Original Paper

Usability and Satisfaction of a Multidomain Information and Communication Technology–Based Rehabilitation Management Program in Patients With Postacute Stroke: Multicenter Formative Evaluation

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Abstract

Background: Information and communication technology (ICT) can help bridge the postacute stroke care gap by supporting home-based rehabilitation, but evidence on the usability and adoption of such programs in Asian health care settings is limited.

Objective: This study aimed to describe the usability and satisfaction of a tablet-based, multidomain ICT-based rehabilitation management program in patients with postacute stroke, and to explore descriptively how participants with and without acceptable usability differed.

Methods: This multicenter prospective cohort study enrolled patients with postacute stroke who were discharged home within 30 days of onset from 3 university hospitals. Participants used a tablet-based program providing medication guidance, rehabilitation content in 4 therapy domains, clinic scheduling, and social welfare information. Usability was defined according to ISO 9241-11:2018 and assessed with the System Usability Scale (SUS), with a prespecified threshold of 68. Satisfaction (6 items, 5-point Likert scale), self-reported usage, and open-ended responses were collected at 1 month after discharge and 3 months after onset. Mann-Whitney *U* tests, Cohen *d* effect sizes, and Firth penalized logistic regression compared participants with and without acceptable usability.

Results: Of 24 enrolled patients (mean age 62.5, SD 9.1 years; 17 male), 22 completed the 1-month, and 8 the 3-month evaluation. The mean 1-month SUS score was 60.34 (SD 17.48), below the threshold of 68, and 6 of 22 participants (27%) scored ≥68. Patients younger than 65 years scored higher than older patients (68.3 vs 50.8; *P*=.02). Participants scoring ≥68 were younger (56.2 vs 64.2 years), had higher cognitive scores (27.5 vs 24.2) and fewer depressive symptoms (1.3 vs 6), and more often used the program for more than 20 minutes per session (6/6, 100% vs 7/16, 44%; *P*=.03). Satisfaction ranged from 3.68 to 4.23 out of 5 and was higher in all 6 domains among participants with lower ambulatory function, although no comparison reached significance (averaged across items, 4.29 vs 3.70; *P*=.09). Completers and noncompleters of the 3-month evaluation did not differ in baseline characteristics or 1-month SUS score (*P*=.97).

Conclusions: In this formative evaluation, a multidomain ICT-based rehabilitation management program showed suboptimal usability alongside favorable satisfaction. With only 6 participants reaching the usability threshold, the observed differences in age, cognitive function, and depressive symptoms are hypotheses for adequately powered studies rather than determinants. End users helped define the program content through focus group interviews, but the design itself was never tested with users before deployment, which plausibly explains the dissociation between favorable content satisfaction and poor interface usability. User involvement in requirements definition is necessary but not sufficient.

Trial Registration: ClinicalTrials.gov NCT04720820; https://clinicaltrials.gov/study/NCT04720820

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Keywords: stroke rehabilitation; telerehabilitation; transitional care; usability; patient satisfaction; digital health; information and communication technology; formative evaluation

Introduction

Stroke remains the second leading cause of disability-adjusted life years globally, imposing a substantial burden on both individuals and health care systems [1,2]. Following acute treatment and initial hospitalization, patients with subacute stroke who are discharged home frequently face a critical gap in continuity of care. Systematic reviews have demonstrated that community-dwelling survivors with stroke experience substantial unmet needs across multiple domains, including rehabilitation, self-care, cognition, mood, and health education [3,4]. Nearly half of survivors with stroke in the community report at least one unmet rehabilitative need, with the highest proportions observed in the domains of anxiety and depression, self-care, and pain management [4]. Critically, the number of unmet needs is an independent negative predictor of health-related quality of life, and higher levels of unmet needs have been associated with greater functional dependency and poorer community reintegration [3-5]. These findings underscore the urgent need for systematic approaches that extend rehabilitative management beyond the hospital setting to support survivors with stroke during the vulnerable postdischarge period.

Information and communication technology (ICT) has emerged as a promising approach for bridging this postacute care gap by extending rehabilitation services into the home environment [6,7]. Telerehabilitation and mobile health (mHealth) platforms can facilitate home-based exercise programs, enable remote monitoring of functional recovery, and deliver patient education [8]. A Cochrane review of telerehabilitation services for stroke found that remote-delivered interventions achieved comparable outcomes to in-person rehabilitation for motor function, activities of daily living, and quality of life [6]. More recently, app-based and tablet-based programs have been developed to deliver multidomain rehabilitation content, including physical, cognitive, and language therapy, with several pilot studies reporting high acceptability and feasibility among survivors with stroke [6,9]. The Comprehensive Post-Acute Stroke Services (COMPASS) trial in the United States demonstrated that integrating digital health tools into a transitional care pathway improved care coordination and patient-reported outcomes [8]. An AI-driven cognitive telerehabilitation platform was shown to be noninferior to therapist-supervised rehabilitation in patients with subacute stroke in a recent randomized controlled trial [10]. Despite this expanding evidence base, most ICT-based rehabilitation programs have focused on a single domain (eg, upper limb motor function or cognition), and comprehensive multidomain programs that address the diverse postdischarge needs of survivors with stroke remain scarce.

A fundamental prerequisite for the successful implementation of any ICT-based rehabilitation program is adequate usability, as poor usability directly undermines treatment adherence, sustained engagement, and ultimately clinical effectiveness [11,12]. In stroke populations, usability presents a particular challenge because patients exhibit highly variable characteristics in age, cognitive function, motor impairment, and prior technology experience, all of which may influence the ability to adopt and effectively use digital health tools [9]. A systematic review of barriers to mHealth access among survivors with stroke identified older age, cognitive impairment, low digital literacy, and limited caregiver support as key impediments to technology adoption [11]. Broderick et al [9] further demonstrated that technology usability and acceptability were significant determinants of adoption in a cohort of survivors with stroke using a self-directed upper limb rehabilitation system, with stroke severity mediating the relationship. Similarly, a blended-care telerehabilitation platform developed for survivors with stroke was rated highly usable by inpatients and therapists, yet adherence to the prescribed training varied widely between participants, indicating that usability and sustained engagement are not equivalent [13]. However, few studies have systematically examined how specific patient characteristics relate to usability outcomes in the context of comprehensive, multidomain ICT-based rehabilitation programs for postacute stroke care.

In this formative evaluation, we aimed to describe the usability and satisfaction of a tablet-based, multidomain rehabilitation management program developed for patients with postacute stroke, encompassing rehabilitation content across physical, swallowing, cognitive, and language domains, along with medication guidance, clinic scheduling, and social welfare information. The program was provided to patients discharged home after acute stroke, and usability was assessed at 1 month after discharge and 3 months after stroke onset. As a secondary, exploratory objective, we described how participants who did and did not reach the conventional threshold for acceptable usability differed in demographic

and clinical characteristics. Given the small size of this cohort, this second objective was framed as hypothesis-generating: our aim was to identify candidate characteristics for adequately powered future studies rather than to establish determinants of usability.

Methods

Study Design

This was a multicenter prospective cohort study conducted as a substudy of the Korean Model for Post-Acute Comprehensive Rehabilitation (KOMPACT) project, a pragmatic randomized controlled trial investigating the efficacy of early supported discharge (ESD) for patients with postacute stroke in Korea [4]. The study was conducted at 3 university hospitals: Seoul National University Bundang Hospital (SNUBH; Seongnam), Chungnam National University Hospital (CNUH; Daejeon), and Pusan National University Yangsan Hospital (PNUYH; Yangsan). This substudy was a single-arm prospective cohort evaluation and was not itself randomized; the parent randomized trial (ClinicalTrials.gov NCT04720820) is reported separately [4].

