



REVIEW

Analyzing Facilitators and Barriers to Telehealth in Rural North America During the COVID-19 Pandemic: A Scoping Review

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Abstract

Background: It has previously been established that many people living in rural communities experience health disadvantages and less access to medical care. Over the past decade, innovations in telehealth and other innovative models of care have been developed with the goal of overcoming these inequities for those living in rural areas.

Objective: The aim of this paper was to describe both outcomes and characteristics of studies involving telehealth in rural areas of North America during the COVID-19 pandemic.

Materials and Methods: A scoping review was undertaken. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method was utilized in order to understand the empirical and theoretical data on telehealth usage in the United States, Canada and Mexico during the COVID-19 pandemic. The following terms were utilized: 'rural health' AND 'telehealth' AND 'covid-19'. Separate searches were completed for the three included countries: 'United States', 'Canada', and 'Mexico'. PubMed and Google Scholar were utilized.

Results: The literature search revealed 1197 articles published in English between 1st January 2019 and 31st August 2022. One hundred and fifty articles were included in the review including 135 from the United States, 12 from Canada, and 10 from Mexico. Some articles were cross-collaborations between two of these countries. Among these papers, 18% (27) focused on telemedicine for mental health treatments, 14.7% (22) focused on oncology or cancer, 11.3% (17) focused on telemedicine for the veteran subpopulation, 2.7% (4) used a mixed methods approach, and 14% (21) used a qualitative approach.

Conclusion: This scoping review reveals that the current literature on telehealth in rural areas during the COVID-19 pandemic is largely descriptive. There were only a few publications that focused on comparative health outcomes using telehealth in urban and rural populations in close proximity to each other. Telehealth is well represented in published literature on inequities and innovation, but there is still limited data on health outcomes and comparisons that can be drawn cross-nationally. Further studies should aim to study longer term health outcomes for those in rural areas using telehealth as opposed to areas where telehealth interventions have not yet been adopted.

Keywords: COVID-19, North America, Rural and remote, Rural healthcare, Telehealth, Telemedicine.

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Introduction

The National Aeronautics and Space Administration (NASA) contributed to telemedicine as through its usage of telemedicine for astronauts during space travel (Kichloo et al., 2020). Since its first introduction, telemedicine's prevalence steadily increased. When compared with other countries in Europe and Asia, North America, especially the United States, uses telemedicine services at much

higher rates (Oh, Park, Jo, & Kim, 2015). Interestingly, telemedicine has gained the most traction over the past decade and risen in usage during the COVID-19 pandemic (McAdam, 2022). Overall, in most geographic areas there is a trend in discussion about and even implementation of telehealth programs.

The COVID-19 pandemic has posed many challenges to global healthcare systems. Indeed, the COVID-19

pandemic has further increased both demand and reliance on telemedicine (Rush, Seaton, Li, Oelke, & Pesut, 2021). Even prior to the pandemic, there were many well-documented healthcare disparities in rural areas when compared to urban areas. However, the pandemic has exacerbated and shed light on many existing disparities in healthcare systems as a whole.

It is of growing interest to determine what factors in particular serve as the strongest or most predictive facilitators or barriers to telemedicine usage and subsequently increased access to healthcare. Some factors are intuitively associated with barriers such as any of the social determinants of health like low socioeconomic status, and reduced health literacy which is more prevalent in many rural communities.

Despite many advances in the administration and execution of telehealth services, there are still several current challenges that must be addressed. For example, 33% of rural Americans lack access to high-speed broadband internet which is necessary to support video-based telehealth visits (Holtz, Mitchell, Hirko, & Ford, 2022). Other barriers include limited experience with technology or disabilities that may prevent participation in telemedicine (Annaswamy, Verduzco-Gutierrez, & Frieden, 2020). Of course, other barriers to medicine are similar to those experienced in traditional healthcare settings such as language barriers and lack of culturally concordant patient education materials (Peters, 2020).

Given these acknowledged disparities in health between rural and urban populations, many would anticipate that existing literature should bolster our understanding of why this may be the case and how these disparities may continue to persist. Of particular interest are studies which compare pre-COVID-19 and post-COVID-19 conditions and outcomes. This can help with developing an overarching picture of this complex issue.

