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Factors Influencing Rehabilitation Behavior in Stroke Patients

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ABSTRACT

Background: Stroke has high incidence and disability rates; rehabilitation is key to reducing disability and improving quality of life. This study identifies factors influencing rehabilitation behavior, supporting the development of personalized plans. Methods: This study identified stroke rehabilitation factors using the CFIR and created a questionnaire for follow-up analysis. Results: Qualitative interviews identified multiple barriers and facilitators across CFIR domains: patients (13 each, 5 domains), caregivers (14 barriers, 15 facilitators, 5 domains), and healthcare workers (14 barriers, 12 facilitators, 4–5 domains).Factor analyses of the questionnaires revealed levels of pain or discomfort (P=0.017), annoyance with daily activities (P=0.007), annoyance with social interaction (P=0.015), understanding of healthcare staff's explanations of the condition (P=0.046), accurate understanding of post-stroke rehabilitation (P=0.024), and the individual's sense of identification with the organization (P=0.003). (P=0.003) were associated with rehabilitation behavior. The difference was statistically significant (P<0.05). Conclusions: This study used interviews and questionnaires to identify key factors influencing stroke patients' and caregivers' rehabilitation behaviors, highlighting links between behavior, context, and individual traits to support personalized rehabilitation.

KEYWORDS

Stroke; Rehabilitation behaviors; Qualitative interviews; CFIR framework

1. INTRODUCTION

Stroke is China's top adult cause of death/disability, imposing vast health, personal, family and societal burdens. The incidence of stroke increases with age, and about 75% of stroke diseases occur in the elderly population over 65 years old [1]. socioeconomic growth, lifestyle shifts, ageing and urbanization have raised cerebrovascular risk factors and driven up disease numbers [1]. According to the 2019 Global Burden of Disease Survey [2] (global burden of disease study, GBD), In China, stroke caused 45.9 million DALYs, the highest among all diseases, including cardiovascular and respiratory conditions. It is the leading health threat, with a 39.9% lifetime risk—the world's highest—and rising by 9% annually [3]. and is expected to double by 2030 compared with 2010, which has become a major public health problem in China.

Advances in medical technology have significantly increased stroke survival, reaching up to 84% according to reports [4]. However, over 40% of survivors experience sequelae such as muscle weakness, sensory abnormalities, dysphagia, and cognitive impairment, severely affecting their ADL and quality of life [5]. Stroke-induced dysfunction may lead to negative emotions in patients, as well as psychological pressure on carers [6]. Rehabilitation therapy effectively reduces stroke-related

disability, promotes recovery, improves function and quality of life, and alleviates burden on patients and caregivers [7].

Many organizations have developed rehabilitation guidelines and technologies, including the 2021 AHA/ASA guidelines, offering evidence-based recommendations for recovery and reintegration [8]. The 2019 China Stroke Rehabilitation Guidelines recommend a three-phase model to enhance recovery, quality of life, and daily function while reducing complications [9]. The AHA/ASA recommend early rehabilitation to reduce complications and improve function, while Chinese guidelines promote a three-tier system for motor recovery and chronic-phase care, aided by clinical assessment scales [10]. Technological advances have brought efficient tools like sEMG into rehabilitation [11]. motion analysis systems [12], transcranial magnetic stimulation (TMS) [13] and magnetic resonance imaging (MRI) [14], etc. These methods are now used in stroke rehabilitation to predict recovery and treatment response [15].

The number of disabled stroke survivors is rising, with increasing rehabilitation uptake; in the U.S., over 800,000 are diagnosed annually, and about 65% receive rehabilitation [16]. In Canada, 62,000 experience a stroke or TIA yearly, with over 6,500 receiving inpatient rehab; however, some forgo care due to socioeconomic and family burdens, and needs often exceed capacity [17]. In low-income countries, limited rehabilitation resources lead to low uptake and rising unmet needs [18]. Due to limited research on post-stroke rehabilitation in China, this study applied the 39-element CFIR framework across five domains [19]. CFIR is widely used to identify multidimensional barriers and facilitators, making it ideal for studying influences on stroke patients' rehabilitation behaviors [20]. Through a qualitative study, we explore motivations, identify barriers and facilitators, develop a questionnaire, and examine key influences to guide rehabilitation optimization.

2. METHODS

2.1. Study Design

This study used qualitative interviews with stroke survivors, caregivers, and healthcare workers to identify rehabilitation facilitators and barriers, analyzed through directed content analysis [21], and mapped to the CFIR framework.

