Functional Status and Its Related Factors Among Stroke Survivors in Rehabilitation Departments of Hospitals in Shenzhen, China

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Research Article

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Abstract

Background: Many stroke survivors have multiple chronic diseases and complications, coupled with various other factors which may affect their functional status. We aimed to investigate the factors associated with poor functional status in hospitalized patients with stroke in Shenzhen, China.

Methods: This is a cross-sectional study. Data on 646 patients with stroke were recruited from four urban hospitals using cluster sampling. The Longshi Scale was used to assess the functional status of stroke survivors. Explanatory variables, i.e. factors affecting functional status, included demographic, lifestyle factors, complications, and chronic conditions. The ordinal logistic regression model was used to investigate factors associated with poor functional status.

Results: Stroke survivors with poor functional status accounted for 72.14% and were assessed as the bedridden group based on the Longshi scale, 21.67% of patients with moderate functional limitation were assessed as the domestic group and 6.19% of the patients with mild functional restriction was assessed as the community group. The highest dependence was noted for feeding (73.39%), bowel and bladder management (69.74%), and bedtime entertainment (69.53%) among the bedridden group, and housework (74.29%) among the domestic group. In the adjusted model, patients who were in older age groups (odds ratio [OR] = 2.39, 95% CI: 1.55–3.80), female (OR = 1.73, 95% CI: 1.08–2.77), duration of stroke more than 12 months (OR = 1.94, 95% CI: 1.28–2.95), with pulmonary infection (OR = 10.91, 95% CI: 5.81–20.50), and with deep venous thrombosis (OR = 3.00, 95% CI: 1.28–7.04) had almost or more than two times the risk of poorer functioning.

Conclusions: Our study found that 72.14% of stroke survivors had poor functional status, 21.67% and 6.19% of stroke survivors had moderate functional limitations and mild functional restrictions in rehabilitation settings. The older age bracket (age ≥ 60) and females were more likely to exhibit poor functioning. Pulmonary infection and deep venous thrombosis, both common post-stroke complications, were related to the increased chance of dependence. Therefore, interventions aimed at treating or preventing pulmonary infection and deep vein thrombosis need to contribute to addressing these circumstances and subsequent dysfunction after stroke.

Background

Over the past century, stroke had a dramatic increase and became the third leading cause of disability worldwide [1]. About 37 - 45% of stroke survivors have functional disabilities [2, 3]. More stroke survivors will be coping with functional disability and be dependent on others for one or more activities of daily living (ADLs) [1]. There is an urgent need to address the disability problems and change of functional status caused by stroke [1, 4, 5]. Limitations in ADLs stand for poor functional status and increased need for social support.

Most studies use the Modified Rankin Scale (mRS) to distinguish the patients' functional outcome, which helps to distinguish a wide range of disability categories, but mRS does not measure ADL-related

functions and is insensitive to subtle differences in functional status between patients [6]. The Longshi scale (LS) is a visual-based scale that assesses abilities based on activity range and dependency and is used in China [7–9]. The participants/their family members/their caregivers report the real functional status and ADL manifestations of the patients with stroke, including people with cognitive impairment (National Standard of the People's Republic of China, No. GB/T 37103–2018) [10]. With the Barthel index as a reference, LS can better identify the disability of stroke survivors than mRS [10].

With the increasing prevalence and burden of multiple chronic conditions (MCC) in stroke survivors, MCC has a modest association with post-stroke functional outcome and contributes considerably to functional impairment [11–15]. As far as we know, In the Asia Pacific region, only one study in Singapore confirmed the relationship between MCC and post-stroke readmission [16], and a previous study of our team also found that the more MCC, the worse ADL ability of elderly stroke survivors, but it did not show the situation in young stroke survivors [13]. Therefore, due to the differences in individuals' characteristics, this study focuses on hospitalized stroke survivors in China's medical system settings.