Conceptual Framework and Usability Assessment

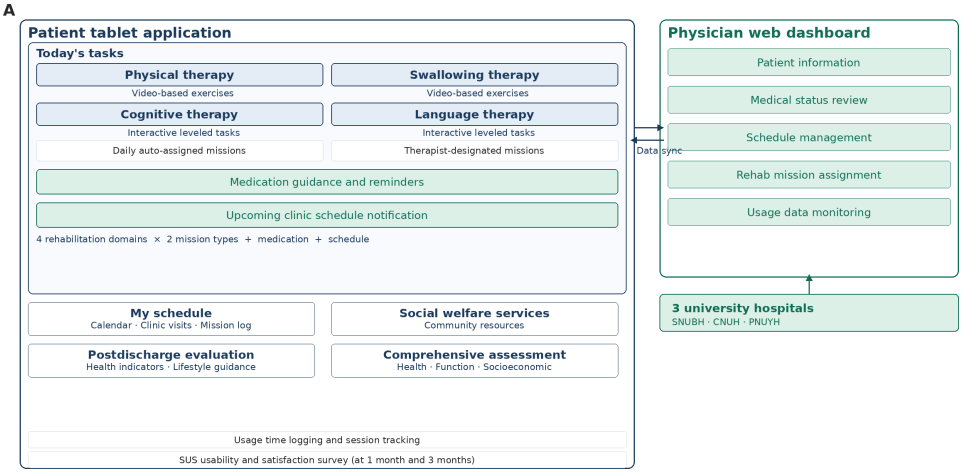
We adopted the ISO 9241-11:2018 definition of usability: the extent to which a system can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use [14]. The users were adults recovering from mild-to-moderate stroke (modified Rankin Scale [mRS] 1-3; functional ambulatory category [FAC] score of ≥3) living at home with a caregiver, with heterogeneous cognitive function and technology experience, together with their caregivers. The goals were to perform prescribed home exercises across physical, occupational, swallowing, and language domains, to manage medications and appointments, and to access rehabilitation and welfare information. The environment was the participant's home during the first 3 months after stroke, using a loaned tablet without on-site technical support.

Usability was measured with the System Usability Scale (SUS), a validated 10-item questionnaire yielding a score from 0 to 100 [15,16]. A score of ≥68 was prespecified as the threshold for acceptable usability; this value approximates the mean of the reference distribution from general software evaluations and the "OK"-to-"good" boundary of the adjective rating scale [16,17], and is the benchmark most often applied to stroke rehabilitation technologies, permitting comparison with that literature. Because it was not derived from digital health applications, and a meta-analysis of digital health apps found a differing distribution [18], results are also reported as the full SUS distribution. The SUS captures the satisfaction component of ISO 9241-11 principally and does not directly measure effectiveness or efficiency.

Development of the ICT-Based Program

The tablet-based program was developed by a multidisciplinary team of rehabilitation physicians, nurses, physical and occupational therapists, speech-language pathologists, and medical social workers (Figure 1). It was installed on a 10.4-inch Android tablet (Galaxy Tab S6 Lite; Samsung Electronics) provided to participants at discharge and comprised 5 domains: (1) medication guidance with reminders; (2) outpatient appointment notifications; (3) rehabilitation modules for physical, occupational, dysphagia, and language therapy with instructional videos; (4) social welfare and community resource information; and (5) a comprehensive evaluation module tracking functional status. A web-based physician dashboard allowed clinicians to review usage data and functional status at outpatient visits. Screenshots are shown in Multimedia Appendix 1.

Figure 1. Schematic overview of the information and communication technology–based rehabilitation management program. The system comprises a patient application and a physician web dashboard synchronized through a central database across the 3 hospitals. The patient app delivers 4 rehabilitation domains (physical, cognitive, swallowing, and language) through auto-assigned and therapist-designated missions, alongside scheduling, educational, and assessment modules; the dashboard supports remote monitoring and personalized mission allocation. Usability and satisfaction were assessed at 1 month after discharge and 3 months after onset. CNUH: Chungnam National University Hospital; PNUYH: Pusan National University Yangsan Hospital; SNUBH: Seoul National University Bundang Hospital; SUS: System Usability Scale.



The program was designed and built at SNUBH; the 2 other centers contributed participants but were not involved in development. Before specification, focus group interviews (FGIs) were held separately with 4 stakeholder groups: 5 physical and occupational therapists; 5 rehabilitation physicians; 5 survivors with stroke, and 5 accompanying family caregivers; and 2 medical social workers. Each group met once for 60 to 90 minutes in December 2020, before parent-trial enrollment began in March 2021, and was moderated by the first author. Participants described difficulties after discharge, unmet rehabilitation and information needs, and the functions a home-based tablet program should provide. The content domains subsequently implemented were derived from these needs and reconciled with the clinical requirements of the KOMPACT transitional care model. Session notes were consolidated by team consensus into a list of required functions; verbatim transcripts were not retained, and no formal qualitative coding was applied. The FGIs were a development activity rather than a research study and are reported to document the provenance of the program's content, not as qualitative findings.

Interface and interaction design (screen architecture, navigation depth, text and icon sizing, and the mapping of content onto screens) was then determined by the clinical investigators with HEALTHCONNECT Co, Ltd (Seoul, Republic of Korea), an external health information technology company contracted for the project, and implemented in a single specification-and-build cycle; the same company hosted and operated the platform throughout the study. The design was not reevaluated with survivors with stroke or caregivers before deployment, and no prototype usability testing was conducted. In terms of the human-centered design cycle of ISO 9241-210:2019 [19], user involvement was concentrated in understanding the context of use and specifying requirements, whereas evaluation of the design solution with end users was deferred until after deployment; this study constitutes that first evaluation cycle.

Participants

Participants were recruited from the 3 university hospitals between March 2021 and June 2023. The inclusion criteria were as follows: (1) clinical diagnosis of acute stroke (ischemic or hemorrhagic, excluding transient ischemic attack); (2) expected discharge to home within 30 days of stroke onset; (3) mRS score of 1 to 3; (4) FAC score of 3 or greater; and (5) no deficit of consciousness (National Institutes of Health Stroke Scale [NIHSS] items 1a, 1b, and 1c all scored 0). Exclusion criteria included medical instability, indwelling urinary catheter, prohibited oral intake, uncontrolled pain, psychobehavioral problems, severe cognitive deficit, and inability to use the ICT-based program. The study was planned to enroll 30 participants, 10 at each of the 3 centers. Enrollment was constrained by the COVID-19 pandemic, during which admissions for acute stroke rehabilitation and the opportunity to approach eligible patients before discharge were both reduced, and recruitment closed at 24 participants when enrollment for the parent trial ended in June 2023. Because participants were identified within the workflow of the ongoing parent trial, screening logs recording the numbers screened, found eligible, approached, and declining participation were not maintained systematically across the 3 sites and could not be reconstructed retrospectively.

Procedures

Prior to discharge, participants were familiarized with the ICT-based program through a structured orientation session conducted by the research team. Participants were encouraged to use the program for at least 30 minutes per day until 3 months after stroke onset. Outcome assessments were performed at 2 time points: 1 month after discharge and 3 months after stroke onset. Participants had the option to discontinue usage at 1 month after discharge if they did not wish to continue, at which time the tablet was returned and a final evaluation was conducted.