2.2. Study Population

From October 2022 to October 2023, this study conducted semi-structured interviews with 18 stroke patients, 17 caregivers, and 20 healthcare workers from University City Hospital of Chongqing Medical University. Participants met specific criteria: patients were diagnosed, stable, aged ≥20, in need of rehabilitation, and able to communicate; caregivers were long-term, aged ≥20, and able to communicate; healthcare workers had over 5 years of experience in relevant departments at secondary or higher-level hospitals, with a bachelor's degree or higher. Patients and caregivers were grouped by post-discharge rehabilitation engagement. General information is in Tables 1–3.

Based on qualitative interview results, a questionnaire was administered to 100 stroke patients who met the following criteria: confirmed diagnosis, stable condition, age ≥18, normal communication, and informed consent.

Table 1. Basic characteristics of research subjects

serial number	gender	age	education	course of disease
post-rehabilitation				
A1	female	69	vocational secondary school	1 year
A2	male	42	junior high school	2 months
A3	male	67	Undergraduate	6 months
A4	female	53	High School	6 months
A5	male	59	High School	1 year and 8 months
A6	female	61	Illiteracy	8 months
A7	male	81	College	5 years and 10 months
A8	male	59	junior high school	1 year and 7 months
A9	female	72	Elementary School	1 month
non-rehabilitated				
B1	male	67	vocational secondary school	1 year and 4 months
B2	female	74	Elementary School	2 years and 4 months
B3	male	73	Elementary School	5 years and 11 months
B4	male	60	junior high school	4 months
B5	female	75	Elementary School	1 year and 2 months
B6	male	71	Elementary School	21 years
B7	male	68	junior high school	1 month
B8	male	52	College	4 years and 11 months
B9	female	81	College	3 years and 3 months

Table 2. Basic characteristics of the caregivers

serial number	gender	age	education	course of disease
post-rehabilitation				
C1	female	40	junior high school	2 months
C2	male	22	Undergraduate	3 months
C3	female	56	junior high school	1 month
C4	male	55	High School	6 months
C5	male	58	High School	2 months
C6	female	53	junior high school	2 years
C7	female	65	High School	2 months
C8	female	67	Illiteracy	10 months
C9	female	55	High School	1 year and 8 months
C10	male	61	Illiteracy	10 months
C11	female	67	junior high school	3 years
non-rehabilitated				
D1	female	65	High School	1 year and 4 months
D2	female	72	College	2 years
D3	female	69	junior high school	5 years and 11 months
D4	female	39	College	4 months
D5	female	69	junior high school	1 month
D6	male	82	Undergraduate	3 years and 3 months

Table 3. Basic characteristics of the medical workers

number	gender	Age (years)	education	Work (years)	sections	function	title	Hospital level
E1	male	32	bachelor's degree	9	rehabilitation unit	doctor	intermediate	grade 3A
E2	female	39	bachelor's degree	13	neurology	doctor	Associate Senior	grade 3A
E3	female	30	bachelor's degree	5	neurology	doctor	intermediate	grade 3A
E4	female	33	bachelor's degree	8	rehabilitation unit	doctor	intermediate	grade 3A
E5	female	33	bachelor's degree	8	rehabilitation unit	doctor	intermediate	grade 3A
E6	female	41	undergraduate	7	rehabilitation unit	Physiotherapist	intermediate	grade 3A
E7	female	39	undergraduate	10	rehabilitation unit	Physiotherapist	intermediate	grade 3A
E8	female	31	bachelor's degree	5	neurology	doctor	elementary	grade 3A
E9	female	36	undergraduate	7	rehabilitation unit	Physiotherapist	elementary	grade 3A
E10	male	39	undergraduate	15	neurology	doctor	intermediate	grade 3A
E11	female	36	bachelor's degree	6	neurology	doctor	intermediate	grade 3A
E12	female	35	undergraduate	13	neurology	Physiotherapist	intermediate	grade 3A
E13	female	59	undergraduate	40	neurology	Physiotherapist	intermediate	grade 3A
E14	male	36	bachelor's degree	7	neurology	doctor	elementary	grade 3A
E15	female	40	undergraduate	5	geriatrics	doctor	elementary	grade 2A
E16	female	38	bachelor's degree	13	geriatrics	doctor	Associate Senior	grade 2A
E17	female	33	undergraduate	11	geriatrics	Physiotherapist	intermediate	grade 2A
E18	female	37	bachelor's degree	10	rehabilitation unit	doctor	intermediate	grade 2A
E19	male	38	bachelor's degree	10	rehabilitation unit	doctor	intermediate	grade 2A
E20	male	34	undergraduate	8	rehabilitation unit	doctor	elementary	grade 2A

2.3. Data Collection

Researchers introduced the study by phone, obtained consent, and scheduled face-to-face interviews. Before each session, study details and confidentiality were explained, and consent was confirmed. Using a semi-structured guide—developed by experts and refined through pilot interviews—researchers conducted one-on-one interviews, with one leading and another observing nonverbal cues. Questions were adapted in real time to explore rehabilitation behavior; each interview lasted about 30 minutes.

