The Impact of Telehealth on Rural Cancer Care: A Review of Current Practices and Guidelines

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Abstract

Rural oncology patients have poor access to oncology care which negatively impacts quality of care and delivery of treatment. Recent telehealth interventions show evidence of improvement on this problem. Policies and guidelines regarding telehealth have enhanced cohesiveness within the field and have the potential to further improve patient care. This review summarizes research on telehealth interventions for rural oncology patients and of related guidelines and standards of practice. The literature review included searches of PubMed and CINAHL using telehealth related terms and was limited to articles published in English in the last ten years (2008 - 2018). A review of guidelines and standards of practice searched health-related organization databases for policies, protocols, and guidelines related to the use of teleoncology and telehealth. Sixteen research articles that evaluated the use of telehealth on cancer care were reviewed. Ten guidelines, policies, and recommendation documents were reviewed that summarized group stances and protocols for telehealth use. Review of the literature reveals the following significant benefits of teleoncology to rural patients: high patient and provider satisfaction, increased access to care, improved symptom management, cost-effectiveness, and safety of the intervention. While research studies on rural teleoncology are limited, existing research demonstrates positive findings on care for the rural cancer patient. Current guidelines and standards help to standardize the practice of telehealth, but further development of guidelines specific to teleoncology are needed to help promote uptake of the practice and reduce barriers to care.

The Impact of Telehealth on Rural Oncology Care: A Review of Current Practices and Guidelines

Rural oncology patients face numerous barriers in accessing cancer treatment. Rural patients have higher mortality and poverty rates, lower insurance coverage, and face geographic barriers in accessing cancer treatment, especially complicated treatments such as surgery and complex chemotherapy regimens (Markin et al., 2010). Lack of access to care encompasses disparities in a wide range of areas, including: access to specialty oncology services, advanced imaging, radiation oncology, infusion centers, and palliative care services (Charlton, Schlichting, Chioreso, Ward, & Vikas, 2015). Additionally, rural patients have decreased access to screening and staging services (Markin et al., 2010). Recent trends towards centralization of major cancer treatment centers have had unsure effects on rural hospitals and their patients (Markin et al., 2010). Multi-specialist teams are often required for comprehensive cancer care, and rural locations make coordination of care more challenging. In rural hospitals, cancer care access is complicated by the smaller number of chemotherapy trained nurses and medical oncologists as well as by high staff turnover rates (Markin et al., 2010). Cancer support service personnel are less available in rural areas, including fewer oncologists, palliative specialists, social workers, and nurses (Charlton et al., 2015). These barriers have contributed to the gap in health outcomes (including increased morbidity and mortality) between rural and metropolitan oncology patients (Unger et al., 2018). Rural patients face a higher incidence of cancer-related deaths than patients in metropolitan areas (Henley et al., 2017). Furthermore, cancers which could be identified by screening (for ex., cervical and colorectal) and cancers that are caused by smoking (such as laryngeal and lung) have both higher incidence and mortality rates in rural populations (Henley et al., 2017). Smoking cessation and screening have increased in metropolitan areas while related

cancer rates have declined (Henley et al., 2017). These same trends have not been identified in rural areas. Rural patients also have heightened risk factors for cancer including cigarette smoking, physical inactivity, increased obesity rates, and decreased access to healthcare and screening (Henley et al., 2017).

As demand for cancer care continues to increase in the United States, partially due to the rising aging population, the necessity for an approach that addresses these issues is critical. The dynamic and compounding issues that rural patients face in accessing cancer care make a singular approach to resolving this issue challenging, but several strategies have been developed in recent years. Technological innovations have allowed for the creation of new interventions to address shortcomings in our healthcare delivery systems, including approaches such as virtual tumor boards and teleoncology. Telehealth has been defined by The World Health Organization (WHO), the American Telemedicine Association, and the European Commission as the "use of telecommunication to advance health", and clarified by WHO as:

> the delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information, for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interest of advancing the health of individuals and their communities. (WHO, 2010)

Thus, a telehealth practitioner is a licensed healthcare provider who engages in the above telehealth services within their respective scope of practice (WHO, 2010). Additionally, telenursing has been further defined as "the delivery, management and coordination of care and services provided via information and telecommunication technologies" (College of Registered Nurses of Nova Scotia, 2017).

Background

Rural Health/Rural Oncology Care

For rural patients, geographic disadvantages significantly impact their ability to access timely care, which is especially marked in the southern part of the country and for Native American populations (Onega et al., 2008). For cancer patients, travel time has been shown to have an impact on utilization of healthcare, resulting in lower use of breast-conserving treatment, lower participation in clinical trials, and a higher risk of presentation with an advanced stage cancer (Onega et al., 2008). In areas where rural patients do not have a local oncologist, the average time spent traveling to receive chemotherapy treatments was found to be 58 minutes (Ward et al., 2014).

An analysis of the geographic distribution of the healthcare workforce by the American Society of Clinical Oncology revealed that 20% of the American population lives in rural areas and only 3.1% of oncologists work in these areas (Kirkwood, Bruinooge, Goldstein, Bajorin, & Kosty, 2014). The same report found that 70.3% of counties within the United States did not have oncologists available (Kirkwood et al., 2014). In the areas of lowest oncologist density (< 2.9 oncologists per 100k population) patients were found to have lower survival rates than areas of higher oncologist density (Mehta et al., 2018). Current measures to evaluate provider density in relation to the population, including Health Professional Shortage Areas (HPSAs) and Medically Underserved Areas (MUAs), may not be adequate to monitor and promote increased oncology presence as their designation is based on primary care provider and not specialist density (Mehta et al., 2018). Programs aimed at targeting these areas and their related disparities, including the Conrad-30 Program, a federal program which promotes medical graduate placement in MUAs and HPSAs, and gives priority placements to new primary care providers

over specialists (Mehta et al., 2018). Clearly, underserved areas would benefit from programs which prioritize placement of oncologists.

The quality of the rural healthcare workforce may not be satisfactory to meet rural cancer care needs. The oncology workforce is facing major changes as our aging population grows. While our health care provider workforce ages, the population will continue to grow, with 18% growth expected by 2030 (Burrows, Suh, & Hamann, 2012). In addition to growth, our population is aging at a rapid pace, which adds additional pressures on the healthcare workforce (Burrows et al., 2012). Cancer is one of the top three causes of death in people aged 65 and older, meaning our oncology care needs will grow along with the population ("Older Persons' Health", 2017). The age gap between oncologists under 40 years old and those older than 64 continues to grow, with more oncologists currently practicing who are age 64 and older (Kirkwood et al., 2014). Younger oncologists are not replacing these retiring oncologists at an adequate rate, causing concern for a future oncologist shortage (Kirkwood et al., 2014). The American Society of Clinical Oncology has anticipated a shortage of 2,550 to 4,080 oncologists, which is predicted to occur in 2020 and be more pronounced in rural and socially disadvantaged areas (Mehta et al., 2018). Thus, rural physicians are taking on greater workloads than ever, requiring them to work longer and to accommodate more patient visits per day (Burrows et al., 2012).

Noted shortages of other healthcare workers, including nurses, advanced practice providers (Nurse Practitioners and Physician Assistants), pharmacists, and radiology and laboratory technicians have also grown (Burrows et al., 2012). Health Professional Shortage Areas show us where there are deficits in providers in comparison to total populations within an area, and can illuminate rural provider deficiencies ("Rural Healthcare Workforce", 2018). Rural

HPSAs account for 65% of all HPSAs and represent 34.5 million Americans (Burrows et al., 2012). In order to eliminate the HPSA classification, 3,959 new healthcare providers would be needed. A total of 8,851 new providers would be needed in order to obtain the appropriate population-to-practitioner ratios (2,000:1) (Burrows et al., 2012). Rural nurses obtain lower salaries than metropolitan nurses, which leads to greater rates of nurse turnover ("Rural Healthcare Workforce", 2018). A 2013 report published by The Health Resources and Services Administration, entitled The U.S. Nursing Workforce: Trends in Supply and Education, found that rural nurses are more likely to be nearing retirement, less likely to be employed by a hospital, and represent 16% of all national RNs ("Rural Healthcare Workforce", 2018). Per capita, RNs in urban areas represent 93.5 RNs per 10,000 people, compared to 85.3 RNs per 10,000 people in rural areas ("Rural Healthcare Workforce", 2018).

Many who specialize, including both medical and nursing professionals, stay in urban areas close to where they received their education and where pay tends to be higher (Burrows et al., 2012). Furthermore, in rural areas there are lower efforts to recruit healthcare providers, less reimbursement for services, and significantly fewer training sites (Burrows et al., 2012). This effect can be mitigated through the introduction of rurally-focused policies and programs to address rural healthcare worker needs ("Rural Healthcare Workforce", 2018). Rural healthcare education should be supported through enhancement of scholarships, grants, and loan repayment/forgiveness policies. Additionally, state schools should work to produce healthcare workers prepared to enter rural practice by incorporating rurally-focused education into the curriculum. Finally, the rural healthcare workforce can be supported by enhancing clinical placements and residency programs in rural areas ("Rural Healthcare Workforce", 2018).

The importance of utilizing telehealth to decrease deficits in healthcare provision to rural areas has also been noted, as well as the recommendation for states to promote the use of new types of patient-provider interactions ("Rural Healthcare Workforce", 2018). Telehealth has been recognized as a potential way for rural providers to increase their capacity to serve local patients and as a mechanism to support placement of new rural providers (Burrows et al., 2012). Recent initiatives such as the Telehealth Network Grant Program have been developed and implemented in order to promote the establishment of networks for rural (defined by exclusion as any area which is not urban or metropolitan) and frontier (defined as a sparse population which is geographically remote) areas so that access can be expanded and coordination of care can be improved (Health Resources and Services Administration, 2016; United States Department of Agriculture, 2016).

