

Quality of Life of Stroke Patients at One Year after Discharge from Inpatient Rehabilitation: A Multicenter Study

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ABSTRACT

Objective: To investigate the quality of life (QoL) and factors significantly associated with QoL of stroke patients at 1 year after discharge from post-stroke inpatient rehabilitation.

Materials and Methods: This study included patients from 9 rehabilitation centers. QoL of stroke patients was evaluated using the World Health Organization Quality of Life Instrument - Brief Version. Patient QoL scores at the 1-year follow-up were compared with those recorded at discharge from inpatient rehabilitation. Factors related to QoL at one year after discharge were identified using univariate analysis and multiple linear regression.

Results: One hundred and ninety-seven patients were recruited with a mean age of 63.3 ± 12.4 years. Of the 197 patients that were recruited, 21 (10.7%) were readmitted during the 1-year post-discharge period. Of those, there were 16 single readmissions, and 5 double readmissions. The mean QoL score at one year after discharge was significantly lower than the score at discharge. Multiple linear regression analysis revealed 5 factors as being independently associated with QoL, including having a leisure activity, modified Barthel (Activity of Daily Living, ADL) Index (mBI) at the 1-year follow-up, needing a caregiver, anxiety score, and depression score with regression coefficients of 6.42 (95% CI: 2.32, 10.51), 0.64 (95% CI: 0.07, 1.21), -7.88 (95% CI: -12.25, -3.52), -0.79 (95% CI: -1.41, -0.18), and -1.14 (95% CI: -1.71, -0.56), respectively.

Conclusion: At one year after discharge from inpatient rehabilitation, stroke patients had poorer QoL, and five factors were found to be associated with post-discharge QoL. Strategies to enhance post-discharge QoL are urgently needed.

Keywords: Quality of life; stroke patients; discharge; inpatient rehabilitation (Siriraj Med J 2021; 73: 216-223)

INTRODUCTION

Stroke is a major worldwide public health problem that often leads to chronic disability. Results from the Epidemiologic Stroke Study of Thailand that was conducted in 2011 revealed a crude prevalence of stroke among adults aged ≥ 65 years of 2.7%.¹ Stroke survivors suffer from

functional dependency, and they have adversely affected abilities in daily life, including inability to perform self-care, transfer, and ambulation.² The long-term consequences of stroke have a negative impact on the quality of life (QoL) of both stroke patients and their caregivers.³ A 2015 study from Korea reported that stroke was ranked

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as the 3rd highest cause of quality-adjusted life-year loss.⁴ Moreover, poor QoL can cause depressive symptoms in patients with chronic stroke⁵, and post-stroke depression has a negative impact on functional outcomes and the QoL of patients with stroke.⁶ Godwin, *et al.* reported a higher level of depression to be associated with a lower mental QoL among stroke survivors.⁷

Some studies reported improved QoL after stroke at durations of follow-up that varied by study. For example, van Mierlo, *et al.* conducted a multicenter prospective longitudinal cohort study specific to the course of QoL from 2 months up to 2 years after stroke.⁸ Their results revealed that QoL, participation, and life satisfaction improved during the first year after stroke, with most changes occurring during the first 6 months.⁸ In contrast, Paredes, *et al.* studied the QoL of stroke patients at 12 months and found that all indices of QoL were lower over time compared to healthy controls.⁹ Laurent, *et al.* reported the QoL of stroke survivors at the 2-year follow-up and found QoL to be significantly impaired compared to controls.¹⁰ In 2017, Kusambiza-Kiingi and colleagues conducted a study in stroke survivors at community health centers, and they found poor QoL among their study population.¹¹

The consequences after stroke attack were reported to be motor paralysis, dependency in self-care and ambulation, communication disorder, swallowing problem, and serious cognitive decline.¹²⁻¹⁴ Factors reported to be significantly related to poor QoL included age, gender, body functional impairment, comorbidities, and depressive mood.^{10,15-16} However but importantly, some of these factors can be prevented or minimized to improve QoL after stroke. Although most stroke patients achieve better functional outcomes after rehabilitation¹⁷, some patients remain unsatisfied with the lowered QoL they experience due to residual disabilities after stroke. QoL is a subjective measurement of patient well-being that should be considered in the assessment of stroke survivors. A study of the QoL of stroke survivors during admission for inpatient rehabilitation showed significant improvement in patient QoL.¹⁸⁻¹⁹ However, studies specific to QoL in Thai stroke patients after receiving inpatient rehabilitation are scarce. Accordingly, the aim of this study was to investigate the QoL and factors significantly associated with QoL of stroke patients at one year after discharge from post-stroke inpatient rehabilitation.

