Telehealth: Measurement for Best Outcomes in Support of Rural Residents

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Abstract

Purpose: Recent challenges like the global COVID-19 pandemic have led to innovations in health care practices. Specifically, advancements in remote, contactless telemedicine. For the rural residents, telemedicine is increasing access to specialists, generalists, mental health providers and unique therapies. With rapid growth, healthcare providers must move swiftly to prepare their organizations to implement telemedicine in an ethical and efficient manner. The purpose of the following study is to examine how healthcare professionals can apply and measure rural telemedicine to specifically support rural patients. Understanding how to measure telemedicine effectiveness is particularly important for rural health care nurses and doctors as they balance innovative technology and quality of care.

Sample: After IRB approval, 31 participants were identified from two sections of a graduate management of business administration course within the healthcare management specialization. All participants were admitted graduate students in the HC management specialization.

Method: The study utilizes inductive thematic analysis to investigate the sample of survey results describing telehealth in rural areas. The participants completed an anonymous online survey specifically addressing telehealth care in rural locations as related to opportunities and measurements. Through inductive thematic analysis, the researchers identify numerous cross-referenced themes from the data.

Findings: Participants identified access to healthcare as the greatest gap that telehealth can fill for rural residents. Additionally, participants identified patient surveys as the best way to measure tele-patient experience and satisfaction.

Conclusion: The following study identifies the greatest gap that can be filled by telehealth in rural areas as access to care. The study also identifies the best measurement for telehealth effectiveness for rural residents as patient surveys. This study aims to bring about awareness of rural telehealth opportunities through ongoing discussion directly with current and future healthcare providers.

Keywords: telehealth, telemedicine, rural, healthcare workers

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The word "*telemedicine"* was introduced in the 1970s (Strehle & Shabde, 2006). "'*Tele*' is a Greek word signifying "distance," and "mederi"" is a Latin word signifying 'to heal' (Sageena et al., 2021, p. 1320). Telemedicine uses information and communication technology to support long-distanced health care services (Ashfaq et al., 2020). The future of telemedicine is bright.

> Telemedicine is rising as a promising tool for better clinical care to patients at home, saving time, providing cost effective and prompt access to healthcare services. Simultaneously, health professionals can see numerous patients, thus increasing revenue, e-data analysis increasing practice efficiency, providing better diagnosis, informed decision, and management. (Sageena et al., 2021, p. 1322).

In 2017, it was reported by The New England Journal of Medicine that, "Telehealth technologies, tools, and services are becoming an important component of the health care system," (Tuckson et al., 2017, p. 1585). During the pandemic, the rate of telehealth provider adoption increasing by 340% from 2015 to 2019 (Bryant, 2019). Telemedicine was the leading healthcare industry trend in 2021 (GlobalData, 2021) and the telemedicine industry market is expected to

reach more than $130 billion by 2025 (Elliott & Yopes, 2019). Clearly, it is essential that health care providers prepare for this modality (Chike-Harris, 2021). For the healthcare provider, one critical area of preparation is identifying the best measurements to use to understand if telemedicine is supporting patient quality of care.

Research regarding telemedicine is positive. In 2020, more than 76% of hospitals reported using telehealth to offer services to their patients (American Hospital Association [AHA], n.d.) and more than 50% of hospitals incorporating remote patient monitoring capabilities (AHA, n.d.). Additionally, 40 to 60 percent of consumers are expressing an interest in telemedicine, 58% of physicians view telemedicine as favorable, 84 percent of physicians are offering virtual visits and 57% of physicians prefer to continue offering virtual care post-pandemic (Bestsennyy et al, 2021).

One population that has experienced benefit from increased telemedicine usage throughout America is the rural resident (Quinton et al, 2021). The United States Department of Agriculture (USDA) Economic Research Service (n.d.) defines rural as having a population ranging from 2,500 up to 50,000. Approximately 16% of Americans live in rural areas (American Association for Accreditation of Ambulatory Surgery Facilities [AAAASF], 2019), yet rural hospital closures are on the rise with more than half of rural counties lacking a single hospital (Anderson & Singh, 2021). Even if medical facilities are available, many rural medical organizations are understaffed (Council on Graduate Medical Education, 2020) and travel to receive healthcare creates additional expenses for rural residents (Anderson & Singh, 2021). This is of significant concern as access to healthcare is critical for overall physical and mental health (Office of Disease Prevention and Health Promotion, n.d.). Rural residents have unique challenges in accessing healthcare (Rural Health Information Hub, n.d.). In fact, many recognize that rural America faces a health care crisis (Ollove, 2020).