Status of Rural Health

Research conducted and evaluated by the CDC found overall there was a decrease in cancer rates from 1999-2014, but the rate at which cancer was decreasing was slower in rural areas compared to urban areas (Henley et al., 2017). From 2011 - 2015, rural counties comprised 2% of all cancer cases, but 8% of cancer deaths, with higher mortality rates for prostate, cervical, breast, colon, and rectal cancers. Additionally, cancers caused by smoking had higher mortality rates, including oral cavity cancers and cancers of the throat and lungs (Henley et al., 2017). Cancers related to smoking were noted to be higher in rural areas both in incidence and in mortality. Additionally, it was found that cancers that could be addressed by screening (such as cervical and colorectal) were also higher in rural areas in both incidence and mortality, highlighting a disparity in access to screening. Higher incidences of cancers caused by human papillomavirus were also noted in rural counties (Henley et al., 2017). Many of these disparities

are caused by differences in lifestyle risk factors in rural areas, such as sedentary lifestyles, alcohol consumption, exposure to UV rays, cigarette smoking, obesity, and exposure to carcinogenic agents (Henley et al., 2017). Research evaluating health practices and health behaviors found that rural areas reported low rates of health behaviors associated with reducing cancer risk, including: physical activity, reducing alcohol consumption, not smoking, and sustaining a healthy BMI (Matthews et al., 2017). Higher prevalence of risk factors, in addition to poorer access to quality care and greater financial hardships, leads to measurable health disparities between rural and metropolitan cancer patients.

Teleoncology

Teleoncology may have the ability to decrease disparities in access to cancer care for rural patients when applied in consistent, practical, and prolonged programs. The definition of teleoncology differs slightly from that of telemedicine, with teleoncology being defined as the:

> application of telemedicine to oncology, including diagnostics (laboratory, radiology, pathology), treatment (surgery, radiation oncology, medical oncology), and supportive (rehabilitation and palliative) care. Therefore, teleoncology includes any telemedicine application used to advance cancer care (Hazin & Qaddoumi, 2010).

There are multiple types of teleoncology, all which offer different benefits and cater to varying subspecialties within oncology (Hazin & Qaddoumi, 2010). Synchronous teleoncology involves live interactions, mainly incorporating videoconferencing. This type of teleoncology initiative can be expensive, especially if video-conferencing capabilities are not already in existence at a cancer center. More affordable methods for synchronous communication, which rely on internet host sites, have developed in recent years and make web-conferencing more accessible to providers. Unlike video-conferencing units, which must be installed and maintained, web

conferencing requires less money and maintenance. Transmission of high-resolution images can be achieved through the use of virtual microscopy systems, which benefit the practice of pathology and other laboratory services (Hazin & Qaddoumi, 2010). Single direction communication, or asynchronous transmissions, uses technology to send information from one site to another, and is also known as the "store-forward" approach (Sirintrapun & Lopez, 2018). These types of teleoncology initiatives can be used when the service is needed to send, store, and/or retrieve information. This type of teleoncology is common in imaging and telepathology (Hazin & Qaddoumi, 2010). Combinations of synchronous and asynchronous methods are often used, with video-conferencing as well as document transmission occurring between providers (Sirintrapun & Lopez, 2018). Mobile technology has also been used to assess, monitor and advise patients on symptoms and to provide ongoing support through treatment via Short Message System (SMS) messaging (Sabesan, 2014).

Teleoncology is a young field, and thus thorough evaluation of the service is necessary in order to ensure the greatest benefit. A national survey of oncology providers found that telehealth practices are present in numerous subspecialties across the country, with genetic counseling being the most commonly utilized with 35% of institutions reporting current use (The Oncology Roundtable & Association of Community Cancer Centers, 2018). Forty-eight percent report using virtual tumor boards for provider-to-provider communication, but a similar number (45%) report using no telehealth for provider-to-provider interactions (The Oncology Roundtable & Association of Community Cancer Centers, 2018). The majority of respondents report no plans on offering telehealth services to address oncology needs, which prompts a greater need for evaluation of the utility of telehealth in an effort to increase knowledge and awareness of the practice (The Oncology Roundtable & Association of Community Cancer Centers, 2018).

While it seems some hospitals are reluctant to utilize telehealth, this survey data also shows that an abundance of hospitals are already practicing telehealth or plan to offer it in the next two years (The Oncology Roundtable & Association of Community Cancer Centers, 2018). An example of a program with long-standing telehealth initiatives is Veterans Affairs (VA), who have recently expanded their services with the 'Anywhere to Anywhere' program, which functions to expand services to rurally located veterans using the newly designed VA video connect service (Office of Public and Intergovernmental Affairs, 2018). Telehealth initiatives within the VA allowed for 2.3 million telehealth visits in 2017, with over 582,000 of those visits being to rural veterans (Wicklund, 2019).

Standards of Practice and Guidelines

Few long-running teleoncology systems exist in the United States to address the needs of rural oncology patients. Because of the accumulation of disparities affecting rural patients (including poor access to alternative mechanisms of receiving treatment) many rural patients suffer from decreased quality of life, heightened financial strains, and inequitable access to treatment and screening. Clear policies and standards of practice specific for teleoncology providers are needed to enhance quality of care, safety, and promote use. Without cohesive guidelines, varying methods and approaches for practicing teleoncology are utilized, leaving performance and safety as major variables. A 2013 survey of the utility of current telehealth guidelines found that 97% of respondents believed telehealth required standards and guidelines, with a majority of respondents citing the importance of guidelines in standardizing the field, decreasing liability, and promoting credibility (Krupinski, Antoniotti, & Bernard, 2013). The same survey found that providers perceive telehealth guidelines impacting the provision of care by promoting understanding and adoption of telehealth, improving outcomes, access, quality of

care, reducing costs, and providing information to payers on reimbursement (Krupinski et al., 2013).

Policy decisions should be based on scientific findings from published literature (Sabesan, 2014), and teleoncology literature is complicated by small sample sizes and difficulties with randomization, leaving a small pool of high-quality literature to define the practice and inform health policy. With increasing amounts of randomized control studies being published, the body of literature on teleoncology is growing and is showing signs of a maturing field that has the evidence necessary to create evidence-based standards. Without clear guidelines, providers are left with the burden of determining how to best engage in teleoncology interventions, which complicates the development of a cohesive body of literature on which to build the field. Additionally, teleoncology providers do not have a clear understanding of litigation, and this burdens both rural and metropolitan providers, as telehealth requires specialists to depend on rural providers for many aspects of patient care and can put providers in complex situations (Sabesan, Simcox, & Marr, 2012). Without clear guidelines to guide the practice, both time and resources are lost when new telehealth practices are planned and implemented from the ground up due to a lack materials to reference for guidance.

Although guidelines created for telehealth as a broad practice have utility and enhance the practice of teleoncology, the field of teleoncology is complicated by numerous factors, including the complexity of treatments and the critical health status of patients, which dictate a need for specific guidelines. As telehealth broadens and subspecialties emerge, each subspecialty will require thorough evaluation to enhance growth of the field, promote public awareness, and foster further development of telehealth in a variety of forms.

This review aims to evaluate the safety, feasibility, and effectiveness of teleoncology interventions for rural populations, as well as to summarize the existing policies and standards of practice and guidelines for the field. This evaluation will discuss how clear standards of practice will ultimately benefit the utility of teleoncology interventions. Implications for the field of nursing and future directions to improve advancement of the field will also be discussed.

Methods

A literature review was conducted in order to explore existing literature on teleoncology. Literature was included in this review that evaluated teleoncology interventions, which included assessing the following topics: patient and provider satisfaction, symptom management, cost-effectiveness, and delivery of care and safety. Studies with original data and systematic reviews published in peer-reviewed journals were collected through two databases (PubMed and CINAHL) and screened for relevance. A publication time period from 2008 through December 2018 was utilized for inclusion. Keywords including: telemedicine, telehealth, rural health, oncology, technology, teleoncology, cancer, symptom management and cost-effectiveness were utilized in varying combinations to conduct a literature review. MeSH terms Telemedicine/methods*, Telemedicine/trends, Patient satisfaction, Medical Oncology/trends, Medical Oncology/methods*, Rural Population, and Rural Health services/organization & administration* were also utilized in conducting the review. Reference lists of evaluated articles were searched for relevant literature. Sixteen studies that met this criteria and were included in this review. Additionally, a review of professional standards of practice and guidelines for telehealth users by professional organizations, both from national telehealth associations and nursing specific associations will be reviewed in order to assess the existence, quality, and comprehensiveness of existing guidelines. This review also determined the presence of

teleoncology specific guidelines, as well as to summarize guidelines for general telehealth practices. A total of ten published guidelines, standards, and recommendations/policy priorities are included.

Results

The 16 articles that met eligibility criteria addressed teleoncology and its impact on rural oncology care delivery. By assessing key aspects of teleoncology function reviewed in these 16 papers, including: patient and provider satisfaction, symptom management, cost-effectiveness, delivery of care and safety, the overall efficacy of teleoncology can be determined, and it can be decided if teleoncology improves access and quality of care to rural oncology patients, with the ultimate goal of increasing use across the country. Review of standards of practice and guidelines will determine the current status of teleoncology guidelines as well as areas for future development, and will be assessed in the latter half of this review.