These assessment time points were inherited from the parent KOMPACT trial, in which 3 months after onset was selected to correspond to the end of the period of most rapid functional recovery and to the point at which responsibility for transitional care passes to community services. We acknowledge that this time point lies within the subacute phase of stroke recovery, so that usability was measured during a period of ongoing functional change. Because participants were discharged home at varying intervals after onset (all within 30 days by protocol), the interval between the 2 assessments necessarily varied between participants and could be short for participants discharged late; the observed intervals are reported in the Results.

Outcome Measures

The primary outcome was the SUS. Secondary outcomes included a satisfaction survey consisting of 6 items assessed on a 5-point Likert scale (program quality, fulfillment of postdischarge health care needs, overall satisfaction, willingness to recommend, problem-solving assistance, and intention for future use), usage patterns, content module evaluation (frequency of use and perceived helpfulness of each rehabilitation module), and structured open-ended responses.

The satisfaction instrument was developed by the research team for the parent KOMPACT trial and adapted for this study. It has not undergone formal psychometric validation, and no reliability or validity data are available for it; scores are therefore reported item by item rather than as a composite.

All usage metrics, including the number of sessions per day, the number of sessions per week, the session-duration category, and the use of each content module were self-reported by participants or their caregivers on a structured questionnaire administered at each assessment visit. Although the physician dashboard displayed usage information during outpatient visits, server-side usage logs were not exported or retained for research purposes; consequently, no objectively recorded usage data were available for analysis. Session duration was recorded on a 4-level ordinal scale (1,≤20 minutes; 2, 21-40 minutes; 3, 41-60 minutes; and 4,>60 minutes) and is reported as a frequency distribution. No

continuous measure of session duration in minutes or hours was collected.

Analysis of Open-Ended Responses

Narrative data comprised brief free-text answers to 3 structured open-ended prompts administered at each assessment visit (helpful aspects of the program, unhelpful aspects, and suggestions for improvement), recorded verbatim in Korean by the assessor at the outpatient visit. Responses were analyzed by inductive content categorization rather than by a formal qualitative methodology. All responses were read and categorized by a single investigator (WKC), who grouped statements into inductively derived categories; no second coder was involved, and interrater reliability was therefore not assessed. Category frequencies are reported as the number of participants contributing at least 1 statement to each category. Responses were categorized in the original Korean, and illustrative statements were translated into English by a bilingual member of the research team. Because responses were brief, elicited by fixed prompts, and categorized by 1 coder, no claim is made to thematic saturation or to analytic triangulation, and the results are reported descriptively as structured participant feedback.

Statistical Analysis

Descriptive statistics were used to summarize demographic and clinical characteristics, SUS scores, satisfaction scores, and usage patterns. Mann-Whitney *U* tests were used to compare SUS and satisfaction scores between subgroups defined by age (<65 vs≥65 years), sex, ambulatory function (FAC 3 vs FAC 4-5), cognitive status (Korean Mini-Mental State Examination [K-MMSE] score≥24 vs<24), and program usage duration (1-mo vs 3-mo users). The Fisher exact test was used for categorical comparisons.

Participants were dichotomized into SUS score≥68 and SUS score<68 groups. Cohen *d* effect sizes were calculated for continuous variables (0.2 small, 0.5 medium, and 0.8 large). Because only 6 participants had SUS scores of ≥68, the events-per-variable (EPV) ratio (outcome events per candidate predictor) was 0.86, far below the conventional minimum of 10, so multivariable modeling was not supportable. Firth penalized likelihood logistic regression [20,21] was therefore used to estimate odds ratios for each predictor individually (age, sex, K-MMSE, Patient Health Questionnaire-9 [PHQ-9], mRS, FAC, and Korean version of the modified Barthel index [K-MBI]); these estimates are reported for completeness, not as tests of prediction. Paired 1-month and 3-month scores were compared with the Wilcoxon signed-rank test. Completers and noncompleters of the 3-month evaluation were compared on baseline, usage, usability, and satisfaction variables. In an exploratory analysis of response style, each SUS item was converted to its 0-to-4 contribution score, mean contributions were computed separately for the 5 positively and 5 negatively worded items, and their difference was compared across cognitive and age strata. Analyses used Python 3.10 (SciPy, statsmodels) and the logistf package in R 4.3.2. Significance was set at $P<.05$.

Ethical Considerations

The study protocol was reviewed and approved by the institutional review board of each participating institution: SNUBH (B-2012/654-308), CNUH (2020-12-094), and PNUYH (04-2021-004). Written informed consent was obtained from all participants or their legal guardians prior to enrollment. The study was conducted in accordance with the Declaration of Helsinki.

Participants and caregivers were informed during consent about what data the program would record, how they would be stored and used, who could access them, and for how long they would be retained; the consent form was approved by the institutional review boards. Because the platform was built and hosted by HEALTHCONNECT Co, Ltd, we distinguish safeguards the research team could verify from those within the contractor's responsibility. Verified from the system and its documentation: data were transmitted over an encrypted (HTTPS) connection; access to the clinician web system required individually issued credentials with complex passwords; accounts were provisioned by institution and professional role, so that each clinician could retrieve only the patient list of their own institution; and account creation, modification, and password reset were restricted to a single administrator account at the coordinating center. Server configuration, encryption at rest, access logging, and any certification of the hosting environment were the contractor's responsibility and were not documented to the research team; we make no claim about them. For the research dataset, direct identifiers were held in a separate file under the principal investigator and replaced by study codes. Data were stored in password-protected files on encrypted external storage in a locked research office, released to approved third parties only in nonidentifiable form, and are retained for 3 years after study completion under Article 15 of the Enforcement Rule of the Bioethics and Safety Act, after which documents containing personal information are destroyed under Article 16 of the Enforcement Decree of the Personal Information Protection Act. Participants were reimbursed for travel. The approvals cited above pertain to the cohort study. The FGIs were conducted at SNUBH in December 2020 as a program-development activity and did not collect or retain individually identifiable research data.

