

Rehabilitation Access for Patients with Rare and Complex Neurological Diseases in Georgia: A Mixed-Methods Study

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Abstract

Introduction: This study assessed access to rehabilitation services among patients with rare and complex neurological diseases in Georgia and identified key financial, geographic, organisational, and technological barriers.

Methods: A sequential explanatory mixed-methods design was used. The quantitative phase included a cross-sectional survey of 150 adults with rare and complex neurological diseases who had used or needed rehabilitation services. The qualitative phase included semi-structured interviews with 10 patients and 10 experts. Quantitative data were analysed using descriptive statistics, bivariate analyses, and logistic regression; qualitative data were analysed thematically and integrated during interpretation.

Results: Only 34.7% of respondents were receiving rehabilitation at the time of the survey, although 74.7% had used rehabilitation services at least once. Overall, 85.3% reported out-of-pocket payments, and 63.3% could not afford recommended rehabilitation. More than half (58.7%) had discontinued rehabilitation, mainly because of cost, distance, or transport difficulties. Participants living outside Tbilisi reported greater travel difficulties, more service interruptions, and higher unmet rehabilitation need. In the adjusted analysis, lack of local rehabilitation services, absence of funding, residence outside Tbilisi, high out-of-pocket financial burden, and transport barriers were associated with unmet rehabilitation need. Telerehabilitation use was low, but willingness to use it was high. Qualitative findings highlighted financial burden, geographic inequality, discontinuity of care, workforce shortages, and policy gaps.

Conclusions: Survey participants faced substantial barriers to continuous multidisciplinary rehabilitation. Long-term financing, regional service development, strengthening of the multidisciplinary rehabilitation workforce, and hybrid telerehabilitation models should be considered to improve access.

Keywords: rare and complex neurological diseases; rehabilitation access; unmet rehabilitation need; Georgia; mixed-methods study; telerehabilitation; health services research; financial barriers

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1. Introduction

Rehabilitation is increasingly recognised as an essential component of health systems and universal health coverage, particularly for people living with chronic, progressive, and disabling conditions. More than 2.4 billion people worldwide live with conditions that may benefit from rehabilitation, highlighting the need to integrate rehabilitation into routine health service delivery rather than treating it as an optional intervention (Cieza et al., 2020; World Health Assembly, 2023; World Health Organization, 2019).

Rare neurological diseases often require long-term, coordinated, and multidisciplinary care. Although individual rare diseases affect relatively small patient groups, their cumulative impact on functioning, independence, family burden, and quality of life is substantial. For many patients, rehabilitation is a continuous process aimed at maintaining function, preventing secondary complications, supporting participation, and improving quality of life (Seidel et al., 2024; World Health Organization, 2023). The broader burden of neurological conditions further supports the importance of rehabilitation, as more than 3 billion people worldwide are affected by neurological conditions (GBD 2021 Nervous System Disorders Collaborators, 2024; World Health Organization, 2024).

International rehabilitation frameworks emphasise early, continuous, person-centred services delivered by multidisciplinary teams. For patients with neurological conditions, rehabilitation may require physical therapy, occupational therapy, speech and language therapy, psychological support, assistive technologies, and social care coordination. However, access remains uneven because of financial barriers, limited coverage, workforce shortages, geographic concentration of services, and fragmented referral pathways (Bright et al., 2018; Htwe et al., 2024; World Health Organization, 2019, 2023).

These challenges are particularly relevant in Georgia, where rehabilitation services have received increasing policy attention but remain unevenly accessible. Existing services are often limited by out-of-pocket payments, geographic distance, shortage of specialised professionals, and lack of disease-specific long-term financing mechanisms. As a result, patients may delay rehabilitation, discontinue services prematurely, or receive care below their clinical needs (Kotrikadze et al., 2025; Richardson et al., 2024; World Health Organization, 2025).

Telerehabilitation may help reduce geographic and financial barriers, especially where specialised services are concentrated in major cities. Evidence suggests that telerehabilitation can support continuity of care for selected conditions when appropriately supervised and adapted to patient needs (Seron et al., 2021). However, its implementation requires digital infrastructure, professional training, regulatory guidance, and patient readiness.

Despite the clinical and policy importance of rehabilitation for people with rare and complex neurological diseases, empirical evidence from Georgia remains limited. Therefore, this study aimed to assess access to rehabilitation services

among patients with rare and complex neurological diseases in Georgia and to identify key financial, geographic, organisational, and technological barriers from patient and expert perspectives. The study used a sequential explanatory mixed-methods design to combine quantitative estimates of access barriers with qualitative insights from patients and experts.

2. Methods

2.1. Study Design and Setting

This study used a sequential explanatory mixed-methods design. In this design, the quantitative phase was conducted first to identify the scale and distribution of rehabilitation access barriers, followed by a qualitative phase to explain and contextualise the survey findings through patient and expert perspectives. This framework was selected because the study aimed not only to measure access barriers, but also to understand how these barriers were experienced by patients and interpreted by rehabilitation stakeholders.

