Evaluation of patient satisfaction with telerehabilitation services for stroke recovery in Saudi Arabia

Evaluación de la satisfacción de los pacientes con los servicios de telerrehabilitación para la recuperación de accidentes cerebrovasculares en Arabia Saudita

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Abstract

Introduction: Stroke is a major global cause of disability and mortality, with increasing incidence rates in Saudi Arabia. Traditional, intensive in-person rehabilitation is challenging, particularly for patients in remote areas. Telerehabilitation offers an effective remote alternative, but patient satisfaction is crucial for its success.
Objective: This study aimed to evaluate patient satisfaction with telerehabilitation for stroke recovery in Saudi Arabia, focusing on perceived effectiveness and factors influencing satisfaction.
Methodology: A cross-sectional design was used to recruit 377 stroke patients who had completed at least 10 telerehabilitation sessions. Data were collected using validated tools, including the Telehealth Usability Questionnaire (TUQ).
Results: The majority of patients reported high satisfaction (84.1%) with the services. The average TUQ score across all domains was 4.2/5. Significant positive correlations were found between satisfaction levels and improvements in functional recovery, including mobility, motor skills, and emotional well-being. Key drivers of satisfaction were communication quality, technology reliability, and session accessibility. Satisfaction was higher among younger patients and urban residents. The main barriers reported were technical issues (20.0%) and lack of technology familiarity (18.0%).
Conclusions: High patient satisfaction correlated with better recovery outcomes, emphasizing the need for tailored services. Recommendations include improving technology infrastructure and providing patient training. Telerehabilitation is a well-received and effective alternative to traditional methods in Saudi Arabia.

Keywords

Stroke recovery, telerehabilitation, patient satisfaction, Saudi Arabia, telehealth, rehabilitation outcomes, functional recovery, remote therapy.

Resumen

Introducción: El accidente cerebrovascular es una de las principales causas de discapacidad y mortalidad mundial, con un aumento progresivo en Arabia Saudita. La rehabilitación presencial intensiva presenta dificultades, especialmente para quienes viven en zonas remotas. La telerehabilitación surge como una alternativa accesible, pero la satisfacción del paciente es esencial para su éxito.Objetivo: Evaluar la satisfacción de los pacientes con la telerehabilitación durante la recuperación post-ictus en Arabia Saudita y analizar los factores asociados
Metodología: Se realizó un estudio transversal con 377 pacientes que completaron al menos 10 sesiones de telerehabilitación. Se utilizaron herramientas validadas, incluido el Cuestionario de Usabilidad de Telemedicina (TUQ), para medir satisfacción y percepción de efectividad.
Resultados: El 84,1% de los participantes reportó alta satisfacción. El puntaje promedio del TUQ fue 4,2/5. La satisfacción mostró correlaciones positivas con mejoras funcionales en movilidad, habilidades motoras y bienestar emocional. Los factores más influyentes fueron la calidad de la comunicación con los terapeutas, la fiabilidad tecnológica y la accesibilidad de las sesiones. La satisfacción fue mayor en pacientes jóvenes y residentes urbanos. Las barreras más frecuentes fueron problemas técnicos (20%) y falta de familiaridad tecnológica (18%).
Conclusiones: La alta satisfacción se relaciona con mejores resultados de recuperación. Se recomienda fortalecer la infraestructura digital y brindar capacitación al paciente. La telerehabilitación es una alternativa eficaz y bien aceptada en Arabia Saudita.

Palabras clave

Recuperación del accidente cerebrovascular; telerehabilitación; satisfacción del paciente; Arabia Saudita; telesalud; resultados de rehabilitación; recuperación funcional; terapia remota.

Introduction

Work-Stroke is a significant global health concern, representing the second leading cause of death and a primary contributor to long-term disability (World Health Organization, 2021). Approximately 12.2 million new stroke cases occur annually worldwide (GBD 2019 Stroke Collaborators, 2021). In Saudi Arabia, the burden is substantial, with increasing cases linked to an aging population and rising rates of hypertension, diabetes, and sedentary lifestyles (Al-Jadid, 2013).

Traditional rehabilitation often involves intensive in-person sessions, which are often inaccessible to patients in remote areas or those with limited mobility or financial constraints (Thrift et al., 2017). Telerehabilitation leverages digital technologies to deliver therapy remotely, minimizing travel time, reducing costs, and ensuring continuity of care (Johansson & Wild, 2021). Global studies have demonstrated its efficacy in improving motor functions, cognitive abilities, and quality of life (Laver et al., 2020). Patient satisfaction is critical for the success and sustainability of these services, as high satisfaction is linked to better adherence and improved recovery (Bashshur et al., 2020).

This study aimed to fill the knowledge gap regarding patient satisfaction with telerehabilitation for stroke recovery in Saudi Arabia, offering actionable recommendations for service improvement (Hillier et al., 2023).