This paper details the current state of knowledge of telehealth facilitators and barriers across several developed North American countries, all of which have recognized disparate health outcomes between urban and non-urban populations. A thorough review of existing literature is required to address next steps for telehealth utilization especially in rural areas. This integrated review is aimed to analyze and review peer-reviewed empirical and theoretical data, inclusive of both qualitative and quantitative methodologies, on telehealth utilization in rural areas of the United States, Canada and Mexico with a specific focus on the COVID-19 pandemic. Furthermore, this paper aims to identify current gaps in our understanding of existing health disparities and how telehealth may improve to better benefit rural populations.

Materials and Methods

Design: Systematic approach following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method. The authors considered a scoping review the most appropriate review for this research question, given the broad research question, qualitative synthesis and gaps in current literature.

Eligibility criteria: Papers were included if they were:

1. published in peer reviewed journals between January 2019 and 31 August 2022;
2. written in the English language;
3. reported telehealth use in rural communities in North America and the role of COVID-19 on telehealth in these communities.

Papers written prior to January 2019 were excluded in order to focus on papers published during the COVID-19 pandemic. Original research papers, systematic reviews, and reviews were considered. Letters to the editor, opinion pieces and case studies were excluded from this review. Papers were excluded if data did not correspond to at least one of the following countries: United States, Canada and Mexico. Papers were included if they reported on telehealth use in rural health care, rural in this context was accepted if defined by the authors as rural or remote contexts relative to country of origin.

Information sources: The electronic databases PubMed, and Google Scholar were searched using Medical Subject Headings (MeSH) and key words. **Figure 1** outlines the utilized search strategy for these databases. The following terms were utilized: 'rural health' AND 'telehealth' AND 'covid-19'. Separate searches were completed for the three included countries: 'United States', 'Canada', and 'Mexico'.

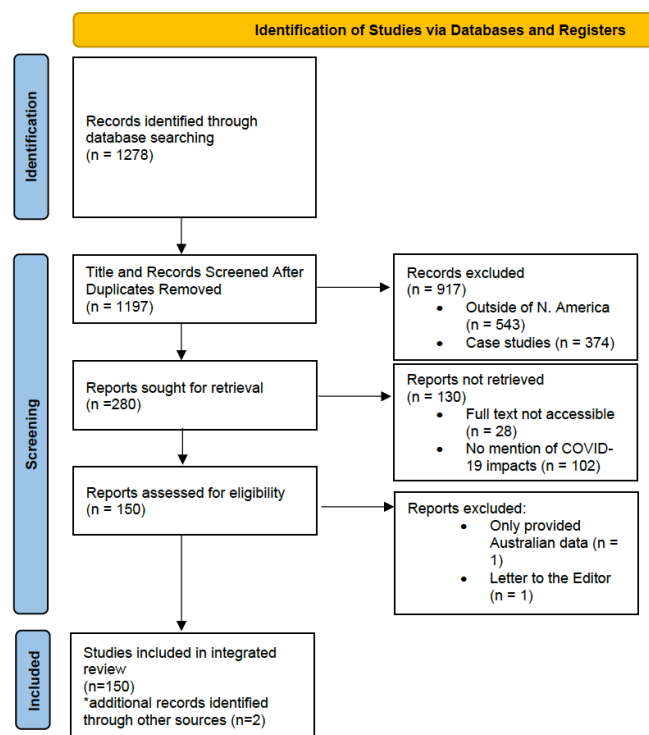


Figure 1: PRISMA Flow Diagram. From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al., The PRISMA Group (2020). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372:n71. doi: 10.1136/bmj.n71

Study selection: Papers were assessed for eligibility for

inclusion by the primary investigator (MW) and by utilizing the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method.

Data extraction: Data were extracted using a structured data extraction Table. The data extraction table included the following: author details; journal details; methodological approach; summary of findings; and conclusions. This was later distilled to provide overall characteristic summary tables which included methodological approach, facilitators, and barriers.

Ethics: This is a systematic review and the reviewers used publicly accessible documents as evidence. There was no requirement for an institutional ethics approval before commencing a systematic review.

Results

Characteristics of included studies: Literature searching revealed 1197 articles published in English between 1st January 2019 and 31st August 2022. One hundred and fifty articles were included in the review including 135 from the United States, 12 from Canada, and 10 from Mexico. Some articles were cross-collaborations between two of these countries. Among these papers, 18% (27) focused on telemedicine for mental health treatments, 14.7% (22) focused on oncology or cancer, 11.3% (17) focused on telemedicine for the veteran subpopulation, 2.7% (4) used a mixed methods approach, and 14% (21) used a qualitative approach (Table 1).