Review of Literature

This study included an initial literature search of 514 peer reviewed articles based on the search criteria of "effectiveness of telehealth" and "rural care" with publication dates between 2019- 2024. Articles were reviewed in depth if they specifically addressed measuring the effectiveness of telehealth, telehealth care in support of rural patient needs, and how healthcare providers can strategically use measurements to support quality of rural tele-healthcare in their organization.

Measurements for Effective Telehealth

It is important to measure healthcare outcomes to support ongoing improvement to quality of care. Measurements for face-to-face healthcare have long been studied (Culhane-Pera et al, 2021; Grigoroudis et al., 2012). However, many researchers are recognizing a need for clear telehealth measurements (Chuo et al., 2021; Sahu et al. 2022). The following literature examines methods for measuring telehealth outcomes.

Researchers are examining methods and strategies that can be uniformly applied to measure telehealth. Chuo, Chandler, and Lorch (2021) identified that there are significant variations in evaluation methods and measures for pediatric telehealth programs. To support streamlined measurements, the researchers presented Supporting Pediatric Research on Outcomes and Utilization of Telehealth (SPROUT), Telehealth Evaluation and Measurement (STEM) for assessing a telehealth program. With SPROUT, there are four telehealth measurement domains, health outcomes, health delivery quality and cost, experience and program implementation. The first domain, health outcomes, measures the goal of making the patient healthier, the second domain measures the quality and cost of healthcare delivery, the third domain measures the individual experience and impact encounters have on patient's daily life, and the fourth domain

measures the operational aspect of telehealth with key performance indicators. The researchers recognize the potential of using the STEM model as it offers a construct to define and organize telehealth measures. Overall, the researchers recommended a valid and reliable system that recognizes patients, providers, the healthcare system, and payers with actionable measures to assess telehealth.

In addition to examining care specific measurements, Knapp et al. (2021) recognized that with the rise of digital health technologies and telemedicine, the need for evidence-based evaluation is increasing. This research team identified patient-reported outcome measures (PROMs) and patient-reported experience measures (PREMs) as essential for evaluation of telemedicine. Through a systematic literature review with 303 studies, the researchers identified that health-related quality of life, emotional function and adherence were the most frequent assessed outcome domains. Patient reported outcome measures are used more frequently than PREMS in telemedicine. Notably, health literacy and proper training were both preconditions for using the applications.

The literature, notes clearly that telehealth requires ongoing measurement, and the measurements should examine the telehealth system benefit to patient, provider, healthcare system, and payer. Actionable measures and telehealth provider training are needed to maximize telehealth outcomes.

Telehealth Care in Support of Rural Patient Needs

Telehealth has a unique potential in rural areas (Orlando et al., 2019; Tsou et al, 2021). To maximize telehealth outcomes in rural areas, it is important to understand rural residents' needs, demographics, perceptions of care and access to technology. Additionally, it is important to

understand the providers' perception of telehealth application in rural settings. The following articles discuss the unique application of telehealth in rural locations.

Understanding the rural patient's preferred telehealth communication tools is an important initial telehealth assessment. Orlando et al. (2019) conducted a systematic review to explore whether patients and their caregivers living in rural and remote areas were satisfied with telehealth videoconferencing as a mode of service delivery in managing their healthcare. The researchers examined literature reviewing 36 studies of people living in rural or remote areas who attended outpatient appointments for health conditions via videoconferencing and if the studies measured patient or caregiver satisfaction. Data on satisfaction was extracted and synthesized. Overall, satisfaction with telehealth was categorized into system experience, information sharing, consumer focus, and overall satisfaction. There were high levels of satisfaction across all dimensions, but the researchers noted that there is a lack of clarity in terms of how satisfaction was defined and measured. People living in rural and remote areas were generally satisfied with telehealth as a mode of service as it improved access.

While generally satisfied with telehealth, are there some telehealth services that specifically support better outcomes for rural residents? Tsou et al. (2021) examined emergency telehealth use to improve access of patients residing in rural and remote areas to specialists' care. Specifically, the researchers reviewed 21 articles examining the outcomes measuring effectiveness of telehealth in rural and remote areas and analyzing the clinical context in which these measures are used. The study concluded that, telehealth use in rural and remote emergency departments demonstrated effectiveness in achieving improved or equivalent clinical effectiveness, appropriate care processes and favorable service use patterns.

The research reviewed here found that effectiveness of telehealth in rural or remote locations is favorable:

1. Patients appreciate access to care.
2. Providers see value and opportunity in telehealth application for rural residents.
3. In some cases, telehealth improves the speed of care for rural residents.