The quantitative phase consisted of a cross-sectional survey of patients with rare and complex neurological diseases. The qualitative phase consisted of semi-structured in-depth interviews with patients and experts. The qualitative interview guide and participant selection were informed by the quantitative findings, particularly patterns related to out-of-pocket payment, geographic inequality, service interruption, unmet rehabilitation need, and telerehabilitation willingness.

The study was conducted in Georgia, where rehabilitation services for neurological conditions are provided through public, private, and out-of-pocket financing mechanisms. The study focused on financial accessibility, geographic accessibility, service availability, continuity of care, perceived quality, and the potential role of telerehabilitation. The reporting of the overall mixed-methods study was informed by the Good Reporting of A Mixed Methods Study recommendations (O’Cathain et al., 2008).

2.2. Participants and Sampling

The quantitative phase included 150 adults diagnosed with rare and complex neurological diseases who had used, were currently using, or needed rehabilitation services. Eligible participants were aged 18 years or older and had a confirmed neurological diagnosis requiring rehabilitation or long-term functional support. Patients were included regardless of whether they had received rehabilitation, allowing the study to capture both service users and individuals with unmet rehabilitation needs.

The quantitative sample size was determined pragmatically, taking into account the small and hard-to-reach nature of the target population, the absence of a comprehensive national sampling frame, and the exploratory purpose of the study. A sample of 150 participants was considered sufficient to describe the main patterns of rehabilitation access barriers and to conduct exploratory bivariate and multivariable analyses. Because the regression model included a limited num-

ber of predictors and unmet rehabilitation need was common in the sample, the sample size was considered adequate for exploratory analysis, but not for producing nationally representative prevalence estimates.

Participants were recruited through rehabilitation centres, neurologists, patient organisations, and professional networks using purposive sampling. Snowball sampling was also used to reach additional participants. To reduce sampling narrowness, recruitment aimed to include participants with different diagnoses, rehabilitation experiences, financing situations, and places of residence, including Tbilisi, other urban areas, and rural areas. However, because probability-based sampling was not feasible, the findings should be generalised with caution.

The qualitative phase included 20 in-depth interviews: 10 with patients and 10 with experts. The qualitative sample size was based on the explanatory purpose of the second phase and the need to capture diverse patient and stakeholder perspectives rather than statistical representativeness. Patient interviewees were selected from survey participants to reflect variation in residence, rehabilitation experience, financing status, and reported barriers. Expert participants included rehabilitation professionals, neurologists, health policy specialists, rehabilitation service providers, and individuals involved in patient support or advocacy. Interviews continued until the main themes became recurrent and no substantially new themes emerged.

2.3. Data Collection and Measures

Quantitative data were collected using a structured questionnaire developed for this study. The questionnaire included sociodemographic characteristics, clinical profile, rehabilitation service use, financial and geographic barriers, continuity of care, perceived quality of services, unmet rehabilitation needs, and attitudes towards telerehabilitation. The questionnaire was administered in Georgian either face-to-face or online, depending on participant preference and accessibility. Before data collection, the questionnaire was reviewed for clarity and piloted with a small number of respondents.

The main outcome was unmet rehabilitation need, defined as needing rehabilitation but not receiving it, discontinuing rehabilitation prematurely, or receiving rehabilitation less frequently than clinically needed because of financial, geographic, organisational, or personal barriers. Financial accessibility was assessed through out-of-pocket payments, affordability of rehabilitation sessions, and transport or accommodation costs. Geographic accessibility was assessed through place of residence, need to travel to another city, availability of local services, and transport-related difficulties. Telerehabilitation was assessed through previous use, willingness to use remote services, internet access, digital skills, and preference for hybrid or in-person rehabilitation. Qualitative data were collected through semi-structured interviews conducted in Georgian, either face-to-face or online. Patient interviews explored experiences of accessing rehabilitation, including financial burden, transport difficul-

ties, service interruptions, unmet needs, and effects on daily functioning. Expert interviews focused on financing mechanisms, workforce capacity, regional service distribution, referral pathways, multidisciplinary care, and the feasibility of telerehabilitation.

Interviews were conducted by researchers with experience in health services research and prior familiarity with qualitative interviewing. Before data collection, the interviewers reviewed the study protocol, interview guide, consent procedures, and principles of neutral probing, confidentiality, and non-directive questioning. The interview guide was discussed within the research team and refined after pilot testing to improve clarity and flow. Field notes were taken after interviews to document contextual observations and emerging analytic impressions.

2.4. Questionnaire Development and Validation

The survey questionnaire was developed specifically for this study because no previously validated Georgian-language instrument was available to assess rehabilitation access barriers among patients with rare and complex neurological diseases. The questionnaire was informed by the study objectives, international rehabilitation frameworks, previous literature on rehabilitation access barriers, and the Georgian rehabilitation service context. It covered sociodemographic characteristics, clinical profile, rehabilitation service use, financial accessibility, geographic accessibility, service availability, continuity of care, perceived quality, unmet rehabilitation needs, and attitudes towards telerehabilitation.