MATERIALS AND METHODS

This prospective multi-center study was a part of the Thai Stroke Rehabilitation Registry (TSRR), which was a 1-year follow-up project. This study was conducted

during January 2008 to June 2009. The study protocol was approved by the institutional review boards of all 9 centers that participated in this study, and the study fully complied with the principles and standards set forth in the Declaration of Helsinki and all of its subsequent amendments. Siriraj Hospital was the center that initiated this multicenter trial, and approval to conduct this study was given by the Siriraj Institutional Review Board of the Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand (Si 316/2006).

Our research assistant called stroke participants in the TSRR who had received inpatient stroke rehabilitation one year earlier and invited them to participate in this study. The same research assistant contacted and interviewed all eligible participants at each center.²⁰ Patients who were unwilling or unable to join this study were excluded, and the reasons for exclusion are presented in Fig 1. Written informed consent was obtained from all participants prior to their inclusion in the study.

Demographic and clinical data of participants at discharge and at the 1-year follow-up were recorded, including personal data, physical abilities, and psychological data. Collected data included age, gender, type of stroke (ischemic or hemorrhagic), and having complications, including musculoskeletal pain, contracture, spasticity (measured by modified Ashworth Scale; MAS ≥ 3), pressure ulcer, deep vein thrombosis (DVT), bowel-bladder incontinence, and/or infections. The proportion of patients who developed one or more complications during the year after discharge was recorded, and the rate of readmission during 1 year was assessed. Additional data that was collected included discharge location, employment status, source of income, having leisure activity, and needing a caregiver.

Physical abilities consisted of functional score, motor recovery stage, using wheelchair, walking ability, and urinary control. Patient functional score was evaluated by modified Barthel Index (mBI), which is a commonly used and widely accepted activities of daily living (ADL) assessment tool. The mBI is used to assess physical abilities, such as feeding, dressing, bathing, transferring, and ambulation (range score 0-20). A higher mBI score reflects greater independence.²¹ Brunnstrom Motor Recovery Stage (BMRS) was used to assess motor recovery stage due to its simple and practical applicability. It is categorized into 6 stages, and a higher stage of BMRS represents better recovery.²²

Psychological data consist of anxiety and depression information that was determined using the Hospital Anxiety and Depression Scale (HADS) screening tool.²³ The scores of each domain range from 0-21, and a score