The presence of chronic disease and demographic factors such as age, sex, complications, and lifestyle behaviors (e.g., smoking or use of alcohol) play an important role in the development of functional outcomes of patients with stroke [1, 11, 17–19]. Pulmonary infection, deep vein thrombosis (DVT), urinary tract infection are the common complications after stroke [1]. Different studies have shown that the infection rate after stroke ranges from 5% - 65%, pulmonary infection is 1% - 33%, and urinary tract infection is 2% - 27% [20, 21]. Moreover, these complications influence each other and are risk factors for each other. Pulmonary infection is an independent risk factor associated with DVT in hospitalized patients with stroke [17]. Even though functional outcome studies among stroke survivors, in general, have shown that the most powerful predictor of functional recovery is the initial severity of the stroke [22, 23], but few studies detailed the clinical characteristics of hospitalized patients with stroke [23], especially in rehabilitation departments of urban hospitals in China.

It is important to note that a full understanding of the situation of stroke survivors is essential for planning current and future needs for healthcare resources and for identifying appropriate treatment strategies [23]. Hence, the knowledge of the factors related to poor functional status may help physicians to identify these factors and intervene as soon as possible, and it will help to highlight the demographic characteristics, lifestyle factors, complications, MCC, etc. of stroke survivors among rehabilitation departments of urban hospital settings in Shenzhen, China.

Materials And Methods

Study design and setting

The cross-sectional survey was conducted in the rehabilitation medicine departments of four hospitals in four districts of Shenzhen, China. These hospitals were selected through convenient sampling. Initially, the purpose of this study was to investigate the care needs of inpatients in rehabilitation hospitals. The

study protocol was registered in China Clinical Trial Registration Center (ChiCTR -2000034067) and approved by the ethics committee of Shenzhen Second People's hospital.

Study participants

A total of 1019 hospitalized patients were screened, and 646 stroke survivors were recruited using cluster sampling between August 4 and August 22, 2021 (Fig.1). Stroke was diagnosed according to the 10th edition of the International Classification of Diseases (ICD-10) [24], and all patients in the selected hospitals who were diagnosed with stroke and older than 18 years old were included. The type of stroke is based on the first diagnosis from the patients' medical history. Subarachnoid hemorrhage was not included. Before the recruitment, the investigator would explain the study contents in detail and obtain the informed consent of each subject or their family.

Study variables

Dependent variable

The ADL measured by the LS scale is used to define the functional status as the dependent variable [9]. LS scale assesses participants' independence or dependence on two questions and nine activities: bowel and bladder control, feeding, entertainment, toileting, grooming, housework, community mobility, shopping, and social participation (Fig. 2) [7].

According to the LS, the activity levels were divided into three groups (bedridden, domestic, and community groups) depending on the activity range of the participants (Fig. 3) [10]. To determine the activity range of the participants, the participants/their family members/caregivers were asked "Can you/he/she get off the bed independently? And can you/he/she go outdoor independently?", with only two options available for the answer, "yes or no" [8]. The bedridden group represents those who cannot get off the bed independently. The subjects assessed as the domestic group can get off the bed independently but cannot go outdoor independently. The subjects in the community group can go outdoor independently [8]. In previous studies, we have proved that the LS was reliable and valid for disability assessment [9]. Notably, the LS indicates the level of the functional status of participants. The community group was considered to have a mild functional limitation, the domestic group indicates moderate functional limitation, and the bedridden group has poor functional status (having a severe problem performing everyday tasks).

Independent variables

In this study, we collected patients' age, sex, body mass index (BMI), smoking, alcohol consumption, and disease information of complications and multiple chronic conditions as the independent variables. Demographic data were obtained by online questionnaires from participants and their families. Questions about smoking and drinking were assessed as dichotomous (yes/no) responses. Our study considered nine common chronic diseases: (1) hypertension, (2) cardiovascular disease, (3) diabetes, (4) hyperlipidemia, (5) hyperuricemia, (6) chronic obstructive pulmonary diseases, (7) chronic renal

insufficiency, (8) abnormal liver function, (9) chronic bronchitis, and three common complications: (1) pulmonary infection, (2) urinary system infection, (3) DVT. The assessment of stroke survivors was done by asking participants whether a health professional told them that they have this condition, and there are only two options (yes/no); a method widely used to assess MCC [25]. In addition, the history of any chronic disease or the use of related drugs or other treatment is also recorded as "yes". Ultimately, we defined the chronic disease by using self-reports, medical history, and a combination of these two assessments. The sum of MCC and complications were classified as categories: 0, 1, and ≥ 2 .

