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Community-Identified Approaches to Improve Access to Telehealth in Rural Communities

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Abstract

Introduction: Despite a rapid growth in telehealth adoption in recent years, rural and remote communities still struggle with adoption. To address this issue, we explored community-identified approaches to improving telehealth access in rural Washington State.

Methods: Using group concept mapping (GCM), participants brainstormed, sorted, and rated statements in response to the prompt, "Possible approaches to providing or accessing telehealth in your community include…" Multidimensional scaling and hierarchical cluster analyses were used to generate a similarity matrix across all statements and group statements into clusters. Statements were rated in terms of feasibility, impact, and cost.

***Results*:** Fourteen participants completed the brainstorming activity, and 16 participants completed the sorting step and the first rating step. Participants included healthcare providers or professionals or members of health, healthcare, wellness, or community services agencies. The GCM process generated 70 statements, which were grouped into six clusters. These clusters suggest possible approaches such as investing in community infrastructure, ensuring access to telehealth technology, improving technology infrastructure, providing training/awareness of telehealth,

pursuing state-level and policy solutions, and interventions within the healthcare system for telehealth engagement and delivery. Participants prioritized solutions that involved training/awareness efforts and healthcare systems engagement as highly feasible and impactful.

***Discussion*:** The study's findings provide insight into potential interventions to improve telehealth access in rural communities, considering their potential impact, feasibility, and cost. This study highlights the importance of community-oriented research methods when addressing health disparities in rural areas.

Keywords: rural, telehealth, access

Approches identifiées par la communauté pour améliorer l'accès à la télésanté dans les communautés rurales

Résumé

Introduction : Malgré une croissance rapide de l'adoption de la télésanté au cours des dernières années, les communautés rurales et éloignées ont encore du mal à l'adopter. Pour résoudre ce problème, nous avons exploré des approches identifiées par la communauté pour améliorer l'accès à la télésanté dans les zones rurales de l'État de Washington.

Méthodes : À l'aide d'une cartographie conceptuelle de groupe (CCG), les participants ont réfléchi, trié et noté les déclarations en réponse au message-guide : « Les approches possibles pour fournir ou accéder à la télésanté dans votre communauté incluent… » Une mise à l'échelle multidimensionnelle et des analyses de grappes hiérarchiques ont été utilisées pour générer une matrice de similarité pour toutes les déclarations et déclarations de groupe en grappes. Ces déclarations ont été évaluées en termes de faisabilité, d'impact et de coût.

Résultats : Quatorze participants ont terminé l'activité de brainstorming et 16 participants ont complété l'étape de tri et la première étape d'évaluation. Les participants comprenaient des prestataires de soins de santé, des professionnels ou des membres d'agences de santé, de soins de santé, de bien-être ou de services communautaires. Le processus CCG a généré 70 déclarations, regroupées en six grappes. Ces grappes suggèrent des approches possibles telles que l'investissement dans les infrastructures communautaires, la garantie de l'accès à la technologie de télésanté, l'amélioration de l'infrastructure technologique, la formation/sensibilisation à la télésanté, la recherche de solutions politiques et au niveau de l'État, et des interventions au sein du système de santé pour l'engagement et la prestation de la télésanté. Les participants ont donné la priorité aux solutions impliquant des efforts de formation/sensibilisation et d'engagement des systèmes de santé comme étant hautement réalisables et efficaces.

Discussion : Les résultats de l'étude donnent un aperçu des interventions potentielles pour améliorer l'accès à la télésanté dans les communautés rurales, compte tenu de leur impact potentiel, de leur faisabilité et de leur coût. Cette étude met en évidence l'importance des méthodes de recherche axées sur la communauté pour lutter contre les disparités en matière de santé dans les zones rurales.

Mots-clés : rural, télésanté, accès

1.0 Introduction

While telehealth has received academic and practitioner attention for the past several decades, especially as Internet access and capabilities have expanded and improved, the COVID-19 pandemic brought telehealth to the forefront of healthcare conversations. Mandatory shutdowns, social distancing practices, and other recommendations to mitigate transmission significantly challenged existing healthcare systems. As a result, global telehealth use expanded drastically, with some countries seeing an increase in telehealth services in local areas of over 2,000% within the first few months of the pandemic (Jayawardana & Gannon, 2021; Schulz et al., 2022; Wherton et al., 2021). The accelerated adoption of telehealth services during the pandemic was, however, impeded by numerous factors across the globe, including but not limited to whether an established telehealth infrastructure existed prior to the pandemic and healthcare institutions' previous experience with telehealth (Fisk et al., 2020; Omboni, 2020; Schulz et al., 2022).

In the United States, the rapid expansion of telehealth required during the COVID-19 pandemic highlighted numerous barriers that exist to providing these services (Chu et al., 2021). Inadequate or lack of Internet access, devices, and/or technological knowledge remain prominent barriers to telehealth for patients, especially older adults (Chang et al., 2021; Drake et al., 2019). Digital inequality, or constrained access to the Internet, can impact the ways in which digital health tools are accessed and used. By recent estimates, about 97% of Americans have a cellphone and an estimated 15% access Internet services solely through their cellphone and do not have broadband service at home (Pew Research Center, 2024). Reliance on a cellphone for Internet services is more common among Americans living in rural areas *versus* suburban or urban areas (Pew Research Center, 2024). Smartphone-only households face unique access challenges and are more likely to experience barriers to care (Blumberg & Norris, 2020), including telehealth. Additionally, widespread adoption of telehealth across the United States is impacted by legal and regulatory frameworks that vary greatly across states (Naito et al., 2021). These issues can lead to substantially different experiences with telehealth access and quality of care depending on geographic region, urban/rural status, and socioeconomic status.

