

Telemedicine Services in Central Virginia during COVID-19: A Systematic Review of the Literature

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ABSTRACT The study emphasizes the delivery of healthcare to patients as the number of cases of coronavirus 2019 (COVID-19) has increased significantly during what has been characterized as a pandemic. A key factor in slowing the transmission of a virus is social distancing, thus decreasing person-to-person contact. Telehealth can help with remote assessment and the provision of care. For people at higher risk of being affected with COVID-19 (e.g. older adults with pre-existing medical conditions), telemedicine can provide convenient access to routine care without exposure.

Keywords: COVID-19, telemedicine, Central Virginia, rural, health

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INTRODUCTION

Telemedicine generally refers to the allocation of health services to places considered to be remote through modern technology such as web-based conferencing. Notably, it eliminates the need for physical presence, or physical in-office face to face meetings in the administration of healthcare. According to the American Academy of Family Physicians (2020) telehealth is different from telemedicine in that it refers to a broader scope of remote health care services than telemedicine. Telemedicine refers specifically to remote clinical services, while telehealth can refer to remote non-clinical services. The terms telehealth and telemedicine are often used interchangeably.

A limited number of studies focus on the impact of telemedicine in remote and rural areas, particularly the regions that have marginalized communities, which exist on the fringes of the United States (U.S.) healthcare system. In the review “Telemedicine Use in Rural Native American Communities in the Era of the ACA: a Systematic Literature Review,” Kruse, Bouffard, Dougherty and Parro (2016) examined the application of telemedicine innovations in Native American communities. To discover the results, the researchers engaged in a systematic literature review of fifteen peer-reviewed studies from four catalogs, or databases by applying the themes for access, quality, and cost. The study reveals that the Native Health Services reaches fifty-nine percent of Native Americans and leads to cost savings of around \$36 billion annual-

ly (Kruse et al., 2016). The findings demonstrated that telemedicine systems increase the accessibility to health care, improving the quality of care and decreasing costs in Native American societies. To implement telemedicine systems in rural Native American communities, certain strategies should be applied since the study showed that only 10% of Native American communities have internet access (Kruse et al., 2016). Market assessment was among the current implementation strategies. This strategy, according to Kruse et al., (2016) was helpful because the hospital’s executive leadership could find an opportunity to engage the community to determine what types of healthcare services may suit their needs. Integrating telemedicine with strategy and other systems is useful in the sense that it may guarantee efficiency in medical treatment services. It may make it less difficult for physicians to clearly understand the context of rural communities and the various health disparities that exist among specific minority populations.

Telemedicine Used to Support the Challenges of COVID-19 Racial Data Collection

As reported by Virginia Department of Health (VDH) (2020) a major challenge is the significant amount of missing data on race and ethnicity in disease reports. The reports that are generated at the local level have inadequate data results. The VDH (2020) has continued to encourage individuals, health providers and laboratories to report race and ethnicity data. The (VDH) (2020)

has discussed changes to how race and ethnicity data are presented. This update may provide a more detailed look at the effects of COVID-19 on minority populations across the Commonwealth of Virginia. VDH has combined race and ethnicity information into one category and expanded the number of racial identities from three to seven. Previously, race data was reported as one of three categories: White, Black or African American, and Other. Ethnicity data identified individuals as either Hispanic or Latino or Not Hispanic or Latino. It has been reported that COVID-19 is disproportionately affecting the Latinx population in the Commonwealth of Virginia. Although Latinx people make up ten percent of the Commonwealth's population, they account for 45 percent of the COVID-19 cases, 35 percent of the hospitalizations and 11 percent of the deaths. Factors such as access to health care, poverty, geography, occupation and racism have increased these disparities. The VDH local districts have worked to expand testing and outreach within these communities. According to the VDH (2020) updated reporting of accurate race and ethnicity data is an essential step toward better measuring COVID-19 infection rates, as well as the overall impact of the pandemic. In addition, the use of telemedicine would specially allow practitioners in the field and researchers with the Office of Health Equity to identify health inequities within the Central Virginia region. This would also allow for the provision of information to develop methods of tracking and reporting guidelines for future health crises.