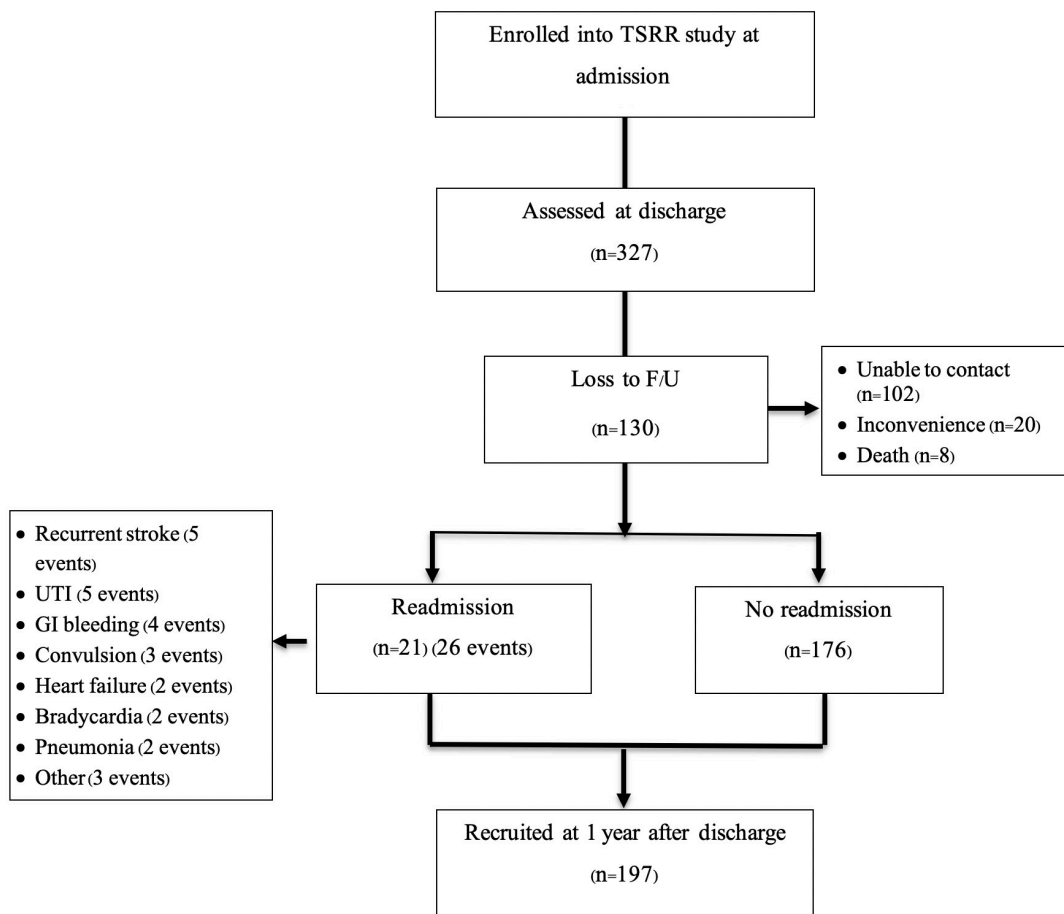


Fig 1. Flowchart of the study recruitment process

Abbreviations: TSRR, Thai Stroke Rehabilitation Registry; F/U, follow-up; UTI, urinary tract infection; GI, gastrointestinal

≥11 defines the presence of anxiety or depression. This scale was translated into Thai language and was reported to have good psychometric properties.²⁴

Patient quality of life, the main outcome of this study, was assessed using the World Health Organization Quality of Life – Brief Version (WHOQOL-BREF) questionnaire.²⁵ It comprises 4 dimensions, including physical (7 items), psychological (6 items), environment (8 items), and social (3 items). The QoL score is continuous data that ranges from 26-130, with a higher score indicating better QoL. The total QoL score was analyzed. This questionnaire has good psychometric properties, and it was translated into Thai language and validated.²⁶ At one year after discharge, enrolled study participants were interviewed to obtain the previously described information, and to be assessed using the WHOQoL-BREF, mBI, and HADS tools.

Factors, including personal factors, physical abilities, and psychosocial factors, were compared between discharge and 1 year after discharge from inpatient stroke rehabilitation to assess their impact on patient QoL.

Statistical analysis

Continuous data, including age, functional score (mBI), anxiety, depression, and QoL score, are presented as mean plus/minus standard deviation (SD). Categorical variables are presented as number and percentage (%). Paired *t*-test or McNemar's was used to analyze demographic data at discharge and at the 1-year follow up. Concerning univariate analysis, unpaired *t*-test and Pearson's correlation coefficients (*r*) were used to analyze factors related to QoL. Factors that were statistically significant ($p < 0.05$) in univariate analysis were included into multiple linear regression analysis. The results of that analysis are presented as regression coefficient (*b*), and were used to determine the effect of QoL score after adjusting for confounding factors. Data were analyzed using SPSS Statistics version 18.0 (SPSS, Inc., Chicago, IL, USA). A *p*-value < 0.05 was regarded as being statistically significant.

RESULTS

The number of patients at discharge in the TSRR project was 327. In this 1-year follow-up study, only 197

(60.25%) patients could be followed-up. Among the 197 patients recruited, 21 patients (10.7%) were readmitted. Of those, there were 16 cases of single readmission, and 5 cases of double readmission (26 events total). The reasons that patients could not be followed-up, and the causes of readmission are presented in Fig 1. The demographic and clinical characteristics of stroke patients compared between discharge and the one-year follow-up are given in Table 1. The mBI, BMRS, HADS-anxiety, and WHOQoL-BREF scores were all statistically significantly different between discharge and one year. The mBI and BMRS were both significantly improved, whereas the percentage of patients with anxiety increased and the QoL score decreased from discharge to one year. A comparison of age, gender, and type of stroke between those who could (n=197) and who could not (n=130) be followed-up is shown in Table 2.