Despite these issues, telehealth has the potential to increase access to quality care, especially in rural areas where there are fewer providers. While health systems are responding to the demand for telehealth, exemplified by the Centers for Medicare & Medicaid Services expansion of coverage for virtual visits with psychologists and social workers in the United States (Alvarado-Dyer et al., 2023; Galea et al., 2020; United States Department of Health and Human Services, 2023), such changes can leave behind populations most impacted by health disparities. Further complicating efforts to address inequities, the barriers to effective and efficient telehealth services are not identical across rural communities. Thus, successful telehealth expansion and adoption requires

identification of community-tailored interventions to address barriers that leverage community-specific resources. In other words, there is not a 'one-size fits all' telehealth plan that will work for all communities and the resources to help ensure widespread access vary greatly. Specific interventions meant to address socioeconomic barriers to participation, for example, could include telehealth based in schools (Garber et al., 2021) or public libraries (DeGuzman et al., 2022), but such approaches must be carefully identified as both feasible and impactful in each community.

This study presents findings from a community effort to identify approaches to improve telehealth access in a rural region of Washington State, located along the southern Canadian border. The aims of this study were to identify potential interventions to improve telehealth access in rural communities in this region and evaluate them according to their potential impact, feasibility, and cost.

2.0 Methods

This study took place between September 8 and December 31, 2021, in rural northcentral Washington State. Over 260,000 people reside in this 32,857 square-kilometer region located between Seattle and Spokane (National Association of Counties, n.d.), which is characterized by broad forested mountains and high deserts and punctuated by frontier-type towns.

2.1 Participants

Eligible participants included healthcare providers or professionals, as well as members of health, healthcare, wellness, and community services agencies. Participants were identified through professional networks and community representatives and, if needed, web searches were conducted. Telephone calls were made if email addresses were not available online or through community partners. Inclusion criteria included adults aged 18 years or older, with experience or interest in telehealth or community health services and residing or working in northcentral Washington. Potential participants received an email invitation which described the nature of the study. Interested individuals completed an electronic consent form and were provided with information on how to proceed with the study.

2.2 Procedures

The research team utilized group concept mapping (GCM), a participatory research method that is well-suited for connecting with hard-to-reach populations to gather input and feedback in a collaborative, community-oriented manner (Burke et al., 2005; Cook & Bergeron, 2019; Kane & Trochim, 2007). To accommodate travel and social-distancing restrictions during the COVID-19 pandemic, all study procedures were conducted via online software (GroupWisdom, Concept Systems). The online format allowed diverse and geographically dispersed community members to participate without requiring the high-speed Internet bandwidth necessary for video or audio interviews or focus groups.

Brainstorming. To elicit participant input and guide GCM activities in alignment with the study focus, the following open-ended focus prompt was utilized: "Possible approaches to providing or accessing telehealth in your community include…." Respondents brainstormed ideas in response to the focus prompt within the online GroupWisdom software platform. While submitting ideas on the platform, participants could view others' brainstormed ideas in real time. Additional ideas were added by the

study team based on findings from previously conducted key informant interviews (Graves et al., 2022). The list of brainstormed ideas was reviewed and synthesized simultaneously by two members of the study team for redundancies or applicability; deletions or edits were made only if there was consensus within the study team.

Sorting. After participant statements were collected, participants were then asked to organize the statements into piles or groups based on their perception of similarity. All statements were sorted, and participants could create as many or as few piles as they chose. This activity was also completed online using GroupWisdom, wherein participants could 'click and drag' statements into piles. Participants provided a label for each pile they created.

Rating. Following sorting, participants were then asked to rate each statement based on their own knowledge of (a) "its potential impact on increased health services in your community," (b) "its potential feasibility of implementation in your community," and (c) "its potential cost of implementation in your community." Response options were offered on a 5 point-Likert scale from 1 (minor) to 5 (major). Participants were instructed to use their best judgement in cases where they were unsure how to rate the statement.

Data Analysis. Multidimensional scaling was used to assess statement proximity and spatial arrays. Sorting data were transformed into a similarity matrix, demonstrating the individual binary co-occurrence of statements. A point map represents this relationship on a two-dimensional plane, with the proximity between statements (points) indicating that participants more often sorted these statements together. The fit between the similarity matrix and the group-level point map is indicated by a 'stress value,' a measure that evaluates the similarity of distances between points on the map and values in the similarity matrix. Stress values commonly range from 0.10 to 0.35 (Kane & Rosas, 2017; Kane & Trochim, 2007).

A cluster map is generated using hierarchical cluster analysis, which generates 'bridging values' for each statement. Bridging values range from 0 to 1, with low bridging values indicating an anchored placement on the cluster map, indicating that participants often sorted the statement together with other adjacent statements on the map (Kane & Trochim, 2007). These statements are interpreted as more representative of the cluster in which the statement is grouped. Higher bridging values suggest less commonality between a statement and its neighbors; these statements may be related generally to multiple statements across the map. Bridging values are also generated for each cluster, indicating the homogeneity (low bridging value) or heterogeneity (high bridging value) of the cluster. Cluster bridging values are utilized in determining the number of clusters in the map—'cluster solution'.

Rating data inform participant assessments of statements through go-zone maps. A go-zone map is a bivariate scatter of statements and rating scales, demonstrating the relationship between measured participant rating of each statement (mean rating) for two scales.

Participants had the option to complete some or all GCM activities. All participants were asked to complete a short questionnaire indicating demographics such as (a) age, (b) employment—in healthcare *versus* not, (c) affiliation, (d) race/ethnicity, and (e) the community location with which they most identified. All data were reviewed and summarized by the project team in aggregate and participant identifiers were not linked to results. Participants who completed all sorting and rating steps were provided a $25 gift card as a token of appreciation for their time. This study protocol was determined to be exempt from human subjects review by the authors' institutional review board pursuant the requirements at 45 CFR 46.104(d).

3.0 Results

A total of 26 participants took part in the study. Fourteen participants completed the brainstorming step and 16 completed the sorting step. Completion varied across rating steps (n=16 for impact, n=13 for feasibility, and n=13 for cost); some participants completed only one step, whereas seven completed all steps. For all activities, approximately half of the participants identified as healthcare providers or healthcare professionals and they were either affiliated with health, healthcare, or wellness organizations or community services agencies/organizations (see Table 1). Most respondents were approximately 50 years old and identified as White (non-Hispanic). For the sorting and impact rating steps, there was representation from all northcentral Washington counties (37.8% from Chelan, 25.1% from Okanogan, 12.5% from Douglas, 12.5% from Grant, and 12.5% of respondents who serve multiple counties within the region). Participants from Douglas County did not complete the feasibility and cost rating steps.