Healthcare Provider Applications of Measurements to Support Effective Rural Telehealth

Literature is showing that telehealth offers benefits like reduce hospital admissions (Davila et al., 2023), improved access to care (Orlando et al., 2019) and improved or equivalent clinical effectiveness with traditional care (Tsou et al., 2021). However, clear measurements of telehealth outcomes require further research (Chuo et al., 2021; Mohktar et al., 2015; Sahu et al. 2022). Within the healthcare organization, providers seek to improve the efficiency and quality in the delivery of healthcare services. Therefore, the healthcare provider requires effective measurements of telehealth outcomes. Current literature addressing telehealth measurement of outcomes that are important to healthcare providers, nurses and doctors is reviewed here.

While telehealth was in use and researched pre-COVD, telehealth research, design and implementation focus shifted with the COVID-19 pandemic. Anderson and Singh (2021) conducted a study with the purpose of gaining an understanding of telehealth usage during COVID-19 in rural healthcare facilities. Through an action research methodology that included a review of literature, review of existing documents, strengths, weaknesses, opportunities, and threats (SWOT) analysis and staffing plans, the researchers identified several strategies important for increasing telehealth uptake. Specifically, it was identified telehealth services could support patient and provider safety by minimizing exposure during the pandemic, that the healthcare organization must communicate effectively with payers to ensure their understanding of telehealth

covered services, the use of tele-triage methods for assessing and caring for patients can decrease the number of people seeking in-person services, and providers may need to customize outreach plans for patients with limited technology and connectivity. Uniquely, the researchers suggested that healthcare leaders schedule staff such that all employees incorporate regular telework into the schedules to increase telehealth utilization.

Increased application of telehealth is one method for improving awareness and quality of services. However, barriers to effective implementation remain. Chen and colleagues (2021) conducted a study to assess telehealth adoption among hospitals located in rural and urban areas to identify barriers related to enhancing telehealth capabilities. They reviewed the 2018 AHA Annual Survey (n = 4,608), which is an annual census of US hospitals with an 80% response rate. The study focused on the general medical and surgical hospitals that responded to the telehealth section measuring telehealth adoption (n = 3,537). Further the research team linked the AHA Annual Survey with data from the 2018 AHA Annual Information Technology (IT) Supplemental Survey to track in-depth measures of barriers to telehealth capabilities (n = 2,277). The research concluded that substantial differences in telehealth adoption occur among hospitals located in rural and metropolitan areas. Specifically, telehealth adoption rates increased with urbanity, rural hospitals were least likely to have telehealth systems with patient engagement capabilities and rural hospitals were least likely to report the clinical information electronically from outside providers. Overall, there were significant barriers to telehealth use among hospitals located in rural areas. Additionally, rural hospitals lacked the health information exchange capacity among health care providers and lacked patient engagement capabilities.

Telemedicine is a leading healthcare industry trend and the telemedicine industry market is expected to continue to grow (Elliott & Yopes, 2019). Yet, literature also indicates that unique

challenges to telehealth application in rural areas persist (Anderson & Singh, 2021; Chen, et al., 2021). Clearly, it is essential that health care providers prepare for this modality (Chike-Harris, 2021). Additionally, for the healthcare nurse and doctor, one critical area of preparation continues to be identifying the best measurements to use to understand if telemedicine is supporting rural patient quality of care.

Research Questions

This study sought to expand the research concerning measurements for evaluating telehealth care in rural areas. Many researchers have examined effective healthcare measurements for traditional care and for telehealth, however there is a shortage of telehealth measurement specifically for quality care with rural residents. This research may support further the exploration of telehealth care measurements necessary for creating the highest quality of care for rural residents. Further, this research may support healthcare providers in developing telehealth initiatives and training specific to serving rural patients.

For this study, it was hypothesized that healthcare professionals' perceptions of telehealth in rural areas would reveal themes about gaps in care and effective measurements. Therefore, the following research questions were explored:

1. What are the greatest gaps that can be addressed by telehealth in rural areas?
2. How can telehealth outcomes best be measured?

The answer to these two research questions were identified through a qualitative analysis of research participant's self-reported perceptions of telehealth and a review of literature examining telehealth quality of care in rural settings.

Methodology

The study utilized inductive thematic analysis (Guest et al., 2012) to investigate the sample of survey results describing telehealth in rural areas. Inductive thematic analysis is a comprehensive process where researchers identify numerous cross-references between the data and evolving themes (Hayes, 1997). In fact, thematic analysis is considered most appropriate for studies that seek to discover interpretations (Alhojailan, 2012). Namey et al. (2008) said,

> Thematic moves beyond counting explicit words or phrases and focuses on identifying and describing both implicit and explicit ideas. Codes developed for ideas or themes are then applied or linked to raw data as summary markets for later analysis, which may include comparing the relative frequencies of themes or topics within a data set, looking for code co-occurrence, or graphically displaying code relationships (p. 138).