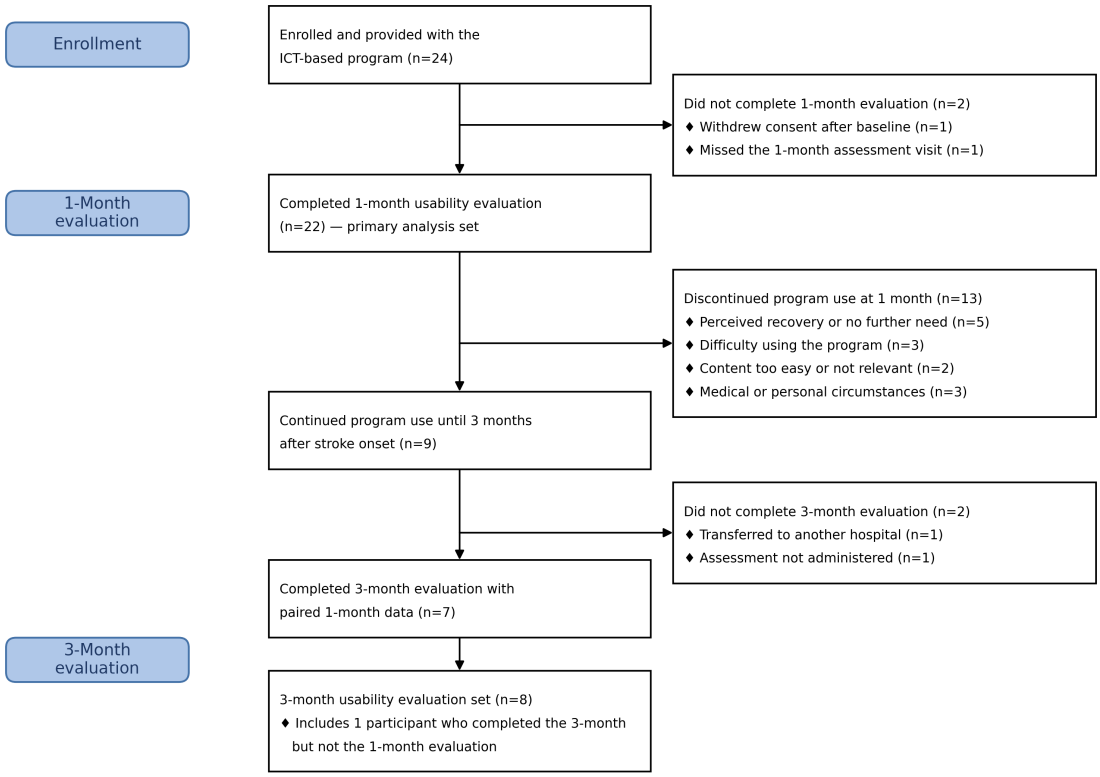
Results

Participant Flow

In total, 24 participants were enrolled and provided with the program (SNUBH, n=4; CNUH, n=10; and PNUYH, n=10). Two did not complete the 1-month evaluation (1 withdrew consent after baseline; 1 missed the visit), leaving 22 in the primary analysis set. At 1 month, 13 of 22 (59%) discontinued program use, citing perceived recovery or no further need (n=5), difficulty using the program (n=3), content that was too easy or not relevant (n=2), and competing medical or personal circumstances (n=3). Of the 9 who continued, 7 completed the 3-month evaluation (1 was transferred to another hospital; 1 was not assessed at the scheduled

visit). Including the participant who missed the 1-month but attended the 3-month assessment, the 3-month set comprised 8 participants, 7 of whom had paired data (Figure 2). Numbers screened, eligible, approached, and declining were not recorded systematically.

Figure 2. Participant flow through the study. Reasons for discontinuation were obtained from structured open-ended responses recorded at the 1-month and 3-month assessment visits. ICT: information and communication technology.



Screening logs (numbers screened, eligible, approached, and declining) were not maintained systematically across the 3 study sites. ICT: information and communication technology.

Participant Characteristics

A total of 24 patients were enrolled across the 3 participating hospitals (SNUBH, n=4; CNUH, n=10; PNUYH, n=10). The mean age was 62.5 (SD 9.1) years, and 17 of 24 (71%) patients were male. The majority had ischemic stroke. Regarding functional status, 9 (38%) patients had mRS scores of 1, 11 (46%) had mRS scores of 2, and 4 (17%) had mRS scores of 3. The FAC distribution was 13 (54%) patients with FAC scores of 3 and 11 (46%) with FAC scores of 4 to 5. A total of 16 (67%) patients had a K-MMSE score within the normal range (≥24), whereas 8 (33%) had scores suggestive of cognitive impairment.

Content Module Usage Patterns

Among the rehabilitation content modules, the physical therapy module was the most frequently used, with 15 of 22 (68%) participants reporting its use. The daily exercise missions and therapist-designated missions were rated as "very useful" or "useful" by 15 of 22 (68%) participants at 1 month. The cognitive and language therapy modules were less frequently used, with 9 to 11 of 22 participants (41% to 50%) reporting their use. Participants expressed concerns regarding the appropriateness of the difficulty level of rehabilitation content, with several noting that exercises were too easy for their functional level. At the initial screen assessment at 1 month, 14 of 22 (64%) participants reported being able to review daily tasks, upcoming schedules, and medications at a glance, while 3 of 22 (14%) found the interface difficult to navigate.

System Usability

The mean SUS score at 1 month postdischarge was 60.34 (SD 17.48), which fell below the acceptable usability threshold of 68. Six of 22 (27%) participants had SUS scores of 68 or above. Among the 10 individual SUS items, item 5 ("I found the various functions in this program are well integrated") received the highest mean score (3.95), while item 6 ("I thought there was too much inconsistency in this program") received the lowest (reverse-scored: 2.14), indicating perceived inconsistency as a relative weakness.

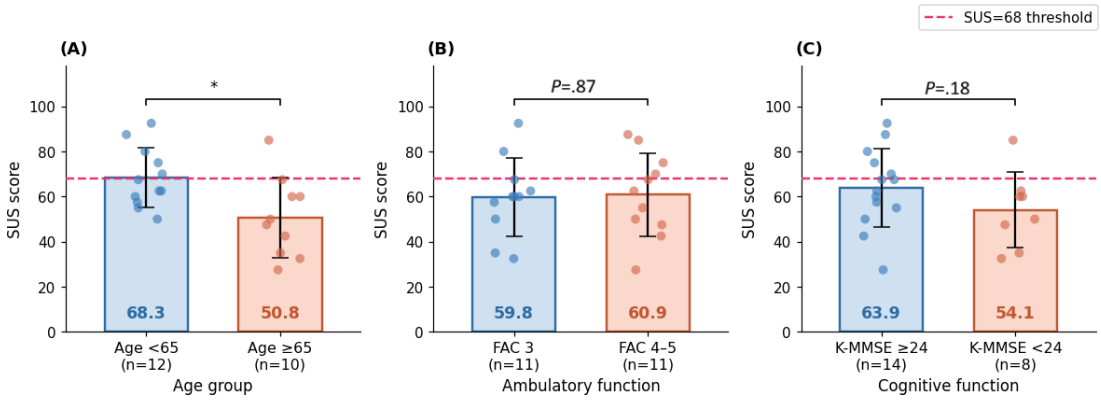
Subgroup analysis revealed significant differences in SUS scores by age group. Patients younger than 65 years (n=12) scored significantly higher than those aged 65 years and older (n=10): 68.3 (SD 13.2) versus 50.8 (SD 17.7; P=.02). Male patients scored numerically higher than female patients (61.2 vs 57.9), and patients with normal cognitive function (K-MMSE≥24; n=14) scored higher than those with cognitive impairment (K-MMSE<24; n=8): 63.9 versus 54.1 (P=.18), though these differences did not reach statistical significance (Table 1 and Figure 3).

Table 1. Patient characteristics and outcomes of participants with acceptable (SUS[a] score≥68) and unacceptable (SUS score<68) usability at 1 month after discharge (N=22).