Based on qualitative findings, a questionnaire on post-stroke rehabilitation was developed, refined, and pre-tested for clarity with ten patients. It was then administered to stroke patients at Chongqing Medical University's Affiliated University City Hospital, with researchers providing explanations, obtaining consent, and assisting as needed. Completed questionnaires were collected on-site and data entered into the university's RWD platform within 24 hours.

2.4. Statistical Analysis

Qualitative data were transcribed, verified, and checked within 24 hours, with tone and emotional cues noted. Using NVivo 12.0, directed content analysis was conducted to code data, generate themes, and map them to the CFIR framework until saturation, identifying facilitators and barriers to post-stroke rehabilitation.

Questionnaire data were analyzed using STATA 17.0: count data were presented as frequencies; multiple-choice options were grouped by the CFIR framework and described accordingly,

dichotomous variables were analyzed with the Wilcoxon rank sum test, and tertiary variables with the Kruskal-Wallis H test.

3. RESULTS

3.1. Patients

A total of 13 barriers covering 5 dimensions and 13 facilitators covering 5 dimensions of the CFIR framework were obtained from interviewing patients.

3.1.1. Intervention Characteristics

Two barrier elements were identified: intervention cost and program intensity/quality. Stroke rehabilitation involves long treatment cycles and time-intensive sessions, imposing high time costs on patients.

Patient A3: 'It takes a long time to come to recovery, usually staying for a few months, and so many people can't make it.'

At the same time, the poor effectiveness of rehabilitation techniques in the past also affects patients' rehabilitation behavior.

Patient A7: 'I've done rehab and it didn't work ..... I did it close to a month or so ..... over a decade ago.'

3.1.2. Outer Setting

Three barrier elements were identified: patient needs and resources, peer pressure, and external policies. Rehabilitation intensity should be individualized, as some patients cannot tolerate overly intense programs.

Patient A5: 'Well, those two days of recovery were so intense that we just didn't do it.'

The difference in the level of rehabilitation between primary care and general hospitals affects patients just as much.

Patient B2: 'Our community hospitals don't have these (rehabilitation), it's better to have a general hospital, we don't care over there.'

A total of 3 facilitating elements were identified, including patient needs and resources, external collaboration, and external policies and incentives. Post-rehabilitation patient needs were relatively richer, with more concerns and worries about the disease to prevent worse.

Patient A1: 'I'm afraid to fall, I'm afraid to walk, I'm afraid to somersault (fall), I'm afraid.'

Patients discharged from rehabilitation had more concerns about ongoing rehabilitation outside the hospital and no professional guidance for home rehabilitation.

Patient A2: 'After I was discharged from hospital, I went home and didn't recover much, just the usual walks out ..... It would be nice to recover in the neighborhood.'

3.1.3. Inner Setting

A total of 2 barrier elements were identified, including accessibility of knowledge and information, and collaboration and communication. More difficult access to knowledge and information about stroke is one of the barrier elements to rehabilitation behavior of stroke patients.

Patient A8: 'I didn't know how much I would be reimbursed when I came (for rehabilitation) before, and my family didn't know.'

A total of 2 facilitating elements were identified, including accessibility of knowledge and information, collaboration and communication. Access to disease-related information from multiple sources promotes continued patient recovery.

Patient A1: 'Other things, like what the doctor says about the benefits, I write that down, and what my colleagues say, and the content of text messages I write down.'

3.1.4. Individual Characteristics

Five barriers were identified, including knowledge and beliefs about the intervention program, self-efficacy, the individual's stage of change, the individual's identification with the organization, and other personal characteristics. Patients' knowledge and beliefs about intervention programs varied, with some patients trusting in "old-fashioned" methods, and post-disease emotional problems causing patients to put off their recovery plans.

Patient A5: 'I don't want to think about problems now, they used to say that thinking about problems too much makes you prone to dementia, I don't think about anything.'

Patients with lower self-efficacy are also more likely to back out.

Patient A6: 'That's the situation, that's my future anyway, the situation is not good, no-good results.'

Emotional problems in patients after stroke can affect recovery.

Patient B3: 'Often it's all brain stuffiness and fainting ..... don't want to do anything.'

A total of five facilitating elements were found, including knowledge and beliefs about the intervention program, self-efficacy, the stage of change the individual is in, the individual's identification with the organization, and other personal characteristics. Patients and their carers had better recovery awareness and disease awareness.

Patient B1: 'The golden recovery period for stroke is three months.'

Most patients who have chosen recovery have a strong sense of self-efficacy, a strong desire to recover, and a belief in their ability to be able to return to desired levels.

Patient A2: 'I see other people, a lot of them are discharged, and I'm sure if I stick with it I'll be discharged normally.'