An inductive thematic analysis has four stages to support a comprehensive analysis (Joffe & Yardley, 2004). First, the data is reduced to identify only comments associated with the research questions. Next, the reduced sample is coded. Third, the samples are reviewed seeking strategies for linking or eliminating codes within the identified concepts. Finally, the data is presented to an independent coder who was trained to review the codebook.

Reliability

The independent coders applied the codebook to the entire sample and the reliability of codes was evaluated for the thematic analysis to ensure the themes' interpretations were maintained between coders (Crabtree & Miller, 1999). If any deviation occurred between the researchers and the coders, the variation was discussed until unanimity was achieved. Once 100% intercoder reliability was achieved a frequency analysis of themes was applied.

Procedures

First, the researcher submitted an Institutional Review Board (IRB) proposal to the university and obtained IRB approval to complete the study. With IRB approval, 31 graduate students specializing in healthcare management at a regional university completed an anonymous survey answering two questions regarding perceptions of telehealth in rural areas.

1. What is the greatest gap telehealth can fill in rural areas?
2. How best can telehealth outcomes be measured?

No identifying data were collected. Results were analyzed, categorized and conclusions were drawn based on themes.

Participants

Participants (n = 31) were identified from two sections of a graduate course within the healthcare management specialization. The students in these courses were admitted graduate students in the healthcare management specialization and had the choice to participate or not participate in the survey with absolutely no impact, positive or negative, to their grade or course experience. No demographic data were collected to protect the anonymity of the participants.

Results

The researcher initially individually examined each survey. Next two trained individual coders reviewed the surveys and identified key words and phrases, specifically seeking identification of themes. Any variations in thematic conclusions were discussed between the researcher and the two coders, until unanimity was achieved.

Question One

When asked the question, “What is the greatest gap that can be addressed by telehealth in rural areas?” Table 1 shows the number and overall occurrence of each theme.

Table 1

Number and Overall Occurrence of Responses to Question 1

Theme	Number	Overall Occurrence
Access to care.	12	38.71%
Access to specialists.	6	19.35%
Training for patients and providers.	3	9.68%
Access to mental health provider.	3	9.68%
Patient information.	2	6.45%
Access to providers.	2	6.45%

Table percentage are not rounded.

Four primary themes emerged. Using rounded numbers, 39% (n = 12) of participants identified *access* to healthcare as the greatest gap that telehealth can fill for rural residents. Twenty percent (n = 6) of participants identified access to specialists as the greatest gap filled by telehealth for rural residents. Ten percent (n = 3) of the participants identified that training for patients and providers can increase in availability with telehealth in rural locations. Ten percent (n = 3) identified telehealth as supporting access to mental health providers and services. Example participant statements for each theme are listed in Table 2.

Table 2

Examples of Participant Responses to Question 1 by Theme

Participant	Theme	Statement
P06	Access to care.	"Access to care."
P10	Access to care.	"Access to healthcare."
P01	Access to specialists.	“The patients in rural areas don’t always have access to specialists, and telehealth bridges the gap and allows for specialists access outside of primary care in rural areas.”
P05	Access to specialists.	The greatest gap to be addressed by telehealth in rural areas is to increase access to specialty healthcare to those that have geographic barriers. The biggest problem in rural and small communities is not a primary care access but the subspecialties such as orthopedic, urology, endocrinology services to name a

		few are scarce. Telehealth may provide solutions to bring these desired specialties to rural areas.
P03	Telehealth training for patient and provider.	"Funding and training."
P08	Telehealth training for patient and provider.	"Potentially the educational piece for both practitioner and end user."
P09	Access to mental health services.	"Access to mental health services."
P09	Access to mental health services.	"The lack of specialized services like psychiatry and behavioral services."

Question Two

When asked the question, "How best can telehealth outcomes be measured," four major themes emerged. Nearly 52% (n = 16) of the participants identified patient surveys as the best way to measure patient satisfaction. Sixteen percent (n = 5) identified patient utilization of telehealth as an effective measure of telehealth in rural areas. Ten percent (n = 3) identified that telehealth effectiveness might best be measured through the use of mobile apps tracking patient health and compliance. Ten percent (n = 3) identified measuring if telehealth reduced the number of office visits as the best way to assess patient satisfaction. Example participant statements for three themes are listed in Table 3.

