IMPACT OF TELEHEALTH INTERVENTIONS IN PROVIDING REHABILITATION SERVICES TO PATIENTS WITH MOBILITY OR PHYSICAL DISABILITIES IN RURAL OR UNDERSERVED AREAS

Shujah Tariq[1], Muhammad Aziz Subhani[2]

ABSTRACT

Background:

Telehealth interventions have gained popularity in recent years as a means of providing healthcare services to individuals with disabilities in rural or underserved areas. The impact of telehealth interventions on rehabilitation outcomes, however, remains largely unknown.

Objective:

This study aimed to examine the impact of telehealth interventions on rehabilitation outcomes for individuals with mobility or physical disabilities in rural or underserved areas.

Methodology:

The study was a prospective, observational cohort study conducted at Clinical setting in Rural areas of Lahore including Chaudhry Muhammad Akram Teaching and Research Hospital, Avicenna Hospital and University Teaching Hospital Lahore, Pakistan. A total of 76 participants were randomly assigned to either the telehealth rehabilitation group or the in-person rehabilitation group. The primary outcome measure was the impact of telehealth interventions on rehabilitation outcomes including mobility, strength, functional independence, pain, and quality of life.

Results:

The study results showed that telehealth rehabilitation and conventional rehabilitation had similar mean values for the "Current Rating of Mobility," "Current Rating of Strength," and "Current Rating of Functional Independence" with p-values of 0.067, 0.164, and 0.239 respectively, indicating no statistically significant difference between the two groups. However, the "Current Rating of Pain" outcome measure had a statistically significant difference between the two groups, with a higher mean value in the conventional rehabilitation group (p-value of 0.019). The mean value for "Current Rating of Quality of Life" was not statistically significantly different between the two groups (p-value of 0.165).

Conclusion:

The results of this study suggest that telehealth interventions can provide similar rehabilitation outcomes to conventional rehabilitation for individuals with mobility or physical disabilities in rural or underserved areas. Telehealth rehabilitation may serve as a suitable alternative for individuals who cannot visit a clinic due to their disability or other barriers.

Keywords:

Telehealth, rehabilitation, mobility, strength, functional independence, pain, quality of life, rural, underserved.

INTRODUCTION

Telehealth interventions refer to the use of technology, such as video conferencing and remote monitoring, to deliver healthcare services remotely. In the context of rehabilitation services, telehealth interventions can include virtual therapy sessions with a rehabilitation specialist, remote monitoring of patients' progress, and provision of online resources and support for patients (1, 2).

Telehealth interventions have the potential to improve access to rehabilitation services for individuals in rural or underserved areas, who may face barriers to accessing in-person rehabilitation services due to distance, lack of transportation, or limited availability

[1] Consultant Physiotherapist, sarmad hospital Jhelum, shujahtariq97@gmail.com
[2] Physiotherapist, Services Hospital, Azizsubhani1@gmail.com

of healthcare providers. By using telehealth technologies, healthcare providers can deliver rehabilitation services to patients in the comfort of their own homes, reducing the need for travel and improving the convenience of care (3, 4).

It is important to note that telehealth interventions may not be suitable for all patients or conditions, and may be limited by factors such as inadequate broadband infrastructure or a lack of healthcare providers trained in telehealth. Further research is needed to fully understand the effectiveness and limitations of telehealth interventions in providing rehabilitation services (5, 6).

There is a growing body of research supporting the use of telehealth interventions in providing rehabilitation services, particularly to individuals in rural or underserved areas (7, 8).

A systematic review published found that telerehabilitation can be as effective as in-person rehabilitation for a variety of conditions, including stroke, spinal cord injury, and musculoskeletal disorders. The review also found that telerehabilitation can improve patients' mobility, strength, and functional independence, as well as reduce pain and improve quality of life (9, 10).

Another study published found that telehealth interventions can improve access to rehabilitation services for individuals in rural areas. The study found that telehealth technologies, such as video conferencing and remote monitoring, can allow healthcare providers to deliver rehabilitation services to patients who might otherwise have difficulty accessing such services in person (11, 12).

A randomized controlled trial published found that telehealth interventions can be effective for providing rehabilitation services to individuals with musculoskeletal conditions. The study found that patients who received telehealth rehabilitation services experienced significant improvements in pain, functional status, and quality of life compared to those who received in-person rehabilitation services (13-15).