Table 1. *Characteristics of Participants for Each GCM Step, Northcentral Washington, 2021*

	Rating steps			
	Sorting (n=16)	**Impact (n=16)**	**Feasibility (n=13)**	**Cost (n=13)**
Age				
Mean	52.4	52.4	51.4	51.4
Median	53.5	53.5	50.0	50.0
Healthcare provider or professional				
Yes	8 (50.0)	8 (50.0)	7 (53.9)	7 (53.9)
No	8 (50.0)	8 (50.0)	6 (46.2)	6 (46.2)
Organizational affiliation				
Health, Healthcare, or Wellness	6 (37.5)	6 (37.5)	6 (46.2)	6 (46.2)
Education	1 (6.25)	1 (6.25)	1 (7.7)	1 (7.7)
Public Utility District, Internet Service Provider, Telecom	1 (6.3)	1 (6.3)	-	-
Community Services	2 (12.5)	2 (12.5)	2 (15.4)	2 (15.4)
Other[a]	6 (37.5)	6 (37.5)	4 (30.8)	4 (30.8)
Race/Ethnicity				
White (non-Hispanic)	13 (81.3)	13 (81.3)	10 (76.9)	10 (76.9)
American Indian or Alaska Native	1 (6.3)	1 (6.3)	1 (7.7)	1 (7.7)
More than one race/ethnicity	1 (6.3)	1 (6.3)	1 (7.7)	1 (7.7)
No response	1 (6.3)	1 (6.3)	1 (7.7)	1 (7.7)

Note: Values indicate n (%) unless otherwise indicated. Columns may not sum to 100% due to rounding. Any non-listed categories indicate no responses. [a]Other organizational affiliations included the following: 'community service, but a very multi-dimensional hub of resources,'; 'community-based organization,'; 'anti-poverty community development services,'; 'community action agency,'; 'fire district,'; 'early childhood education,'; and 'non-profit social service.'

A total of 61 statements were initially suggested in the brainstorming step. After reviewing these statements, three (4.9%) were combined with other similar statements due to redundancy and 12 additional statements were added—due to participants providing more than one unique idea within a single statement or study team additions from key informant interviews conducted for a related project prior to this study. The final list consisted of 70 statements generated through the brainstorming process (see Table 2).

Table 2. *Statements Describing Approaches to Providing or Accessing Telehealth in Northcentral Washington Communities, 2021.*

#	Statement
1	Establish telehealth centers with privacy booths/rooms at central locations in town (e.g., at city hall or the library).
2	Engage home-visiting nurses and outreach workers to assist with telehealth use within patients' homes.
3	Allow patrons to check out laptops—for telehealth use—from the library.
4	Build a mobile app that can be used for telehealth either on one's own device or at a community partner location.
5	Build a mobile app that will allow for easy telehealth access.
6	Change state and federal regulations to be more accepting of telehealth services.
7	Create a telehealth system like '911' for triage and intervention and to connect to relevant resources.
8	Educate community members that telehealth is an easy, reliable, convenient, and private way to access healthcare.
9	Engage with clinics and providers on overcoming barriers to implementing telehealth services.
10	Ensure a telehealth program has a schedule and an option to contact by phone if patients need assistance in connecting.
11	Ensure providers can bill for services provided via telehealth
12	Ensure secure, reliable internet connectivity for all residents.
13	Ensure telehealth access is easily navigable on a mobile phone.
14	Ensure that people in remote areas have access to necessary computers and technology (i.e., internet).
15	Ensure the telehealth platform has the ability to translate into a number of languages to reach all demographics.
16	Establish internet kiosks.
17	Establish telehealth kiosks at doctor's offices.
18	Establish telehealth kiosks at local fire stations.
19	Establish telehealth kiosks at local supermarkets (i.e., maybe near pharmacy).
20	Establish telehealth kiosks at public schools.
21	Establish telehealth kiosks at the public libraries.
22	Evaluate the internet connectivity and access in each community; provide mobile hotspots to those who need them.
23	Expand telehealth to include other health and social services in the community (e.g., chronic disease management, meeting with DSHS, etc.).
24	Expand broadband access in rural areas.

Table 2 continued

25	Generate buy-in from providers who serve rural areas that lack universal access to internet or computers.
26	Have trusted messengers provide technology support to those needing it.
27	Help healthcare organizations develop processes and identify key staff members to make the process streamline for the patient from start to finish.
28	Help healthcare organizations identify which services are most appropriate to utilize telehealth, and what the benefits are for the organization, as well as the provider and patient.
29	Implement a community education campaign to inform residents about telehealth options.
30	Implement equipment check-out programs (i.e., through public libraries) to increase access for telehealth services.
31	Incentivize attendance at an 'introduction to telehealth' class with a hot meal.
32	Increase access to broadband Internet services.
33	Increase community awareness of telehealth opportunities and benefits.
34	Integrate remote patient monitoring and chronic disease self-care and education/prevention/interventions into telehealth.
35	Provide a service that allows patients to call a switchboard and make telehealth appointment.
36	Provide affordable and standardized telehealth platform(s) that are simple to use.
37	Provide community training on how to access healthcare remotely.
38	Provide computer literacy classes.
39	Provide gift cards to community members who complete a form that confirms understanding of how telehealth works.
40	Provide telehealth access at a central location in rural areas, such as a sheriff sub-station or fire station.
41	Provide training for local healthcare providers specifically in telehealth.
42	Work with the small public hospitals and small-town clinics to develop the infrastructure needed for telehealth.
43	Partner with the library system to have mobile hotspots & laptops/tablets set aside and reservable for up to 48 hours for telehealth appointments.
44	Private booths/kiosks in libraries, schools, or other community centers or a trailer that can pull up outside libraries.
45	Provide hotspots and a telehealth tablet or 'smart device' solely for telehealth within the home—preloaded and set up for ease of access with access name/password.
46	Provide informational fliers to providers on how to implement telehealth services in their practice.
47	Provide mobile hotspots for rural residents to make access more reliable.
48	Provide more robust action on 'chronic disease' care for people.
49	Ensure local health clinic staff is on board with telehealth as an alternative platform to provide services.
50	Provide ongoing instruction to medical staff on using the technology/software.
51	Provide opportunities to teach the community how to use the technology/software being used for telehealth.

