious Doctorate of Nursing scholarly project on telehealth services, which allows patients an opportunity to have an appointment with their healthcare provider through video technology.

“Telemedicine/telehealth has been in place at Central Montana Medical Center for rural patients since 2014 as a way to augment care provided by the visiting doctor,” Linhart said. “I conducted a research study evaluating patients’ perspectives with telemedicine and how well they are satisfied with this form of care. I also surveyed local primary care providers to determine their level of satisfaction.”

On Tuesday, Linhart shared her presentation to a number of CMMC health providers and representatives. Many of them are her colleagues, as she works in the CMMC oncology department part-time while continuing her education.

“My first job out of school was actually in oncology,” Linhart said, “so this project reflects not only that love, but also my love for this rural environment.”

This being the case, her focus for this study was on teleoncology.

The presentation Tuesday started off with Dr. Bryan Martin of the Benefis Sletten Cancer Institute Oncology Department in Great Falls delivering an introduction. It’s Martin,
Linhart said, who has really helped patients get comfortable with telemedicine, as he’s been instrumental in utilizing the program, regularly working with CMMC patients from Great Falls via videoconference.

**Why telehealth, and what is it exactly?**

During her presentation Tuesday, Linhart explained thoroughly what telehealth is and why it is important.

“The goal of telehealth is to exchange medical information from one site to another in a variety in order to improve a patient’s clinical health status,” Linhart said. “It’s a tool first introduced in the 1970s but as technology has taken off and rapidly expanded, telehealth has followed suit in a variety of ways.”

Telehealth has come a long way on a global scale, Linhart said, as it is commonly used in Australia, New Zealand, Sweden, Germany, Canada, Japan and Norway.

“The list is extensive,” Linhart said. “It’s caught on.”

And, after doing such extensive research, Linhart said she can see why.

“Telehealth decreases the disparities of distance,” Linhart said. “By using this service, patients located at a distance are still able to receive specialty care.”

This is particularly important in rural areas like Central Montana. According to her research, Linhart said 65 percent of the population of Montana is rural. Furthermore, 52 percent of Montana residents travel more than 50 miles for their oncology care and 26 percent travel up to 100 miles for the care.

That’s why “teleoncology” is catching on at CMMC and why it has grown since its inception in 2014, when Dr. Martin saw his first patient in Suite 5 of CMMC while still in his office in Great Falls.

“[Martin] just pops into a room with the capabilities of telemedicine and conducts the visit that way,” Linhart said.

When using telemedicine, patients are assisted by a nurse during their visit to help with the stethoscope, the camera and more.

This works well for oncology patients, Linhart said, as a lot of oncology visits are about symptoms and “taking care of the whole self.”

“Oncology patients feel it’s a good tool,” she said.
Survey says…

Linhart did an extensive literary review on this subject, and results have been positive.

“All overall, we’ve had high satisfaction rates, especially with the decreased travel burden,” Linhart said. “Cost savings were also significant, as well as decreased wait times.”

Telehealth, Linhart said, “increases access to quality health care and specialty health care for Central Montana residents” and would fulfill a need for the area she holds dear.

“I love this area and I want to continue to improve peoples’ lives here,” she said. “This is a wonderful place to live. I think we all know this, but it comes at a cost, too.”

There is some work to do to increase the use of telehealth tools, as, according to a 2015 survey, only 52 percent of Montanans said they’d consider video conferencing. This being the case, Linhart is dedicated to telehealth awareness, gathering baseline information, what providers think about it and what patients think about it.

With the increased rates of aging, higher rates of chronic disease and higher financial costs, Linhart said it’s crucial to look into the benefits involved with this new medical opportunity.

Earlier this year, Linhart conducted a local survey adapted from the work of Medical Oncologist Dr. Malcolm Brigden of Ontario. Twenty-one telemedicine patients and 21 face-to-face patients completed the survey. Eighty-three percent of patients were in for a routine check. On average, most patients drove 13 miles to get to the clinic, but the furthest patient away from Lewistown drove in 40 miles.

“Telemedicine saved our patients a 214-mile round trip to Great Falls,” Linhart said, “which, according to the IRS medical reimbursement per mile, saved them $40.66.”

And even more striking, Linhart said, was the high satisfaction rate of patients, as 81 percent of those who experienced telemed visits in her recent survey were very pleased with the results. Linhart said she believes that is no fluke.

“The study that I did hopefully shows that the satisfaction by our patients and general satisfaction by primary care providers gives us enough room to gauge how well our patients appreciate being able to be seen here in any capacity, whether face-to-face or telemedicine,” Linhart said. “The minimal difference we see shows the two are comparable.”

Furthermore, Linhart said after her presentation, the survey is encouraging, leading her to believe “there is a place for this in our little community.”
Spreading the word

Of those who participated in the survey, Linhart said 93 percent of the face-to-face patients did not know telemedicine visits existed, and 46 percent of the telemedicine patients were unaware prior to the check-up.

“Those are some pretty high numbers for the lack of awareness,” Linhart said. “The general lack of awareness by the providers, patients and everyone is really one of the major end factors. This lack of awareness contributes to the low utilization, and, considering the widespread acceptability we’ve seen across the literature and here at our own facility, this is an important area for us to address going down the road.”