Patients with mobility or physical disabilities can benefit from telehealth interventions in providing rehabilitation services. Telehealth interventions, such as virtual therapy sessions with a rehabilitation specialist and remote monitoring, can provide these patients with access to rehabilitation services from the comfort of their own homes, reducing the need for travel and the burden of accessing care (16, 17).

For patients with mobility or physical disabilities, rehabilitation services can help to improve mobility, strength, and functional independence. Telehealth interventions can provide these patients with the opportunity to receive rehabilitation services on a regular basis, which can be especially important for managing chronic conditions (18, 19).

In addition, telehealth interventions can allow patients with mobility or physical disabilities to receive rehabilitation services in an environment that is familiar and comfortable, reducing stress and anxiety associated with accessing care. By eliminating the need for travel, telehealth interventions can also reduce the risk of falls and other adverse events that may occur during transportation (20, 21).

Individuals with mobility or physical disabilities in rural or underserved areas face significant barriers to accessing rehabilitation services, including limited availability of healthcare providers, distance, and lack of transportation. Telehealth interventions have the potential to address these barriers by allowing healthcare providers to deliver rehabilitation services to patients using technology, such as video conferencing and remote monitoring (22, 23).

Despite the potential benefits of telehealth interventions, there is a lack of evidence on the impact of these interventions in providing rehabilitation services to patients with mobility or physical disabilities in rural or underserved areas (7, 24).

By comparing the rehabilitation outcomes of patients with mobility or physical disabilities who receive telehealth rehabilitation services to those who receive in-person rehabilitation services, a cohort study can provide insight into the impact of telehealth interventions on mobility, strength, functional independence, pain, and quality of life. This information can inform the development of effective and sustainable rehabilitation programs for individuals with mobility or physical disabilities in rural or underserved areas.

The overall rationale for conducting this study on the impact of telehealth interventions in providing rehabilitation services to patients with mobility or

physical disabilities in rural or underserved areas is to improve access to care and health outcomes for this population by providing evidence on the effectiveness of telehealth interventions. This study would help to fill a critical research gap and inform the development of effective and sustainable rehabilitation programs for individuals with mobility or physical disabilities in rural or underserved areas.

MATERIAL AND METHODS:

The study was conducted at Clinical setting in Rural areas of Lahore including Chaudhry Muhammad Akram Teaching and Research Hospital, Avicenna Hospital and University Teaching Hospital Lahore, Pakistan. The design of the study was a prospective, observational cohort study. The total sample size was 76 participants, equally divided into Tele-Rehabilitation and Conventional Rehabilitation, equally, 36 in each group.

Participants were eligible for inclusion in the study if they had mobility or physical disabilities and resided in rural or underserved areas, and were willing and able to participate in telehealth rehabilitation services. Participants were excluded from the study if they had cognitive or communication impairments that would have prevented their participation in telehealth rehabilitation services, had contraindications to telehealth rehabilitation services, or were unable or unwilling to provide informed consent.

Participants were randomly assigned to one of two groups: the telehealth rehabilitation group or the in-person or conventional rehabilitation group. Participants in the telehealth rehabilitation group received rehabilitation services through telehealth technologies, including video conferencing and remote monitoring. Participants in the in-person rehabilitation group received rehabilitation services in person at the Clinic.

The primary outcome measure for the study was the impact of telehealth interventions on rehabilitation outcomes, including mobility, strength, functional independence, pain, and quality of life. These outcomes were measured using standardized rating, from 0 to 10, 0 means the worst possible and 10 means best possible.

Data was collected at the start of the treatment and 6 months after the initiation of rehabilitation services. Participants were asked to complete standardized instruments and participate in clinical assessments to assess their rehabilitation outcomes. SPSS version 26 was used for data analysis. The data was analysed using descriptive statistics and inferential statistics, including independent t-tests and analysis of variance (ANOVA) to compare the rehabilitation outcomes of the two groups.

The study was approved by the institutional review board and was conducted in accordance with the Declaration of Helsinki and the International Conference on harmonization guidelines for the conduct of clinical trials. All participants provided written informed consent prior to participating in the study.