Table 1: Methodological Approach Characteristics of Included Studies.

Design Type	f	%
Systematic Review	56	37.30
Observational Descriptive	12	8.00
Randomized Control/ Cluster	34	22.70
Qualitative	21	14.00
Mixed Methods	4	2.70
Other	23	15.30

Facilitators and Barriers: Also among these papers, 82.7% (124) address COVID-19 as a facilitator of increased telemedicine usage, 70.7% (106) indicated that higher rates of health literacy increased telemedicine usage, 56.0% (84) demonstrated a difference in uptake of telemedicine wherein urban areas used telemedicine at higher rates than rural areas (Table 2). Additionally, 44.7% (67) of the papers indicated higher rates of digital literacy (namely how to use video conferencing software) resulted in more telehealth usage, and 2.7% (23) indicated other facilitators such as translated patient education materials (Table 2).

These factors are not only attributed to telemedicine usage but also to other factors like satisfaction and demographic differences. In one study, it was found that telemedicine satisfaction scores were significantly higher among participants who used video conferencing (M= 4.18) compared to those who used phone alone (M = 3.79) (p= 0.031) (Rush et al., 2021). Another study also indicated that older age, rural status, lower SES, Asian race, Black race, and Hispanic/Latino ethnicity are all associated

with lower rates of video-based telemedicine (Hsiao et al., 2021). A surprising finding was that urban areas, despite already having greater access to health services, utilized telemedicine at higher rates than rural areas (Chu et al., 2021).

Table 2: Facilitators and Barriers of Telehealth From Included Studies.

Facilitators & Barriers	f	%
COVID-19	124	82.70
Health Literacy	106	70.70
Urban Environment	84	56.00
Broadband Access	79	52.70
Digital Literacy	67	44.70
Other	23	2.70

*Note: facilitators include the presence of the above, barriers include the absence of the above

Several barriers also appear to overlap. Namely, many of these studies suggest, individuals without digital literacy and reliable internet broadband access typically also have struggles with health literacy because of inability to access reliable patient education materials. It is also more common that rural populations have lower socioeconomic status and educational attainment which are broadly associated with poorer health outcomes and literacy scores.

Discussion

Through this review it was revealed that the literature on telehealth facilitators and barriers for rural and remote populations were generally qualitative or some form of review. Interestingly, there were only a few studies which utilized surveys to gauge facilitators and barriers for people living in rural areas. Potentially, this is because many telehealth interventions are happening on a government-level rather than a study-level so data from health departments may help provide a more complete picture. There were a vast amount of telehealth papers, but data comparing outcomes and significance of different barriers was relatively sparse as was data comparing telehealth usage efficacy to other interventions.

Disparities in healthcare access in remote and rural areas is an ongoing issue that is universally acknowledged. It is well documented that “health deserts”, where there are inadequate or nonexistent medical facilities, are common in rural areas (Behrman, Fitzgibbon, Dulin, Wang, & Baskin, 2021). Despite many well-intentioned efforts, there remain logistical practicalities that are challenging to overcome. It is also a highly complex issue with other factors such as social isolation, resilience, economic well-being and aging potentially also playing important roles. Solutions that aim to address issues such as lack of broadband access, digital literacy and language barriers, are crucial to ensure telemedicine access is equitable for all patients (Romain, Trinidad, & Kotagal, 2022). It is also important that future research aims to address ways to reduce health disparities for the rural population.

It is also important to consider that classifications of urban, regional, or remote may be differentially applied across publications which may impact interpretations of