Variables	Overall (N=22)	SUS score≥68 (n=6)	SUS score<68 (n=16)	*P* value
Demographics				
Age (years), mean (SD)	62 (9.1)	56.2 (6.3)	64.2 (9.1)	.06[b]
Age <65 years, n (%)	12 (55)	5 (83)	7 (44)	.16[c]
Male, n (%)	16 (73)	5 (83)	11 (69)	.63[c]
Study site				
SNUBH[d], n (%)	3 (14)	2 (33)	1 (6)	.13[e]
CNUH[f], n (%)	10 (45)	1 (17)	9 (56)	—
PNUYH[g], n (%)	9 (41)	3 (50)	6 (38)	—
Clinical characteristics				
K-MMSE,[h] mean (SD)	25.1 (4.5)	27.5 (3.8)	24.2 (4.6)	.13[b]
K-MBI,[i] mean (SD)	82.7 (12)	81.2 (16.5)	83.3 (10.5)	.91[b]
FAC,[j] mean (SD)	3.6 (0.7)	3.8 (0.8)	3.5 (0.6)	.33[b]
mRS,[k] mean (SD)	1.9 (0.7)	1.8 (0.8)	1.9 (0.7)	.94[b]
PHQ-9,[l] mean (SD)	5.1 (5.7)	1.3 (2.3)	6 (6)	.17[b]
Program usage (self-reported)				
Sessions per day, mean (SD)	2.4 (0.9)	2.3 (0.8)	2.4 (1)	.97[b]
Sessions per week, mean (SD)	3.9 (2)	4.5 (2.3)	3.7 (1.9)	.53[b]
Duration per session[m]				.03[b]
≤20 min, n (%)	9 (41)	0 (0)	9 (56)	—
21-40 min, n (%)	5 (23)	2 (33)	3 (19)	—
41-60 min, n (%)	4 (18)	2 (33)	2 (13)	—
>60 min, n (%)	4 (18)	2 (33)	2 (13)	—
Sessions >20 min, n (%)	13 (59)	6 (100)	7 (44)	.046[c]
Satisfaction (5-point Likert)				
Program quality, mean (SD)	4.23 (0.81)	4.50 (0.55)	4.12 (0.89)	.43[b]
Needs fulfillment, mean (SD)	3.82 (1.05)	4.33 (1.03)	3.62 (1.02)	.17[b]
Overall satisfaction, mean (SD)	4.14 (0.77)	4.67 (0.52)	3.94 (0.77)	.06[b]
Willingness to recommend, mean (SD)	4.05 (0.95)	4.17 (1.17)	4 (0.89)	.56[b]
Problem-solving help, mean (SD)	4.05 (0.90)	4.33 (1.03)	3.94 (0.85)	.36[b]
Future use intention, mean (SD)	3.68 (1.43)	3.83 (1.47)	3.62 (1.45)	.73[b]

[a]SUS: System Usability Scale.
[b]Mann-Whitney *U* test.
[c]Fisher exact test.
[d]SNUBH: Seoul National University Bundang Hospital.
[e]Permutation-based exact test for the 3×2 table.
[f]CNUH: Chungnam National University Hospital.
[g]PNUYH: Pusan National University Yangsan Hospital.
[h]K-MMSE: Korean Mini-Mental State Examination.
[i]K-MBI: Korean version of the modified Barthel index.
[j]FAC: functional ambulatory category.
[k]mRS: modified Rankin Scale.
[l]PHQ-9: Patient Health Questionnaire-9.
[m]Duration per session was recorded as a 4-level ordinal category and compared with the Mann-Whitney *U* test on the ordinal scale; the dichotomized comparison (>20 min vs ≤20 min) is shown separately.

Figure 3. System Usability Scale scores by subgroup at 1 month after discharge (A) Age group: patients aged younger than 65 years scored significantly higher than those aged 65 years or older (*P*=.02). (B) Ambulatory function: no significant difference between functional ambulatory category 3 and functional ambulatory category 4 to 5 groups. (C) Cognitive function: patients with Korean Mini-Mental State Examination scores of 24 or higher scored numerically higher than those with Korean Mini-Mental State Examination scores below 24 (*P*=.18). The red dashed line indicates the System Usability Scale=68 acceptable usability threshold. Error bars represent SDs. FAC: functional ambulatory category; K-MMSE: Korean Mini-Mental State Examination; SUS: System Usability Scale.



Characteristics of Participants With and Without Acceptable Usability

Participants were dichotomized into a SUS score≥68 group (n=6) and a SUS score<68 group (n=16) to describe how they differed. Compared with the SUS score<68 group, the SUS score≥68 group was younger (56.2, SD 6.3 vs 64.2, SD 9.1 years; *P*=.06), had higher K-MMSE scores (27.5, SD 3.8 vs 24.2, SD 4.6; *P*=.13), had lower PHQ-9 scores (1.3, SD 2.3 vs 6, SD 6; *P*=.17), and reported longer sessions: all 6 (100%) participants in the SUS score≥68 group reported sessions longer than 20 minutes, compared with 7 of 16 (44%) in the SUS score<68 group (*P*=.03 by Mann-Whitney *U* test on the ordinal duration category; *P*=.046 by Fisher exact test on the dichotomized category; Table 1). Effect size analysis further demonstrated that age (Cohen *d*=–0.91), depressive symptoms (Cohen *d*=–0.79), cognitive function (Cohen *d*=+0.71), and ambulatory function (FAC; Cohen *d*=+0.48) had the largest magnitudes of difference between groups (Multimedia Appendix 2). Firth penalized likelihood logistic regression identified no statistically significant associations; all 95% profile likelihood CIs crossed 1.0 (Multimedia Appendix 3). Given that only 6 participants had acceptable usability, these analyses cannot support inference about determinants and are reported descriptively.

Item-Level SUS Responses

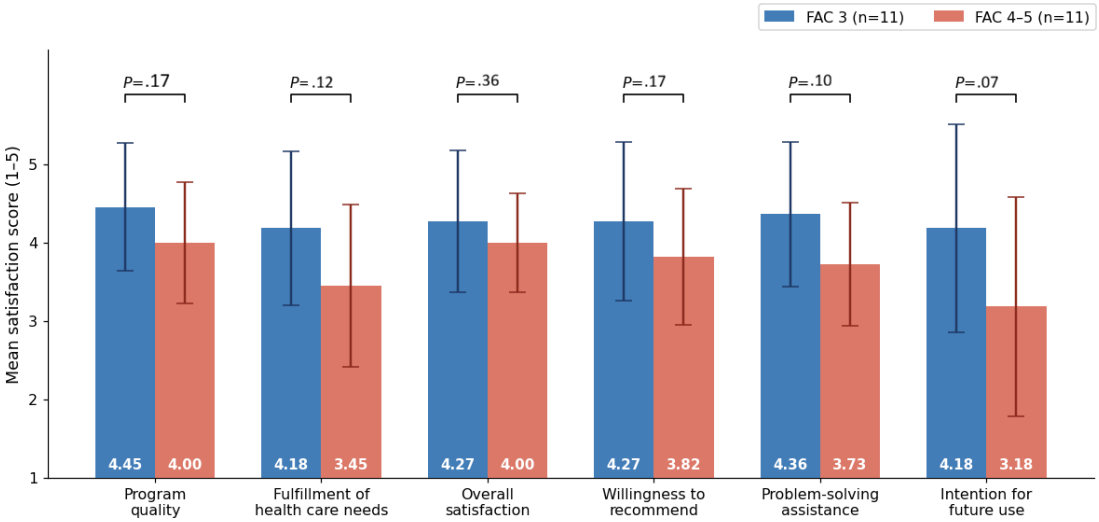
In an exploratory analysis of item-level responses, the difference between mean contributions from positively worded and negatively worded SUS items did not differ appreciably between participants with K-MMSE scores <24 and≥24 (0.58, SD 0.77 vs 0.94, SD 1.13; *P*=.76), and K-MMSE score was not correlated with this polarity difference (Spearman ϱ=0.06; *P*=.80). A parallel analysis by age group was likewise unrevealing (≥65 years, 0.62 vs <65 years, 0.97; *P*=.67; Multimedia Appendix 4).