Teleoncology

Patient and provider satisfaction with teleoncology. Five studies were found which address patient and provider satisfaction related to telehealth interventions (see table 1). The Townsville Cancer Centre in Queensland, Australia has been practicing and evaluating telemedicine for rural oncology patients since 2007, and has provided a wealth of information regarding patient and provider satisfaction with services, as well as other components of telemedicine services such as safety and feasibility, which will be discussed later in this paper (Sabesan, Simcox, & Marr, 2012). The telemedicine system utilized by the Townsville Cancer Centre focuses on video-conferencing which provides a link between patients in rural provider offices with specialist oncologist services. Examination by the rural provider, review of labs, and provider-provider discussion are used to inform the oncologist, who then determines a chemotherapy treatment

plan, including dosing and regimen planning. Chemotherapy is then able to be delivered at the rural site by chemotherapy trained nurses, saving patients travel time both at the time of treatment determination and for the duration of the treatment. Researchers evaluated provider and patient satisfaction with the system using a 5-point Likert scale. Results of the survey showed patient (n=50) and provider satisfaction (n=18), with main themes focusing on benefits in: time efficiency, cost-efficiency, enhanced communication, enhanced rapport building, medication safety, and delivery of specialist consultation in rural areas. A primary area of concern for both patients and providers continues to be the perceived necessity of an in-person physical examination (despite an in-person examination by the rural provider). Patients also displayed acceptance and satisfaction with receiving chemotherapy treatment at the rural site, with 82% of patients preferring to receive their care through the video-conferencing system over traveling to metropolitan cancer centers. Healthcare workers indicated satisfaction with the intervention, citing high confidence in the safety, communication, access to the Townsville center as needed, and access to adequate education necessary for operations (Sabesan, Simcox, & Marr, 2012).

The same Townsville Cancer Centre provided teleoncology care via video-conferencing to indigenous cancer patients in rural Australia (Mooi, Whop, Valery, & Sabesan, 2012). Through interviews, researchers evaluated patient, family member, and healthcare worker satisfaction. Similar to results reported by Sabesan, Simcox, & Marr (2012), patients (n=23), family members (n=two), and healthcare workers (n=six) reported high levels of satisfaction with teleoncology services. In all parties, preference for video-conferencing over face-to-face services were reported, with emphasis on the benefits of reduced cost, travel, and waiting times (Mooi et al., 2012). Interestingly, healthcare workers viewed the nurse/doctor presence at the

telemedicine appointment of greater importance than patients, who sometimes did not cite this as an important component of their care. Providers caring for indigenous populations through telemedicine programs should be consistent in providing culturally congruent care and ensuring patient preferences are being met (Mooi et al., 2012).

Patients involved in a Tennessee teleoncology program saw their oncologists face-to-face at a primary visit, and then received half of their follow-ups via teleoncology video-conferencing (Hede, 2010). Reporting of patient satisfaction by Hede (2010) indicated that 95% of the 200 patients involved in a Tennessee teleoncology intervention reported high levels of satisfaction and that teleoncology visits were either equal in quality or better quality than in-person visits (Hede, 2010).

A randomized control trial involving four rural clinics involved with the Duke Comprehensive Cancer Center evaluated the impact of telemedicine for cancer genetic counseling on patient satisfaction when compared to face-to-face cancer genetic counseling (Buchanan et al., 2015). As rural areas have decreased access to cancer screening, extension of telemedicine to services such as cancer genetic testing could have additional impacts on outcomes for rural patients, such as improved early detection, risk management, and treatment. A system which incorporated videoconferencing and file sharing was utilized for the intervention group (Buchanan et al., 2015). The Visit-Specific Satisfaction Questionnaire used a 5-point Likert scale to assess patient satisfaction with the following areas: waiting time, technical care, interpersonal care, and overall satisfaction. An additional survey, The Genetic Counselor Satisfaction Survey was used to assess value of the service. Use of the telemedicine service was associated with high satisfaction (n=81), which was similar to the satisfaction of in-person services, as reported by the control group (n=81). The control group received in-person genetic

services at their local oncologists office. 98% of those in the intervention group reported being comfortable with using the telegenetics communication system (Buchanan et al., 2015). Findings from a 2016 study by Bradbury et al. using videoconferencing to enhance access to genetic screening saw similar result with patient satisfaction and positive feelings towards the service, with reductions noted in anxiety and depression as well (V1 n=61; V2 n=41) (Bradbury et al., 2016).

Symptom management with teleoncology. Five studies were identified which evaluated the impact of telehealth on symptom management in cancer patients (table 2). The impact of a telephone-based telehealth intervention on oncology-related depression and pain was evaluated in a randomized control trial for both rural and urban patients in Indiana (Kroenke et al., 2010). Two hundred and two patients in the intervention group received telephone care management via a multidisciplinary team, which included symptom management for both depression and pain. The control group (n=203) received in-person care as usual. Assessments occurred at baseline and at four follow-up points over a year to monitor symptoms. The telecare model was found to lead to statistically significant improvements in both pain and depression reports in rural and urban oncology patients. Additionally, this intervention demonstrated advancements over usual care for quality of life, anxiety, and mental health (Kroenke et al., 2010). Further research by Kroenke et al. (2014) showed additional statistically significant benefits in the treatment of chronic pain through evaluation of telehealth in a randomized control trial. The intervention group (n=124) received telecare which implemented symptom monitoring and an algorithm to determine the optimal non-analgesic medication, which led to lower reports of pain. The control group (n=126) received in person pain care from their provider (Kroenke et al., 2014).

A study evaluating the effectiveness of a mobile-phone based intervention system for symptom management of cancer was conducted and evaluated by Kearney et al. (2009). This system was utilized to monitor oncology patients and manage chemotherapy symptoms remotely, including: fatigue, nausea, vomiting, diarrhea, mucositis, and hand-foot syndrome. Specifically, this intervention was targeted at oncology patients being treated for colorectal, breast, or lung cancer. A randomized control trial method was utilized and 112 patients were evaluated over five points in time in order to assess symptom morbidity. The research found statistically significant effects on managing fatigue-related symptoms and provided a timely system for monitoring chemotherapy-related toxicity in the intervention group (n=56). The control group (n=56) received standard care for symptom management (Kearney et al., 2009).

A randomized control trial tested the effectiveness of a telephone counseling system on 304 breast cancer patients to assess levels of psychosocial outcomes, including: distress, depression, sexual functions, and personal growth (Marcus et al., 2009). Personal growth encompasses themes such as how a cancer diagnosis impacts life perspectives and values. The intervention group (n=152) received 16 telephone sessions over one year following treatment with assessment of psychosocial outcomes occurring at three time points following enrollment. The control group (n=152) was provided with a resource book for various breast cancer needs. No differences were found between distress and depression levels in the intervention group and the control group. Significant results were seen in the intervention group for sexual dysfunction and personal growth, reporting lower levels of sexual dysfunction at 12- and 18-month follow-ups and greater reported personal growth at 12 and 18 months. In comparison, the control group showed no changes in reported levels of sexual dysfunction, reinforcing that telehealth

interventions for this psychosocial outcome may be especially beneficial at targeting this resistant symptom (Marcus et al., 2009).

Yun et al. (2012) tested the effectiveness of an internet-based education service in reducing fatigue and depression, as well as improving quality of life in cancer survivors. A randomized control trial method was utilized to evaluate 273 cancer survivors. Assessment of the primary outcome, fatigue, revealed that the intervention group (n=136) experienced a significant reduction in fatigue. Further, the intervention group reported significantly lower anxiety scores and an increased quality of life, which included greater emotional, social, and cognitive abilities (Yun et al., 2012).

Cost-effectiveness of teleoncology. The review of the literature revealed four studies assessing the impact of telehealth cancer care on costs (table 3). The University of Kansas Medical Center (KUMC) maintains one of the longest operating teleoncology programs worldwide, which began in 1995 and continues into 2019 (Doolittle, Spaulding, & Williams, 2011). This program connects KUMC oncologists with rural practices and has expanded to include additional practices in recent years. In a review of the 15-year cost-effectiveness of this program, it was found that the original cost of a teleconology visits ($812) dropped to $251 after ten years. As the number of teleoncology visits in the clinic increased, the cost per visit dropped (Doolittle et al., 2011). Research has also indicated that a teleoncology program will reach a point of sustainable cost-effectiveness when at least 200 patients are seen per year using the system (Doolittle et al., 2011). The study reported above by Hede (2010), which gathered findings regarding patient satisfaction, also evaluated cost-effectiveness of teleoncology interventions at their Tennessee teleoncology site (Hede, 2010). It was determined that in order for teleoncology

interventions to be cost-effective, the operation must save a minimum of 5 hours of travel for physicians each month.

The study from the Duke Comprehensive Cancer Center discussed above, which utilized telehealth to deliver cancer genetic counseling, also evaluated the cost-effectiveness of the service in order to determine feasibility of the intervention (Buchanan et al., 2015). The telehealth service was found to cost less than half of an in-person appointment, with the telehealth service costing $106 per person and the in-person service costing $244 per-person. These results have significant implications for clinics which aim to promote cancer genetic counseling but cannot afford to provide it as an in-person service (Buchanan et al., 2015).