Symptoms left over from the stroke and the huge gap in life drive patients to rush to recovery.

Patient A1: 'I used to sing, not very accurately, but I liked to sing, I had a big voice. Just not with this illness.'

3.1.5. Processes of Implementation

A total of 2 barrier factors were identified, including implementation, reflection and evaluation. Some of the very mild patients reported that their doctors did not mention rehabilitation-related information when they were discharged from the hospital.

Patient B8: 'When I was in hospital at the time, the doctor didn't ask me to do rehab, and I didn't do it, so I was sent home to exercise.'

3.2. Caregiver

A total of 14 barriers covering the five dimensions of the CFIR framework and 15 facilitators covering the five dimensions were obtained through interviews with carers.

3.2.1. Intervention characteristic

Intervention intensity and quality barrier elements were found. Slower recovery of patients affects carers.

Carer C7: ‘Although there is a little bit of strength in the hand now, he still can't move his hand very well, he can't move it normally’.

Intervention intensity and quality promotion elements were found. Good results were found in the rehabilitation units of general hospitals or rehabilitation specialized hospitals.

Carer C3: ‘After the hospitalization (rehabilitation) it was just basically we were helping him (the patient) to walk around and now he (the patient) is basically able to walk.’

3.2.2. Outer setting

A total of four barrier elements were identified, including patient needs and resources, peer pressure, external policies and incentives, and external collaboration. Unrehabilitated caregivers had low expectations for patient recovery.

Carer D4: ‘I think it's fine for him not to do anything, as long as he can look after himself, that's all I ask.’

The disparity in the level of rehabilitation between healthcare providers is also a consideration for carers.

Caregiver C4: ‘We have rehabilitation in the districts and counties, but we don't have the equipment, and the equipment in the districts and counties is definitely less.’

At the same time, as carers also bear the rest of the family burden, the distance between home and healthcare facilities and the convenience of access to healthcare are also important points for carers.

Carer C9: ‘Rehabilitation and then having to travel so far and a, honestly ha, such a hassle.’

A total of four facilitating elements were identified, including patient needs and resources, peer pressure, external collaboration, and external policies and incentives. Caregivers were concerned about issues related to the patient's continued recovery from hospital discharge and safety risks.

Carer C5: ‘Need guidance from a doctor, mainly health wise then.’

Proximity greatly enhances the convenience of rehabilitation and reduces the burden on carers.

Carer C7: ‘Because my child is studying there, well, it's closer to the hospital, so it's easier to do everything, and I can take care of my family.’

3.2.3. Inner setting

A total of 2 barrier elements were identified, including collaboration and communication, and available resources. Rehabilitation programs should be tailored to the individual characteristics of the patient and can be counterproductive if they are beyond the patient's tolerance.

Carer C6: ‘They want the speed to recover faster, but she [the patient] can't take it again.’

At the same time, hospital diets have become a concern for carers.

Carer D3: ‘I just go and hit their canteen at night and the canteen food is just harder. I heat it up in the microwave’

A total of 2 facilitators were identified, including accessibility of knowledge and information, and collaboration and communication. Diversification of access to information may increase the reach of stroke-related information.

Carer D1: ‘The old man in my neighborhood, who I was dancing with, also had a stroke, and he's not too old, but he's all nestled up at home now.’

3.2.4. Individual Characteristics

A total of five barrier elements were identified, including knowledge and beliefs about the intervention program, self-efficacy, the stage of change the individual is in, the individual's identification with the organization, and other personal characteristics. Knowledge of stroke disease and rehabilitation is important.

Carer C8: 'We usually buy some medicine outside when we have a small cold, we haven't been in these hospitals, we don't know what rehabilitation is.'

The popularity of the Internet has made it easy for patients to search for disease-related information, and at the same time, patients are easily deceived by false information on the Internet.

Carer C9: 'He just buys that kind of medicine online, he just wants to be cured in one go, he just buys potent drugs to take.'

The stage of change that the carer is in, e.g. the carer's family burden, emotional burden, all have an impact on recovery behaviors.

Carer C9: 'It's just, it can't be helped. So that's sometimes it's just, he (the patient) is in a hurry, he's saying I'm (the patient) sick because of you (the carer).'

A total of five facilitating elements were identified, including knowledge and beliefs about the intervention program, self-efficacy, the stage of change the individual is in, the individual's identification with the organization, and other personal characteristics. The golden period of stroke rehabilitation is an important concept that needs to be disseminated to patients and carers.

Carer C9: 'Last time I heard a patient say the golden period was a year.'

Self-efficacy is reflected in the patient's stronger willingness to recover, better compliance, and ongoing management of the patient by the carer.

Carer C2: 'No matter how much pain she was in, she always said she was going to get better and was very strong.'