Table 2 continued

52	Provide telehealth stations through partnerships with agencies that meet families where they are (e.g., Community Actions, Food Banks, DSHS, schools, Early Learning).
53	Provide telehealth vans that are Wi-Fi enabled and have a schedule for driving to hub communities or parks for telehealth appointments—like the library bookmobiles.
54	Provide training to providers and clinic staff on telehealth administration and billing.
55	Provide transportation to a central computer kiosk that would provide telehealth services.
56	Provide transportation to locations with telehealth access.
57	Provide solar-powered picnic tables that have free Wi-Fi and a place to plug in a laptop.
58	Start a program that helps providers purchase technology that allows for telehealth services.
59	Hold a telehealth 'fair' to advertise and explain available telehealth options.
60	Ensure that telehealth is available and open to anyone to start a visit or schedule a visit using an app on their phone.
61	Make a telehealth app that can link to other healthcare information (e.g., electronic health records, vaccine status, etc.).
62	Use artificial intelligence (AI) with telemedicine to triage/prioritize multiple patients—determining who would be seen first or the highest risk person who needs helped first.
63	Utilize grange halls and school nurses to provide specialized telehealth services and clinical services.
64	Utilize outreach workers to educate and bring resources to places, such as orchards and migrant camps.
65	Utilize proven international approaches with community health workers and telehealth sites for rural communities.
66	Utilize tech training at senior meal sites along with distribution of simple phones/equipment
67	Have a volunteer program for training community members—seniors, mono-lingual—on how to utilize telehealth options and other technology.
68	Set up telehealth at local pharmacies so that once the appointment is over, patients can easily collect medicine they have been prescribed—if applicable.
69	Have a grant program for households to purchase telehealth equipment.
70	Provide training for community members to use telehealth technology.

On average, participants who completed the sorting step grouped statements into seven piles (mean 6.6; range 4–10). The sorted statements were combined to generate a point map (see Figure 1). The stress value for the point map was 0.2088, indicating a reasonably good fit between the multidimensional scaling data and the map (Kane & Trochim, 2007). The optimal cluster solution, based on the cohesiveness of statements spatially in the point map and the hierarchical cluster analysis, was comprised of six clusters (see Figure 2). The labels suggested by participants for each cluster were chosen to best represent each cluster's statements. The clusters described include approaches to improving rural telehealth access that

require ‘community infrastructure’ (Cluster 1), involve ‘ensuring access to telehealth technology’ (Cluster 2), require ‘technology infrastructure for telehealth’ (Cluster 3), involve ‘training/awareness of telehealth’ (Cluster 4), relate to ‘state- and policy-level considerations (Cluster 5), and involve ‘healthcare systems engagement and delivery’ (Cluster 6).

Figure 1. Point map illustrating 2-dimensional spatial relationship between statements (n=16 participants, stress value 0.2088).

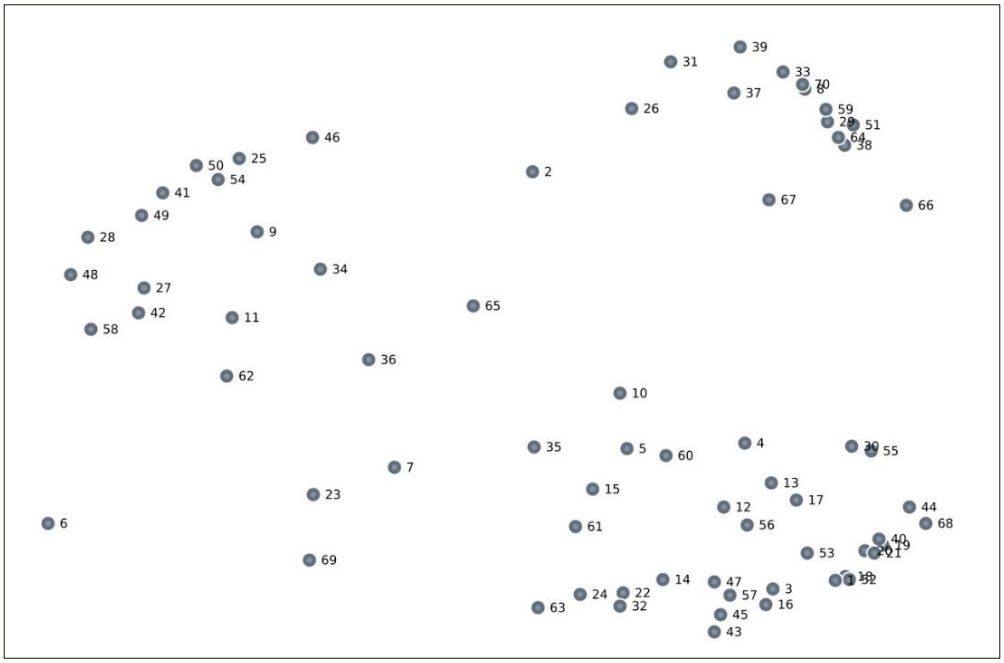
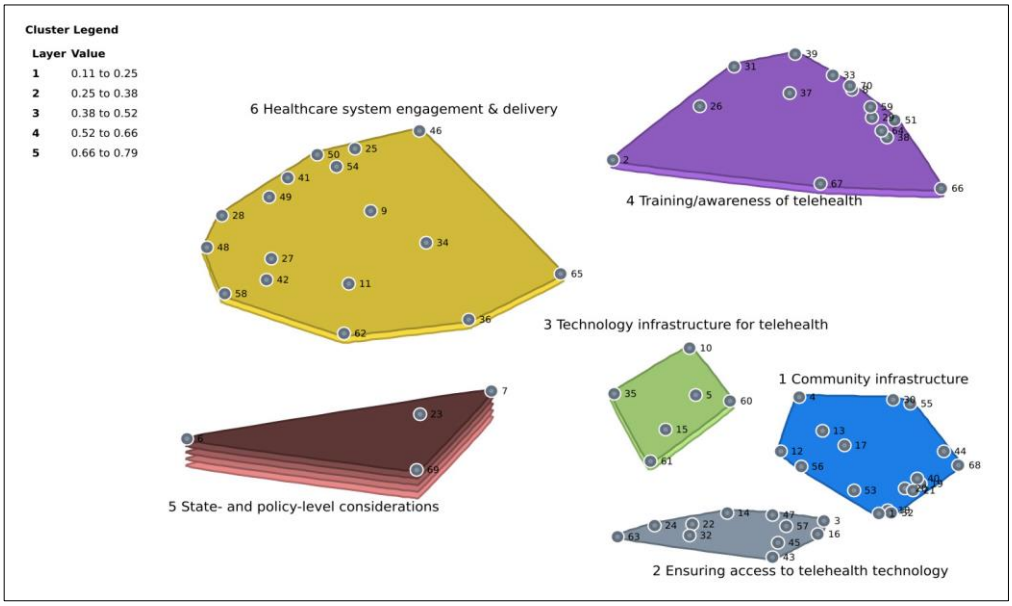