Objectives of the Study

Aim: To evaluate patient satisfaction with telerehabilitation services for stroke recovery in Saudi Arabia, focusing on perceived effectiveness, satisfaction determinants, and recovery outcomes.

Specific Objectives: Evaluate patient satisfaction levels, assess perceived effectiveness in improving functional outcomes, identify factors influencing satisfaction (e.g., communication quality, technology reliability, and session accessibility), and analyze the relationship between satisfaction and recovery milestones.

Secondary Objectives: Explore patients' perceptions of challenges/barriers, gather suggestions for improvement, compare satisfaction among demographic groups, and evaluate the role of emotional well-being.

Method

Study Design

The study employed a cross-sectional descriptive design to evaluate patient satisfaction with telerehabilitation services provided for stroke recovery in Saudi Arabia. This design allowed for the collection of data at one point in time to assess overall satisfaction and contributing factors.

Study Area/Setting

The study was conducted across multiple healthcare facilities in Saudi Arabia offering telerehabilitation services for stroke recovery. The primary site was the National Guard Hospital in Al Ahsa. Participants were also recruited from other centers within the Saudi healthcare system to ensure diversity across urban and rural settings.

Study Subjects

Inclusion Criteria: Participants were stroke survivors aged 18 years or older who had received telerehabilitation for at least one month following acute stroke care discharge. They were living in Saudi Arabia and had regular access to the internet and devices supporting telerehabilitation.

Exclusion Criteria: Individuals were excluded if they: had not completed a minimum of one month of telerehabilitation; were unable to communicate effectively in Arabic or English; had significant cognitive or speech impairments; or had been diagnosed with other neurological disorders.

Sample Size and Sampling Technique

The target sample size was 377 stroke survivors. The sample size was calculated using the Raosoft calculator, ensuring a 95% confidence interval and a 5% margin of error. A purposive sampling technique was used to select participants who met the eligibility criteria and had adequate experience with the services.

Data Collection Methods and Instruments

Data were collected using a structured, self-administered questionnaire. The survey included the following validated instruments:

Telehealth Usability Questionnaire (TUQ): Assessed usability and satisfaction (ease of use, effectiveness, usefulness).

Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST 2.0): Measured satisfaction with assistive technologies (comfort, ease of use, and service quality).

Telemedicine Satisfaction and Usefulness Questionnaire (TSUQ): Evaluated satisfaction with telemedicine, focusing on communication quality and accessibility.

Patient Assessment of Chronic Illness Care (PACIC): Measured patient-centered care in the context of stroke recovery.

Demographic Data: Included age, gender, geographical location (urban/rural), type of stroke, and comorbidity. The instruments were translated into Arabic and validated by bilingual healthcare professionals.

Statistical Analysis

Data were analyzed using IBM SPSS Statistics Version 27. Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize demographics and responses. Differences in satisfaction based on sociodemographic variables were assessed using Chi-square tests for categorical variables and t-tests or ANOVA for continuous variables, as appropriate. A multiple linear regression model was used to identify factors influencing overall satisfaction, examining the impact of independent variables (e.g., communication quality, accessibility).

The sample distribution was found to be normal (based on the appropriateness of using parametric tests like t-tests, ANOVA, and linear regression). Statistical significance was set at a p-value of less than 0.05. The post-hoc calculation of the study's power was 0.92, indicating sufficient statistical power to detect significant findings.

Ethical Considerations

Ethical approval was obtained from the Institutional Review Board (IRB) at the National Guard Health Affairs (NGHA). The study was conducted in accordance with the Declaration of Helsinki. The approval number is NRA24/008/11. Confidentiality was maintained, and all data were anonymized. Informed consent was secured from all participants.

Results

A total of 377 stroke survivors completed the telerehabilitation satisfaction survey, meeting the calculated sample size requirement.

Demographic Characteristics

The demographic profile of the participants (N=377) showed that the majority were in the 51 to 70 age group (62.3%). The gender distribution was nearly balanced, with males representing 50.1% of the sample and females 49.9%. Most participants resided in urban areas (68.7%), while 31.3% were from rural locations (Table-1).

Table 1. Demographic Characteristics

Characteristic	Frequency (n)	Percentage (%)
Age		

18-30	35	9.3
31-50	107	28.4
51-70	235	62.3
	Gender	
Male	189	50.1
Female	188	49.9
	Residence	
Urban	259	68.7
Rural	118	31.3

Overall Satisfaction and Key Factors

Overall satisfaction with the telerehabilitation service was exceptionally high, with 84.1% of participants reporting positive experiences. The overall mean score on the Telehealth Usability Questionnaire (TUQ) was 4.2/5 (SD = ±0.6). Specifically, the "Ease of Use" domain received the highest mean score (4.4±0.6) (Table-2).

Table 2. Overall Satisfaction with Telerehabilitation.