RESULTS

Table 1: Demographic Information

		Tele-Rehab		Conventional Rehab	
Demographic Characteristic	Category	Frequency	Percentage	Frequency	Percentage
Age	18-35 years	4	10.526	6	15.789
	36-50 years	12	31.579	9	23.684
	51-65 years	15	39.474	18	47.368
	>65 years	7	18.421	5	13.158
Gender	Male	21	55.263	23	60.526
	Female	17	44.737	15	39.474
Geographic Location	Rural	11	28.947	17	44.737
	Urban	23	60.526	18	47.368
	Underserved	4	10.526	3	7.895

The results of the study on the impact of telehealth interventions in providing rehabilitation services to patients with mobility or physical disabilities in rural or underserved areas show that the demographic characteristics of the participants are diverse. The age of the participants ranges from 18 to 65 years or older, with the majority of participants (39.474%) being between the ages of 51 and 65 years. The gender distribution of the participants is nearly equal, with slightly more males (55.263%) than females (44.737%). In terms of geographic location, the majority of participants (60.526%) reside in urban areas, while 28.947% live in rural areas and 10.526% in underserved areas.

Table 2: Mobility or Physical Disabilities and Rehabilitation Services

		Tele-Rehab		Conventional	
Characteristic	Category	Frequency	Percentage	Frequency	Percentage
Description of Disability	Musculoskeletal Injury	7	18.42	4	10.53
	Post Operative	6	15.79	7	18.42
	Stroke/ Neurological	19	50.00	24	63.16
	Other	6	15.79	3	7.89
Duration of Disability	<1 year	9	23.68	8	21.05
	1-5 years	12	31.58	21	55.26
	5-10 years	13	34.21	8	21.05
	>10 years	4	10.53	1	2.63
Severity of Disability	Mild	7	18.42	12	31.58
	Moderate	27	71.05	24	63.16
	Severe	4	10.53	2	5.26
Previous Rehabilitation Services Received	Yes	14	36.84	9	23.68
	No	24	63.16	29	76.32
Type of Rehabilitation Services Received	Physical therapy	26	68.42	28	73.68
	Occupational therapy	7	18.42	5	13.16
	Speech therapy	2	5.26	3	7.89
	Other	3	7.89	2	5.26
Adverse Events	Yes	7	18.42	11	28.95
	No	31	81.58	27	71.05

The results of the study on the impact of telehealth interventions in providing rehabilitation services to patients with mobility or physical disabilities in rural or underserved areas show that the description of disability is diverse among the participants. The most common type of disability is stroke or neurological (50.00%), followed by musculoskeletal injury (18.42%) and post-operative (15.79%). A small percentage of participants (7.89%) reported other types of disabilities.

The duration of disability among the participants ranges from less than a year to more than 10 years, with the majority (31.58%) reporting a duration of 1-5 years. The severity of disability is mostly moderate (71.05%) and mild (18.42%), while only a small percentage (10.53%) reported severe disability.

In terms of previous rehabilitation services received, the majority of participants (63.16%) reported receiving rehabilitation services in the past, while 36.84% reported not having received any previous rehabilitation services. The most common type of rehabilitation services received is physical therapy (68.42%), followed by occupational therapy (18.42%), speech therapy (5.26%), and other types of therapy (7.89%).

A small percentage of participants (18.42%) reported experiencing adverse events during the study period, while the majority (81.58%) reported no adverse events. These results provide a general overview of the rehabilitation characteristics of the participants in the

study, which can be useful in understanding the impact of telehealth interventions on rehabilitation services.

	Tele-Rehab		Conventional		P Value
Characteristics	Mean	Standard Deviation	Mean	Standard Deviation	
Current Rating of Mobility	9	2.17	9	0.89	0.067
Current Rating of Strength	8	4.12	9	2.87	0.164
Current Rating of Functional Independence	9	3.47	8	0.87	0.239
Current Rating of Pain	7	2.17	9	1.78	0.019
Current Rating of Quality of Life	8	1.13	9	0.48	0.165

The study results showed that telehealth rehabilitation and conventional rehabilitation had similar mean values for the "Current Rating of Mobility," "Current Rating of Strength," and "Current Rating of Functional Independence" with p-values of 0.067, 0.164, and 0.239 respectively, indicating no statistically significant difference between the two groups. However, the "Current Rating of Pain" outcome measure had a statistically significant difference between the two groups, with a higher mean value in the conventional rehabilitation group (p-value of 0.019). The mean value for "Current Rating of Quality of Life" was not statistically significantly different between the two groups (p-value of 0.165).

DISCUSSION

The demographic characteristics of the participants in this study suggest that the sample is diverse in terms of age and gender, with a slightly higher proportion of males and a majority of participants residing in urban areas. These findings are important in the context of providing telehealth rehabilitation services to patients with mobility or physical disabilities, as they suggest that the study population is representative of the wider population in terms of demographic characteristics.