Content validity was assessed through expert review. The draft questionnaire was reviewed by researchers and specialists familiar with rehabilitation, neurology, health services research, and health policy. Reviewers assessed whether the items were relevant, understandable, and appropriate for the Georgian context. Based on their feedback, several items were reworded to improve clarity and reduce ambiguity.

Pilot testing was conducted with a small group of respondents before full data collection. The pilot assessed question clarity, sequence, response options, completion time, and respondent burden. Minor wording and formatting changes were made after pilot testing; no major changes to the structure of the questionnaire were required.

Formal psychometric validation was not conducted because the questionnaire was primarily designed to collect descriptive information on service use, access barriers, and patient experiences rather than to measure a single latent construct. Reliability coefficients such as Cronbach's alpha were therefore not calculated for the full questionnaire. However, clarity, face validity, and content relevance were strengthened through expert review and pilot testing.

2.5. Data Analysis

Quantitative data were analysed using descriptive and inferential statistics. Categorical variables were presented as frequencies and percentages, while continuous variables were summarised using means and standard deviations or

medians and interquartile ranges, depending on distribution. Bivariate analyses examined differences in rehabilitation access by key participant characteristics. Chi-square or Fisher's exact tests were used for categorical variables, and independent-samples t-tests or Mann–Whitney U tests were used for continuous variables, as appropriate.

Logistic regression analysis was used to identify factors associated with unmet rehabilitation need. Independent variables included place of residence, financial burden, availability of local rehabilitation services, transport barriers, financing status, and duration of diagnosis. Predictor variables were examined for conceptual overlap and multicollinearity, and the number of predictors was limited to reduce the risk of model overfitting. The reporting of the cross-sectional quantitative component was informed by the STROBE recommendations for observational studies (von Elm et al., 2007). Before conducting logistic regression analysis, variables included in the model were examined for missing data. Cases with missing values on variables included in the regression model were handled using complete-case analysis. Multicollinearity among predictors was assessed using variance inflation factors and tolerance values. Model fit was evaluated using the Hosmer–Lemeshow goodness-of-fit test, Nagelkerke R^2 , and overall classification accuracy. Because the study was exploratory and included statistical comparisons across multiple predictors, no adjustment for multiple comparisons was applied. Therefore, p-values should be interpreted cautiously and used to identify patterns for further investigation rather than as confirmatory evidence.

Qualitative data were analysed using thematic analysis (Braun & Clarke, 2006). Interview recordings and notes were transcribed and reviewed repeatedly to ensure familiarity with the data. An initial coding framework was developed inductively from the interview material, while also reflecting the study objectives related to financial, geographic, organisational, workforce-related, and technological barriers. Codes were grouped into broader themes through iterative discussion and comparison across patient and expert interviews.

Two researchers coded the interview material using an agreed coding framework. Coding differences were discussed and resolved by consensus; formal intercoder agreement statistics were not calculated because the analysis aimed to develop interpretive themes rather than quantify coding reliability. Data saturation was assessed during analysis. Interviews continued until the main themes became recurrent and no substantially new themes emerged from additional interviews. Saturation was judged separately for patient and expert interviews and then reviewed across the full qualitative dataset. The qualitative reporting was informed by the Consolidated Criteria for Reporting Qualitative Research (Tong et al., 2007).

Because the sample included several rare neurological diagnoses with different clinical courses and rehabilitation needs, diagnosis was used primarily to describe sample composition. Exploratory comparisons by diagnostic group were considered; however, disease-specific multivariable analy-

ses were not performed because some diagnostic subgroups were small, particularly dystonia and other rare neurological conditions. Conducting separate regression models by diagnosis would have produced unstable estimates and increased the risk of sparse-data bias. Therefore, the primary analysis focused on shared rehabilitation access barriers across diagnostic groups, while the heterogeneity of conditions was addressed in the interpretation and limitations.

2.6. Integration of Quantitative and Qualitative Findings

Integration occurred at three stages of the study. First, integration occurred at the design stage, as the qualitative phase was planned to explain and contextualise the quantitative survey findings. Second, integration occurred during sampling and data collection, because patient interviewees were selected to reflect key quantitative patterns, including place of residence, rehabilitation discontinuation, financial burden, unmet rehabilitation need, and willingness to use telerehabilitation. The qualitative interview guide was also informed by the survey results. Third, integration occurred during interpretation and reporting. Quantitative findings were used to identify the frequency and distribution of access barriers, while qualitative findings were used to explain how these barriers affected continuity of care, household finances, daily functioning, and trust in the health system. The findings were compared using a side-by-side approach organised around the main themes of financial barriers, geographic inequality, discontinuity of care, workforce shortages, policy gaps, and telerehabilitation. Areas of convergence between patient survey data, patient interviews, and expert interviews were highlighted in the Results and Discussion sections.

2.7. Ethical Considerations

Ethical approval was obtained from the Research Ethics Committee of Caucasus University before data collection (approval number CU 53-12.05.25; 12 May 2025).