Further evaluation of findings from the teleoncology services at The Townsville Cancer (TCC) involved a cost analysis of their teleoncology services, in comparison to the cost of usual care at TCC (Thaker, Monypenny, Olver, & Sabesan, 2013). All patients managed at TCC via teleoncology were evaluated to assess total costs of the service. Over 56 months, a total of 605 teleoncology appointments occurred, and a net savings of $320,118 was documented, mainly related to reductions in travel costs. These researchers suggest redistributing savings to rural centers to enhance their capabilities and resources for providing cancer care (Thaker et al., 2013).

Delivery of care and safety of teleoncology. Six studies identified and discussed the use of telehealth to impact access to care and the related safety of the care (table 4). In addition to evaluating patient satisfaction and cost-effectiveness, researchers at the telehealth program at the Townsville Cancer Centre (TCC) in Queensland, Australia, described above, also evaluated the ability to improve access to specialty consultations through teleoncology services (Sabesan et al., 2012). One hundred and fifty-eight patients from 18 rural towns in North Queensland received a

total of 745 cancer consultations from the Townsville teleoncology program. Through receiving consultation services at their local hospital, rural patients were able to achieve access to specialist consults, which led to avoidance of unnecessary hospital transfers and assisted with treatment planning. This enabled more patients to receive cancer services closer to home (Sabesan et al., 2012).

The Townsville Cancer Centre has also looked at the impact of using a chemotherapy supervision model in order to enable the administration of chemotherapy at rural clinics through medical oncologist supervision (Chan, Larkins, Evans, Watt, & Sabesan, 2015). Unlike the other evaluation components involved in the Townsville teleoncology program, this was the first study to evaluate the safety of this type of teleoncology intervention. A quasi-experimental design was used to compare the effects of teleoncology supervised chemotherapy administration for 89 patients at the remote location to 117 patients at the Townsville Cancer Center (TCC), who received usual care. Researchers evaluated toxicity, which included reports of serious side effects, mortality, and hospital admissions, as well as dose intensity, which involved the total number of doses received and cycles of treatment (Chan et al., 2015). Patients at the rural location were able to receive chemotherapy following video-conferencing between rural providers and medical oncologists at the TCC, which lead to the oncologist determining the best treatment regimen, as well as patient medical fitness to begin chemotherapy. At the rural site, chemotherapy-trained nurses then administered the chemotherapy. Following evaluation, it was found that there were no differences in dose intensity or toxicity between the rural and TCC group. Patients at both sites received and experienced similar doses, cycles, levels of side effects, and hospital admissions. There were no differences in levels of mortality between groups. These findings reveal that chemotherapy supervision at rural sites via a teleoncology program is a safe

mechanism that can allow for high-quality administration of various complex chemotherapy regimens closer to home for rural patients (Chan et al., 2015).

A virtual tumor board (VTB) program at the University of North Carolina Lineberger Comprehensive Cancer Center was initiated in 2010 and aimed to enhance access to multidisciplinary discussions, recommendations, and treatment assistance for providers across the state (Shea et al., 2014). This mechanism allowed for providers to video-conference with multidisciplinary tumor boards and discuss complex cases where second opinions may be needed. Qualitative data was collected through surveys, interviews, and observation. VTBs were found to be useful to community-based providers throughout North Carolina, primarily citing the utility of a second opinion, as well as the benefit of determining eligibility for clinical trials, especially for patients who may not have otherwise known of the trials. Community-based providers also noted that this service was especially useful when patients were not otherwise able to travel to UNC for consultations. As the VTBs were scheduled around the UNC physician schedule, they were less accessible to the community-based provider, highlighting the future importance of ensuring that the benefit of VTB participation outweighs any time lost (Shea et al., 2014).

In order to enhance access to high-quality care for breast cancer patients, a telehealth initiative was developed that combines teleoncology, telepathology, and telemammography into delivery of care (Lopez et al., 2009). The aim of this service was to streamline the breast cancer care spectrum, which can include numerous visits for physical exams, imaging, and biopsies. The Telehealth Rapid Breast Care Process aims to provide same-day reporting and rapid biopsies through the use of technology, reducing the fragmentation in the care process. Additionally, the service links patients with breast cancer specialists once a diagnosis has been determined. In

review of this program, when comparing the conventional method of pathology diagnosis to the virtual slide telepathology, the virtual slide telepathology (n=154) was able to detect several discrepancies in the usual method of pathology that may have otherwise gone undetected (Lopez et al., 2009).

Enhanced access and delivery of care can also involve improved coordination and delivery of psychosocial care. Psychosocial teleoncology care has been shown to improve cancer-related distress symptoms (n=152) (Marcus et al., 2009). Additional research focusing on the benefit of internet-based psychotherapy demonstrated improved access to geographically distributed young adults with cancer, with the average patient residing 148 miles from a cancer center (Melton, Brewer, Kolva, Joshi, & Bunch, 2017). These findings show that tele-based psychotherapy is not only beneficial in reducing distress, but also allows for a wide distribution of service across diverse geographical areas (Melton et al., 2017).

Telehealth approaches have also demonstrated effectiveness in expanding access to palliative care services, as this aspect of cancer care is especially challenged when rurality and long-distance travel are present, as palliative care services are often only available on an inpatient basis (Worster & Swartz, 2017). Community-based palliative care services remain limited. A review of palliative care delivered through telehealth (n=16) revealed positive findings in improved symptom control, enhanced coordination between oncologists and palliative specialists, fewer emergency department visits and fewer in-patient admissions (Worster & Swartz, 2017).

Professional Guidelines and Policies

Ten guidelines on telehealth care were identified and reviewed (table 5). One guideline addresses cancer care and telehealth (COSA Teleoncology Guidelines Working Group, 2016). The remaining guidelines and standards broadly discuss telehealth care.

American Telemedicine Association. As the only organization solely focused on telehealth, the American Telemedicine Association (ATA) is at the forefront of the telemedicine field, guiding the development and implementation of telemedicine policies at the state and federal levels, and have defined themselves as the voice of telemedicine policy. In North Carolina, New York, Oklahoma, and Pennsylvania, state medical boards dictate that providers must practice telemedicine in conformity with ATA guidelines (Krupinski & Bernard, 2014). The American Telemedicine Association differs from other governing bodies of telemedicine as it has a broad focus which encompasses a diverse field of specialty clinical services. The first example of a telemedicine guideline was in 1999 when the ATA published guidelines for telepathology, closely followed by guidelines for diabetic retinopathy and dermatology (Krupinski & Bernard, 2014). Guidelines from the ATA are created through a comprehensive literature review process from an established committee, which includes a Chair and a Vice-Chair who are selected by the ATA President and Executive Committee, and board of voluntary members. This team works to review the literature, develop recommendations, and go through multiple rounds of rigorous review to create guidelines which are evidence-based and accessible to the public (Krupinski & Bernard, 2014). Currently, no ATA guidelines specific to teleoncology exist.

In 2007, the Core Standards for Telemedicine Operations were published, which was an early effort by a panel of experts to standardize the field with practice guidelines and operational instructions (American Telemedicine Association, 2007). This document provided early adopters

of telemedicine with a comprehensive set of terminology that promoted consistency of language employment and early standards for administrative, clinical, and technical components of the practice. Additional publications by the American Telemedicine Association include sub-specialty guidelines for tele-mental health, teledermatology, tele-ophthalmology, tele-rehabilitation, telepathology, and tele-home health (Krupinski & Bernard, 2014).

The 2007 publication of the Core Standards for Telemedicine Operations was updated in 2014 by the publication of the Core Operational Guidelines for Telehealth Services Involving Provider-Patient Interactions (American Telemedicine Association, 2014). This updated document includes alterations and more comprehensive instructions regarding: privacy of data, identity verification for patients/providers, mobile device based telehealth, and patient education related to telehealth. Improvements in this document also include updated definitions and enhanced clarification of requirements through the use of keywords "shall," "should," and "may," which enable providers to better understand differences between requirements and areas where personal judgement should be relied upon. Administrative, clinical, and technical standards are all comprehensively expanded from the 2007 version, with major additions regarding documentation requirements, emergency procedures, criteria for use of telemedicine devices and equipment such as mobile phones, and the necessity of delivering culturally competent care. Recommendations for enhancing the quality of telehealth communications, including ensuring that rooms are private, secure, soundproof, and have locks on doors, are also unique to this document. Data storage requirements, the importance of encryption, and software needs are also discussed in this updated document (American Telemedicine Association, 2014).

The American Telemedicine Association published the Expert Consensus Recommendations for Videoconferencing-Based Telepresenting in 2011, which is being

discussed in this review for its relevance to a primary method of teleoncology delivery, videoconferencing (American Telemedicine Association, 2011). The purpose of this document is to define the requirements of being a telepresenter and to summarize critical steps in engaging in teleconferencing. Guidelines for this process, specifically for the teleconferencing presenter, are crucial, as accurate and appropriate information exchange is key for success. The guidelines describe necessary steps for the presenter to take before and during video conferencing, including scheduling, preparation, and quality and safety of the service. Technical standards are also described, which include controlling for appropriate lighting and noises during the session and troubleshooting issues that arise. Clinically, during the video-conference, the presenter maintains responsibility of acting as a patient advocate, protecting privacy, acting with cultural competency, and maintaining awareness of body language (American Telemedicine Association, 2011).

A 2017 policy priority summary published by the American Telemedicine Association discusses major priorities that need to be addressed in order to create policies that promote the visibility of telemedicine to patients, providers, and payers (American Telemedicine Association, 2017a). Priorities are based on the fundamental principles defined by the ATA, which include: eliminating government barriers to use, deterring development of new barriers, promoting telehealth use, increase value of the service, and increase patient outcomes and roles in the service. Because of the frequent multiple chronic conditions which often affect Medicare beneficiaries, leaving them homebound and at risk, ATA encourages Medicare to cover telehealth in payment to improve delivery of care to Medicare beneficiaries. ATA also promotes the removal of existing barriers for Medicare coverage for telehealth services, including geographical restrictions on coverage, asserting that all services which would otherwise be

covered by Medicare should be covered if rendered through alternative approaches (American Telemedicine Association, 2017a).