Figure 2. Cluster solution with thematic groupings of statements brainstormed and sorted by participants. Layers illustrate cluster bridging values, with more layers indicating higher bridging values—see legend for layer values.



3.1 Cluster Descriptions

Cluster 1 describes approaches to providing or accessing telehealth in northcentral Washington communities that require or involve community infrastructure. These include, for example, the suggestion to 'establish telehealth centers with privacy booths/rooms at central locations in town' (see Table 3). This statement had the lowest bridging value, indicating consistent placement with other adjacent statements on the map. Cluster 1 statements (n=17) include telehealth kiosks at various community locations (e.g., supermarkets, doctor's offices, fire stations) and mobile vans serving as Wi-Fi hubs for community members at public parks. The 11 statements that make up Cluster 2, 'ensuring access to telehealth technology,' included approaches involving bringing broadband, computers, and/or hotspots to community members to access telehealth. This cluster was centered on strategies for facilitating access to telehealth services at the individual level. There was some conceptual overlap with Cluster 1 (e.g., in Cluster 2, there is a suggestion to 'establish internet kiosks'), which is consistent with the proximity of the two clusters (see Figure 2). Cluster 1 and Cluster 2 are distinguished by the need for community partnerships suggestions (Cluster 1) *versus* a focus on telehealth access (Cluster 2). Both clusters emphasize the role of the community in identifying and implementing solutions to solutions to improve telehealth access.

Table 3. *Statements Describing Approaches to Providing or Accessing Telehealth in Northcentral Washington Communities, 2021* (statements are ranked by impact within cluster).

	Cluster solution and statements	**Bridging value[a]**	**Impact rating[b]**	**Feasibility rating[c]**	**Cost rating[d]**
Cluster 1: Community infrastructure		***0.11***			
12	Ensure secure, reliable internet connectivity for all residents.	0.12	4.73[f]	3.23	4.33
13	Ensure telehealth access is easily navigable on a mobile phone.	0.12	4.64	3.31	3.08
52[e]	Provide telehealth stations through partnerships with agencies that meet families where they are (e.g., Community Actions, Food Banks, DSHS, schools, Early Learning).	0.03	4.27	**3.77[f]**	3.33
1	Establish telehealth centers with privacy booths/rooms at central locations in town (e.g., at city hall or the library).	0.00	3.73	3.46	3.58

Cluster solution and statements		Bridging value[a]	Impact rating[b]	Feasibility rating[c]	Cost rating[d]
4	Build a mobile app that can be used for telehealth either on one's own device or at a community partner location.	0.20	3.67	3.62	3.42
44	Private booths/kiosks in libraries, schools, or other community centers or a trailer that can pull up outside libraries.	0.14	3.67	3.54	3.42
53	Provide telehealth vans that are Wi-Fi enabled and have a schedule for driving to hub communities or parks for telehealth appointments—like the library bookmobiles.	0.02	3.67	3.23	4.25
56	Provide transportation to locations with telehealth access.	0.09	3.67	2.92	3.50
20	Establish telehealth kiosks at public schools.	0.02	3.53	3.38	**3.00**[g]
30	Implement equipment check-out programs (i.e., through public libraries) to increase access for telehealth services.	0.26	3.53	3.46	3.33
55	Provide transportation to a central computer kiosk that would provide telehealth services.	0.29	3.47	2.85	3.33
68	Set up telehealth at local pharmacies so that once the appointment is over, patients can easily collect medicine they have been prescribed (if applicable).	0.23	3.25	3.46	3.42
21	Establish telehealth kiosks at the public libraries.	0.03	3.20	3.54	3.17
40	Provide telehealth access at a central location in rural areas,	0.05	3.13	3.69	3.25

	Cluster solution and statements	Bridging value[a]	Impact rating[b]	Feasibility rating[c]	Cost rating[d]
	such as a sheriff sub-station or fire station.				
17	Establish telehealth kiosks at doctor's offices.	0.20	3.00	3.31	3.08
19	Establish telehealth kiosks at local supermarkets (i.e., maybe near pharmacy).	0.04	3.00	3.15	3.31
18	Establish telehealth kiosks at local fire stations.	0.00	2.87	3.69	3.08
	Cluster 2: Ensuring access to telehealth technology	***0.15***			
14	Ensure that people in remote areas have access to necessary computers and technology (i.e., internet).	0.10	**4.60**[f]	3.31	4.50
24	Expand broadband access in rural areas.	0.22	4.53	3.38	4.50
32	Increase access to broadband Internet services.	0.13	4.40	3.31	4.42
22	Evaluate the internet connectivity and access in each community; provide mobile hotspots to those who need them.	0.17	4.13	3.62	3.58
47[e]	Provide mobile hotspots for rural residents to make access more reliable.	0.04	4.13	3.69	3.50
45	Provide hotspots and a telehealth tablet or 'smart device' solely for telehealth within the home—preloaded and set up for ease of access with access name/password.	0.08	3.73	3.15	3.83
16	Establish internet kiosks.	0.03	3.67	3.54	3.58