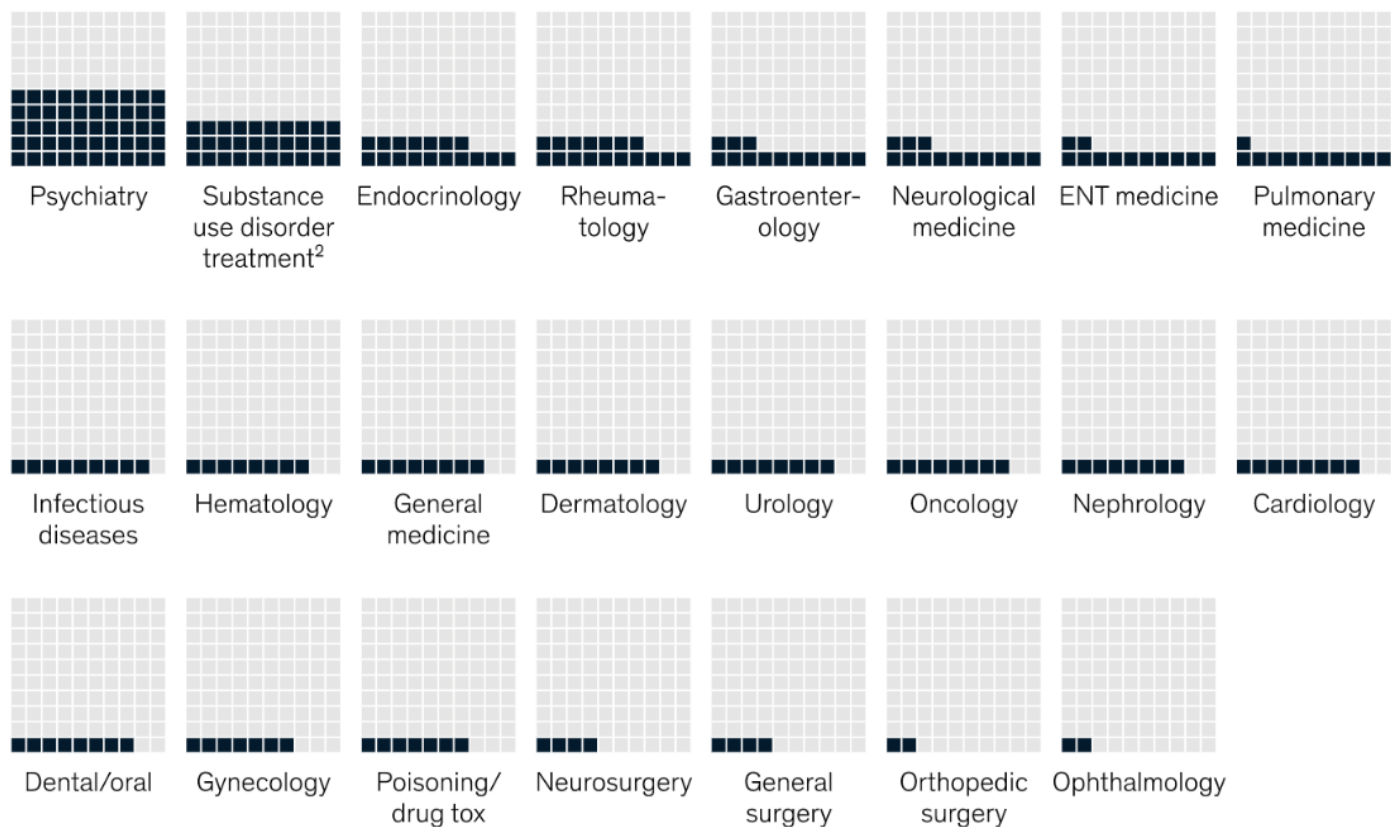


Figure 2: Substantial Variation Exists in Share of Telehealth Claims Across Specialties data from McKinsey Analysis. *Note: Substance Use disorder treatment includes addiction medicine.

data. The countries represented in this review had similar amounts of rural population percentages but differed in overall population and land mass. Furthermore, distance from health services is important for determining access, however, different countries may use different distances to classify an area as medically underserved. Likewise different countries may vary slightly in their classification of what constitutes an underserved area as anything from a region with no medical access to a region with limited medical access. Furthermore, increasing urbanization and its impacts may also be a consideration for study alongside these complex factors.

An area of particular interest in this review were differences in telehealth across North America utilizing the United States, Canada and Mexico as examples. There were many papers that focused specifically on rural America and less papers that focused exclusively on Canada or Mexico's rural areas. Therefore, it is important to consider that as more research is performed different barriers and facilitators unique to these areas may become visible. Approximately 18% of Canadians make up its rural population compared to 20% of Americans and 36% of Mexicans (Romain et al., 2022). One of the studies revealed that because of the work hours of Mexican farmers, offering telehealth services outside of typical business hours improved access) (Tulimiero et al., 2021). During the time period of 2019 to 2021, telehealth usage increased 73% in Mexico, 19.3% pre-pandemic vs. 41.2% during the pandemic in Canada, and telehealth utilization increased 78x in the United States especially during the early months of the pandemic and stabilized to a 38x spike after that (Johnson,

Dupuis, Goguen, & Grenier, 2021) (Johnson et al., 2021). Many of these data points, in addition to the ones in the studies analyzed, indicate a $p < 0.005$ which shows that the increase in telehealth just in these past few years is highly significant.