Licensing barriers, which often require practitioners to obtain additional prerequisites beyond those needed for face-to-face clinical care, lead to decreased access for patients who could benefit from telehealth (American Telemedicine Association, 2017a). The current approach to licensure requires providers to meet credentialing needs at the distant (or receiving end) of the telemedicine interaction, but this can deter smooth delivery of interstate care. ATA urges lawmakers to create policies which promote efficient use of telemedicine across state lines, which includes the necessity of enabling fluid internet prescribing capabilities and multi-state compacts. ATA also notes and urges consideration of the ability for telemedicine to address major interests of the federal government, including promoting efficiency in the government, enhancing population health, and developing new innovations (American Telemedicine Association, 2017a). The Federal Communications Commission (FCC) plays a key role in maximizing the utility of telemedicine, and ATA prioritizes facilitating collaboration with the FCC in order to extend broadband infrastructure and to develop network bridges between existing telemedicine systems. Additional components addressed as being critical in future policies include integration of the electronic health records with telemedicine initiatives, utilizing telemedicine to address emergency communications, and improving the status of international policy in order to globalize telemedicine initiatives (American Telemedicine Association, 2017a).

Board of nursing recommendations. Although not an example of published guidelines, a policy statement by the National Council of State Boards of Nursing (NCSBN) on telehealth nursing practice helps to improve visibility and provides guidance for nurses in the field of

telehealth (NCSBN, 2014). The NCSBN recognized telehealth nursing care as a part of regulated nursing practice, and thus requires its own regulations and rules. The council states that telehealth nursing includes any nursing care administered through telecommunication approaches, with the goal to improve client health, deliver interventions, and monitor outcomes. Challenges to telehealth nursing practice such as privacy of the patient, identity verification of the nurse, and enforcement of nursing standards are mentioned. The ability for nurses to engage in patient teaching and coaching is recognized as a component of nursing practice that is highly accessible by telehealth, as patients frequently rely on nurses to provide and verify information. An additional area of nursing that the council recognizes as being highly accessible to telehealth practice is triage nursing, as nurses can rapidly assess and make recommendations regarding the necessity of treatment. Further information is needed to determine nursing responsibility in telehealth practice, define the scope of the practice, and regulate nursing practice across state lines (NCSBN, 2014).

An additional position statement published by the North Carolina Board of Nursing (2018) seeks to guide and promote safe practice for nurses interested in telehealth. In agreement with the NCSBN, the NCBON recognizes the inclusion of telehealth practice as falling within the legal scope of nursing practice. This position statement clarifies that nurses engaging in telehealth in North Carolina must hold licensure in the state where the client is located, or hold practice privilege in the distant state. Nurses may practice any component of patient care within their scope of practice, as they would face-to-face (North Carolina Board of Nursing, 2018).

Additional guidelines and recommendations. The College of Registered Nurses of Nova Scotia is one of the only nursing bodies to publish guidelines for telenursing, which aims to guide and inform the practice of telenursing (College of Registered Nurses of Nova Scotia,

2017). This document provides a definition of telenursing, as defined by the College of Nurses of Ontario (CNO): "the delivery, management and coordination of care and services provided via information and telecommunication technologies" (CNO, 2017). The document is designed in a question and answer format that serves to answer common questions nurses interested in telenursing might need answered before engaging in the practice. A summary of telenursing technologies are included, as well as common telenursing approaches including: triage via call-centers, patient education through "ask a nurse" approaches, crisis intervention, multidisciplinary video-conferencing, assessment, continuing nursing education, and website development (College of Registered Nurses of Nova Scotia, 2017). Principles of telenursing state that successful telenursing will: supplement current health care services, increase access, minimize unnecessary treatment, enhance quality of care delivered, and secure the privacy of nurse-patient information. The guidelines clarify that any nurse practicing telenursing is responsible for following all standards of practice for face-to-face nursing in their area, as well as the respective code of ethics and scope of practice. It may be left up to the nurse how these in-person standards are to be applied to situations unique to telenursing. Additional questions regarding geographical limitations and liability are addressed. The necessity of adequate education is reinforced and suggestions are provided for how to enhance the quality of the nurse-client relationship established through appropriate behaviors and language (College of Registered Nurses of Nova Scotia, 2017).

A similar guideline document published by The College of Nurses of Ontario (2017) proposes similar guidelines, but incorporates more definitions related to telenursing and offers clinical scenarios for nurses considering telenursing to review. The inclusion of a glossary,

additional resources, and suggested reading makes this document highly useful to nurses considering telenursing (CNO, 2017).

An additional document published by the American Academy of Ambulatory Nursing (2018) intends to inform and guide nursing telehealth practice. Their unique document, Scope and Standards of Practice for Professional Telehealth Nursing, offers a framework for nurses in telehealth to follow in order to ensure high quality care. The document provides a context for telehealth practice, including 16 standards of the field. Six of these standards address each component of the nursing process (assess, diagnosis, outcome identification, planning, implementation, and evaluation), in order to make the guidelines more accessible to current practicing nurses. The additional ten guidelines dictate performance standards for nurses practicing telehealth. Although developed by ambulatory care nurses, this document was created in order to be highly accessible across a wide range of disciplines, and it is not specific to a particular specialty nursing practice. Oncology protocols and specialty considerations are not discussed (American Academy of Ambulatory Nursing, 2018).

A summary of recommendations published by the Clinical Oncology Society of Australia is one of the only existing bodies of recommendations specifically for teleoncology services (COSA Teleoncology Guidelines Working Group, 2016). Although it is not a comprehensive set of guidelines, the document sets out to provide recommendations to nurses and healthcare practitioners engaging in teleoncology services. In addition to providing recommendations, the documents also provides clinical and organizational practice points to ensure the greatest quality of care is provided. Specifically, this document recommends the use of teleoncology to provide services such as chemotherapy administration, consultations, symptom management, toxicity monitoring, and survivorship care. The authors note that a variability of available services will

occur depending on staffing and scope of practice at both the rural and urban sites. In order to successfully implement chemotherapy supervision models, telenursing and telepharmacy must be included in care, adequate nursing training is required (including chemotherapy training and basic life support training), and the environment must be carefully assessed for hazards in order to ensure both workers and patients are protected. The authors recommend videoconferencing to provide medical care, as well as telephone services to help educate, manage side effects, and improve psychosocial outcomes. Telephone screening is recommended to increase uptake of screening services for oncology patients. Palliative care services administered via telehealth video-conferencing mechanisms are recommended for rural patients who cannot access these services otherwise. Objectives to ensure privacy of the patient are also summarized, including: carefully selecting video-conferencing technology with embedded security features, use of encrypted networks, and storing all recordings securely. It must be noted that most of the recommendations made by this board received grades of either C or B, indicating that the amount of evidence to support practice recommendations is not strong enough to provide definitive recommendations that can guide practice (COSA Teleoncology Guidelines Working Group, 2016).

Discussion

Teleoncology

Following testing in various clinical settings, the use of teleoncology has displayed numerous benefits to rural oncology care, including high patient and provider satisfaction (Bradbury et al., 2016; Buchanan et al., 2015; Hede, 2010; Mooi et al., 2012; Sabesan, Simcox, & Marr, 2012). The literature shows that teleoncology can increase access to care, including specialty consultations and genetic counseling (Chan et al., 2012; Lopez et al., 2009; Melton et

al., 2017; Shea et al., 2014; Worster & Schwartz, 2017). Symptom management and remote delivery of chemotherapy are additional complex care management aspects that have been successfully managed by teleoncology initiatives (Kearney et al., 2008; Kroenke et al., 2010; Kroenke et al., 2014; Marcus et al., 2009; Sabesan et al., 2012; Yun et al., 2012).Teleoncology has also demonstrated cost-effectiveness in clinical settings, both for hospitals and patients (Buchanan et al., 2015; Doolittle et al., 2011; Hede, 2010; Thaker et al., 2013). Multiple forms of teleoncology have proven effective, including synchronous and asynchronous models. Teleoncology can serve to enhance and optimize the oncology workforce in order to decrease disruptions caused by rural workforce shortages, predicted oncologist shortages, and our aging population. Evidently, teleoncology can benefit vulnerable patients receiving cancer care by enhancing the safety of treatment delivery and access to treatment options, two prominent effects which could be enhanced by guideline creation.

Barriers to teleoncology. Although the benefits of telehealth appear clear in the literature, logistical and infrastructure barriers remain. Potential barriers to teleoncology uptake require evaluation to ensure the efficacy of the intervention is greater than the burden. The most common globally reported barrier to the use of telehealth is the perception that it is too expensive to implement (World Health Organization, 2010). Through an evaluation of the global status of telehealth, the World Health Organization (2010) reports that close to 70% of countries desire greater information on the cost-effectiveness of telehealth, and over 60% of countries want more clinical data on telehealth.