All participants received information about the study purpose, voluntary participation, confidentiality, and the right to withdraw at any time without consequences. Written informed consent was obtained from participants when interviews or survey completion were conducted face-to-face. Verbal informed consent was obtained when data collection was conducted online or when written consent was not practicable. In such cases, verbal consent was documented by the research team before data collection began. Personal identifiers were removed from the dataset, qualitative quotations were anonymised, and all data were stored securely for research purposes only.

3. Results

3.1. Participant Characteristics

A total of 150 patients with rare and complex neurological diseases participated in the survey. The mean age was 44.5

years (SD = 13.2), and 54.7% were women. Participants resided in Tbilisi (40.0%), other urban areas (30.0%), or rural areas (30.0%). Most had completed higher education (60.0%), and half reported a low monthly household income. The most common diagnoses were Parkinson's disease

(28.0%), multiple sclerosis (25.3%), neuromuscular disorders (23.4%), dystonia (13.3%), and other rare neurological conditions (10.0%). Most participants had lived with their diagnosis for more than one year, 70.0% reported disability status, and 56.7% required caregiver support.

Table 1

Sociodemographic and clinical characteristics of participants

Variable	Category	n (%)
Sex	Male	68 (45.3)
Sex	Female	82 (54.7)
Residence	Tbilisi	60 (40.0)
Residence	Other urban	45 (30.0)
Residence	Rural	45 (30.0)
Education	Secondary	22 (14.7)
Education	Vocational	38 (25.3)
Education	Higher	90 (60.0)
Employment status	Employed	30 (20.0)
Employment status	Unemployed	45 (30.0)
Employment status	Retired	30 (20.0)
Employment status	Student	10 (6.7)
Employment status	Disabled	35 (23.3)
Monthly household income	Low	75 (50.0)
Monthly household income	Middle	50 (33.3)
Monthly household income	High	25 (16.7)
Diagnosis	Multiple sclerosis	38 (25.3)
Diagnosis	Parkinson's disease	42 (28.0)
Diagnosis	Dystonia	20 (13.3)
Diagnosis	Neuromuscular disorders	35 (23.4)
Diagnosis	Other	15 (10.0)
Duration of diagnosis	< 1 year	22 (14.7)
Duration of diagnosis	1–5 years	65 (43.3)
Duration of diagnosis	> 5 years	63 (42.0)
Disability status	Yes	105 (70.0)
Disability status	No	45 (30.0)
Need for caregiver support	Yes	85 (56.7)
Need for caregiver support	No	65 (43.3)

3.2. Rehabilitation Service Use

Most respondents had used rehabilitation services at least once (74.7%), but only 34.7% were receiving rehabilitation at the time of the survey. This indicated a gap between rehabilitation need and ongoing service use.

The most frequently reported primary rehabilitation approach was multidisciplinary rehabilitation (35.3%), followed by physical therapy (30.0%), occupational therapy (16.7%), speech therapy (10.0%), and psychological support

(8.0%). Rehabilitation frequency was inconsistent: 30.0% received services irregularly, and 33.3% received rehabilitation only when they could afford it.

Rehabilitation was most often received in Tbilisi (43.3%), followed by home-based rehabilitation (20.0%), regional services (13.3%), online rehabilitation (13.3%), and Batumi (10.0%). Neurologists were the most common referral source (40.0%). More than half of respondents had discontinued rehabilitation (58.7%), most commonly because of cost, distance, or transport-related difficulties.

Table 2

Rehabilitation service use among patients with rare and complex neurological diseases (n = 150)

Variable	Category	n (%)
Ever used rehabilitation services	Yes	112 (74.7)
Ever used rehabilitation services	No	38 (25.3)
Currently receiving rehabilitation	Yes	52 (34.7)
Currently receiving rehabilitation	No	98 (65.3)
Primary rehabilitation approach	Physical therapy	45 (30.0)
Primary rehabilitation approach	Occupational therapy	25 (16.7)

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Variable	Category	n (%)
Primary rehabilitation approach	Speech therapy	15 (10.0)
Primary rehabilitation approach	Psychological support	12 (8.0)
Primary rehabilitation approach	Multidisciplinary	53 (35.3)
Frequency of rehabilitation	Weekly	30 (20.0)
Frequency of rehabilitation	Monthly	25 (16.7)
Frequency of rehabilitation	Irregular	45 (30.0)
Frequency of rehabilitation	Only when affordable	50 (33.3)
Place of rehabilitation	Tbilisi	65 (43.3)
Place of rehabilitation	Batumi	15 (10.0)
Place of rehabilitation	Region	20 (13.3)
Place of rehabilitation	Home	30 (20.0)
Place of rehabilitation	Online	20 (13.3)
Referral source	Neurologist	60 (40.0)
Referral source	Rehabilitation physician	35 (23.3)
Referral source	Self	40 (26.7)
Referral source	Organisation	15 (10.0)
Waiting time	No waiting	20 (13.3)
Waiting time	< 1 month	35 (23.3)
Waiting time	1–3 months	60 (40.0)
Waiting time	> 3 months	35 (23.3)
Discontinued rehabilitation	Yes	88 (58.7)
Discontinued rehabilitation	No	62 (41.3)
Main reason for discontinuation	Cost	35 (39.8)
Main reason for discontinuation	Distance	15 (17.0)
Main reason for discontinuation	Transport	15 (17.0)
Main reason for discontinuation	Lack of spec	10 (11.4)
Main reason for discontinuation	Deterioration	8 (9.1)
Main reason for discontinuation	Other	5 (5.7)

Note. Primary rehabilitation approach reported by respondents. PT, physical therapy; OT, occupational therapy; Psych, psychological support; Rehab, rehabilitation; Org, organisation.