The patient, who is the main laborer of the family, wants to reduce the burden of the family after recovering as soon as possible.

Carer C2: 'A lot of maybe work or study and life might take some time off to spend with my mum, originally her work was still more important in our family as well.'

3.2.5. Processes of Implementation

A total of 2 barrier elements were identified, including implementation, reflection and evaluation. Caregivers responded that patients had poor continuity of treatment in the clinic after discharge and only walked for exercise at home.

Carer D4: 'The most he exercises is walking, nothing more.'

Carers reflect on delayed stroke transport to hospital and failure to recognize the problem and take it to hospital in time.

Carer D1: 'It's not like I was paying attention, at the time if I had known that he (the patient) was going to get stroke and all that, I would have taken him to the hospital, it wouldn't have been as bad as it was.'

A total of 2 facilitating elements were found, including mobilization, and champions. Healthcare professionals in the first clinic were the longest contact and most trusted by patients and their careers, and rehabilitation preaching in the first clinic had a facilitating effect on patients' recovery behavior.

Carer C7: 'We started in hospital and the doctors told us to get out of hospital and go to rehab and be able to recover a lot.'

Family support and advocacy for recovery is equally contributory.

Carer C8: ‘He has no strength, already this side are no strength, no strength hand cannot hold tight, at that time said to go there (rehabilitation department), operating (treatment) two days (a period of time).’

3.3. Medical Workers

A total of 14 barriers covering the four dimensions of the CFIR framework and 12 facilitators covering the three dimensions were obtained from the interviews with healthcare professionals.

3.3.1. Intervention characteristic

A total of 3 barrier elements were identified, including intervention intensity and quality, complexity, and cost. Some patients will search for relevant information via the Internet, have preconceived ideas, and have less trust in healthcare professionals.

Doctor E1: ‘Let's say, sometimes you bring a patient in and he will look up Baidu and ask me what to treat, and then say that you, the doctor, are not treating him the right way.’

Some healthcare professionals mentioned that some of the patients undergoing rehabilitation might also give up halfway because of financial problems.

Nurse E6: ‘Well, if the patient doesn't come, then it might be the points I just mentioned and there might not be any money (to continue rehabilitation).’

A total of 3 facilitating elements were found, including intervention intensity and quality, relative advantage, and cost. Early intervention in rehabilitation had a significant effect on preventing the onset and development of poststroke sequelae.

Doctor E8: ‘There are patients with muscle strength of only zero grade one level in this case, carry out the regulation in the late stage of the regulation, after some rehabilitation training in the rehabilitation department, there is a chance to be able to stand and get a higher quality of life.’

Patients perceive traditional rehabilitation to be very effective and to have a relative advantage.

Doctor E4: ‘And then the other thing is that maybe it's just that trust in traditional medicine, and some patients feel that traditional rehabilitation is very effective, and there's a higher level of acceptance.’

Some of the patients undergoing rehabilitation have lower time costs due to the proximity of their homes to the hospital.

Doctor E4: ‘Patients will choose some hospitals that are close to their homes and more convenient, for example, if some places are in the university town area, they may choose to be with us.’

3.3.2. Outer setting

A total of 3 barrier elements were identified, including patient needs and resources, external collaboration, and external policies and incentives. Patients can be prevented from undergoing rehabilitation if they have a low level of symptoms or a low need for rehabilitation of physical function.

Doctor E5: ‘Some family members just say that it's fine for him [the patient] to be able to walk, to be able to take care of himself, and that the family doesn't need to be around him too much.’

A total of seven facilitating elements were identified, including patient needs and resources, external collaboration, external policies and incentives, collaboration and communication, leadership input, available resources, and accessibility of knowledge and information. For patients who cannot be cared for at home, inpatient rehabilitation can prevent risks and reduce caregiver stress.

Nurse E12: ‘It's just that families can't take care of them, and at home they are also afraid that patients will have problems like falls and secondary injuries, so they also come to inpatient rehabilitation to try.’

At the same time, good external collaboration, such as multidisciplinary teams, can also promote rehabilitative behaviors.

Doctor E15: ‘Doing this rehabilitation of the extremities, because the patient chooses to come to us, and also because this geriatrics and rehabilitation department is a combined department. '

Similarly, the enhancement of available resources such as rehabilitation professionalism and staffing is important.

Nurse E12: ‘Our rehabilitation nursing this piece of work is still more professional, is specialized in this kind of stroke nurses for rehabilitation training this kind of knowledge training, a series of these rehabilitation knowledge.’

3.3.3. Inner setting

A total of four barrier elements were identified, including structural characteristics of the organization, collaboration and communication, available resources, and accessibility of knowledge and information. Rehabilitation departments started late in most hospitals and are nascent.