Access to broadband internet is not thoroughly available across rural areas of the United States, and this disparity in digital access mirrors the disparity in cancer care access, leaving this population with further vulnerabilities. Broadband internet is a necessity in order for patients and

providers in rural areas to engage in telehealth approaches such as video-conferencing, which is often accomplished through online host sites. Research has shown that 58% of rural Americans indicate they experience problems with access to high-speed internet, with 24% designating it as a major problem (Parker et al., 2018). Although internet access has now been described as a public utility by the Supreme Court (United States Telecom Assoc. v. FCC and United States, 2016), 39% of those living in rural areas still lack internet access, which equates to 23 million people (Federal Communications Commission, 2016). While some programs, such as the Connect America Fund, aim to decrease disparities in internet access and promote development of infrastructure (Federal Communications Commission, 2017), lack of access to broadband internet at appropriate speeds remains a major barrier to telehealth utilization in rural areas.

Some telehealth initiatives utilize the rural primary care provider to deliver chemotherapy and monitor patients for cancer-related side effects at their rural site (Chan et al., 2015; Doolittle, 2001). Although chemotherapy supervision has been demonstrated to be safe and effective (Chan et al., 2015), it is reasonable to assume that some primary care providers would feel uncomfortable engaging in this practice without adequate training and assistance (Doolittle, 2001). Telehealth practices which require primary care providers to take on additional roles without appropriate education should be carefully evaluated for their utility prior to uptake.

For the last twenty years, telehealth has been reimbursed in some capacity by the Centers for Medicare and Medicaid Services (CMS), but reimbursement for services is complicated by patient location (Center for Medicare and Medicaid Services, 2018). CMS beneficiaries must also live in a designated HPSA to qualify for reimbursement, and these areas are designated based on limitations in primary care providers and not oncologists (Center for Medicare and Medicaid Services, 2018). As data is being produced which demonstrates the effectiveness of

telehealth in improving access and quality of care, CMS restrictions have eased and 42 states now dictate that telehealth be covered by their Medicaid programs (Charlton et al., 2015). Additionally, 17 states now call for telehealth to be reimbursed by private insurance (Charlton et al., 2015). While these changes in availability of reimbursement for telehealth increase access for many patients, no two states are managing telehealth reimbursement in the same way, leading to challenges with uptake, implementation, and regulation. Lack of national telehealth policies has led to states developing their own legislation and rules for coverage, leaving the practice without a cohesive mechanism of practice (Charlton et al., 2015).

A 2014 national survey distributed by the American Academy of Family Physicians (AAFP) evaluated physician use of telehealth interventions and described top barriers to implementation (Moore, Coffman, Jetty, Petterson, & Bazemore, 2016). While most providers agreed that telehealth programs could enhance access for patients, only 15% reported using it within the past year. Major themes regarding barriers involved: lack of reimbursement and training, high costs of equipment, and issues involving liability. AAFP cites the necessity of policy changes to address provider barriers and eventually lead to increased adoption (Moore et al., 2016). Similar themes were noted in a national evaluation of cancer trends, where reimbursement, operational changes, and provider reluctance were noted as major barriers to uptake (The Oncology Roundtable & Association of Community Cancer Centers, 2018).

State licensure requirements add an additional barrier to uptake of telehealth, as many providers are limited to practicing within the state they are licensed, even though telehealth approaches extend their reach and capabilities of providing care (Weinstein et al., 2014). Several states have developed new licenses, specific to telehealth, which allow providers to practice across state lines. These states include both California and New Mexico, with New Mexico

providing licenses to teleradiologists that reduce the barriers to providing care. If physicians do wish to engage in practice out-of-state, it can be an expensive process to obtain adequate licensure and this lends itself to being a barrier for providers wishing to engage in multi-state telehealth (Weinstein et al., 2014).

Additional barriers involve discrepancies in hospital credentialing requirements, as a provider may meet their own hospitals requirements but not the hospital at which they are providing telehealth-based care. As this was a noted barrier to widespread use of telehealth, CMS and the Joint Commission established new regulations, which allows for "credentialing by proxy" to occur for physicians providing telehealth care (Weinstein et al., 2014). Credentialing by proxy allows for hospitals to engage in partnerships, where the telehealth provider must "rely on a distant site hospital or telemedicine entity's credentialing and privileging decisions" (California Telehealth Resource Center, 2014). This process aims to expedite the credentialing process and encourage approaches that utilize telehealth, as well as to decrease administrative work and increase flexibility for providers (Weinstein et al., 2014). Other challenges to successfully implementing telehealth initiatives include the cost of infrastructure, data security risks, cost of maintenance and upkeep, technology failures, necessity of increased staffing, lack of a consistent rural workforce, and concerns regarding economic sustainability (Weinstein et al., 2014).

Guidelines and Standards of Practice

While it is clear that teleoncology services should meet and follow all standards of practice and guidelines of in-person oncology services, this new technology requires its own rules and regulations to enhance cohesiveness and ease of uptake in the field, as well as patient safety and use of evidence-based practice. Although standards of practice and guidelines exist for

other subspecialties of telehealth, and telehealth as a broad field, teleoncology requires unique planning that meets the needs and protects the safety of oncology patients. As with radiology, stroke, and dialysis, telehealth extends itself to be highly useful in oncology, and guideline development should enhance this utility, not deter from it.

Concerns over healthcare provider authentication, liability, confidentiality, patient privacy, data storage, transfer, and use also pose challenges. The World Health Organization notes that legal issues are a major barrier for the use of all types of telehealth (World Health Organization, 2010). Technology-based challenges, including the complicated nature of telehealth systems and the potential for errors and malfunctions, lead to greater concerns regarding how this could impact patient safety and provider liability. In their report on the current status of telehealth, the World Health Organization (2010) states that "definitive and comprehensive guidelines" are necessary to address the problems these barriers pose. Additional legislation will be needed which regulates liability, access, and confidentiality. Ethical standards must also be considered when developing guidelines, as well as standards to ensure that all patients are enabled equal access to the practice and that the implementation of telehealth will not lead to further disparities in care between populations (World Health Organization, 2010).

Teleoncology guidelines can also demonstrate to legislators and payers that teleoncology is a defined practice, comparable to face-to-face care, and should be reimbursed in a similar manner (Krupinski & Bernard, 2014). Guidelines for teleoncology are also useful to illuminating limitations of the service and areas where technology is anticipated to grow to reduce these limitations (such as technologies which use hepatic feedback to allow providers to assess patients virtually through palpation) (Krupinski & Bernard, 2014).

Teleoncology guideline development should be encouraged by the recent passing of numerous bills related to telehealth through the house and the senate, including the CHRONIC Care Act for Medicare patients, the VETS Act, and H.R.3178 (American Telemedicine Association, 2017b). Many bills are still pending in congress, including Mobile Now, FAST Act, CONNECT Health Act, and others (American Telemedicine Association, 2017b). Those working to develop guidelines for teleoncology should see these successes in congress as motivation to promote continuing efforts in guideline development, as the passing of these acts enhances access to telehealth for many Americans and proves the government's vested interest in facilitating the maturation of telehealth practices.

It is likely that the earliest guidelines will be based on the experiences of providers who have utilized telehealth early on, which can provide interested parties with the necessary tools to understand common problems, and implementation strategies. Professional organizations involving teleoncology should also be involved in the process of guideline development, and should ultimately determine the safety, utility, and capacity of the guidelines prior to their distribution and use. Guidelines will require timely updates in order to evolve from experientially-based guidelines to evidence-based standards of care. As telehealth involves rapidly changing equipment and technologies, guidelines will also need to be changed as the technology changes. It may be beneficial for teleoncology to learn from other subspecialties of telehealth which have developed their own tested and validated guidelines, such as teleradiology, which is the longest running subspecialty of telehealth (Weinstein et al., 2014). These guidelines may serve as templates to guide the creation of teleoncology standards, as they address critical components including: provider role and scope of practice, training needs, reimbursement, and liability.

It should be noted and considered that guidelines may have a limited capacity to change provider behavior, and many providers prefer to rely on in-house guidelines instead of nationally published guidelines, such as those put forth by the ATA (Krupinski & Bernard, 2014). This may be caused by reluctance to assume that general guidelines apply to unique clinical settings and workflows. In order to overcome this barrier, guidelines should be adaptable to clinical environments and should accommodate existing teleoncology practices and applications (Krupinski & Bernard, 2014). Ultimately, guidelines must contain core principles that remain the same, even as guidelines change with updating technology, in order to guarantee safety and enhance access for rural oncology patients.

Future Recommendations

The incorporation of technology into healthcare to optimize delivery of care is inevitable, but our preparedness to accurately and effectively deliver it is dependent on preparation and anticipation of future needs. It is anticipated that technology will play an increasingly large role in healthcare, with an emphasis on the growing involvement of telehealth (Weinstein et al., 2014). As teleoncology use increases, both clinically and in published literature, it becomes clear that standardization of the practice is needed. While teleoncology demonstrates clear benefits to the rural oncology patient, a greater number of patients could be impacted in a more efficient manner with standards and guidelines to clarify the field. Additional changes in clinical technology, such as the digitization of health records, which can allow for the use of virtual diagnostic tools within the electronic health record to assess symptoms, should urge the field of oncology to advance concurrently with the technology and ensure that providers are enabled to participate in new opportunities (Sirintrapun & Lopez, 2018).

Additional requirements of the field including building a body of experimental studies, ideally randomized control trials, that add to the existing pool of research and demonstrate the efficacy of teleoncology. Research evaluating safety of chemotherapy supervision models of teleoncology are limited and the field would benefit from additional studies which demonstrate safety of medication supervision through telehealth. Longitudinal research which demonstrates improved outcomes, or equivalency of outcomes to patients at major cancer centers, for patients who receive teleoncology services is also necessary to contribute to existing literature. Additional long-term research on avoidance of hospital admissions and emergency department visits may also be needed to demonstrate effectiveness for rural patients.