Table 3

Examples of Participant Responses to Question 2 by Theme

Participant	Theme	Statement
P12	Patient satisfaction surveys.	"Patient surveys on whether they are satisfied with the experience is really the best measure."
P24	Patient satisfaction surveys.	"I saw, the only way is if each patient is asked about their visit immediately after."

P03	Patient utilization of telehealth.	"Rate of office visits for telehealth patient could be an outcome."
P03	Patient utilization of telehealth.	"The amount of use. If in-person and telehealth appointment are both offered, which is used more?"
P13	Mobile apps to track patient health.	"A mHealth (mobile health) app could be utilized to track compliance with appointments, medications, nonpharmacologic treatments and subjective measure of symptoms."
P24	Mobile apps to track patient health.	"Through the apps and virtual information feeds, doctors can keep a record of health progress and chart how telehealth is helping the patients to get better and what areas are lacking."

The purpose of this study was to identify gaps that telehealth can fill in rural areas and the outcome measures that are most important for support quality of care through telehealth in rural areas. Telehealth is expanding rapidly and understanding the specific gap telehealth can fill in rural areas and the necessary measurements for quality of care is needed for this expansion to be effective, efficient, and sustainable.

Participants in this study identified that telehealth primarily supports access to healthcare for rural residents where travel may be too far to reach medical services. In other words, for rural residents, telehealth offers access to healthcare by serving as a communication medium between patients and providers. Secondly, participants emphasize that rural residents may not have options to easily visit healthcare specialists as the distance may be too far to travel. But, with telehealth, rural residents have the potential to communicate verbally and visually with specialists in any field. Certainly, with healthcare access, the ability to communicate with healthcare providers and specialists has the potential for improving health outcomes for rural residents.

Interestingly, participants reference that telehealth provides access not only to healthcare providers but to mental health professionals. This is consistent as the literature identifies that rural residents lack access to specialists, and does include mental health specialists (Egan et al., 2022;

Myers, 2019). In other words, the participants are identifying telehealth as one tool that may help minimize rural disparities in mental health care.

Patients also identify that telehealth outcomes can be best measured through patient surveys, with a few participants acknowledging that the surveys must be administered immediately following the telehealth visit to fully capture the patient's experience. Utilization rates of telehealth should be a second measure exploring how many patients are seeking telehealth appointments and how many patients follow up telehealth appointments. Finally, participants stated that mobile app devices can help track patient compliance and patient response to care. Pairing telehealth with mobile app tracking may help providers gain greater insight into telehealth effectiveness and patient needs.

Overall, all participants expressed a common view that telehealth has potential to bridge healthcare to rural residents, including access to specialists (Egan et al., 2022; Myers, 2019). Healthcare leaders will be critical as they strategically apply telehealth resources such that sustainable and efficient care can become available to all individuals regardless of distance to medical facilities. This studies participant themes are consistent with current literature that also indicates telehealth has potential to service rural patients (Anderson & Singh, 2021; Chen et al., 2021) and healthcare leaders, doctors and nurses must study and prepare to apply telehealth effectively (Chike-Harris, 2021).

Implications

This study sought to identify gaps and measurements for telehealth applied specifically in rural areas. Based on a review of literature and a survey of 31 healthcare leaders the greatest gap identified was access to care, and the most important measurement was patient satisfaction. This has implications for healthcare leaders and healthcare providers. The needs for telehealth are

widespread but resources are limited and how telehealth is introduced and established can impact effectiveness and sustainability. Healthcare providers may benefit from further research on specific gaps and measurements that telehealth can fill in rural areas.

Limitations and Future Research

The study had one distinct population of participants; the survey participants currently enrolled in a regional Master of Business Administration (MBA) program specializing in Healthcare Management. It might be helpful to also survey current telehealth patients about their experience with telehealth. The pairing of providers' and patients' perceptions may further support ideas about best practices in quality telehealth programs in rural areas.

Conclusions

Technology is advancing so rapidly. Just 20 years ago, the idea of a provider and a patient talking in real time over a computer about patient needs would have been astounding. Now, telehealth is offered in a variety of forms from tele-mental health to tele-oncology. Certainly, one population that can benefit from telehealth is rural America. As telehealth grows, it is important that healthcare providers are trained to consider the unique telehealth needs of rural residents. An important aspect of developing a robust telehealth care program to service rural residents will require strategic measurement of telehealth outcomes such that data becomes the guiding force behind telehealth application decisions.

Declarations

The corresponding author states that there is no conflict of interest.

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