Integration of Telemedicine in Remote and Rural Regions

Since integration poses a challenge to the provision of telemedicine in remote and rural regions, Mehrotra, Jena, Busch, Souza, Uscher-Pines, and Landon (2016) studied how effective integration could be achieved. These researchers conducted a study entitled "Utilization of Telemedicine among Rural Medicare Beneficiaries". The study examined trends in the use of telemedicine from 2004 to 2013 in 29 states using data acquired from insurance companies as the law in these states requires indemnity firms to reimburse patients who used telemedicine as a delivery platform or mode of medical treatment and consultation with their healthcare provider(s). The findings of the study showed that only 1% of Medicare beneficiaries' access telemedicine due to lack of integration. Methora et al., (2016) suggested that the healthcare technology administrator or provider should analyze the governance frameworks. It is possible to address the legal and regulatory issues that would otherwise prevent full exploitation of telemedicine. Additionally, establishing a

mechanism that supports improved collaboration across the departments within the medical treatment center, medical office, and or hospital is vital, when handling the beneficiaries of Medicare (Mehrotra et al., 2016). For this reason, the healthcare technology administrator or provider should understand that mainstream services are strongly situated in hospital's departments, thus bringing the policy responsibilities together can facilitate the integration process in rural localities.

After integration is achieved, telemedicine may provide one of the most professionally sound and readily available ways of enhancing efficiency of the health industry in rural areas. According to Bashshur, Howell, Krupinski, Harms, Bashshur and Doarn (2016) the study "The Empirical Foundations of Telemedicine Interventions in Primary Care" showed that telemedicine can enable the physician to track vital signs, as well as other health information from a distance. The study was a systematic review of research articles from the years 2010 to 2020 using variables like cost, access, health outcomes, and feasibility. The results demonstrated that telemedicine reduced readmissions to hospitals by 30% in rural areas. It can be evidenced from these findings that telemedicine makes it possible to watch, or monitor certain signs and respond immediately to patients recovering from a recent surgery, and or medical treatment.

Telemedicine acts to decrease the resource disparities between rural and urban settings by elevating access to health services. In an earlier study entitled "Sustainable Rural Telehealth Innovation: A Health Case Study" by Singh, Mathiassen, Stachura, and Astapova (2010) explored the topic from a resource point-of-view. The researchers reviewed studies addressing the impact of telemedicine in the largest public health district in the state of Georgia from the years 1988 to 2008. The findings revealed that whereas rural areas have 20% of the country's population, it has less than 11% of physicians, and that the imbalance has increased as the years have proceeded (Singh et al., 2010). Singh et al. (2010) reinforced the findings of other studies when they suggested that telemedicine can decrease the resource gap between rural and urban regions by increasing access to medical services to traditionally underserved communities. Singh et al. (2010) refer to telemedicine as an "alternative healthcare system". Thus, it showcased importance in the delivery of key healthcare services to underserved rural communities. The key aspect in reinforcing this gain is to reach sustainable levels by reinforcing cross sector partnerships and increasing funding for public rural health institutions to enable them to adopt telemedicine

innovations. Overall, telemedicine may provide several benefits for rural health facilities including: (1) providing medical services over wide distances; (2) enables sharing of knowledge; and (3) enhances collaboration in multi-faceted decision making and diagnostic processes across health care institutions.

Telemedicine can be used in the management of chronic diseases. To exemplify this, the study “Interactive telemedicine: effects on professional practice and health care outcomes” examined the use of telemedicine in treating a wide scope of severe health conditions. The study entailed a systematic review of past studies from different databases. As Flodgren, Rachas, Farmer, Inzitari, and Shepperd (2015) found that the application of telemedicine in managing heart failure seems to facilitate the same outcomes as telephone, or direct delivery of health-care; however, the study showed that telemedicine can enhance the regulation for the blood glucose in patients suffering from diabetes. Further, the study could not establish the acceptability of telemedicine by clinicians and patients, and its cost to related health services due to inadequate data recorded in the studies they reviewed (Flodren et al., 2015).

Limited Research on the Use of Telemedicine in Remote and Rural Regions

There are no research studies that discuss the issue as it relates to access and service delivery in rural areas in the United States, specifically rural Central Virginia during this pandemic. Telemedicine has become an important tool to provide healthcare in these circumstances. Robots are being used in monitoring infected patients to limit contact with medical personnel, deliver medical supplies and to disinfect wards to reduce infection risk for staff members.