Factors related to QoL at 1 year are shown in Table 3. Univariate analysis showed the following factors to be significantly associated with QoL: being employed, having a leisure activity, having no caregiver, having complications at follow-up, mBI at follow-up, BMRS of arm and leg, using a wheelchair, ability to walk, urinary incontinence, having anxiety, and having depression. All of those factors were then entered into multiple linear regression analysis. That analysis revealed 5 factors as being independently associated with QoL. Having a leisure activity and high mBI score at one year were associated with good QoL with regression coefficients (b) of 6.42 (95% CI: 2.32, 10.51) and 0.64 (95% CI: 0.07, 1.21). In contrast, needing a caregiver, having anxiety, and having depression were associated with poor QoL with regression coefficients (b) of -7.88 (95% CI: -12.25, -3.52), -0.79 (95% CI: -1.41, -0.18), and -1.14 (95% CI: -1.71, -0.56), respectively.

DISCUSSION

The results of this study revealed that the mean QoL score of stroke patients declined during the 1-year period after discharge from inpatient rehabilitation and this is consistent with the finding of Kusambiza-Kiingi and colleagues who conducted a similar study in the Johannesburg area of South Africa. They evaluated QoL among 108 stroke survivors at community health centers with physiotherapists on staff, and they found poor QoL among stroke patients, and positive correlation between community reintegration and QoL.¹¹ In contrast, Shyu, *et al.* performed a longitudinal study of stroke survivors in Taiwan and evaluated QoL at 1, 3, 6, and 12 months after discharge. They found that even though the QoL of stroke patients improved from 1 to 12 months after

discharge, the QoL scores were considerably lower than in normal populations, especially relative to activities and participation.²⁷

One of the main reasons why the QoL of stroke patients in our study declined over the 1-year post-discharge period may be that more than three-fourths (76.8%) of patients in the TSRR had developed at least one complication during that period, and nearly 60% of patients with complications at discharge still had the same complications one year later.²⁸ It is, therefore, clear that strategies need to be developed and implemented that will improve and maintain the QoL of stroke patients after discharge from inpatient rehabilitation. An example strategy may be to educate patients and their families/caregivers in how to prevent complications after discharge.

Concerning factors related to improving the QoL of stroke patients, the present study found high mBI score at the 1-year follow-up, low anxiety score, low depression score, having leisure activity, and no need for caregiver all to be independently associated with QoL. Heikinheimo and Chimbay reported age, gender, and functional recovery to be factors associated with QoL.¹⁵ Mutai, *et al.* found younger age and better function related to better QoL, and depression related to poorer QoL.¹⁶ Laurent, *et al.* found life satisfaction and QoL of stroke patients to be significantly impaired in all life domains.¹⁰ Patient QoL was strongly correlated with functional independence, persistence of hemiplegia, and depressed mood.¹⁰ Similar to the findings of our study, functional recovery was reported by many studies to be associated with QoL.^{10,15-16} Even though higher mBI score was one of positive factors associated with QoL, its effect was not large (b=0.63). This might be due to the fact that the change in mBI score between discharge and 1 year was 2.4 ± 3.9 .²⁰ The mBI score at the 1-year follow-up was greater than the mBI at discharge (mean mBI at 1 year and at discharge were 16.04 ± 4.30 and 13.66 ± 4.34 , respectively).

Two previous studies reported greater anxiety and depression scores to be the most important factors related to QoL.²⁹⁻³⁰ Anxiety and depression may be a barrier to the rehabilitation process and patient outcomes, and may predict poorer post-rehabilitation QoL of stroke patients. Previous study reported that QoL can be improved over the long-term if physicians can detect and adequately treat anxiety and depression.³¹ Concerning anxiety, Tang and colleagues measured anxiety using HADS to evaluate its effect on stroke patients, and they found anxiety to be significantly associated with QoL ($r = -0.154$).³¹ Our study also found that anxiety could affect QoL in stroke patients, but not by much (b=-0.79). In contrast,

TABLE 1. Demographic and clinical characteristics of stroke patients at discharge and at one year after discharge (N=197).