Studies should reference teleoncology standards of practice and guidelines (as they develop) both in discussion and in planning and implementing research, as this supports growth of the field and can encourage providers in different clinical environments to utilize teleoncology. By using teleoncology guidelines within published research, it demonstrates their safety and efficacy and validates their development (Krupinski & Bernard, 2014). Research should focus on optimizing itself to be compatible for use in evidence-based guideline development by following guidelines that allow for extension of research findings to the target population (Bergmo, 2012). This can include using designs that are representative of normal patient workloads, and modeling techniques that enable more accurate evaluation of costs and cost comparison analyses (Bergmo, 2012). Research would also benefit from using a standardized method of evaluating data, in order to ensure data is accessible, valid, and can be utilized in creating guidelines (Krupinski & Bernard, 2014).

Telehealth guidelines should consider inclusion of guidelines for patients, as well as providers (Krupinski & Bernard, 2014). As patients become more tech savvy, many may prefer

to communicate with their providers through web-browser systems to send photos of conditions, describe physical complaints, and seek recommendations. Ultimately, it must be determined what is feasible for the provider to address. Guidelines may need to be incorporated which address provider limitations and define appropriate actions for these types of scenarios (Krupinski & Bernard, 2014).

Guideline creation for teleoncology is burdened by the rapidly changing technologies used to deliver the service and the time consuming and costly nature of research to evaluate new devices. Thus, teleoncology guidelines may face the threat of not being relevant within short periods after publication. Guideline creators must consider timeliness of data publication and be aware that frequent updates to guidelines may be necessary to ensure the safety and reliability of services before their use (Krupinski & Bernard, 2014). Telehealth practitioners should be continually provided the latest information on changes to the practice, reimbursement, and legislation.

Conclusion

Teleoncology services should be available to all patients of need through an integration of telehealth into oncology services in order to enhance access to screening, diagnostic services, and individualized treatment. Hospital systems should consider the unique needs of their rural populations when developing teleoncology practices and ensure that resources are tailored to the needs of their populations. Consistent training and education are needed for both rural and non-rural providers in order to enhance the essential function of improving access and coordination of care for rural cancer patients. Multidisciplinary (e.g., doctors, nurses, pharmacists, genetic counselors, psychosocial support) teams should be utilized whenever possible when providing teleoncology care in order to address comprehensive patient care issues and support optimal

health. Providers should utilize current standards of practice and guidelines to direct their care, even if the guidelines are not yet specific for oncology. Guidelines for video-conferencing and telehealth communications bear significant utility for those practicing teleoncology, even if they do not address specific oncology dilemmas. Oncology providers should work to promote the uptake of telehealth interventions in their hospitals, and should consider the need for development of teleoncology specific guidelines while they engage in teleoncology practice. Ultimately, teleoncology specific guidelines are lacking and further development of policies specific to both medical practice and nursing will enhance the quality, safety, and overall use of teleoncology for rural patients. Guidelines and policies should be integrated into the use of teleoncology services, and oncologists should have a clear understanding of the rules and evidence-based recommendations for best practices. Current telehealth guidelines for subspecialties have been well received and demonstrate great potential for success within teleoncology. The creation of guidelines is a collective obligation of those who currently utilize teleoncology, and is critical in determining future use and safety.

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Table 1: Summary of patient/provider satisfaction studies of teleoncology

Authors	Title	Literature Typology	Sample and setting	Objective/Hypothesis	Technology Focus	Results
Sabesan, S., Simcox, K., & Marr, I. (2012).	Medical oncology clinics through videoconferencing: An acceptable telehealth model for rural patients and health workers	Survey Design	55 videoconferencing patients at the Townsville Cancer Center (Queensland, Australia) evaluated between 2007-2010	Evaluate the satisfaction of rural patients who were receiving videoconferencing services for medical oncology management at a rural center.	Videoconferencing, telephone	Satisfaction with the use of videoconferencing was high both among patients and healthcare workers, with the greatest benefits noted in: improved rapport, time-efficiency, medication safety, communication, cost-efficiency, and delivery of consultations.
Mooi, J. K., Whop, L. J., Valery, P. C., & Sabesan, S. S. (2012).	Teleoncology for Indigenous patients: The responses of patients and health workers.	Descriptive study - semistructured interviews.	9 indigenous patients, 6 healthcare workers, and 2 family members were interviewed who had received videoconferencing oncology services between 2007-2011	Assess the experiences of indigenous patients using the videoconferencing service out of the Townsville Cancer Center, as well as their families and healthcare workers.	Videoconferencing	High satisfaction reported, with emphasis on reduced travel, waiting, and costs.
Hede, K. (2010)	Teleoncology Gaining Acceptance With Physicians, Patients.	Discussion	200 cancer patients (both urban and rural) who received videoconferencing services at the Tennessee Teleoncology project	Compare the patient satisfaction of videoconferencing services for patients to normal in-office services.	Videoconferencing	High satisfaction reported from patients, with 95% preferring videoconferencing to in-person services.
Buchanan et al., 2015	Randomized Trial of Telegenetics vs. In-Person Cancer Genetic Counseling: Cost, Patient Satisfaction and Attendance.	Randomized control trial	162 patients receiving cancer genetic counseling (CGC) teleoncology services at 4 rural clinics associated with the Duke Comprehensive Cancer Center	To report on satisfaction, cost, and attendance of rural patients involved in telegenetic CGC services compared to those who received in-person CGC.	Videoconference delivery of CGC, telephone survey follow-up	Similar satisfaction rates to in-person CGC services were found.
Bradbury, A. et al., 2016	Utilizing Remote Real-Time Videoconferencing to Expand Access to Cancer Genetic Services in Community Practices: A Multicenter Feasibility Study	Feasibility study	61 patients receiving remote videoconferencing cancer genetic services at 3 medical sites in New Jersey and Delaware	Evaluate the feasibility and patient feedback to receiving cancer genetic services through a videoconferencing mechanism at centers were no genetic provider was available.	Videoconferencing	100% of patients involved reported satisfaction with the service, with high ratings for ease of use of the service and comfort with the level of privacy afforded.

Table 2: Studies of symptom management with teleoncology

Authors	Title	Literature Typology	Sample and setting	Objective/Hypothesis	Technology Focus	Results
Kroenke et al., (2010)	Effect of Telecare Management on Pain and Depression in Patients With Cancer.	Randomized control trial	Patients from 16 rural and urban oncology centers; 202 received intervention and 203 received care as usual	To evaluate the effectiveness of a centralized telecare intervention on depression and anxiety in oncology patients	Centralized telecare management by a nurse (telephone based) and automated symptom management using either phone calls or web-based surveys	Statistically significant improvements in patient reports of depression and anxiety were found in the intervention group
Kroenke et al., (2014)	Telecare Collaborative Management of Chronic Pain in Primary Care.	Randomized control trial	Patients from 5 primary care offices in a VA medical center were randomized into 2 group - 124 received the intervention and 126 received care as usual	To assess the use of telecare as an intervention for oncology patients with chronic pain	Telephone based	The intervention group reported higher levels of improvement in pain scores. Use of a specific algorithm for determining analgesic medication is believed to be a contributor to positive results.
Kearney et al. (2008).	Evaluation of a mobile phone-based, advanced symptom management system (ASyMS©) in the management of chemotherapy-related toxicity.	Randomized control trial	Patients from 5 cancer centers and two local hospitals receiving outpatient chemotherapy for lung, colorectal, or breast cancer - 56 received the intervention and 56 received standard care.	Assessment of the impact of the phone based symptom monitoring system (ASyMS©) on reducing the severity and occurrence of chemotherapy related symptoms, including: mucositis, nausea, vomiting, diarrhea, hand-foot syndrome	Telephone based symptom monitoring system (ASyMS©)	The ASyMS© revealed improved fatigue related scores and allowed for earlier detection of chemotherapy-related side effects and toxicity
Marcus et al., (2009)	Can telephone counseling post-treatment improve psychosocial outcomes among early stage breast cancer survivors?	Randomized control trial	Patients from 21 hospitals post-treatment for breast cancer - 152 received the intervention and 152 in the control group received post-treatment resources for breast cancer	To assess the impact of a telephone counseling service (16 sessions) on psychosocial factors for patients with breast cancer	Telephone counseling service	Significant improvements were found in the intervention group for reports of sexual dysfunction and personal growth
Yun et al. (2012)	Web-Based Tailored Education Program for Disease-Free Cancer Survivors With Cancer-Related Fatigue: A Randomized Controlled Trial.	Randomized control trial	Patients post-treatment from 4 hospitals who had cancer-related fatigue - 136 received the intervention and 137 received standard care.	To determine the effects of internet based education on patients with cancer-related fatigue	Internet based education service	The intervention group saw improvements in fatigue measures, lower anxiety scores, and an overall improved quality of life