Nurse E7: ‘Actually, like post-stroke rehabilitation, like our department, because this rehabilitation department in our hospital, he was, in October of the previous year (2020), he was separated independently. So, he hasn't really been around for particularly long, and then originally then it was with the cardiology department in together for rehabilitation,’

Being a newborn department, the lack of resources available to the department was also an issue that was mentioned more often by the medical staff.

Nurse E12: ‘Well, staffing is also a little bit tight because if you go by the ratios, we're actually understaffed in our unit in terms of rehabilitation, both physicians and technicians.’

Doctors mention that section leaders are limited.

Doctor E18: ‘Then perhaps the more cutting-edge ones in the community now, the experts or the big names, the experts and professors that we can get are also very limited.’

3.3.4. Individual Characteristics

A total of four barrier elements were identified, including knowledge and beliefs about the intervention program, self-efficacy, the stage of change the individual was in, and other personal characteristics. Some patients had low awareness of rehabilitation or had problems with high or low expectations.

Nurse E17: ‘But some patients that kind of rehabilitation effect expectations are particularly high, in fact, some patients missed the best time to come over the rehabilitation, the effect was not very good, but their expectations will be particularly high, he stayed in a week, he felt that is not much effect, the second week he asked to be transferred.’

A total of 2 facilitating elements were found, including knowledge and beliefs about the intervention program, and individual identification with the organization. A strong desire to reintegrate into society, especially if the patient is the main laborer in the family, was found to favor continued rehabilitation.

Doctor E2: ‘Then the young people may be more willing to go through the training to improve themselves, and later go out of this ward to enter the society, so a willingness will be a little bit stronger.’

3.3.5. Univariate analysis of rehabilitation behavior of interviewed patients

Table 4. Univariate analysis on basic characteristics and rehabilitation behavior

	Rehabilitation behavior			
	well-functioning goes home (N=53)	Formal rehabilitation (N=27)	Informal rehabilitation or No rehabilitation (N=20)	P-value
Gender (N, %)				
Man	36 (54.55)	17 (25.76)	13 (19.70)	0.753
Women	17 (50.00)	10 (29.41)	7 (20.59)	
Age (N, %)				
<65	25 (52.08)	12 (25.00)	11 (22.92)	0.724
≥65	28 (53.85)	15 (28.58)	9 (17.31)	
Education (N, %)				
Primary and below	17 (48.57)	8 (22.86)	10 (28.57)	0.396
Junior High School	17 (50.00)	11 (32.35)	6 (17.65)	
High School and above	19 (61.29)	8 (25.81)	4 (12.90)	
Marital status (N, %)				
Married/cohabiting	51 (54.84)	25 (26.88)	17 (18.28)	0.160
Unmarried/divorced/ separated/widowed	2 (28.57)	2 (28.57)	3 (42.86)	
BMI (N, %)				
<18.5	2 (66.67)	1 (33.33)	0 (0.00)	0.372
18.5-23.9	19 (47.50)	8 (20.00)	13 (32.50)	
24.0-27.9	19 (52.78)	12 (33.33)	5 (13.89)	
≥28	12 (63.16)	5 (26.23)	2 (10.53)	
Missing	1 (50.00)	1 (50.00)	0 (0.00)	
Smoking (N, %)				
No	39 (50.00)	22 (28.21)	17 (21.79)	0.445
Yes	12 (60.00)	5 (25.00)	3 (15.00)	
Missing	2 (100.00)	0 (0.00)	0 (0.00)	
Drinking (N, %)				
No	39 (50.65)	21 (27.27)	17 (22.08)	0.540
Yes	12 (57.14)	6 (28.57)	3 (14.29)	
Missing	2 (100.00)	0 (0.00)	0 (0.00)	
Hypertension (N, %)				
No	16 (59.16)	4 (14.81)	7 (25.93)	0.781
Yes	36 (50.00)	23 (31.94)	13 (18.06)	
Missing	1 (100.00)	0 (0.00)	0 (0.00)	
Diabetes (N, %)				
No	35 (53.85)	16 (24.62)	14 (21.54)	0.946
Yes	17 (50.00)	11 (32.35)	6 (17.65)	
Missing	1 (100.00)	0 (0.00)	0 (0.00)	
Dyslipidemia (N, %)				
No	43 (58.90)	15 (20.55)	15 (20.55)	0.156
Yes	8 (36.36)	9 (40.91)	5 (22.73)	
Missing	2 (40.00)	3 (60.00)	0 (0.00)	

As shown in Table 4, a total of 100 stroke patients were investigated in this study, of whom 66 (66.00%) were male and 34 (34.00%) were female. The age distribution of the patients was relatively

average, with 35.00% of patients with primary school and below education level, 34.00% with middle school education level, and 31.00% with high school and above level; 93.00% of the patients were married or cohabiting; 20.00% of the patients smoked cigarettes; 21.00% consumed alcohol; most of the patients also suffered from chronic hypertension (72.00%), 34.00% of the patients had diabetes mellitus and 22.00% had dyslipidemia. The univariate results showed that patients' age, education, marital status, BMI, health behavior, and chronic disease status were not associated with rehabilitative behaviors, and the differences were not statistically significant (P>0.05).