Cluster solution and statements		**Bridging value[a]**	**Impact rating[b]**	**Feasibility rating[c]**	**Cost rating[d]**
43	Partner with the library system to have mobile hotspots & laptops/tablets set aside and reservable for up to 48 hours for telehealth appointments.	0.31	3.40	**3.77[f]**	**3.08[g]**
3	Allow patrons to check out laptops—for telehealth use—from the library.	0.04	3.33	3.54	3.42
63	Utilize grange halls and school nurses to provide specialized telehealth services and clinical services.	0.52	3.33	3.46	3.33
57	Provide solar-powered picnic tables that have free Wi-Fi and a place to plug in a laptop.	0.04	2.50	2.62	3.67
Cluster 3: Technology infrastructure for telehealth		***0.27***			
10[e]	Ensure a telehealth program has a schedule and an option to contact by phone if patients need assistance in connecting.	0.38	**4.13[f]**	**3.92[f]**	**2.50[g]**
15[e]	Ensure the telehealth platform has the ability to translate into a number of languages to reach all demographics.	0.22	**4.13[f]**	3.77	3.08
60	Ensure that telehealth is available and open to anyone to start a visit or schedule a visit using an app on their phone.	0.23	**4.13[f]**	3.38	3.08
5	Build a mobile app that will allow for easy telehealth access.	0.20	4.00	3.54	3.42

Cluster solution and statements		**Bridging value[a]**	**Impact rating[b]**	**Feasibility rating[c]**	**Cost rating[d]**
35	Provide a service that allows patients to call a switchboard and make telehealth appointment.	0.35	3.53	3.58	2.75
61	Make a telehealth app that can link to other healthcare information (e.g., electronic health records, vaccine status, etc.).	0.23	3.53	3.54	3.83
Cluster 4: Training/awareness of telehealth		***0.34***			
8[e]	Educate community members that telehealth is an easy, reliable, convenient, and private way to access healthcare.	0.18	**4.40[f]**	4.23	2.38
2[e]	Engage home-visiting nurses and outreach workers to assist with telehealth use within patients' homes.	0.59	4.31	3.85	3.00
64[e]	Utilize outreach workers to educate and bring resources to places, such as orchards and migrant camps.	0.36	4.13	4.08	3.23
67	Have a volunteer program for training community members—seniors, mono-lingual—on how to utilize telehealth options and other technology.	0.47	4.13	3.62	2.67
51[e]	Provide opportunities to teach the community how to use the technology/software being used for telehealth.	0.29	4.07	4.15	2.83

Cluster solution and statements		Bridging value[a]	Impact rating[b]	Feasibility rating[c]	Cost rating[d]
26[e]	Have trusted messengers provide technology support to those needing it.	0.54	4.00	3.75	2.75
33[e]	Increase community awareness of telehealth opportunities and benefits.	0.23	4.00	**4.46[f]**	**2.17[g]**
37[e]	Provide community training on how to access healthcare remotely.	0.29	4.00	4.31	2.83
70[e]	Provide training for community members to use telehealth technology.	0.22	3.93	4.00	2.67
29	Implement a community education campaign to inform residents about telehealth options.	0.24	3.87	4.15	2.33
31	Incentivize attendance at an ‘introduction to telehealth’ class with a hot meal.	0.33	3.87	4.15	2.42
66	Utilize tech training at senior meal sites along with distribution of simple phones/equipment	0.49	3.80	3.69	2.75
38	Provide computer literacy classes.	0.30	3.60	3.69	2.77
59	Hold a telehealth ‘fair’ to advertise and explain available telehealth options.	0.30	3.07	3.77	2.25
39	Provide gift cards to community members who complete a form that confirms understanding of how telehealth works.	0.25	2.73	3.77	2.58
Cluster 5: State- and policy-level considerations		***0.79***			

Cluster solution and statements		**Bridging value[a]**	**Impact rating[b]**	**Feasibility rating[c]**	**Cost rating[d]**
6	Change state and federal regulations to be more accepting of telehealth services.	1.00	**4.33[f]**	3.62	3.25
23[e]	Expand 'telehealth' to include other health and social services in the community (e.g., chronic disease management, meeting with DSHS, etc.).	0.73	4.07	**3.77[f]**	**3.17[g]**
7	Create a telehealth system like '911' for triage and intervention and to connect to relevant resources.	0.52	3.67	2.92	3.83
69	Have a grant program for households to purchase telehealth equipment.	0.92	3.40	3.08	3.83
Cluster 6: Healthcare system engagement & delivery		***0.37***			
42[e]	Work with the small public hospitals and small-town clinics to develop the infrastructure needed for telehealth.	0.37	**4.67[f]**	3.85	3.85
49[e]	Ensure local health clinic staff is on board with telehealth as an alternative platform to provide services.	0.19	4.60	4.00	2.33
11[e]	Ensure providers can bill for services provided via telehealth	0.43	4.53	3.92	2.58
25[e]	Generate buy-in from providers who serve rural areas that lack universal access to internet or computers.	0.39	4.40	3.69	2.25