Characteristics	At discharge	1-year after discharge	p-value [#]
Age (years), mean±SD	62.3±12.4	63.3±12.4	-
Gender: Male, n (%)	113 (57.4%)	113 (57.4%)	-
Type of stroke: Ischemic, n (%)	143 (72.6%)	143 (72.6%)	-
Complications (n=186), n (%)	134 (72.0%)	123 (66.1%)	0.222
mBI (n=180), mean±SD	13.7±4.3	16.0±4.3	<0.001
BMRS arm (n=177), n (%)			<0.001
Stage I-III	104 (58.8%)	81 (45.8%)	
Stage IV-VI	73 (41.2%)	96 (54.2%)	
BMRS leg (n=177), n (%)			0.001
Stage I-III	78 (44.1%)	57 (32.2%)	
Stage IV-VI	99 (55.9%)	120 (67.8%)	
Anxiety ≥11 (n=167), n (%)	8 (4.8%)	20 (12.0%)	0.023
Depression ≥11 (n=167), n (%)	25 (15.0%)	36 (21.6%)	0.135
WHOQoL-BREF score, mean±SD	85.2±11.5	81.1±14.5	0.001
LOS (days), mean±SD	25.8±15.2	-	-

A p-value<0.05 indicates statistical significance

[#]Paired t-test for continuous data, and McNemar's test for categorical data

Abbreviations: SD, standard deviation; mBI, modified Barthel Index; BMRS, Brunnstrom Motor Recovery Stage; WHOQoL-BREF, World Health Organization Quality of Life Instrument - Brief Version; LOS, length of stay

TABLE 2. Patient characteristics compared between those loss to follow-up and those included at one year after discharge.

Characteristics	Loss to FU (n=130)	One year after discharge (n=197)	p [#]
Age (years), (mean±SD)	63.2±11.7	63.3±12.4	0.975
Gender: Male, n (%)	80 (61.5%)	113 (57.4%)	0.491
Type of stroke: Ischemic, n (%)	91 (70.0%)	143 (72.6%)	0.619

A p-value<0.05 indicates statistical significance

[#] Unpaired t-test for continuous data, and chi-square test for categorical data

Abbreviations: FU, follow-up; SD, standard deviation

TABLE 3. Univariate and multivariate analysis to identify factors significantly associated with improvement in the quality of life of stroke patients at one year after discharge.

	Univariable analysis [#]		Multiple linear regression			
	Mean±SD of QoL	p	b	95% CI of b	SE (b)	p
Age (years)	r=0.116	0.115				
Gender		0.262				
Male (n=113)	80.1±15.7					
Female (n=84)	82.5±12.9					
Discharge location		0.071				
Nursing home	73.8±19.0					
Home	81.6±14.2					
Employment		<0.001				
No	79.5±14.4					
Yes	90.3±12.6		2.02	(-2.96, 7.00)	2.52	0.425
Source of income		0.054				
Themselves/spouse	83.6±15.6					
Others	79.4±13.6					
Having leisure activity		0.004				
No	74.3±15.0					
Yes	82.5±14.2		6.42	(2.32, 10.51)	2.07	0.002
Need caregiver		<0.001				
No	93.8±9.9					
Yes	77.9±13.8		-7.88	(-12.25, -3.52)	2.21	0.001
Complications		<0.001				
No	87.7±13.4					
Yes	78.4±13.9		-2.10	(-5.69, 1.50)	1.82	0.273
Readmission		0.169				
No (n=176)	81.6±14.5					
Yes (n=21)	76.7±15.1					
mBI	r=0.466	<0.001	0.64	(0.07, 1.21)	0.29	0.027
BMRS arm		<0.001				
Stage IV, V, VI	85.1±14.2					
Stage I, II, III	77.1±13.6		-1.34	(-5.61, 2.93)	2.16	0.535
BMRS leg		<0.001				
Stage IV, V, VI	84.4±13.9					
Stage I, II, III	75.3±13.8		-0.49	(-5.29, 4.30)	2.43	0.839
Using wheelchair		0.001				
No	77.4±14.2					
Yes	84.5±13.9		-1.64	(-5.54, 2.26)	1.98	0.407
Walking ability		<0.001				
Unable	71.7±14.2					
Able	83.3±13.8		1.74	(-3.65, 7.14)	2.73	0.524
Urinary incontinence		<0.001				
No	83.1±14.3					
Yes	72.2±11.6		-0.92	(-5.66, 3.83)	2.40	0.703
Anxiety	r=-0.575	<0.001	-0.79	(-1.41, -0.18)	0.31	0.012
Depression	r=-0.661	<0.001	-1.14	(-1.71, -0.56)	0.29	<0.001