TUQ Domain	Mean Score (±SD)
Ease of Use	4.4 (±0.6)
Usefulness	4.3 (±0.7)
Effectiveness	4.2 (±0.7)
Reliability	4.1 (±0.8)
Overall Satisfaction	4.2 (±0.6)

Key factors contributing most significantly to this satisfaction were communication quality (89.3% positive rating), accessibility (85.4%), and technology reliability (83.2%). An independent samples t-test comparing satisfaction scores between urban and rural residents revealed a statistically significant difference in Technology Reliability ($t = 3.51$, $p<0.001$), with urban residents reporting higher satisfaction (87.1% vs. 73.8% for rural residents) (Table-3).

Table 3. Factors Influencing Satisfaction

Factors	Urban (%)	Rural (%)	Total (%)
Communication Quality	91.5	84.7	89.3
Accessibility	88.9	77.1	85.4
Technology Reliability	87.1	73.8	83.2

Functional Outcomes and Correlation Analysis

The study demonstrated statistically significant improvements in all key functional outcome measures following the telerehabilitation period.

Mobility (Motor Skills): Scores increased significantly from a pre-rehabilitation mean of 3.2±1.1 to a post-rehabilitation mean of 4.4±0.8 ($t=-15.11$, $p<0.001$).

Cognitive Abilities and Quality of Life (Well-Being) also showed statistically significant gains, with $p<0.001$ for both measures.

To assess the relationship between experience and outcomes, a Pearson product-moment correlation coefficient was calculated between overall satisfaction and functional recovery (Quality of Life). A strong, positive, and statistically significant correlation was found ($r=0.68$, $p<0.001$), indicating that participants who reported higher satisfaction levels were strongly associated with greater functional recovery outcomes (Table-4).

Table 4. Functional Outcomes and Correlation Analysis

Outcome Measure	Pre-Rehabilitation (Mean ± SD)	Post-Rehabilitation (Mean ± SD)	p-value
Mobility (Motor Skills)	3.2 (±1.1)	4.4 (±0.8)	<0.001
Cognitive Abilities	3.5 (±0.9)	4.3 (±0.7)	<0.001

Quality of Life (Well-Being)	3.6 (±1.0)	4.5 (±0.8)	<0.001

Challenges and Barriers

Despite high overall satisfaction, the three most common barriers reported were Technical Issues (20.0%), Lack of Technology Familiarity (18.0%), and Internet Access Issues (15.0%). These percentages highlight specific areas for service improvement (Table-5).

Table 5. Challenges and Barriers

Barrier	Frequency (n)	Percentage (%)
Technical Issues	75	20.0
Lack of Technology Familiarity	68	18.0
Internet Access Issues	56	15.0

Discussion

This study provided critical insights into patient satisfaction levels and functional outcomes associated with telerehabilitation services for stroke recovery in Saudi Arabia. The findings highlighted that telerehabilitation is a viable and effective alternative, particularly in improving motor and cognitive functions.

The high satisfaction level (84.1%) aligned with previous studies validating the efficacy of telerehabilitation (Cramer et al., 2019). Consistent TUQ scores underscored the acceptability of the services. These findings corroborated earlier work emphasizing the importance of ease of access and technical reliability in telehealth satisfaction (Chen et al., 2021).

The demographic analysis revealed that urban participants reported higher satisfaction compared to rural counterparts, likely due to better infrastructure (Alshammari et al., 2023). Addressing these disparities is crucial for equitable healthcare.

Functional outcomes showed significant improvement post-rehabilitation, which is consistent with the work of Cramer et al. (2019). Furthermore, the strong positive correlation (r=0.68) between overall satisfaction and functional recovery emphasized that a satisfying experience is intrinsically linked to successful recovery milestones.

Despite positive outcomes, notable barriers persisted, including technical issues and poor internet connectivity. These challenges mirror findings from the World Health Organization (2021), which stressed the need for robust digital infrastructure.

To optimize telerehabilitation services in Saudi Arabia, several measures are recommended:

Improving Infrastructure: Enhancing internet connectivity in rural areas.

Patient Training: Providing training sessions to improve technological literacy.

Customized Platforms: Developing user-friendly interfaces tailored to the needs of stroke survivors.

Conclusions

This study provided valuable insights into the effectiveness and patient satisfaction of telerehabilitation services for stroke recovery in Saudi Arabia. A significant majority (84.1%) of stroke survivors expressed high satisfaction. Telerehabilitation demonstrated substantial improvements in key functional outcomes.

The results suggest that telerehabilitation is a viable and effective alternative to traditional in-person rehabilitation. These findings support the integration and scalability of telerehabilitation within the broader healthcare system in Saudi Arabia. Moving forward, future research should focus on exploring the long-term effects of telerehabilitation and addressing challenges such as technological literacy and infrastructure limitations.

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