Satisfaction Survey

Satisfaction scores at 1-month postdischarge ranged from 3.68 to 4.23 out of 5 across the 6 survey items. The highest-rated item was program quality (mean 4.23, SD 0.81), followed by overall satisfaction (mean 4.14, SD 0.77), willingness to recommend (mean 4.05, SD 0.95), and problem-solving assistance (mean 4.05, SD 0.90). The lowest-rated item was intention for future use (mean 3.68, SD 1.43), reflecting uncertainty about long-term engagement.

Participants with FAC 3 (n=11) reported higher satisfaction than those with FAC 4 or 5 (n=11) in every domain (Figure 4): program quality 4.45 (SD 0.82) versus 4 (SD 0.77), fulfillment of health care needs 4.18 (SD 0.98) versus 3.45 (SD 1.04), overall satisfaction 4.27 (SD 0.90) versus 4 (SD 0.63), willingness to recommend 4.27 (SD 1.01) versus 3.82 (SD 0.87), problem-solving assistance 4.36 (SD 0.92) versus 3.73 (SD 0.79), and intention for future use 4.18 (SD 1.33) versus 3.18 (SD 1.40; *P*=.07-.36). Averaged across items, satisfaction was 4.29 (SD 0.74) versus 3.70 (SD 0.75; *P*=.09). No individual domain reached significance; the consistent direction across all 6 domains is the observation of interest and suggests that patients with greater unmet rehabilitation needs perceived greater benefit. Satisfaction did not differ by age group or sex.

Figure 4. Satisfaction survey scores at 1 month after discharge by ambulatory function (functional ambulatory category 3 vs functional ambulatory category 4-5). Patients with lower ambulatory function (functional ambulatory category 3) showed consistently higher satisfaction across all 6 domains. Error bars represent SDs. FAC: functional ambulatory category.



Comparison Between 1-Month and 3-Month Evaluations

The median interval between the 1-month and the 3-month assessment was 38 (IQR 15-47; range 0-56) days. In 3 of 8 participants, the interval was 16 days or less, and in 1 participant, both assessments were administered on the same day. Among the 7 participants with paired data, the mean SUS score was 61.1 (SD 13.5) at 1 month and 56.1 (SD 16) at 3 months (Wilcoxon signed-rank P=.50); across all 8 participants evaluated at 3 months, the mean SUS score was 54.4 (SD 18.2). Because of the short and variable interval, these values should not be interpreted as evidence of a change in usability over time. Satisfaction scores at 3 months were generally consistent with the 1-month results, ranging from 3.38 to 4.12 out of 5. Participants who maintained usage until 3 months reported longer daily usage times than the overall cohort at 1 month, suggesting a self-selection effect in which more engaged users continued the program.

Attrition Analysis

Within the 22-participant primary analysis set, the 7 participants who completed the 3-month evaluation were compared with the 15 who did not (Multimedia Appendix 5). No appreciable differences were observed in age (63.1, SD 13 vs 61.5, SD 7.1 years; P=.86), K-MMSE score (25.4, SD 4.8 vs 25, SD 4.6; P=.75), K-MBI score (82.1, SD 15.4 vs 83, SD 10.7; P=.92), FAC, mRS, self-reported usage, or 1-month satisfaction. One-month SUS scores were essentially identical between groups (61.1, SD 13.5 vs 60, SD 19.5; P=.97), and the proportion with an SUS score of ≥68 was 2 of 7 (29%) versus 4 of 15 (27%). Depressive symptoms showed the largest numerical difference, being higher among completers (PHQ-9 8.2, SD 7.1 vs 3.5, SD 4.5; P=.14), although PHQ-9 data were available for only 15 of 22 participants. Given the very small subgroup sizes, these comparisons are underpowered, and the absence of statistically significant differences should not be interpreted as evidence that completers and noncompleters were equivalent.

Open-Ended Responses

Inductive content categorization of the narrative feedback identified 3 primary categories. Positive feedback highlighted the usefulness of the rehabilitation exercise videos, educational content for caregivers on safe transfer techniques and activities of daily living assistance, and the convenience of having a centralized schedule and medication reminder. Negative feedback centered on the cumbersome and nonintuitive user interface, small text and icon sizes that were difficult to read (particularly for older participants), rehabilitation content difficulty levels perceived as too low for patients with mild functional impairment, and difficulty using the program independently. Suggestions for improvement included tailoring rehabilitation content according to each patient's functional level, increasing text and icon sizes, implementing a more intuitive navigation structure, providing detailed step-by-step exercise guidance, and incorporating real-time feedback from therapists through a 1:1 consultation service (preferred by 10 of 22 participants, 45%, at 1 month).

Discussion

Principal Findings

This study evaluated the usability and satisfaction of an ICT-based rehabilitation management program for postacute stroke rehabilitation within the KOMPACT project across 3 university hospitals in Korea. The principal findings were as follows: (1) the overall SUS score of 60.3 fell below the accepted benchmark of 68, indicating suboptimal usability, and only 6 of 22 (27%) participants had scores at or above that benchmark; (2) satisfaction scores were nevertheless generally favorable, ranging from 3.7 to 4.2 out of 5; (3) participants with and without acceptable usability differed descriptively in age, cognitive function, and depressive symptoms, although with 6 events these contrasts cannot be interpreted as determinants; (4) patients with lower ambulatory function reported greater satisfaction, suggesting that

the program may be most valuable for those with greater unmet rehabilitation needs; and (5) engagement was low throughout, with 13 of 22 (59%) participants discontinuing at the earliest permitted opportunity, most often because of perceived recovery, difficulty of use, or content that did not match their functional level.

Where User Involvement Stopped

Satisfaction with the program's content was favorable while interface usability fell below the acceptable threshold, and the development history offers a plausible account of this dissociation. End users were involved substantively in defining what the program should contain: FGIs with survivors with stroke, caregivers, therapists, physicians, and social workers established the content domains, and the open-ended responses in this study suggest that those domains were well chosen. Participants repeatedly identified the exercise videos, caregiver education, and consolidated schedule and medication information as useful, endorsing precisely the content specified during the interviews.

End users were not involved in how that content would be operated. Screen architecture, navigation, text and icon sizing, and module arrangement were settled by the clinical and development teams and deployed without a cycle of usability testing with representative users. Participants' complaints corresponded to this division: what they praised was content; what they criticized (small text and icons, cumbersome navigation, inability to use the program unaided, and exercise difficulty not graded according to functional level) was almost entirely interface and interaction design.

Requirements-stage focus groups cannot substitute for design-stage testing, because focus group participants reason about a system they have not yet operated: they can state what they need but not whether a given screen makes that need easy to satisfy. Every interface problem reported here belongs to the class that a single round of think-aloud testing with a few representative users would surface quickly and cheaply. The pattern we followed (thorough requirements elicitation, a single build, and evaluation deferred until after deployment) is common in publicly funded health technology development, and its cost is visible in our data.

We therefore frame this study not as a summative evaluation of a finished product but as the first, belated iteration of a front-loaded human-centered design cycle. User involvement in requirements definition, however thorough, does not discharge the obligation to test the design solution with users before multicenter deployment; development plans for multidomain rehabilitation platforms should budget for at least 1 round of prototype testing round between specification and rollout.