Cluster solution and statements		Bridging value[a]	Impact rating[b]	Feasibility rating[c]	Cost rating[d]
28[e]	Help healthcare organizations identify which services are most appropriate to utilize telehealth, and what the benefits are for the organization, as well as the provider, and patient.	0.22	4.40	4.15	2.58
36[e]	Provide affordable and standardized telehealth platform(s) that are simple to use.	0.50	4.40	3.77	3.67
9[e]	Engage with clinics and providers on overcoming barriers to implementing telehealth services.	0.39	4.27	4.38	2.33
34	Integrate remote patient monitoring and chronic disease self-care and education/prevention/interventions into telehealth.	0.49	4.20	3.46	3.17
54[e]	Provide training to providers and clinic staff on telehealth administration and billing.	0.24	4.13	4.23	2.92
58	Start a program that helps providers purchase technology that allows for telehealth services.	0.41	4.07	3.54	3.69
27[e]	Help healthcare organizations develop processes and identify key staff members to make the process streamline for the patient from start to finish.	0.28	3.93	3.85	2.67
41[e]	Provide training for local healthcare providers specifically in telehealth.	0.18	3.87	4.38	2.83
50	Provide ongoing instruction to medical staff on using the technology/software.	0.24	3.80	4.00	2.83

Cluster solution and statements		Bridging value[a]	Impact rating[b]	Feasibility rating[c]	Cost rating[d]
48	Provide more robust action on 'chronic disease' care for people.	0.48	3.73	3.62	3.17
65	Utilize proven international approaches with community health workers and telehealth sites for rural communities.	0.52	3.67	3.54	2.92
46	Provide informational fliers to providers on how to implement telehealth services in their practice.	0.41	2.80	**4.46[f]**	**2.00[g]**
62	Use artificial intelligence (AI) with telemedicine to triage/prioritize multiple patients—determining who would be seen first or the highest risk person who needs helped first.	0.56	2.53	2.62	4.08

Note: Rating indicates mean rating (scale from 1 [minor] to 5 [major]).
aBridging value: Bridging values are listed for each statement and cluster. For statements, low bridging values indicate statements that may be more representative of their cluster. For clusters, low bridging values more homogeneity of statements within the cluster.
bImpact rating: Participant rating of potential impact of each statement/idea on increased health services in their community.
cFeasiblity rating: Participant rating of potential feasibility of implementation of each statement/idea in their community.
dCost rating: Participant rating of potential cost of implementation of each statement/idea in their community.
eGo-Zone statement—top rating for feasibility and impact. These rows are also shaded.
fStatement has highest rating in feasibility or impact cluster—major feasibility or impact.
gStatement has lowest rating in cost cluster—minor cost.

Cluster 3—six statements—relates to technology infrastructure required to implement a telehealth program, including services needed to make telehealth appointments or apps to link to healthcare information or facilitate access. Statements within this cluster revolved around developing and improving tools, such as software, to better meet the community's needs. In contrast to Clusters 1 and 2, solutions in Cluster 3 may rely more on advancements in technology rather than community involvement.

Cluster 4 is characterized by statements (n=15) that describe approaches to providing or accessing telehealth in northcentral Washington communities that require or involve training and/or awareness of telehealth. This includes educating community members about telehealth as an easy, reliable, convenient, and private way to access healthcare, training in using telehealth technology, or efforts to increase computer literacy. Approaches in this cluster may be addressed by

community health or education agencies, such as community colleges, senior centers, or health districts.

Cluster 5 contains four relatively heterogeneous statements, confirmed by a high bridging value (0.79). These statements cohere in their relationship to state- or policy-level interventions. Statements in this cluster include creating 'a telehealth system like 911 for triage and intervention and to connect to relevant resources' and changing 'state and federal regulations to be more accepting of telehealth services.' Advocacy groups, policymakers, and community representatives, among others, can play a role in formulating and supporting strategic initiatives aimed at addressing these solutions.

Cluster 6—17 statements—includes suggestions for improving access to telehealth that require or involve engagement of the healthcare system. For instance, statements in this cluster included 'provide training for local healthcare providers specifically in telehealth' and 'ensure local health clinic staff are on board with telehealth as an alternative platform to provide services.' Generally, the healthcare system, including hospitals and clinics, as well as providers, could address strategies within this cluster.

3.2 Rating

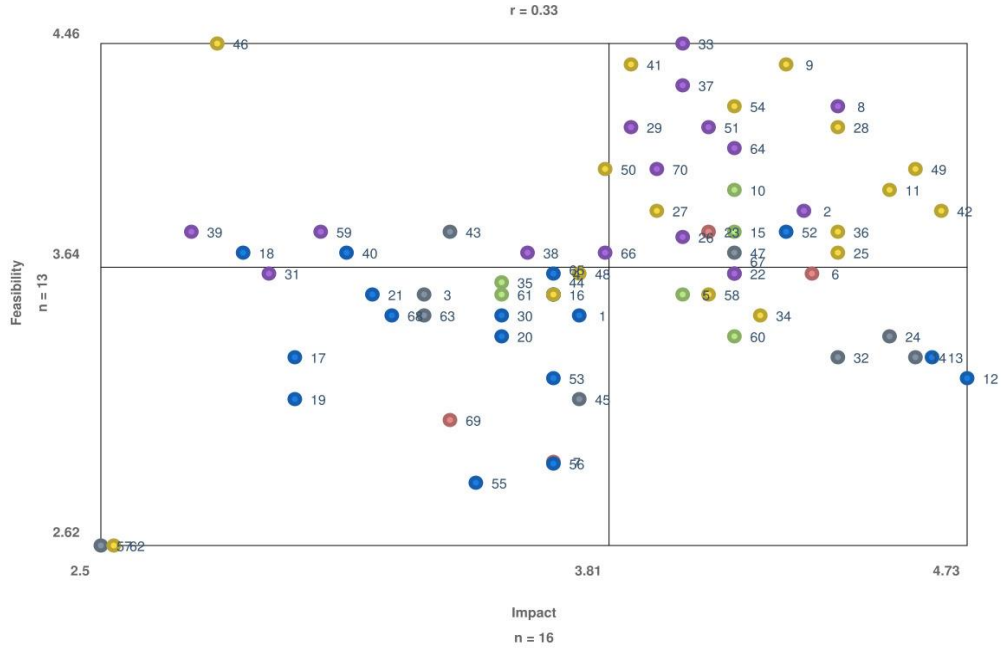
Respondents rated statements for impact, feasibility, and cost on a scale from 1 [minor] to 5 [major]. Impact rating scores ranged from 2.5 to 4.7 (median: 2.4), feasibly rating scores ranged from 2.6 to 4.5 (median: 2.2), and cost rating scores ranged from 2.0 to 4.5 (median: 2.3). Statements rated by participants as having potential for major impact or feasibility (i.e., those with the highest mean rating within each cluster) are specified in Table 3, as are statements with the lowest mean cost rating per cluster (minor cost). Altogether, participants rated 24 statements as having both high impact and high feasibility. These statements are located in the top right quadrant of the go-zone map, demonstrating the relationship between measured participant rating of each statement (mean rating) for impact and feasibility (see Figure 3). Most of these high-impact and high-feasibility statements belonged to Clusters 4 and 6 (see Table 3). There was a weak correlation (r=0.33) between the feasibility and impact ratings, suggesting that statements that were rated as high feasibility were not consistently rated as high impact, or vice versa.