A *p*-value<0.05 indicates statistical significance

[#] Unpaired *t*-test and Pearson's correlation coefficients (r)

Abbreviations: SD, standard deviation; QoL, quality of life; CI, confidence interval; b, regression coefficient; SE, standard error; mBI, modified Barthel Index; BMRS, Brunnstrom Motor Recovery Stage

Morris, *et al.* reported that anxiety appears to be more important than depression in predicting poor QoL at 6 months after stroke.³²

Many studies reported the impact of depression on the QoL of stroke patients.^{10,16,33-34} QoL in stroke patients with depression was more severely impaired than in non-depressed stroke patients.³³ Depression after stroke has a negative impact on outcomes, including self-care functions and QoL after stroke.^{6,33-34} Since depression is a common consequence after stroke, medical personnel should maintain a high level of vigilance to early detect these conditions by using simple screening tools, such as HADS or Patient Health Questionnaire-9 (PHQ-9).

Leisure activities are important for stroke patients because they promote happiness and relaxation, and these effects help to promote healing for both the mind and the body. Our study found having a leisure activity to be a factor that positively influences patient QoL. Our research group found that creative art therapy consisting of art and music therapy enhanced inpatient rehabilitation among 118 inpatient stroke patients. More specifically, we found that creative art therapy twice a week for four weeks (8 sessions) combined with conventional physical therapy (20 sessions) could significantly decrease depression, improve physical functions, and increase QoL compared to physical therapy alone.³⁵

Another factor independently related to QoL of stroke survivors was not having a need for a caregiver. This may indirectly imply that those participants had better functions, which meant that they did not need a caregiver. A study conducted in Mongolia reported being single to be a factor associated to low QoL.³⁶ The situation in Eastern countries is not like in Western countries. Being discharged to home to live with their family as opposed to a nursing home or other type of care facility, is common among Thai stroke patients.

This study had some limitations. First, the relatively small sample size may have limited our ability to identify all statistically significant relationships and differences. Second, all facilities from which the patients for this study were recruited were defined as tertiary care centers, so our study population may not be representative of general stroke patient population. Third, there are many tools available for assessing QoL, including the Stroke Impact Scale, the Stroke Specific Quality of Life scale, the Burden of Stroke Scale, and the WHOQOL-BREF questionnaire - all of which are specific health-related QoL instruments that were developed during the last decade³⁷; therefore, direct comparison of QoL between our study and previously published studies could not be performed. Fourth and last, only 60% of subjects from

the TSRR project could be followed-up for a full 12 months after discharge. This high loss to follow-up rate was influenced by factors that may include difficulty in contacting the patient, transportation-related problems, inconvenience to be or disinterest in being followed-up at the evaluating hospital, and failure to remember to attend. It should be noted that nearly 40% of our patients reside in a rural area, which would have made travel to the evaluating center more difficult and inconvenient. Future studies should include this limitation into the study design and consider physician visits to increase the follow-up rate, which will strengthen the integrity of the study findings.

CONCLUSION

The QoL of patients with stroke in the Thai Stroke Rehabilitation Registry declined at 1 year after discharge from inpatient rehabilitation. Factors strongly associated with better QoL were having leisure activities and having a high modified Barthel Index score at discharge. The factors strongly associated with decreased QoL were needing a caregiver, having anxiety, and having depression. Strategies to improve the post-inpatient rehabilitation QoL of stroke patients need to be urgently developed and implemented.

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Conflict of Interest Declaration:

All authors declare no personal or professional conflicts of interest relating to any aspect of this study.

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