3.4. Influences on Rehabilitation Behaviour in Stroke Patients And Their Univariate Analysis With Rehabilitation Behaviour

Most patients (58.00%) understood medical explanations, but 34.00% were unclear about rehabilitation, and only 17.00% knew the optimal 3–6 month window; 31.00% were unaware of it. While 57.00% believed full recovery was possible and 56.00% found rehabilitation useful, univariate analysis showed rehabilitation behavior was significantly associated with pain (P=0.017), daily activity limitations (P=0.007), social recreation (P=0.015), understanding of medical advice (P=0.046), and knowledge of rehabilitation (P=0.024).

Multiple-choice questions 9–10 were grouped into key factors influencing stroke rehabilitation: Q9 barriers included family support, beliefs/self-efficacy, and economic reasons; Q10 facilitators included self-efficacy, knowledge, external support, and organizational identification. Results showed beliefs/self-efficacy were the main barrier (59.00%), while self-efficacy was the primary facilitator (81.00%). Univariate analysis indicated organizational identification was significantly associated with rehabilitation behavior (P=0.003). See Table 5.

Table 5. Basic characteristics on factors influencing rehabilitation behavior in stroke patients and its univariate analysis with rehabilitation behavior

	Total (N= 100)	Rehabilitation behavior			P-value
		well-functioning goes home (N=53)	Formal rehabilitation (N=27)	Informal rehabilitation or No rehabilitation (N=20)	
1. The degree of pain or discomfort caused to you					
Not at all	17 (17.00)	10 (58.82)	5 (29.41)	2 (11.76)	0.017
Slight or moderate	57 (57.00)	37 (64.91)	8 (14.04)	12 (21.05)	
Severe or very severe	26 (26.00)	6 (23.08)	14 (53.85)	6 (23.08)	
2. Trouble with your daily activities					
Not at all	26 (26.00)	15 (57.69)	6 (23.08)	5 (19.23)	0.007
Slight or moderate	49 (49.00)	33 (67.35)	7 (14.29)	9 (18.37)	
Severe or very severe	25 (25.00)	5 (20.00)	14 (56.00)	6 (24.00)	
3. The hassle of socializing and entertaining you					
Not at all	31 (31.00)	19 (61.29)	7 (22.58)	5 (16.13)	0.015
Slight or moderate	46 (46.00)	29 (63.04)	8 (17.39)	9 (19.57)	
Severe or very severe	23 (23.00)	5 (21.74)	12 (52.17)	6 (26.09)	
4. The medical staff explained your condition in a way that you can probably understand					
No understanding at all	10 (10.00)	8 (80.00)	2 (20.00)	0 (0.00)	0.046
Few or half	32 (32.00)	12 (37.50)	12 (37.50)	8 (25.00)	
Mostly or all	58 (58.00)	33 (56.90)	13 (22.41)	12 (20.69)	
5. What is post-stroke rehabilitation					
Use all effective treatments to prevent the onset of disability and reduce its impact	27 (27.00)	16 (59.26)	7 (25.93)	4 (14.81)	0.024
Treatment of stroke disorders in the neurology department	9 (9.00)	2 (22.22)	4 (44.44)	3 (33.33)	
Recovering by doing exercise work at home by yourself	19 (19.00)	13 (68.42)	5 (26.32)	1 (5.26)	
Going to the clinic for needles and physiotherapy after discharge from the hospital	9 (9.00)	1 (11.11)	5 (55.56)	3 (33.33)	
Not really	34 (34.00)	19 (55.88)	6 (17.65)	9 (26.47)	
Missing	2 (2.00)	2 (100.00)	0 (0.00)	0 (0.00)	
6. What is the prime time for rehabilitation after a stroke					
1-2 months after stroke	17 (17.00)	10 (58.82)	4 (23.53)	3 (17.65)	0.514
3-6 months after stroke	16 (16.00)	7 (43.75)	7 (43.75)	2 (12.50)	
6-12 months after stroke	4 (4.00)	3 (75.00)	1 (25.00)	0 (0.00)	
All of these are prime rehabilitation periods after stroke	2 (2.00)	2 (100.00)	0 (0.0)	0 (0.0)0	
Not sure.	31 (31.00)	31 (50.82)	15 (24.59)	15 (24.59)	
7. What level of recovery are you comfortable with?					
Completely asymptomatic	31 (31.00)	18 (58.06)	5 (16.13)	8 (25.81)	0.239
Can perform all regular tasks and activities without apparent disability, despite symptoms	57 (57.00)	26 (45.61)	20 (35.09)	11 (19.30)	
Can manage personal affairs without assistance but cannot perform all tasks and activities	8 (8.00)	7 (87.50)	1 (12.50)	0 (0.00)	
Basic self-care	2 (2.00)	1 (50.00)	1 (50.00)	0 (0.00)	
Uncertain	1 (1.00)	1 (100.00)	0 (0.00)	0 (0.00)	
Missing	1 (1.00)	0 (0.00)	0 (0.00)	1 (100.00)	
8. Do you think rehabilitation works?					
Particularly or comparatively useful	56 (56.00)	32 (57.14)	14 (25.00)	10 (17.86)	0.604
Average/ Not very useful/ Not at all useful	41 (41.00)	21 (51.22)	12 (29.27)	8 (19.51)	
Missing	3 (3.00)	0 (0.00)	1 (33.33)	2 (66.67)	
9. What are some of the things that would make you hesitate to go to recovery when making recovery decisions (multiple choice)					
Family Support	31 (31.00)	15 (48.39)	10 (32.26)	6 (19.35)	0.434
Beliefs about the intervention and self-efficacy	59 (59.00)	35 (59.32)	12 (20.34)	12 (20.34)	0.625
Economic reasons	30 (30.00)	14 (46.67)	8 (26.67)	8 (26.67)	0.165
10. Under what circumstances would you choose to go to rehab (multiple choice)					
Self-efficacy	81 (81.00)	44 (54.32)	22 (27.16)	15 (18.52)	1.000
Knowledge and beliefs about intervention programs	25 (25.00)	13 (52.00)	7 (28.00)	5 (20.00)	0.825
External collaboration	22 (22.00)	12 (54.55)	5 (22.73)	5 (22.73)	0.891
Individual identification with the organization	24 (24.00)	19 (79.17)	4 (16.67)	1 (4.17)	0.003