Data collection

All data were collected through face-to-face interviews by uniformly trained therapists and nurses. The data is recorded through electronic questionnaires and stored on the website (<https://www.mikecrm.com>). Without permission, deletion, modification, and sharing of data are prohibited. During the data collection process, the database is supervised by the data administrator. Once unreasonable data records are found, the data administrator will check with the assessor and correct the error based on the actual situation.

Statistical analysis

All analyses were performed using SPSS 23.0 (IBM SPSS statistical software, Windows version, version 23.0. Armonk, NY: IBM Corporation). The number and the frequency (%) distribution of functional state independent variables was reported, and the frequency difference between different functional status groups was tested by the chi-square test. The ordinal logistic regression model was used to carry out the multivariate analysis, including the patients' age, sex, body mass index (BMI), smoking, alcohol consumption, complications, and multiple chronic conditions as covariates. Firstly, simple linear regression is used to detect whether there is multicollinearity between independent variables. If the tolerance is less than 0.1 or the variance expansion factor (VIF) is greater than 10, it indicates that there is collinearity. Secondly, ordinal logistic regression models were used to explore the factors associated with patients' poor functional status, who were assessed as the bedridden group based on the LS scale. Adjusted odds ratio (OR) and 95% confidence intervals (95% CI) of the variables in the final model were reported. A P-value < 0.05 for two-tailed was considered statistically significant.

Results

Demographic, lifestyle characteristics, complications, and multiple chronic diseases of stroke survivors

The average age of the stroke inpatients was 64.38 years (bedridden group: 66.90 ± 15.28 ; domestic group: 60.93 ± 15.34 ; community group: 47.05 ± 13.96) (Table 1). The ratio of males to females was approximately 2:1. The majority of the participants had hypertension (74.3%), and the rates of other variables were: cardiovascular disease (18.1%), diabetes (29.5%), hyperlipidaemia (9.3%), hyperuricemia (3.6%), chronic obstructive pulmonary disease (2.2%), chronic renal insufficiency (7.1%), abnormal liver function (4.2%), chronic bronchitis (2.9%), smoking (8.0%), alcohol use (6.1%), pulmonary infection

(35.3%), urinary system infection (9.2%), and DVT (9.8%) (Table 1). Furthermore, more than half (55.6%) had two or more chronic comorbidities (Table 1).

Table 1

Demographic, lifestyle, MCC and complications in different functional status (N=646)

Characteristics	Total		Functional status						χ ²	P-value
	n	%	bedridden group		domestic group		Community group			
			n	%	n	%	n	%		
Type of stroke									5.77	0.056
Ischemic	321	49.69	219	68.22	82	25.55	20	6.23		
Hemorrhagic	325	50.31	247	76.00	58	17.85	20	6.15		
Sex									12.09	0.002
Male	443	68.58	308	69.53	98	22.12	37	8.35		
Femle	203	31.42	158	77.83	42	20.69	3	1.48		
Age (year)									38.42	<0.001
≤60	258	39.94	156	60.47	71	27.52	31	12.02		
≥60	388	60.10	310	79.90	69	17.78	9	2.32		
Duration (month)										
≤12	216	33.43	142	65.74	56	25.93	18	8.33	6.95	0.031
≥12	430	66.56	324	75.35	84	19.53	22	5.12		
BMI (kg/m ²)									21.94	0.005
≤18.4	65	10.42	55	84.62	9	13.85	1	1.54		
18.5-23.9	395	63.30	294	74.43	78	19.75	23	5.82		
24-27.9	143	22.92	88	61.54	44	30.77	11	7.69		
≥28	21	3.36	10	47.62	8	38.01	3	14.29		
Smoking									0.86	0.650
Yes	50	7.99	39	78.00	9	18.00	2	4.00		
No	576	92.01	415	72.05	127	22.05	34	5.90		
Alcohol consumption									4.66	0.097
Yes	38	6.06	33	86.84	3	7.89	2	5.26		
No	589	93.94	422	71.65	132	22.41	35	5.94		
Hypertension									3.04	0.219