3.3. Financial and Geographic Barriers

Financial and geographic barriers were common. Most respondents paid out-of-pocket for rehabilitation (85.3%), 63.3% could not afford the recommended rehabilitation, and 54.0% reduced the number of sessions because of cost. In addition, 41.3% interrupted rehabilitation due to financial difficulties.

Geographic access was also limited: 70.0% reported transport-related difficulties, 61.3% had to travel to another city, and 65.3% reported that rehabilitation services were unavailable in their region. Respondents also identified major gaps in multidisciplinary care, including lack of multidisciplinary teams (73.3%), occupational therapy (63.3%), and psychological or neuropsychological support (68.0%).

Table 3

Financial and geographic barriers to rehabilitation access (n = 150)

Barrier	Yes, n (%)
Paid out-of-pocket for rehabilitation	128 (85.3%)
Could not afford recommended rehabilitation	95 (63.3%)
Reduced number of sessions due to cost	81 (54.0%)
Interrupted rehabilitation due to cost	62 (41.3%)
Had transport-related difficulties	105 (70.0%)
Needed to travel to another city	92 (61.3%)
Had accommodation costs	55 (36.7%)
Rehabilitation unavailable in the region	98 (65.3%)
Lack of multidisciplinary team	110 (73.3%)
Lack of occupational therapy	95 (63.3%)
Lack of psychological/neuropsychological support	102 (68.0%)

3.4. Comparison of Barriers by Place of Residence

Patients living outside Tbilisi, the capital and main urban service hub of Georgia, reported significantly greater rehabilitation access barriers than those in the capital. Regional residents had higher rates of out-of-pocket payment (92.2%

vs. 75.0%, $p = 0.005$), travel difficulty (96.7% vs. 30.0%, $p < 0.001$), service interruption (71.1% vs. 40.0%, $p < 0.001$), and unmet rehabilitation need (82.2% vs. 46.7%, $p < 0.001$). These findings indicate substantial geographic inequality in rehabilitation access.

Table 4

Comparison of rehabilitation barriers by place of residence

Barrier	Tbilisi ($n = 60$), n (%)	Regions ($n = 90$), n (%)	p
Out-of-pocket payment	45 (75.0%)	83 (92.2%)	.005
Travel difficulty	18 (30.0%)	87 (96.7%)	< .001
Service interruption	24 (40.0%)	64 (71.1%)	< .001
Unmet rehabilitation need	28 (46.7%)	74 (82.2%)	< .001

3.5. Factors Associated with Unmet Rehabilitation Need

Overall, unmet rehabilitation need was reported by 102 participants (68.0% of the total sample). Complete data for all variables included in the regression model were available for 142 participants (94.7% of the total sample), who were included in the complete-case regression analysis. Multicollinearity diagnostics did not indicate problematic overlap among predictors, with variance inflation factor values ranging from 1.12 to 1.85 and tolerance values above 0.54. The Hosmer–Lemeshow goodness-of-fit test indicated ac-

ceptable model fit, $\chi^2(8) = 6.42$, $p = .600$. The model explained 38.5% of the variance in unmet rehabilitation need (Nagelkerke $R^2 = .385$) and correctly classified 76.8% of cases. In the adjusted logistic regression model, unmet rehabilitation need was significantly associated with lack of local rehabilitation services (adjusted $OR = 4.10$, 95% CI : 2.20–7.65, $p < 0.001$), absence of public or private funding (adjusted $OR = 3.65$, 95% CI : 1.90–7.02, $p < 0.001$), residence outside Tbilisi (adjusted $OR = 3.42$, 95% CI : 1.85–6.32, $p < 0.001$), high out-of-pocket financial burden (adjusted $OR = 2.89$, 95% CI : 1.50–5.58, $p = 0.002$), and transport barriers (adjusted $OR = 2.15$, 95% CI : 1.12–4.12, $p = 0.021$).

Table 5

Factors associated with unmet rehabilitation need ($n = 142$)

Predictor	Adjusted OR	95% CI	p
Lack of local rehabilitation services	4.10	2.20–7.65	< .001
Absence of public/private funding	3.65	1.90–7.02	< .001
Residence outside Tbilisi	3.42	1.85–6.32	< .001
High out-of-pocket financial burden	2.89	1.50–5.58	.002
Transport barrier	2.15	1.12–4.12	.021

Note. OR = odds ratio; CI = confidence interval.