According to the Centers for Disease Control (CDC) (2020) and the World Health Organization (WHO) the COVID-19 pandemic has highlighted that telemedicine is a viable alternative to direct patient healthcare. As medical professionals need to stay healthy and disease-free, the need for remote technologies such as telemedicine has increased significantly. The CDC (2020) and the WHO (2020) have advocated for telemedicine to monitor patients and reduce risks of spreading the virus by traveling to hospitals, patient homes, and other treatment centers.

According to Lawler (2015) every patient does not prefer the use of telemedicine services. Although, as suggested by Mann, Chen, Chunara, Testa and Nov (2020) there are a significant number of research studies that seek to explain impact and the attention that telemedicine

has garnered in the recent past. Not all of these studies explicitly guarantee that the discussions will lead to policy decisions that would address current gaps in the literature. The goal of this research study was to perform a synthesis about the telemedicine services functioning in remote and rural Central Virginia, and to articulate the variables related with sustainability and success of these services.

METHODOLOGY

The researcher performed a systematic examination of the literature. The protocol for the study is registered and confines to the PRISMA checklist for suitable reporting items in systematic examinations. The review was performed in five stages including planning, searching, evaluation, and synthesis.

Planning and Searching

In the planning stage, the researcher chose the tasks to be performed. The following research question was created for the study.

1. What were the features of telemedicine services available in remote and rural regions?

The search strategy entailed a three-step process. First, the original limited search was performed through Embase, MEDLIBE, PubMed, and Science Direct applying the terms “rural Virginia” “telehealth and “telemedicine”, and “COVID-19”. Examination of text terms in the abstracts and titles from search results, and for the index words utilized to categorize the study, assisted in the development of the final search phrases. The search was performed in March 2020. The researcher searched peer-reviewed data bases and other sources of grey studies using the words telemedicine, telehealth, rural, remote, video consultation, and Virginia. The phrases were searched for heading pertains to medical headings in the abstracts, or titles by using the Boolean operators ‘OR’ and ‘AND.’ The snowballing technique was applied to highlight other suitable studies in the reference lists of the retrieved studies.

The primary findings of interests to this current study were the lack of type, features, and number of telemedicine services in rural and remote regions recorded. The features for services included the patients, goal of the service, location, and clinical aspects. The secondary findings of interest to this study were; (1) important insights, or findings associated with the sustainability and effectiveness of services; (2) methods applied to examine the services; (3) the measurement of the outcomes; (4)

utilization of resources and costs; (5) process measures.

Screening and Appraisal

The abstracts and titles were screened independently. In case of any doubts, the study remained in the list for examination by a third-party. At the stage of text screening, a reviewer with insight into the area reviewed the entire text for each study and recorded the decision to exclude, or include the article for complete examination and extraction of data that was based on this criteria and its relevance to the study question. The reviewer analyzed the list of studies to be included and excluded and an agreement was reached. All studies that adhered to the inclusion standards that were included in the analysis. The extraction of data was done systematically through the use of a pre-determined list of questions and variables and recorded in a database created for this research. The process was tested on five articles and revised.

The data that was extracted included the following parameters;

1. The year of publication; author; purpose of the article.
2. Geographical setting; remote; rural; included a region in the Commonwealth of Virginia.
3. Service details; clinicians; purpose; form of telehealth used; target clinicians
4. Methodological approach; study design; source of data
5. Recorded outcomes; costs; utilization of resources; facilitators of effectiveness; satisfaction, and process measures
6. Other outcomes including examples of evidence identified variables determining sustainability

A second reviewer performed independent extraction of data for a random selection of eight articles. The findings of the data extraction by both researchers were scrutinized for accuracy, consensus, and completeness. The shortcomings were resolved through mutual discussions. The level of evidence for each article was evaluated using the criteria set by Joanna Briggs Institute. The quality of each study was also examined utilizing and adjusted tool created for a systematic examination of primary healthcare services in remote regions and rural areas. The quality criteria evaluated was determined to be appropriate since it covered a scope of vital features, in regards to, the services and the methodology applied to examine the services. Hence, was effective for the objective of the analysis.

Synthesis Stage

The data was grouped according to discipline, clinical specialty, service details, and geographical location. By utilizing the inductive approach, the data that was extracted related to the sustainability. The effectiveness of services were categorized according to themes to highlight the recurring features in regards to the research questions. The data were synthesized to become a narrative account that summarized the evidence by making comparisons and contrasting the data.