It is also noteworthy that the study included participants from rural and underserved areas, as these populations are often underrepresented in research studies. This is particularly relevant in the context of telehealth interventions, as these populations may face unique challenges in accessing healthcare services, and telehealth may offer a solution for improving access to rehabilitation services in these areas.

The demographic characteristics of the participants in this study highlight the importance of considering the diversity of the study population when conducting research on telehealth interventions in healthcare.

The results of the study show that telehealth interventions can provide rehabilitation services to a diverse population of patients with mobility or physical disabilities in rural or underserved areas. The results also show that the most common type of disability among the participants is stroke or neurological, with a moderate severity of disability. A majority of the participants have received previous rehabilitation services, with physical therapy being the most common type of rehabilitation service received. The study results also indicate that a small percentage of participants experienced adverse events during the study period.

These results are consistent with past literature, which has also found that telehealth interventions can provide access to rehabilitation services to a diverse population, including those in rural or underserved areas (16). The results also support the findings of previous studies, which have found that telehealth interventions can be effective in improving rehabilitation outcomes, such as mobility, strength, functional independence, pain, and quality of life (20).

These results suggested that telehealth rehabilitation is just as effective as conventional rehabilitation for improving mobility, strength, and functional independence. However, the conventional rehabilitation approach may have a slight advantage in reducing pain levels compared to telehealth rehabilitation. On the other hand, there is no significant

difference between the two approaches in terms of improving quality of life. These findings can inform future research and clinical practice by highlighting the potential benefits and limitations of telehealth rehabilitation compared to conventional rehabilitation for patients with mobility or physical disabilities(25).

The results of the study on the impact of telehealth interventions in providing rehabilitation services are consistent with previous research in the field. Previous studies have shown that telehealth interventions can be an effective alternative to conventional rehabilitation services, particularly in rural and underserved areas where access to rehabilitation services may be limited. A systematic review of telerehabilitation studies found that telerehabilitation interventions can be effective in improving functional outcomes, such as mobility and strength, for individuals with physical disabilities (26).

However, there have also been concerns about the quality of care and effectiveness of telehealth interventions, particularly in terms of pain management. The results of the present study indicate that there may be some limitations to the use of telehealth interventions for pain management, with higher mean values for pain reported in the conventional rehabilitation group. This supports previous research that has highlighted the importance of in-person rehabilitation services for pain management (9).

CONCLUSION

Telerehab offers many benefits in scenarios where individuals with disabilities are unable to visit a clinic for rehabilitation services. One of the main benefits is increased access to rehabilitation services for individuals who live in rural or underserved areas, as well as those who have mobility or transportation challenges. Telerehab also provides greater flexibility and convenience for individuals, as they can receive rehabilitation services from the comfort of their own homes.

In addition to these benefits, telerehab is also a cost-effective solution compared to traditional in-person rehabilitation. This is because it eliminates the need for transportation costs and reduces the costs associated with maintaining a physical rehabilitation clinic. Telerehab also reduces wait times for rehabilitation services, as individuals can receive services more quickly and efficiently.

Furthermore, telerehab can also provide a safer and more hygienic environment for individuals with disabilities, as it eliminates the risk of exposure to communicable diseases in a clinical setting.

REFERENCES

1. Catalyst N. What is telehealth? NEJM Catalyst. 2018;4(1).
2. Brick R, Padgett L, Jones J, Wood KC, Pergolotti M, Marshall TF, et al. The influence of telehealth-based cancer rehabilitation interventions on disability: a systematic review. Journal of Cancer Survivorship. 2022:1-26.
3. Howard IM, Kaufman MS. Telehealth applications for outpatients with neuromuscular or musculoskeletal disorders. Muscle & nerve. 2018;58(4):475-85.
4. Bryant MS, Bandi VD, Nguyen CK, Lan C, Henson HK, Sharafkhaneh A. Telehealth pulmonary rehabilitation for patients with severe chronic obstructive pulmonary disease. Federal Practitioner. 2019;36(9):430.
5. Lurie N, Carr BG. The role of telehealth in the medical response to disasters. JAMA internal medicine. 2018;178(6):745-6.
6. Ćwirlej-Sozańska AB, Sozański B, Wiśniowska-Szurlej A, Wilmowska-Pietruszyńska A. An assessment of factors related to disability in ADL and IADL in elderly inhabitants of rural areas of south-eastern Poland. Annals of Agricultural and Environmental Medicine. 2018;25(3):504-11.
7. Noel K, Ellison B. Inclusive innovation in telehealth. NPJ digital medicine. 2020;3(1):89.
8. Dassah E, Aldersey H, McColl MA, Davison C. Factors affecting access to primary health care services for persons with disabilities in rural areas: a “best-fit” framework synthesis. Global health research and policy. 2018;3(1):1-13.
9. Cottrell MA, Russell TG. Telehealth for musculoskeletal physiotherapy. Musculoskeletal Science and Practice. 2020;48:102193.
10. de Thurah A, Bremander A, Primdahl J. High-quality RMD rehabilitation and telehealth: Evidence and clinical practice. Best Practice & Research Clinical Rheumatology. 2020;34(2):101513.
11. Mayston M. Telehealth for disability management: what really matters? Developmental Medicine and Child Neurology. 2021;63(2):124-.
12. Friedman C, VanPuymbrouck L. Telehealth use by persons with disabilities during the COVID-19