3.6. Telerehabilitation Awareness, Use, and Willingness

Awareness and use of telerehabilitation were limited: 30.0% of respondents had heard of telerehabilitation, and only 12.0% had used it. However, willingness to use remote rehabilitation was high (72.0%), and most respondents believed

it could reduce travel burden (76.7%). Most participants had internet access at home (83.3%), but 36.7% reported difficulties using digital technologies. Although interest in telerehabilitation was high, 90.0% still considered in-person rehabilitation necessary, and 60.0% preferred a hybrid model combining in-person and remote care.

Table 6

Telerehabilitation awareness, use, and willingness ($n = 150$)

Variable	n (%)
Has heard of telerehabilitation	45 (30.0%)
Has used telerehabilitation	18 (12.0%)
Willing to use telerehabilitation	108 (72.0%)
Believes telerehabilitation can reduce travel burden	115 (76.7%)
Has internet access at home	125 (83.3%)
Has difficulty using digital technologies	55 (36.7%)
Prefers hybrid model	90 (60.0%)
Believes in-person rehabilitation is still necessary	135 (90.0%)

3.7. Qualitative Findings

The qualitative sample included 10 patients and 10 experts. Patient interviewees included individuals with multiple sclerosis ($n = 3$), Parkinson's disease or parkinsonism ($n = 3$), dystonia ($n = 1$), neuromuscular disorders ($n = 2$), and other rare or complex neurological conditions ($n = 1$), and resided in Tbilisi ($n = 4$), other urban areas ($n = 3$), or rural regions ($n = 3$). Expert interviewees included rehabilitation professionals ($n = 3$), neurologists ($n = 2$), health policy specialists ($n = 2$), rehabilitation service providers or managers ($n = 2$),

and patient support or advocacy representatives ($n = 1$). The qualitative analysis identified six main themes: financial burden, geographic inequality, discontinuity of care, workforce shortages, telerehabilitation potential, and policy gaps. Patient interviews emphasised the practical consequences of unaffordable and geographically distant services, while expert interviews highlighted systemic problems related to financing, workforce capacity, regional service distribution, and the absence of long-term rehabilitation pathways for rare and complex neurological diseases.

Table 7

Qualitative themes from patient and expert interviews

Main theme	Patient perspective	Expert perspective
Financial burden	Rehabilitation is often unaffordable and creates additional household costs	Current financing mechanisms do not cover long-term rehabilitation needs
Geographic inequality	Patients outside large cities often need to travel to receive care	Rehabilitation services remain concentrated in Tbilisi and Batumi.
Discontinuity of care	Rehabilitation is interrupted because of cost, distance, or transport difficulties.	The system lacks structured long-term care pathways for chronic neurological conditions
Workforce shortages	Patients report limited access to specialised therapists	There is a shortage of multidisciplinary rehabilitation teams
Telerehabilitation potential	Remote services may reduce travel burden but cannot replace all in-person care	Telerehabilitation may be useful for follow-up, education, and home-based support
Policy gaps	Patients feel that rare and complex neurological diseases are not sufficiently supported	There is no disease-specific long-term rehabilitation financing model

Note. Themes were derived from semi-structured interviews with 10 patients and 10 experts.

Financial burden was the most frequently discussed barrier in patient interviews. Participants described rehabilitation as clinically necessary but difficult to sustain because of session fees, transport costs, and, for regional residents, accommodation expenses.

“The main problem is not only the price of rehabilitation sessions, but also the cost of transportation and accommodation when services are available only in large cities.”

Patient 3, regional resident

Experts similarly emphasised that the current financing model is not designed for patients who require repeated and long-term rehabilitation.

“Rare and complex neurological diseases require long-term and repeated rehabilitation, but the current financing model is designed mainly for short-term episodes of care.”

Expert 2, rehabilitation specialist

Discontinuity of care was another major theme. Patients reported that rehabilitation was often interrupted because of cost, which could lead to loss of functional progress.

“I have to stop my therapy every few months because I run out of money. By the time I save enough to go back, I have already lost the progress I made before.”

Patient 7, patient with multiple sclerosis

Geographic inequality was particularly important for respondents living outside Tbilisi. These participants described the physical and financial burden of travelling to the capital for specialised rehabilitation.

“In my region, there is no specialised rehabilitation centre. I am forced to travel to Tbilisi, which is physically exhausting for my condition and financially impossible to sustain long-term”

Patient 10, patient with Parkinson's disease

Experts also described workforce shortages and the absence of coordinated multidisciplinary care as major system-level barriers.

“We have many isolated physical therapists, but the lack of a coordinated multidisciplinary team approach means the patient's psychological and occupational needs are often overlooked.”

Expert 5, neurologist

Finally, both patients and experts recognised the potential of telerehabilitation, particularly for follow-up, education, and home-based exercises. However, participants emphasised that telerehabilitation should complement, rather than replace, in-person care.

“Telerehabilitation could be a lifeline for follow-ups and home-based exercises, but it cannot

replace the manual, hands-on intervention required during some phases of rehabilitation.”

Expert 8, rehabilitation physician

3.8. Integration of Quantitative and Qualitative Results

Quantitative and qualitative findings converged around financial barriers, geographic inequality, discontinuity of care, and the limited but promising role of telerehabilitation. The survey showed that 85.3% of participants paid out-of-pocket for rehabilitation and 63.3% could not afford recommended services. These findings were reflected in Patient 3’s description of the combined burden of session fees, transport, and accommodation costs, and in Expert 2’s observation that current financing mechanisms are oriented towards short-term episodes rather than long-term rehabilitation needs.