RESULTS AND DISCUSSION

RESULTS

Selection of Articles

The searches identified seventy-three articles that were potentially eligible. A total of forty-three articles published between the years 2010 and 2020 were used in the review. Most of the articles that were excluded did not match the inclusion criteria of reporting a service in any remote or rural regions of the Commonwealth of Virginia, or other relevant remote and or rural areas in the U.S. Other studies used pilot, or feasibility studies that were not meant as services were also excluded.

The Challenges of Providing Telemedicine in Rural and Remote Central Virginia

There were no studies found within the literature that were conducted in the Commonwealth of Virginia, nor was there any data on rural and remote Central Virginia regarding the use of telemedicine during the COVID-19 pandemic. Additionally, there were no studies regarding the challenges faced by staff shortages and the aid of healthcare operations through the use of telemedicine. As healthcare organization expands, the main objective should be to meet the demands of the consumers, which are primarily the patients. Currently, the major healthcare organizations are largely situated within metropolitan areas in the Commonwealth of Virginia.

According to the Virginia Department of Health (2013) the 2012 Virginia Health Equity Report drew attention to health inequities among persons living in the remote regions and rural areas of Virginia. The use of telemedicine can provide a foundation on which partners and stakeholders can develop new plans/strategies. This would be conducted with the goal of shaping policy and decision-making that could promote health equity in

the Commonwealth of Virginia. Therefore, a possibility of significantly decreasing poor health outcomes would occur with the use of telemedicine and other telehealth platforms in the Central Virginia area. As Faragher, Zhang, Low, Folds and Johnson (2018) have reported that in extreme cases, some patients may not be attended to, and as a result, there is a likelihood of failure to improve their health conditions. According to McCarthy, Su, Crown, Turple, Brown, Walsh and Rochon (2016) staff shortages represent a serious issue that generally would lead to over utilization of the existing doctors and nursing staff members, and the significant impact of this is ineffective service delivery during the current pandemic. Consequently, a lack of satisfaction of the clients, or patients would possibly occur. For this reason, it is important for all healthcare facilities to concentrate on pro-actively addressing the challenge of the limited number of all healthcare professions.

would be significantly decreased.

RECOMMENDATIONS

TELEMEDICINE TO IMPROVE PATIENT OUTCOMES IN RURAL CENTRAL VIRGINIA

Implications of the Study

This study highlighted that there are a number of significant issues to be addressed on the topic of telemedicine. These issues included the depth of the impact telemedicine could have in places that the system is not currently being used. We need to determine how to provide access to localities within the remote and rural areas of Central Virginia, due to increased social-distancing concerns during the COVID-19 pandemic. Additionally, there is a need to determine how telemedicine can enhance health outcomes through the use of tele-conference observational methods.

CONCLUSION

Telehealth and telemedicine have the capability of addressing many vital challenges of providing healthcare to residents located in rural Central Virginia. This region in the Commonwealth of Virginia has a widely dispersed population concentrated in remote and rural regions. The analysis has identified the challenges as well as the range of health services being provided in remote and rural areas in Central Virginia. There is significant potential to enhance healthcare services by increasing the use of the recommended telemedicine technology. Moreover, healthcare outcomes in remote and rural Central Virginia would be improved significantly and costs to patients

Table 1. Showing the inclusion and the exclusion criteria used within the study

Criteria	Inclusion Criteria	Exclusion Criteria
Period	2010 to 2020	Articles published before 2010
Language	English	
Place of study	Central Virginia	Areas outside of the United States
Aspect of healthcare	All healthcare levels including tertiary, secondary, and primary healthcare.	
Geographical delimitation	Rural and remote area	Developed towns and cities
Type of technology services	All available technological services used in delivering telehealth services within the specific area of study.	<ul style="list-style-type: none"> • Telephone only service. • Technology primarily used for administrative purposes • Pilot studies
Study design	All study designs were incorporated within the study including case studies, review as well as both qualitative and quantitative studies.	Studies that do not intend to offer telehealth/telemedicine services

Table 2. Showing the Methodologies used by eligible studies in Reporting and Evaluation Telehealth Services in Central Virginia

Methodology	Number (=43)	Percentage
Perspective of study design		
Qualitative-descriptive	30	75
Qualitative-analytical	25	58
Quantitative-descriptive	25	58
Quantitative-analytical	20	46
The perspective of data collection method utilized		
Observation	34	79
Questionnaire	31	72
Interviews	25	58
Review of service activity	10	23

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