However, another important difference is telemedicine claims across different healthcare specialties. In Figure 2, Psychiatry, Substance Use and Addiction, Endocrinology and Rheumatology are among the top specialties for telehealth claims. This differential uptake of telehealth depending on specialty could be for a few reasons including: 1) unique challenges with diagnosing patients virtually 2) less digital literacy amongst specialists from certain specialties compared to others 3) lack of demand for telehealth for some specialties.

It is also important to consider that these countries also have different systems of health service funding and health care systems, in general. The United States utilizes Medicaid as its service for low-income individuals and families, however, many Americans utilize private insurance plans which are offered either through their employment or paid out-of-pocket. Canada has a decentralized, universal, and publicly funded health system which covers necessary care with people able to buy prescription, vision and dental coverage out-of-pocket. Mexico uses a mixture of public health insurance programs, employer-provided health insurance and out-of-pocket care. Despite this, healthcare costs are the highest in the United States and estimates state that by 2026, consumer out-of-pocket spending is slated to reach \$1,650 per person or \$491.6 Billion (Bestsenny, Gilbert, Harris, & Rost, 2021). Patient access to medical services

due to different health service funding models is another factor to consider when exploring and determining health outcomes.

This review demonstrates that there were large spikes in telehealth usage during the COVID-19 pandemic across different countries in North America and that in many cases telehealth usage has remained at a higher level than pre-pandemic. Despite telehealth's promise as an innovative way to remediate health disparities in rural areas, several studies have laid out barriers to telehealth in rural and remote areas such as broadband access, business hours and language barriers. There remains much research to be performed comparing telehealth to other innovative interventions aimed at increasing access, telehealth patient education program efficacy and longitudinal comparisons of telehealth usage and health outcomes in rural and urban populations. Such studies would ultimately help the public health community's understanding of the effects of remote geography on healthcare and healthcare interventions.

There are several limitations of this review. One limitation is that it is entirely plausible that not all relevant literature has been identified. Furthermore, this is a topic of a lot of current research, so it is possible that additional relevant literature has been published as this review is performed. The review process utilized is a rigorous approach used by many researchers and our particular use of broad search terms, screening and data extraction helped to include relevant information. This review focused on North America of which Canada, the United States and Mexico were selected based on their relative similarities in rural population proportions and differences in their healthcare systems and uptake of telehealth. There are some differences in classification for Mexico, namely some that classify Mexico as Latin America. However, many of the papers focused most heavily on the United States which may serve to limit generalizability to other regions as the US healthcare system differs significantly from many other developed countries. There were very few studies that directly compared the US rural telehealth usage to Canada and Mexico which provided a challenge as this paper then needed additional analysis to be performed to delineate differences and similarities. However, this paper provides important and crucial insights and comparisons into what data is currently available and gaps in current literature.

Conclusion

Telehealth is well-represented in published literature on inequities and innovation, but there is still limited data on health outcomes and comparisons that can be drawn cross-nationally. Further studies should aim to study longer term health outcomes for those in rural areas using telehealth as opposed to areas where telehealth interventions have not yet been adopted.

Overall, this review demonstrates that there are many facilitators and barriers to telemedicine that may contribute to differential health outcomes of urban and rural populations. Future studies should aim to address which facilitators and barriers are most significant, plans for future telemedicine expansion and differences cross-

culturally in telemedicine use. Such data would further knowledge on this growing field and ultimately will help healthcare systems improve healthcare access and outcomes for rural populations.

The review also exposed gaps in existing research that has been published, including a lack of studies comparing telemedicine to other approaches. There was also a lack of research informed policies in these countries to support ongoing efforts to improve healthcare accessibility.

Declarations

Registration and Protocol: The review was not registered.

Funding: There was no financial support for the review.

Competing Interest: The author declares no competing interests.

Availability of Data: For data, please reach out to the author's communication email.

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