Yes	480	74.30	339	70.63	112	23.33	29	6.04	
No	166	25.70	127	76.51	28	16.87	11	6.63	
Cardiovascular disease									1.94 0.379
Yes	117	18.11	86	73.50	27	23.08	4	3.42	
No	529	81.89	380	71.83	113	21.36	36	6.81	
Diabetes									4.30 0.116
Yes	190	29.46	142	74.74	42	22.11	6	3.16	
No	455	70.54	323	70.99	98	21.54	34	7.47	
Hyperlipemia									1.05 0.593
Yes	60	9.29	41	68.33	16	26.67	3	5.00	
No	586	90.71	425	72.53	124	21.16	37	6.31	
Hyperuricemia									1.97 0.374
Yes	23	3.56	15	65.22	5	21.74	3	13.04	
No	623	96.44	451	72.39	135	21.67	37	5.94	
Chronic obstructive pulmonary disease									2.99 0.224
Yes	14	2.17	11	78.57	1	7.14	2	14.29	
No	632	97.83	455	71.99	139	21.99	38	6.01	
Chronic renal insufficiency									0.54 0.765
Yes	46	7.12	35	76.09	8	17.39	3	6.52	
No	600	92.88	431	71.83	132	22.00	37	6.17	
Abnormal liver function									3.38 0.185
Yes	27	4.18	23	85.19	2	7.41	2	7.41	
No	619	95.82	443	71.57	138	22.29	38	6.14	
Chronic bronchitis									3.15 0.207
Yes	19	2.94	17	89.50	2	10.50	0	0.00	
No	627	97.06	449	71.60	138	22.00	40	6.40	

Multiple chronic conditions									8.00	0.104
0	72	11.10	55	76.39	11	15.28	6	8.33		
1	215	33.30	142	66.05	57	26.51	16	7.44		
≥2	359	55.60	269	74.93	72	20.06	18	5.01		
Pulmonary infection									79.67	0.001
Yes	228	35.29	213	93.42	13	5.70	2	0.88		
No	418	64.71	253	60.53	127	30.38	38	9.09		
Urinary system infection									6.94	0.139
Yes	59	9.20	51	86.21	7	12.07	1	1.72		
No	587	90.87	415	70.70	133	22.66	39	6.64		
Deep venous thrombosis									8.21	0.017
Yes	63	9.75	55	87.30	7	11.11	1	1.59		
No	583	90.25	411	70.50	133	22.81	39	6.69		
Complications									65.20	0.001
0	319	49.40	186	58.31	102	31.97	31	9.72		
1	236	36.50	194	82.20	34	14.41	8	3.39		
≥2	91	14.10	86	94.51	4	4.40	1	1.10		
Significant p-values are bolded.										

Functional status

The overall prevalence of the bedridden group was 72.14%, the prevalence of the domestic group was 21.67%, and that of the community group was 6.19% (Table 1). Table 2 reports responses of stroke survivors to each item of the LS scale regarding functional status. In the bedridden group, participants reported inability to eat most frequently (73.39%), followed by bowel and bladder management (69.74%) and bedtime entertainment (69.53%), and 74.29% of the domestic group participants had a severe problem performing housework (Table 2).

Table 2
Stroke survivor's responses to each item on the LS scale of functional status

LS group (n,%)	Item	1point		2 points		3 points	
		n	%	n	%	n	%
bedridden group (466, 72.14%)	Bowel and bladder management	325	69.74	95	20.39	46	9.87
	Feeding	342	73.39	94	20.17	30	6.44
	Bed-time entertainment	324	69.53	127	27.25	15	3.22
domestic group (140, 21.67%)	Toileting	18	12.86	86	61.43	36	25.71
	Bathing	68	48.57	54	38.57	18	12.86
	housework	104	74.29	34	24.29	2	1.43
Community group (40, 6.19%)	Community mobility	5	12.50	11	27.50	24	60.00
	Shopping	3	7.50	17	42.50	20	50.00
	Social interaction	1	2.50	13	32.50	26	65.00