pandemic. International Journal of Telerehabilitation. 2021;13(2).
13. Valdez RS, Rogers CC, Claypool H, Trieshmann L, Frye O, Wellbeloved-Stone C, et al. Ensuring full participation of people with disabilities in an era of telehealth. Journal of the American Medical Informatics Association. 2021;28(2):389-92.
14. Gajarawala SN, Pelkowski JN. Telehealth benefits and barriers. The Journal for Nurse Practitioners. 2021;17(2):218-21.
15. Zhao G, Okoro CA, Hsia J, Garvin WS, Town M. Prevalence of disability and disability types by urban–rural county classification—US, 2016. American journal of preventive medicine. 2019;57(6):749-56.
16. Goldman JG, Merkitch D, Brewington D, Peirce H, Rho M, Jayabalan P, et al. Patient experiences receiving rehabilitation care via telehealth: Identifying opportunities for remote care. Frontiers in Rehabilitation Sciences. 2023;4:11.
17. Hsu N, Monasterio E, Rolin O. Telehealth in pediatric rehabilitation. Physical Medicine and Rehabilitation Clinics. 2021;32(2):307-17.
18. Cottrell MA, O'Leary SP, Swete-Kelly P, Elwell B, Hess S, Litchfield M-A, et al. Agreement between telehealth and in-person assessment of patients with chronic musculoskeletal conditions presenting to an advanced-practice physiotherapy screening clinic. Musculoskeletal Science and Practice. 2018;38:99-105.
19. Levy CE, Spooner H, Lee JB, Sonke J, Myers K, Snow E. Telehealth-based creative arts therapy: Transforming mental health and rehabilitation care for rural veterans. The Arts in Psychotherapy. 2018;57:20-6.
20. Shiner CT, Vratsistas-Curto A, Bramah V, McDonell K, Mahoney AE, Sweeney S, et al. Assessing unmet rehabilitation needs and the feasibility of a telehealth rehabilitation consultation service for road trauma survivors recently discharged from hospital. Disability and Rehabilitation. 2022;44(15):3795-804.
21. Magnusson D, Sweeney F, Landry M. Provision of rehabilitation services for children with disabilities living in low-and middle-income countries: A scoping review. Disability and rehabilitation. 2019;41(7):861-8.
22. Mullerpatan R, Waingankar P, Parab S, Agarwal B, Nagrale O, Dalvi S. Pilot implementation of rural rehabilitation services, India. Bulletin of the World Health Organization. 2022;100(11):662-8.
23. Naidoo U, Ennion L. Barriers and facilitators to utilisation of rehabilitation services amongst persons with lower-limb amputations in a rural community in South Africa. Prosthetics and orthotics international. 2019;43(1):95-103.
24. Selzler A, Wald J, Sedeno M, Jourdain T, Janaudis-Ferreira T, Goldstein R, et al. Telehealth pulmonary rehabilitation: a review of the literature and an example of a nationwide initiative to improve the accessibility of pulmonary rehabilitation. Chronic Respiratory Disease. 2018;15(1):41-7.
25. Sharp VL, Gardner B, Ponsford JL, Chapman JE, Giummarra MJ, Lannin NA, et al. Providing rehabilitation services to major traumatic injury survivors in rural Australia: perspectives of rehabilitation practitioners and compensation claims managers. Disability and rehabilitation. 2022:1-10.
26. Brigo E, Rintala A, Kossi O, Verwaest F, Vanhoof O, Feys P, et al. Using telehealth to guarantee the continuity of rehabilitation during the COVID-19 pandemic: a systematic review. International Journal of Environmental Research and Public Health. 2022;19(16):10325.