4. DISCUSSION

In-depth interviews revealed non-rehabilitating stroke survivors faced more barriers—cost, insurance, beliefs, lack of support, access, and treatment length—than facilitators, while those who rehabilitated reported better awareness, insurance, family support, and quality-of-life expectations. Healthcare

professionals identified facilitators and barriers within the CFIR framework, emphasizing patient needs, collaboration, resources, individual traits, and family context.

Enhancing rehabilitation knowledge among stroke patients and caregivers is crucial, as most lack adequate understanding—consistent with Jing Jin et al.'s findings [22]. Patients often lack stroke and rehabilitation knowledge, leading to delayed care. Although visual and multimedia tools can aid education, short hospital stays and high doctor-patient ratios limit in-hospital teaching; thus, community-based education on stroke risks and the rehabilitation window is needed. Second, strengthening family support is crucial, as caregiving gaps and travel barriers hinder access, while family-provided physical and emotional support improves adherence to home exercise in elderly patients [22-24]. Studies show many stroke patients are elderly and face mobility barriers that limit access to rehabilitation centers [6, 25]. Thus, family support is essential: with caregivers, patients face fewer barriers and better adherence; without, they often discontinue rehab. Third, strengthening interdepartmental collaboration through training improves awareness, coordination, and timely referrals. Fourth, robust social and institutional support is vital to address patients' multiple disabilities and promote rehabilitation [25]. High costs and mobility issues limit stroke patients' access to rehabilitation; financial aid, transportation support, and greater societal investment in services can improve adherence. A survey linked rehabilitation behavior to pain, activity limitations, medical understanding, rehabilitation knowledge, and provider trust. While no direct age–rehabilitation link was found, younger patients tend to have higher recovery expectations, whereas older patients often report lower quality-of-life demands [26]. Younger patients and their caregivers show greater motivation for rapid recovery and community reintegration compared to older patients [27].

Post-stroke dysfunction causes pain and activity limitations; severe cases need family support for adherence, while milder cases are more independent and achieve better outcomes [28]. Thus, the severity of disability and the degree of paralysis after a stroke play a crucial role in the rehabilitation process. Rehabilitation relies on patient engagement; clear communication and trust with providers improve understanding, outcomes, and recovery speed [23]. Effective communication, quality education, and active patient involvement enhance rehabilitation adherence, while strong patient-provider identification and clear communication help overcome negative health beliefs [29, 30]. Thus, stronger patient identification with the hospital and care team is linked to better rehabilitation adherence.

This study's strengths include using the robust Implementation Research Synthesis Framework and being among the first to qualitatively explore rehabilitation facilitators and barriers from multiple perspectives; limitations include a small, single-center sample with potential bias, and possible unexplored themes despite data saturation.

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