4.0 Discussion

Overall, participants identified one highly feasible and impactful solution to improving telehealth in the region, training and awareness of telehealth and healthcare system engagement and delivery, and one high-impact, low feasibility opportunity: 'ensure secure, reliable Internet connectivity for all residents.' Both solutions have support within the literature. For instance, for training and awareness and health care system engagement and delivery, known barriers to telehealth services in rural communities include inadequate access to broadband Internet and technology adequate for telehealth, limited eHealth and technology literacy (Rush et al., 2021), challenges in provider reimbursement—in the United States—(Uscher-Pines et al., 2022), and legal and regulatory frameworks that vary across states (Kichloo et al., 2020; Naito et al., 2021). These findings are consistent with evidence suggesting that rural providers and healthcare systems face challenges in terms of staff education, technology literacy, and integrated health information exchange capacity (Breton et al., 2021; Chen et al., 2021; Terry & Buntoro, 2021).

The high feasibility/high impact solution identified by participants is an important avenue for increasing telehealth access in the region. Suggesting that the healthcare system, including hospitals, clinics, and healthcare teams, can work toward overcoming these challenges by implementing telehealth training for staff and enhancing providers' capacity to deliver telehealth services.

Figure 3. Go-Zone map showing statements rated according to impact (X-axis) and feasibility (Y-axis) of implementation in northcentral Washington. Points (statements) are color-coded to correspond with cluster in Figure 2.



The high-impact, low-feasibility solution identified by participants, ‘ensure secure, reliable Internet connectivity for all residents’ recognizes both the potential of and frustration with Internet and connectivity in the rural frontier west. Previous research highlights the potential benefits of telehealth in rural communities, such as improving access to care, increasing the availability of specialty care services, lowering costs, and improving physician recruitment and retention (Butzner & Cuffee, 2021; Kichloo et al., 2020). However, achieving these gains hinges on the critical factor of adequate Internet access. Improving Internet access has additional implications for community well-being, including access to education, employment, and other services beyond healthcare (Graves et al., 2021). Thus, while improving Internet access may not have been rated as highly feasible by respondents compared to other interventions, the barriers to implementation that contribute to lower feasibility should be examined and considered as regions and municipalities improve Internet access infrastructure.

In addition, telehealth service’s potential to positively impact health care access in rural and other geographic areas may have broader implications related to systemic policy challenges. For example, the rural healthcare workforce, which was already insufficient prior to the COVID-19 pandemic, was severely impacted by the pandemic, especially the availability of specialists, staffing at long-term care facilities, and nurses (Oster et al., 2022). Further research might demonstrate if

telehealth can help to mitigate workforce shortages by more efficiently scaling service access, while policy changes attempt to address workforce pipeline gaps, expand professional credentialing and licensing, and enact interstate reciprocity compacts.

This study has several limitations. First, the sample size was relatively small, and it is possible that the full range of perspectives and ideas from the community were not captured. However, the study participants were deliberately chosen because of their role as community champions, including individuals with a thorough understanding of their community's capacity and needs, such as those working in community services/development and healthcare sectors. Also, the sample size of this study was sufficient analytically and the low stress value provides support that the sample size fell within an acceptable range (Kane & Rosas, 2017; Kane & Trochim, 2007). Second, this study was conducted during the COVID-19 pandemic, which may have influenced participants' perspectives and experiences with telehealth. Telehealth implementation expanded widely in the United States during the pandemic (Chu et al., 2021; Schulz et al., 2022); however, utilization in rural communities lagged behind (Chu et al., 2021; Datta et al., 2022). It is possible that our participants' rating of various approaches to improving telehealth accessibility were colored by the challenges they experienced during the pandemic. Finally, while this study focused on a specific region of Washington State, its findings may not be universally applicable to all rural areas across the United States. Nevertheless, we hope that the findings from this study stimulate discussions on improving telehealth access in rural communities beyond our region.

5.0 Conclusion

This study identified approaches to improving access to telehealth in rural communities and harkens to its potential to improve access to healthcare in otherwise underserved areas of the United States. By using participatory research methods, we were able to identify potential interventions that could impove rural telehealth access. Participants identified a highly feasible, highly impactful solution: 'training and awareness of telehealth and healthcare system engagement and delivery.' One high-impact, low feasibility opportunity was also identified: 'ensure secure, reliable Internet connectivity for all residents.' Our findings have informed the development of community-tailored interventions to address the unique challenges and resources of rural communities and ultimately improve the quality of care in these areas. For example, as a result of this study, the North Central Washington Accountable Community of Health has developed investment plans to optimize clinical telehealth systems, collaborate with community partners to expand telehealth infrastructure, and provide technical telehealth support to community members (North Central Accountable Communities of Health, n.d.). These efforts, and others identified as highly feasible or impactful, may be informative and applicable to rural communities throughout the United States. Participatory methods, such as GCM, center the needs of community members and produce actionable recommendations that work toward equitable health care access.

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