Independent variables related to poor functional status

The complete model includes all variables listed in Table 1, except for the sum of MCC and complications. Therefore, the model is adjusted for all the variables in Table 3. The VIF of the variables included in the model is less than 3.0. In the final model, gender, age, duration of the stroke, pulmonary infection, and DVT were significantly correlated with poor functional status (Table 3). The risk of poor function (OR = 2.43, 95% CI: 1.56 – 3.80) in the elderly group (≥ 60 years old) was more than twice that in the young group (< 60 years old). Those with a disease duration of more than 12 months had close to twice-odd risks of poor functional status (OR = 1.72, 95% CI: 0.97–3.07) than those disease duration within 12 months. The risk was also close to or greater than double among females than males (OR = 1.73, 95% CI: 1.08–2.77), and among those with pulmonary infection (OR = 11.58, 95% CI: 6.02–22.27) and DVT (OR = 3.05, 95% CI: 1.24–7.53).

Table 3
Association factors with poor functional status

Characteristics	Adjusted odds ratio ^a	95% Confidence Interval		P
		Lower	Upper	
Sex				
Male	Ref			
Female	1.73	1.08	2.77	0.022
Age(year)				
<60	Ref			
≥60	2.39	1.55	3.69	<0.001
Duration of stroke(month)				
<12	Ref			
≥12	1.94	1.28	2.95	0.002
Alcohol consumption				
No	Ref			
Yes	3.03	0.92	10.01	0.068
Pulmonary infection				
No	Ref			
Yes	10.91	5.81	20.50	<0.001
Deep venous thrombosis				
No	Ref			
Yes	3.00	1.28	7.04	0.012
^a Adjusted for all the factors which show in Table 1; Significant p-values are bolded.				

Discussion

This study aimed to assess the correlates of functional status based on the LS scale among patients with stroke in hospital settings in Shenzhen, China. We found that 74.12% of stroke survivors assessed as the bedridden group had poor functional status, 21.67% of patients assessed as the domestic group had moderate functional limitation and 6.19% of the patients had mild functional restriction and was assessed as the community group. This study built on observational research that showed that older age,

sex, duration of a stroke, pulmonary infection, and DVT were associated with poor functional status among inpatients with stroke.

In the present study, compared with individuals aged < 60 years, the poor functional status of stroke survivors was 2.43 times higher among individuals aged ≥ 60 years. This is similar to studies about stroke functional outcomes, which have shown that stroke risk and poor outcomes were significantly associated with age [26–28]. Once stroke occurs, the regenerative potential decreases, and the inflammatory responses to this disease increase in the elderly [29, 30]. We also noted that 75.3% of patients with a duration of more than one year had poor functional status, while 65.7% of stroke survivors with a duration of less than one year had poor functional status. It seems that the functional status of patients with a course of more than one year was worse than those with a duration of less than one year among hospitalized stroke survivors (Table 1 and Table 3). Not surprisingly, stroke survivors with good functional status were discharged after a year, while patients with poor functional status who needed continuous medical treatment were transferred to different rehabilitation hospitals in Shenzhen, China.

We observed that females were more likely to have a severe stroke, and were more likely to be assessed as the bedridden group, than males. The female group had more than double the odds of poor functioning (Table 3). This is similar to several previous studies, which show that women have higher 1-month case fatality and lower 1-year survival after stroke [31–33]. In this study, the age was older in women (Supplementary Table 1), and the previous studies found that more severe strokes, less aspirin administration, and likely lower quality of care were attributed to contributing to the situation among female stroke survivors [34]. Another possible explanation is the physiological differences between females and males, such as hormonal influences (especially as prethrombotic and autoimmune diseases are more common in women). Some risk factors, such as atrial fibrillation and hypertension, are more common in women [35, 36]. This result indicated that a sex difference in functional status exists among stroke survivors.

Previous studies also showed that alcohol use was a complicated epidemiological risk factor of stroke [37]. Some studies have shown different results, that is, low-dose alcohol consumption may have a protective effect on stroke [27]. Even in the final ordinal logistic model, the alcohol consumption was not included as a risk factor (Table 3), but the patients with stroke who were consuming alcohol had poorer functional status than those without alcohol use, and the proportion (86.84%) of stroke survivors with poor functional status among those who have alcohol consumption was higher than those (71.65%) without alcohol use (Table 1). The results informed us that methods of lifestyle change (e.g. reducing alcohol consumption) may be prioritized to reduce the higher ADL dependence among stroke survivors.