Comparison With Prior Work

Benchmarking a multidomain platform against SUS scores from single-purpose applications is not a like-for-like comparison. Our mean SUS score of 60.3 falls in the "marginal" to "OK" range [15-17]. Considerably higher scores have been reported under far more supported conditions: the START program, a blended-care platform with daily therapist chat support evaluated in 8 inpatients at a Swiss rehabilitation clinic, achieved a mean SUS score of 86.6 (SD 10.9) [13]. That evaluation differs from ours in almost every element of the context of use (supervised inpatient setting, continuous therapist availability, exercise content confined to a single domain, and a 1-week test period), illustrating how far a SUS score depends on the circumstances of use rather than the system alone. The present program spans 4 rehabilitation domains, scheduling, medication management, and welfare information in one platform, and the navigational and cognitive demands of such architectures exceed those of single-purpose applications, so lower usability scores can be expected even without interface deficiencies. Published usability scores for stroke rehabilitation technologies span a wide range accordingly: an immersive virtual reality mirrored-hand system reported a mean SUS score of 56.67 (SD 13.88) in 15 survivors with stroke [22], 30 points below the START figure, and a scoping review of 111 usability evaluations identified 28 distinct instruments, with most studies combining 2 to 6 [23]. However, this reasoning must not explain away genuine design deficiencies: our qualitative data point to concrete, remediable interface problems, and both the inherent complexity of a multidomain design and the absence of predeployment usability testing contributed to the observed scores. Finally, the benchmark of 68 derives from general software evaluations; a meta-analysis of digital health apps reported a benchmark mean of 68 with an SD of 12.5 [18], so the threshold itself is a source of interpretive uncertainty.

Discordance Between Usability and Satisfaction

The discordance between the below-threshold SUS score (60.3) and favorable satisfaction (3.7-4.2 out of 5) merits interpretation. We had considered whether the alternating positive and negative wording of SUS items might have depressed scores among participants with reduced cognition, but an exploratory item-level analysis did not support this: differential responding by item polarity was similar across cognitive strata and uncorrelated with K-MMSE (Multimedia Appendix 4). The discordance is better explained by the constructs themselves. Interface usability and content satisfaction are distinct: low SUS scores reflect difficulty operating the tablet interface, whereas high satisfaction reflects the perceived value of the clinical content. This pattern is consistent with, but was not tested against, the technology acceptance model (TAM), in which perceived usefulness and perceived ease of use are distinct antecedents of adoption intention [24]; neither construct was measured here, and we offer TAM only as a post hoc interpretation. A Korean nationwide survey of people with disabilities found usage intention driven primarily by perceived usefulness (β=.662; P<.001) rather than ease of use (β=.203; P<.001) [24]. Future evaluations should assess usability, perceived usefulness, and content value as distinct constructs.

Engagement and Adoption Barriers

Engagement was low even at its peak: the physical therapy module, the most-used component, was accessed by only 15

of 22 (68%) participants, the cognitive and language modules by 41% to 50%, and 13 of 22 (59%) stopped at the earliest permitted opportunity. Read with the reasons given for discontinuing, this points to 3 barriers. First, operability: 3 participants stopped because they could not use the program without help, 1 attributing this to a caregiver's unavailability. Second, relevance: participants who had recovered ambulatory function found the exercise content too easy and perceived no continuing need, echoed by the higher satisfaction among those with lower ambulatory function. Third, sustained motivation: the program had no reengagement mechanism, therapist contact between visits, or progress feedback. Each implies a different remedy: caregiver-aware interaction design; adaptive content graded to functional level; and structured re-engagement through scheduled therapist contact, feedback, and prompting. High usability does not guarantee engagement: the START program, with a SUS of 86.6, reported adherence of 17% to 80%, with 3 of 8 patients completing fewer than a quarter of planned sessions, partly because content was too easy [13]. That a highly usable program met the same relevance and motivation barriers suggests they are not simply consequences of poor interface design. Formative evaluations of multidomain platforms should therefore report module-level engagement and reasons for discontinuation alongside summary usability scores.

Patient Characteristics and Usability

The large effect size for age (Cohen d=–0.91) is consistent with systematic reviews identifying older age as a primary barrier to mHealth adoption after stroke [11,12]. Patients younger than 65 years reached a mean SUS score of 68.3, meeting the threshold, whereas those 65 and older scored 50.8; the association did not reach significance in Firth regression, most likely because of the critically limited event count rather than a true absence of association. This divide reflects reduced familiarity with touchscreens, sensory deficits, and age-related cognitive decline [25], and argues for larger text and icons (as participants requested), simpler navigation, and caregiver co-use models.

Depressive symptoms (PHQ-9; Cohen d=–0.79) and cognitive function (K-MMSE; Cohen d=+0.71) also showed meaningful effect sizes favoring the acceptable-usability group, consistent with the literature on patient-level barriers [11,26]. Poststroke depression, affecting roughly 30% of survivors, reduces engagement in rehabilitation [26]; the KOMPACT trial found that ESD improved depressive symptoms [4], suggesting possible synergy between ICT platforms and ESD services. The K-MMSE difference (27.5 vs 24.2) supports cognitive screening before ICT prescription and adaptive interface modes for mild cognitive impairment.

The absence of significant associations in Firth regression (Multimedia Appendix 3) is most parsimoniously attributed to the low event count (n=6; EPV=0.86), under which even large effects are undetectable; every penalized odds ratio nevertheless pointed in the same direction as the corresponding effect size. We therefore make no claim that these variables are determinants of usability. The convergent effect sizes for age (Cohen d=–0.91), depressive symptoms (Cohen d=–0.79), cognitive function (Cohen d=+0.71), and ambulatory function (Cohen d=+0.48) are consistent with prior work [9,11] and provide hypotheses for future testing, whereas functional independence (K-MBI; Cohen d=–0.17) and stroke severity (mRS; Cohen d=–0.06) showed negligible differences. Adequately powered confirmation would require 50 to 100 participants in the acceptable-usability group (EPV≥10).

Satisfaction and Unmet Rehabilitation Needs

The higher satisfaction reported by patients with lower ambulatory function (FAC 3), consistent in direction across all 6 domains although not statistically significant in any of them, likely reflects greater unmet rehabilitation needs, for whom the multidomain program provided meaningful support across rehabilitation exercises, scheduling, and educational content during a vulnerable recovery period. Conversely, patients with better ambulatory function (FAC 4-5) not only perceived the exercise content as insufficiently challenging but may also have found the overall program content less clinically relevant to their remaining rehabilitation needs. Patients who have already regained near-normal ambulatory capacity may have fewer unmet needs that the current program's content domains adequately address, potentially limiting the program's perceived utility in this subgroup beyond convenience features such as scheduling reminders and medication guidance. These findings highlight that the clinical value of a multidomain ICT platform is likely to vary substantially across the functional spectrum and reinforce the importance of developing adaptive, personalized content that is dynamically matched to each patient's functional level and evolving rehabilitation goals [10]. Notably, qualitative data indicated that caregivers actively engaged with educational content, consistent with systematic evidence that dyad-focused telehealth interventions improve outcomes and caregiver preparedness [27,28]. In the Korean cultural context, where family-centered care is deeply embedded, explicitly incorporating caregiver-specific modules and guided co-use protocols into future platform iterations is particularly warranted.