Table 3: Studies of cost-effectiveness of teleoncology

Authors	Title	Literature Typology	Sample and setting	Objective/Hypothesis	Technology Focus	Results
Doolittle, Spaulding, & Williams, (2011)	The Decreasing Cost of Telemedicine and Telehealth.	Retrospective cost analysis	15 year cost analysis (1995 - 2010) of teleoncology practice at University of Kansas Medical Center (KUMC)	To evaluate the cost-effectiveness of the KUMC teleoncology services (patient management through combination of in-person clinic visits and telemedicine clinic visits)	Internet-based videoconferencing	Original cost of telemedicine visits dropped from $812 to $251 in 10 years. Teleoncology programs can obtain sustainability once they see at least 200 patients per year.
Hede (2010)	Teleoncology Gaining Acceptance With Physicians, Patients.	Discussion	Tennessee teleoncology project - Technology Exchange for Cancer Health Network (Tech-Net)	Discuss cost-effectiveness of Tennessee Teleoncology project	Telemedicine outreach clinic using video-conferencing and medical diagnostic tools	Teleoncology services will become cost effective once they save physicians an average of 5 hours of travel per week.
Buchanan et al., (2015)	Randomized Trial of Telegenetics vs. In-Person Cancer Genetic Counseling: Cost, Patient Satisfaction and Attendance.	Randomized control trial	162 patients receiving cancer genetic counseling (CGC) teleoncology services at 4 rural clinics associated with the Duke Comprehensive Cancer Center	Evaluate the cost-effectiveness of the cancer genetic services as compared to usual services	Videoconference delivery of CGC, telephone survey follow-up	Telemedicine CGC was found to cost less than half of in-person CGC, costing $106 compared to $244
Thaker, Monypenny, Olver, & Sabesan, (2013)	Cost savings from a telemedicine model of care in northern Queensland, Australia.	Retrospective cost analysis	Record review of all patients managed by Townsville Teleoncology Cancer Center (TCC) and 6 rural centers between 2007-2011	Analyze the costs of the TCC teleoncology model compared to standard care at Townsville	Videoconferencing	Net savings of $320,118 were found between 2007-2011

Table 4: Studies of delivery of care and safety of teleoncology

Authors	Title	Literature Typology	Sample and setting	Objective/Hypothesis	Technology Focus	Results
Sabesan et al., (2012)	Telemedicine for rural cancer care in North Queensland: Bringing cancer care home.	Descriptive study	158 patients from 18 rural centers who received a total of 745 teleoncology consultations via the Townsville Cancer Center network between 2007-2011.	To describe the impact of teleoncology use at the Townsville cancer Center for rural patients in providing specialist services, urgent care, rural care, and remote chemo supervision.	Videoconferencing	Teleoncology models allows for increased access to care for rural patients, specifically for receiving specialist services and chemotherapy with greater proximity to home.
Chan, Larkins, Evans, Watt, & Sabesan, (2015)	Do teleoncology models of care enable safe delivery of chemotherapy in rural towns?	Quasi-experimental	89 patients in the Townsville Cancer Center (TCC) teleoncology program who received chemotherapy at Mt Isa Hospital and 117 patients who received standard care for their chemotherapy at TCC.	To assess the impact of teleoncology chemotherapy supervision on the dose intensity of chemo, including: toxicity rates, dosing, cycles, amount of side effects, mortality, and hospital admissions compared to standard care with the same oncologists.	Chemotherapy supervision via videoconferencing	No differences were found between groups in toxicity, dose, cycles, side effects, mortality, or hospital admission, and it was determined that delivery of chemotherapy via teleoncology supervision is safe.
Shea et al., (2014)	Assessing the Feasibility of a Virtual Tumor Board Program: A Case Study.	Case study	Virtual tumor board encounters at UNC Lineberger Comprehensive Cancer Center (LCCC), including: review of one VTB case, interviews with physicians (both UNC and community), and one survey of UNC VTB attendees	Assessment of the feasibility of a virtual tumor board at UNC LCCC and to evaluate the initiative for its value and possible barriers for implementation.	Virtual tumor board	Virtual tumor boards benefit the community-based provider in enhancing access to second opinion, clinical trials, and for patients who could not otherwise travel to UNC for care.
Lopez et al., (2009)	Virtual slide telepathology enables an innovative telehealth rapid breast care clinic.	Validation study	154 breast cancer cases that required STAT second opinions at the University Medical Center in Tucson, Arizona	Comparison of effectiveness of virtual slide telepathology to conventional microscopy pathology for STAT pathology second opinions	Virtual slide pathology	Virtual slide pathology has the ability to detect discrepancies in pathology review.
Melton, Brewer, Kolva, Joshi, & Bunch, (2017)	Increasing access to care for young adults with cancer: Results of a quality-improvement project using a novel telemedicine approach	Quality-improvement project	8 young adults with cancer receiving treatment at various Colorado hospitals and cancer centers.	To assess the impact of a telemedicine support group on enhancing access to treatment and minimizing geographic variables	Video conferencing	Patients reported the telemedicine support group to be beneficial and would recommend to others. Low attrition rates were found due to the online, flexible format.

	to supportive group psychotherapy.					
Worster & Swartz, (2017)	Telemedicine and Palliative Care: An Increasing Role in Supportive Oncology.	Literature review	A review of 16 publications discussing the role of telemedicine in palliative care services in oncology.	To summarize the existing literature on integration of telemedicine palliative care to improve access to palliative care services.	Varying	Palliative care administered via telemedicine has shown to improve access for rural patients. Telemedicine based palliative care has shown benefits in symptom control, improved coordination, fewer ED visits, and fewer admissions.

Table 5: Standards of practice and guidelines results

Organization	Title	Guideline Focus	Operational, Technical, or Practice Guidelines	Recommendation/Utility of document	Status
American Telemedicine Association (2011)	Expert Consensus Recommendations for Videoconferencing -Based Telepresenting	Videoconferencing	Operational	Person acting as video presenter must take adequate preparation prior to videoconference to ensure proper scheduling, preparation, and quality of the service. Presenter must control for light and noise. Presenter must advocate for client, maintain privacy, have full awareness of how to utilize technology, and act appropriately during conference.	Published
American Telemedicine Association (2007)	Core Standards for Telemedicine Operations	Video Conferencing, image transmission, remote monitoring, e-health, nursing calls.	Operational	Document explains core terminology related to telemedicine to encourage uniformity of language in the field. Administrative, clinical, and technical standards are summarized.	Published
American Telemedicine Association (2014)	Core Operational Guidelines for Telehealth Services Involving Provider-Patient Interactions	Email, phone communications, videoconferencing, image transmission, m-health, call centers, electronic data transmission, e-health, remote monitoring.	Operational	Updated version of 2007 ATA documents, expands the following areas: education for the telemedicine patient, provider identification, location of service delivery, advice for use of phones with telemedicine initiatives, patient privacy and safety. Documents also expands from 2007 ATA document by offering more clear expectations for administrative, clinical, and technical standards using the terms “shall”, “should”, and “may” to guide professionals.	Published
American Telemedicine Association (2017)	Transforming health care for patients: 2017 policy priorities.	Any telemedicine initiative	Policy Priority Statement	Priorities which require addressing to improve field of telemedicine: eliminate barriers to accessing telemedicine, prevent the development of new barriers, enhance the use of telemedicine to address current gaps in care, enhance payment systems, and improve patient involvement in their telemedicine care.	Published
National Council of State Boards of Nursing (2014)	The national council of state boards of nursing (NCSBN) position paper on telehealth nursing practice.	Nursing telehealth services, including any nursing care delivered through an electronic method	Position statement	The National Council of State Boards of Nursing (NCSBN) recognizes telenursing as falling under the scope of practice of nursing. Telenursing will require its own rules and regulations, similar to other subspecialty fields of nursing.	Published
North Carolina Board of Nursing (2018)	Telehealth/telenursing position statement for RN, LPN, and APRN practice.	Nursing telehealth services, including any nursing care delivered through an electronic method	Position statement	The North Carolina Board of Nursing (NCBON) recognizes telenursing as falling within the legal scope of nursing practice. Nurses practicing telehealth in North Carolina must hold a license in the state where the client is located or must have privilege from the distant site to provide care. Nurses should follow guidelines for face-to-face care when providing telenursing care.	Published

The College of Registered Nurses of Nova Scotia (2017)	Telenursing practice guidelines.	Nursing care administered via telehealth	Practice	Provides a summary of different telenursing approaches and their utility. These guidelines recommend that any nurse practicing telenursing should: improve quality of care, enhance access, decrease unnecessary treatment, supplement other healthcare services, and ensure patient privacy. Nurses practicing telenursing should follow guidelines for face-to-face nursing.	Published
The College of Nurses of Ontario (2017)	Telepractice: practice guideline.	Nursing care administered via telehealth	Practice	Offers a definition of telenursing to help inform the practice: "the delivery, management and coordination of care and services provided via information and telecommunication technologies." Proposes similar recommendations to The College of Nurses of Nova Scotia but includes telenursing definitions and utilizes clinical scenarios, a glossary, and resources, to provide education to the nurse interested in telenursing.	Published
COSA Teleoncology Guidelines Working Group (2016)	Clinical Practice Guidelines for Teleoncology	Teleoncology services	Practice	Provides a set of recommendations, graded A, B, C, or D to guide the delivery of teleoncology services. Practice points are provided to ensure quality of care and to promote standardization of practices. Recommendations focus on summarizing evidence-based teleoncology models of care, the effects of teleoncology, legal issues surrounding teleoncology, patient satisfaction, and the safety of teleoncology.	Published
American Academy of Ambulatory Nurses (2018)	Scope and standards of practice for professional telehealth nursing	Nursing care administered via telehealth	Practice	Defines standards for telehealth nursing care by defining 16 standards of practice. 6 standards address the 6 steps of the nursing process and 10 standards address nursing performance objectives in the field. Standards are broadly applicable to various types of telehealth nursing. Clearly defines competencies required in the field including information on: knowledge needed, interpersonal and technical skills, documentation, and necessities related to professional development.	Published