The survey also showed that unmet rehabilitation need was reported by 68.0% of the total sample and was higher among participants living outside Tbilisi than among those living in the capital. This pattern was consistent with Patient 10’s account of having no specialised rehabilitation centre in the region and needing to travel to Tbilisi for care. It was also supported by expert perspectives describing the concentration of rehabilitation services in large cities.

Similarly, the high rate of rehabilitation discontinuation reported in the survey was supported by Patient 7’s account of interrupting therapy because of cost. Finally, although current use of telerehabilitation was low, willingness to use it was high. Expert 8’s quotation helped explain this contrast by presenting telerehabilitation as useful for follow-up and home-based exercises, but not as a full substitute for hands-on multidisciplinary rehabilitation.

4. Discussion

This study found that, among surveyed patients with rare and complex neurological diseases in Georgia, access to rehabilitation was shaped by a combination of financial, geographic, organisational, and workforce-related barriers. The findings suggest that the main challenge is not simply whether rehabilitation services exist, but whether patients can access them continuously, affordably, and at the intensity required for chronic and progressive neurological conditions.

A central finding was that rehabilitation access appeared to be closely associated with patients’ ability to pay. This is important because rehabilitation for rare and complex neurological diseases is often not a short-term intervention, but a repeated and long-term component of care aimed at maintaining function, preventing complications, and supporting participation. When rehabilitation depends heavily on household payment, continuity of care may become vulnerable to income constraints, transport costs, and competing family needs. This finding is consistent with broader evidence from Georgia showing that out-of-pocket payments remain an important barrier despite progress towards universal health coverage (Goginashvili et al., 2021; Richardson et

al., 2024; Verulava & Arakishvili, 2024; Verulava & Jorbenadze, 2025). It also aligns with international recommendations that rehabilitation should be integrated into health systems and universal health coverage rather than treated as an optional or episodic service (Cieza et al., 2020; World Health Organization, 2019, 2023).

Geographic inequality was another important pattern. Participants living outside Tbilisi appeared to experience greater access-related disadvantage, including limited local service availability, additional travel costs, and transport difficulties. This suggests that centralisation of rehabilitation services may reinforce unequal access, particularly for people with mobility limitations, progressive neurological conditions, or limited household resources. Similar barriers have been reported in low- and middle-income settings, where rehabilitation services are often concentrated in urban centres and are insufficiently integrated into primary care or community-based service delivery (Bright et al., 2018; Htwe et al., 2024).

The association between residence and unmet rehabilitation need requires careful interpretation. In the descriptive analysis, unmet need was substantially higher among participants living outside Tbilisi than among those living in the capital. However, in the adjusted regression model, residence outside Tbilisi remained associated with unmet need alongside other structural barriers, including lack of local rehabilitation services, absence of public or private funding, and transport difficulties. This finding suggests that regional residence should not be understood as an isolated risk factor. Rather, it may capture a broader pattern of access-related disadvantage, in which limited service availability, insufficient financing, and travel-related constraints jointly shape rehabilitation access for patients living outside the capital.

The qualitative findings helped explain why these barriers matter in practice. Patients described rehabilitation as clinically necessary but difficult to sustain, while experts emphasised that current financing and service delivery arrangements are poorly suited to long-term neurological rehabilitation. This convergence between patient and expert perspectives suggests that unmet rehabilitation need is not only an individual-level problem, but also reflects system-level gaps in financing, service organisation, referral pathways, and workforce capacity.

The study also highlights the importance of multidisciplinary rehabilitation. Rare and complex neurological diseases may involve motor, cognitive, communicative, emotional, and social impairments, yet participants reported limited access to occupational therapy, psychological or neuropsychological support, and coordinated multidisciplinary teams. This gap is important because international recommendations for rare and complex neurological diseases emphasise interdisciplinary and coordinated care across the disease course (Seidel et al., 2024). In this context, expanding access to physical therapy alone is unlikely to be sufficient; rehabilitation planning should also address occupational functioning, communication, mental health, assistive technologies, and social participation. Recent evidence from

Croatia similarly suggests that people with motor and visual disabilities may face informational, financial, and service-quality barriers in accessing assistive technology (Pinjateła & Alimović, 2025).

The findings should also be interpreted within the broader context of rehabilitation system development in middle-income countries. Comparative evidence from countries using WHO's Systematic Assessment of Rehabilitation Situation framework shows that rehabilitation systems often face common challenges, including weak governance and financing, limited data, workforce shortages, and low availability of services at primary and community levels (Kleinitz et al., 2024). Similar challenges have been reported in neighbouring countries in the South Caucasus and in other post-Soviet health systems, where rehabilitation and assistive technology services are increasingly recognised as policy priorities but remain unevenly developed (World Health Organization Regional Office for Europe, 2022, 2024). The Georgian findings therefore have wider relevance for health systems seeking to move from episodic, facility-based, and out-of-pocket rehabilitation towards more coordinated, publicly supported, and regionally accessible service models.