Future Directions

Future evaluations of this platform should incorporate a usability instrument developed specifically for health information technology, such as the Health Information Technology Usability Evaluation Scale (Health-ITUES), which assesses perceived usefulness, ease of use, user control, and impact as separate dimensions and for which a validated Korean version is available [29,30]; a usability cut-point for this instrument has also been proposed [31]. Applying such an instrument alongside the SUS would allow the interface and content dimensions that appear to diverge in our data to be measured separately rather than inferred. Prospective application of a TAM-based instrument would likewise permit direct testing of the interpretation offered above. Beyond measurement, the next iteration of the platform should be co-designed with survivors with stroke and caregivers through iterative usability testing, should deliver

content adaptively according to functional level, and should incorporate structured reengagement mechanisms; server-side usage logging should be prespecified and retained so that objective engagement metrics can be analyzed alongside self-report.

Limitations

This study has several limitations. First, the sample was small (n=24 enrolled, n=22 analyzed) and did not reach the planned 30 participants, principally because recruitment coincided with the COVID-19 pandemic. With only 6 participants achieving acceptable usability, the EPV ratio precluded standard logistic regression; Firth penalized estimates and the reported effect sizes should be interpreted cautiously given wide CIs and extreme group imbalance, and the findings are hypothesis-generating. Second, the single-arm design and short follow-up (maximum of 3 months after onset) did not permit assessment of clinical effectiveness; although telerehabilitation can achieve outcomes comparable to in-person rehabilitation [6], whether this program produces clinical benefit remains unverified.

Third, attrition was substantial: 8 of 22 participants were evaluated at 3 months and 7 had paired data. Completers and noncompleters did not differ appreciably in baseline characteristics or 1-month SUS score (Multimedia Appendix 5), arguing against selective retention of those who found the program usable, but the comparison is underpowered. Fourth, the interval between assessments was short and variable (median 38, range 0-56 days), coinciding in 1 participant, so the 3-month data are not an independent longitudinal observation. Fifth, usage data were self-reported and subject to recall and social-desirability bias; server-side logs were not retained. Sixth, the satisfaction instrument was developed by the research team and not psychometrically validated. Seventh, open-ended responses were brief, prompt-directed, and categorized by a single investigator who was also involved in program development, without a second coder, reliability assessment, or member checking; they should be read as structured feedback rather than qualitative findings. Eighth, screening data were not recorded systematically, so the representativeness of the cohort cannot be assessed. Ninth, the platform was built and hosted by an external contractor (HEALTHCONNECT Co, Ltd), and infrastructure-level security (server configuration, encryption at rest, access logging, and any certification) was not documented to the research team; investigators commissioning comparable platforms should specify these arrangements contractually at the outset. Tenth, authentication on the patient tablet required only hospital registration number and name, with an auto-login option; this deliberately lowered the access burden for older users but affords weaker protection, and future deployments should adopt stronger patient authentication and session timeouts. Eleventh, the FGIs were a development activity: transcripts were not retained, no formal coding was applied, and all sessions were moderated by a single investigator on the design team, so the requirements phase cannot be independently appraised, and the correspondence we describe between specified and endorsed content is a plausible account rather than a tested proposition. Finally, the SUS captures principally the satisfaction component of ISO 9241-11; a fuller evaluation would require task-based performance testing, error analysis, and objectively logged interaction data.

Conclusions

This formative evaluation showed that a multidomain ICT-based rehabilitation management program for postacute stroke achieved suboptimal usability alongside generally favorable satisfaction among community-dwelling survivors with stroke, and that engagement declined rapidly after the first month. Participants with acceptable usability were descriptively younger, with better cognitive function and fewer depressive symptoms, but the number of such participants was far too small to identify determinants, and these contrasts should be treated as hypotheses for adequately powered future studies. Patients with greater unmet rehabilitation needs derived higher satisfaction, and the discordance between usability and satisfaction underscores the importance of evaluating interface usability and content value as separate constructs in digital health platforms. The clinical effectiveness of this program remains to be established in future controlled trials. The principal implementation lesson concerns where user involvement was placed: survivors with stroke and caregivers helped define the program content through FGIs, and content satisfaction was correspondingly favorable, but the design solution itself was never tested with users before deployment, and it was interface and interaction design that participants found difficult. User involvement in requirements definition is necessary but not sufficient; multidomain rehabilitation platforms intended for older survivors with stroke should undergo at least 1 cycle of prototype usability testing with end users before multicenter deployment, alongside adaptive content delivery, caregiver couse protocols, and structured reengagement mechanisms.

Generative AI Use

During the preparation of this manuscript, the authors used a large language model (Claude, Anthropic) as an AI-assisted technology. Its use was limited to editing English text and formatting to journal style under the direction and review of the authors. The study design, data analysis, interpretation of results, and final wording were determined solely by the authors. No AI tool was used to generate, fabricate, or alter data or results. The authors reviewed all AI-assisted output, take full responsibility for the scientific integrity of the content, and confirm that AI-assisted technologies are not listed as authors.

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Data Availability

Pseudonymized data supporting this study's findings are available from the corresponding author upon reasonable request, subject to approval from the local institutional review board and completion of a data-sharing agreement.

Authors' Contributions

Conceptualization: WKC, W-SK, MKS, Y-IS, NJP
Data curation: WKC, YSJ, SJ, SHK
Formal analysis: WKC, JSC
Investigation: WKC, YSJ, WSK, MKS, SJ, Y-IS, SHK, N-JP
Methodology: WKC
Visualization: WKC, JSC
Writing – original draft: WKC
Writing – review & editing: WKC, YSJ, JSC, WSK, MKS, SJ, YIS, SHK, NJP
Funding acquisition: NJP
Project administration: NJP
Supervision: NJP

Conflicts of Interest

None declared.

Multimedia Appendix 1

Screenshots of the information and communication technology–based rehabilitation management program interface.
[DOCX File (Microsoft Word File), 711 KB-Multimedia Appendix 1]

Multimedia Appendix 2

Forest plot of Cohen *d* effect sizes comparing patient characteristics between participants with acceptable (System Usability Scale ≥68) and unacceptable (System Usability Scale <68) usability.
[DOCX File (Microsoft Word File), 163 KB-Multimedia Appendix 2]

Multimedia Appendix 3

Forest plot of Firth penalized likelihood logistic regression estimates for individual variables in relation to acceptable usability (System Usability Scale ≥68).
[DOCX File (Microsoft Word File), 237 KB-Multimedia Appendix 3]

Multimedia Appendix 4

Exploratory analysis of item-level System Usability Scale responses by item polarity and cognitive status at 1 month (n=22).
[DOCX File (Microsoft Word File), 16 KB-Multimedia Appendix 4]

Multimedia Appendix 5

Comparison of participants who did and did not complete the 3-month evaluation.
[DOCX File (Microsoft Word File), 21 KB-Multimedia Appendix 5]

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Abbreviations

CNUH: Chungnam National University Hospital
COMPASS: Comprehensive Post-Acute Stroke Services
EPV: events-per-variable
ESD: early supported discharge
FAC: functional ambulatory category
FGI: focus group interview
Health-ITUES: Health Information Technology Usability Evaluation Scale
ICT: information and communication technology
K-MBI: Korean version of the modified Barthel index
K-MMSE: Korean Mini-Mental State Examination
KOMPACT: Korean Model for Post-Acute Comprehensive Rehabilitation
mHealth: mobile health
mRS: modified Rankin Scale
NIHSS: National Institutes of Health Stroke Scale
PHQ-9: Patient Health Questionnaire-9
PNUYH: Pusan National University Yangsan Hospital
SNUBH: Seoul National University Bundang Hospital
SUS: System Usability Scale
TAM: technology acceptance model

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