Being underweight is associated with the highest risk of poor functional status after stroke. In the univariate analysis, The proportion of patients with poor functional status in the underweight group was 84.62%, which was much higher than 61.54% in the overweight group and 47.62% in the obese group (Table 1), and the results are similar to previous reports [38–39]. This may be because people with normal BMI or obesity have better nutritional status and good nutrition after vascular events, which can

significantly facilitate and accelerate the recovery process [40]. This is why the incidence of lung infections is also higher in stroke survivors with nutritional deficiencies [34], while a higher BMI is shown to significantly reduce the risk for pulmonary infection. This is a reminder that lung infections can be prevented by maintaining a normal BMI with nutritional support. In the ordinal logistic analysis model, BMI is not a risk factor, which may be related to the small number of obese patients (21 people) in our study.

Previous studies have found that post-stroke infections can worsen stroke prognosis [41–43]. Pulmonary infection is considered the most common infection after stroke and was associated with a relative risk of mortality 3.0 [44]. In this study, the pooled overall infection rate of pulmonary infection was 35.3% and urinary tract infections occurred in 9.2% of patients. Pulmonary infection is associated with poor functional status with an OR of 10.91, similar to a previous study that included patients with a higher stroke severity who had higher infection rates, especially for the pulmonary infection [21]. That is because infections could lead to immobilization, general frailty, and a delay in rehabilitation, which in turn affect the outcome of stroke survivors [20, 45]. This, in turn, leads to other complications, such as DVT. In this study, patients with thrombosis had poorer functional status than those without thrombosis. However, since this study was a cross-sectional study, it was impossible to determine the causal relationship between these risk factors and poor functional status, and only the correlation between these factors and poor functional status could be found.

Unlike in other studies, MCC was not a risk factor for poor functional status in the logistic analysis in the present study. A potential explanation is that almost 90% of the patients were with more than one MCC (Table 1), and the proportion of patients without MCC was too low, which influenced the results. Previous studies have shown that stroke survivors with MCC have weak physical and/or cognitive abilities, worse hemodynamics, and collaterals after arterial occlusion, which hinder functional recovery after stroke [46], and MCC affects post-stroke neuropsychological adaptation [46–49].

The strength of this study is that it considers the factors and environmental conditions related to hospitalized stroke survivors, as well as their relationship with the patient's functional status. This can enable physicians to perform early management to improve the functional status of stroke survivors, such as paying more attention to pulmonary infection and reducing the incidence rate of DVT among inpatients with stroke in the rehabilitation setting.

Our study has several limitations. As mentioned previously, this study could not determine causal relationships due to the cross-sectional design. Additionally, first, the researched population was recruited from four hospitals in Shenzhen, China, meaning that the findings may not be representative of other areas and may not be generalizable to other settings. Second, due to the hospital settings, the percentage of the bedridden group was the largest. This may have affected the statistical ability for relevant data comparison. Third, due to the retrospective and cross-sectional design, the stroke levels according to the NIH Stroke Scale were not available for analysis, which may have affected the functional status of patients with stroke.

In summary, our study found that 72.14% of inpatients with stroke had poor functional status (diagnosed as the bedridden group based on the LS scale), 21.67% of inpatients with stroke had moderate functional limitations (assessed as the domestic group) and 6.19% had mild functional limitation in rehabilitation settings in Shenzhen, China. The older age bracket and females are more likely to show poor functional status. Pulmonary infection and DVT, both common post-stroke complications, lower BMI, and alcohol consumption were associated with increased probability of dependence. Therefore, the elderly should pay more attention to maintaining a healthy lifestyle (e.g. quitting alcohol) before stroke occurs. Once a stroke occurs, attention should be paid to maintaining nutrition and a normal BMI, and interventions may be applied for patients with stroke to prevent lung infections and DVT to address subsequent functional disability after stroke.

Conclusion

Most patients (72.14%) showed poor functional status, 21.67% had moderate functional limitation and 6.19% had a mild functional limitation, and stroke survivors with older age, female, course of disease longer than 12 months, alcohol consumption, pulmonary infection and deep vein thrombosis had almost or more than twice the risk of poorer functioning in our study.