Telerehabilitation may offer one possible strategy to address geographic barriers, but the findings suggest that it should be understood as a complementary model rather than a replacement for in-person care. Although willingness to use remote rehabilitation was high, most respondents still considered face-to-face rehabilitation necessary. This is consistent with international evidence indicating that telerehabilitation can support continuity of care when appropriately supervised and individualised, but its effectiveness depends on digital access, patient readiness, professional training, and integration with in-person services (Del Pino et al., 2022; Federico et al., 2024; Opoku et al., 2025; Seron et al., 2021). Overall, the study suggests that improving rehabilitation access in Georgia may require a shift from fragmented and episodic service use towards long-term, equitable, and person-centred rehabilitation planning. Policy responses should consider dedicated financing mechanisms for chronic and rare neurological conditions, regional rehabilitation networks, multidisciplinary workforce development, better rehabilitation data systems, and regulated hybrid telerehabilitation models. These strategies may help address the access barriers identified in this study while strengthening the role of rehabilitation within universal health coverage.

4.1. Strengths and Limitations

This study addresses an underexplored area of rehabilitation access in Georgia by focusing on patients with rare and complex neurological diseases. Its mixed-methods design strengthened the analysis by combining survey data with patient and expert perspectives, allowing quantitative patterns to be interpreted alongside lived experiences and system-level explanations.

Several limitations should be noted. The most important limitation concerns the sampling strategy. Participants were recruited through purposive and snowball sampling because

patients with rare and complex neurological diseases requiring rehabilitation are a small and hard-to-reach population and no comprehensive national sampling frame was available. Although this approach helped include participants with relevant rehabilitation experiences, including those with unmet needs, it also introduced selection bias. Patients connected to rehabilitation centres, neurologists, patient organisations, or peer networks may differ from patients who are more socially isolated, less informed, more severely disabled, or disconnected from rehabilitation services.

As a result, the sample cannot be considered nationally representative, and the findings should not be interpreted as prevalence estimates for all patients with rare and complex neurological diseases in Georgia. The high levels of out-of-pocket payment, service interruption, and unmet rehabilitation need observed in this study may partly reflect the experiences of patients reachable through clinical or patient networks. Therefore, the external validity of the quantitative findings is limited, and generalisation to the wider population should be made with caution.

Additional limitations include the use of self-reported data, which may be affected by recall or reporting bias, and the cross-sectional design, which does not allow causal interpretation. The questionnaire was developed specifically for this study and was not formally psychometrically validated. Although expert review and pilot testing were used to strengthen face and content validity, future studies should further validate the instrument in larger and more diverse patient samples.

Finally, the study grouped patients with different rare and complex neurological diseases, including Parkinson's disease, multiple sclerosis, dystonia, neuromuscular disorders, and other rare neurological conditions. These conditions differ in clinical presentation, progression, functional limitations, and rehabilitation requirements. Therefore, the findings should be interpreted as evidence of shared access barriers, such as affordability, geographic availability, continuity of care, multidisciplinary capacity, and telerehabilitation readiness, rather than disease-specific estimates. Disease-specific subgroup analyses were not feasible because several diagnostic groups were small, which would have produced unstable estimates. Future studies should use larger, preferably registry-based or multicentre samples to examine rehabilitation access by diagnosis, disease severity, functional status, and region.

5. Conclusion

This study found that surveyed patients with rare and complex neurological diseases in Georgia experienced substantial financial, geographic, and organisational barriers to continuous rehabilitation. Ongoing access was limited, particularly among participants living outside Tbilisi. Out-of-pocket payments, transport difficulties, lack of local services, and limited multidisciplinary care were associated with unmet rehabilitation need. The findings suggest that

rehabilitation for rare and complex neurological diseases should be considered a long-term and essential component of health care rather than a short-term or optional service. Policy responses should consider dedicated financing mechanisms for chronic and rare neurological conditions, decentralisation of rehabilitation services through regional units or referral networks, strengthening of multidisciplinary rehabilitation teams, and development of hybrid telerehabilitation models.

Overall, improving rehabilitation access in Georgia may require a shift towards more equitable, continuous, and person-centred rehabilitation planning. Reforms focused on financial protection, regional service development, multidisciplinary care, and regulated integration of telerehabilitation may help address unmet rehabilitation need and support functional independence, participation, and quality of life among patients living with rare and complex neurological diseases.

Conflict of Interest

The authors declare no conflict of interest.

Data Availability

The data supporting the findings of this study are not publicly available due to privacy and confidentiality considerations related to patient and interview data. De-identified data may be made available from the corresponding author upon reasonable request and with appropriate ethical approval.

Trial Registration

Not applicable. This study was an observational mixed-methods study and did not involve a clinical trial or intervention.

Author Contributions

Conceptualization: TV, KS. Methodology: TV, KS. Data analysis: TV. Writing – original draft: TV. Writing – review and editing: TV, KS. Supervision: KS. Both authors read and approved the final manuscript.

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