Abbreviations

MCC Multiple Chronic Condition;

ADL Activities of Daily Living;

OR Odds Ratio;

CI Confidence Interval.

Declarations

Acknowledgments

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Authors' contributions

ZJ, ZMC, and WYL contributed to the conception and design of the work; LJH, YQQ, ZZY contributed to the data acquisition; ZJ contributed the analysis and interpretation of data; drafting the work, LF, LJJ, ZFB, and CML contributed to revising the work for important intellectual content. All authors approved of the final version to be published, and agree to be countable for all aspects of the work.

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Availability of data and materials

All the summarized and analyzed data during this study are included in this published article; the original data in this study are available from the corresponding author upon reasonable request.

Ethics approval and consent to participate

This study protocol was approved by the Medical Ethics Committees of Shenzhen Second People's Hospital. The study was registered in the Chinese Clinical Trial Registry on June 22, 2020 (No.: ChiCTR2000034067 <http://www.chictr.org.cn/showproj.aspx?proj=54770>). All inpatients or their proxies were invited to participate in this study after obtaining informed consent before collecting their information. All authors confirmed that all methods were carried out following the research protocol approved by the ethics committee.

Consent for publication

All inpatients or their proxies' consent to publish this study.

Competing interests

The authors declare that they have no competing interests.

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Figures

Figure 1

Flow diagram of selection of study subjects.

龙氏日常生活能力评定量表

LONGSHI ASSESSMENT SCALE OF ACTIVITIES OF DAILY LIFE

姓名 Name 性别 Gender 年龄 Age 电话 Telephone Number 诊断 Diagnosis

评定流程 Evaluation Flow

表1 Form 1

人群 (Group)	评定内容 (Evaluation Contents)						得分 Score	
 床上人 Bedridden Group 评分细则 Assessment Rules	大小便控制 (Toileting and Bladder/Bowel Control)	 1分 1 Points	 2分 2 Points	 3分 3 Points				
		进食 (Feeding)	 1分 1 Points	 2分 2 Points	 3分 3 Points			
			娱乐 (Entertainment)	 1分 1 Points	 2分 2 Points	 3分 3 Points		
		评定结果 Assessment Results 床上人 Bedridden Group 3-4分 3-4 Points 生活完全不能自理 Complete Dependence 5-9分 5-9 Points 生活基本不能自理 Severe Dependence 总分 Total						
		评定者 (Evaluator) :						评定日期 (Date) :

表2 Form 2

人群 (Group)	评定内容 (Evaluation Contents)						得分 Score	
 家庭人 Domestic Group 评分细则 Assessment Rules	如厕 (Toileting)	 1分 1 Points	 2分 2 Points	 3分 3 Points				
		个人卫生 (Personal Hygiene)	 1分 1 Points	 2分 2 Points	 3分 3 Points			
			家务 (Housework)	 1分 1 Points	 2分 2 Points	 3分 3 Points		
		评定结果 Assessment Results 家庭人 Domestic Group 3-4分 3-4 Points 生活小部分自理 Part Independence 5-9分 5-9 Points 生活大部分自理 Part Dependence 总分 Total						
		评定者 (Evaluator) :						评定日期 (Date) :

表3 Form 3

人群 (Group)	评定内容 (Evaluation Contents)						得分 Score	
 社会人 Community Group 评分细则 Assessment Rules	小区锻炼 (Community Activity)	 1分 1 Points	 2分 2 Points	 3分 3 Points				
		购物 (Shopping)	 1分 1 Points	 2分 2 Points	 3分 3 Points			
			活动参与 (Social Participation)	 1分 1 Points	 2分 2 Points	 3分 3 Points		
		评定结果 Assessment Results 社会人 Community Group 3-4分 3-4 Points 生活基本自理 Slight Dependence 5-9分 5-9 Points 生活完全自理 Complete Independence 总分 Total						
		评定者 (Evaluator) :						评定日期 (Date) :

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Figure 2

Longshi Assessment Scale of Activities of Daily Life.

Figure 3

Flow chart of assessment using Longshi Scale.

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