ORIGINAL ARTICLE

Functional Status of Acute Stroke Patients in University Malaya Medical Centre (UMMC), Kuala Lumpur, Malaysia

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Summary

Stroke is a leading cause of death and disability in most developed countries and developing nations. Majority of the stroke survivors are left with significant physical and cognitive impairments. In addition to the improved acute stroke care, they often benefit from rehabilitation in improving their function. This was the first study done to document function for post stroke patients in Malaysia. It was prospective study conducted to document functional status of acute stroke patients upon admission, discharge and at 3 months post stroke. Assessment of functional status for these patients are based on their activities of daily living and ambulation i.e. self- care, sphincter control, mobility, locomotion, communication and social cognition. It is also aimed to describe their demographic and clinical characteristics. Correlation of functional status at 3 months post stroke with the initial severity of stroke was also explored. A total of fifty-one patients with acute stroke in University Malaya Medical Centre (UMMC) were recruited. The patient's age ranged from 38 to 83 years with a mean of 60.2 years. Thirty-six patients (71%) were first stroke sufferers and fifteen patients (29%) had recurrent stroke. At discharge from acute stay, 13% of patients were able to ambulate with aids and 87% needed assistance for ambulation in varying degrees. Eighty-two percent of patients showed improvement in overall function (both motor and cognition) at 3 months post stroke. Sixty percent of patients were independent in ambulation and 40% required assistance. Significant correlation was seen between the initial severity of stroke and functional status at 3 months post stroke. Functional status of patients with stroke has improved at 3 months post stroke. A comprehensive rehabilitation medicine programme should be incorporated into management of stroke patients to expedite functional recovery and improve patient's independence.

Key Words: Acute stroke, Rehabilitation, Initial severity of stroke, Functional status

Introduction

Stroke is one of the most common cause of chronic neurological disability in adult[1]. About two thirds of acute stroke patients will survive the initial stroke and of the survivors, about half are disabled because of persistent neurological impairment[1].

There is evidence to support that stroke incidence is higher in developing countries as reported in World Health Organization's (WHO) MONICA project[2]. In Peninsular Malaysia, the reported cerebrovascular accident in adults in 1997 was 2983 and estimated incidence rate was 68.38 per 100,000 population[3].

In developed countries, studies conducted has shown a trend in reduction in mortality of patients with stroke [4,5]. As mortality declines, the number of stroke survivors with impairments and disabilities has increased [5,6].

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Depending on the initial severity of the stroke, the patient and family require periods of therapy, adaptation and adjustment. Inability of stroke survivors to perform functional self-care activities or walk without assistance creates dependence on others, limit their capacity to socialize and be part of a productive community [1].

Recent advances in acute stroke management are fast improving and rehabilitation management remains the cornerstone of treatment for post stroke survivors [7]. The aim of rehabilitation is to restore these disabled persons to their optimum possible level of physical, mental and social function despite their impairments [8].

Functional status of stroke survivors after maximum recovery is one of the most important features of clinical epidemiology of stroke worldwide [9]. Inferences from the Framingham Study, The Oxfordshire Community Stroke project showed that in spite of significant mortality and morbidity, stroke survivors as a group reached good levels of functional outcome. Four out of five stroke survivors can walk independently and two out of three can become independent in activities of daily living. They also showed that the final functional outcome is related strongly to the severity of the initial stroke and these levels are achieved at about 3 months post stroke [9,10,11].

The Copenhagen Stroke Study conducted in a dedicated stroke unit (acute stroke management with comprehensive rehabilitation programme) showed that initial stroke severity was the most important factor in both neurologic and functional recovery. The prognosis of patients with mild and moderate stroke is generally excellent. The functional recovery generally was completed within 3 months of the stroke onset [12].

Materials and Methods

This prospective study was carried out in University Malaya Medical Centre (UMMC) between July 1999 to October 1999. A total of fifty-one patients with acute stroke admitted to medical wards in UMMC during this time frame were seen and followed up to 3 months post stroke. The patients were referred to the principal investigator by neurology and medical team as soon as the patients were admitted. Written and verbal consent were taken by the principal investigator for both patients and caregivers. Exclusion criteria were patients age 18 and below and subjects who did not satisfy the WHO definition of stroke.

In addition to the acute management of stroke instituted by the neurology team, inpatient rehabilitation programme was incorporated into their management. The rehabilitation management consisted of consultation to the Rehabilitation consultant, Physiotherapist, Occupational therapist and Speech therapist. Patients were also seen as a group during stroke round attended by our neurologist and his team. These patients were followed up after discharge at outpatient rehabilitation clinic and continued their rehabilitation programme. At 3 months post stroke, the principal investigator and a dedicated occupational therapist assessed patient's neurological and functional status.

The patients were assessed by the principal investigator upon referral, at discharge and at 3 months post stroke. Data collection comprised of patient's demographic and clinical characteristics, measurement of impairment of stroke using National Institute of Health of Stroke Scale (NIHSS) and functional status using Functional Independence Measure (FIM).

NIHSS is one of stroke deficit scales, designed to be a rapid screening tool to quantify neurologic deficits in 11 categories[13,14] (refer appendix 3). The score ranges from 0 (normal) to 42 (worst). 0: normal, 1-10; mild to moderately severe neurological deficits, >10: severe /major neurological deficits. Total score and subclass score of NIHSS was used to describe the impairments. Cognitive impairment was assessed using mini mental status examination (MMSE) and is defined as score less than 24.

Functional Independence Measure (FIM) is an instrument of 18 scaled functional items assessing 6 areas of function using 1 to 7 grading system [13, 14, 15]. It is widely used in rehabilitation to assess functional outcome of patients and is discipline free. The functional areas are self-care, sphincter control, mobility, locomotion, communication and social cognition. A score of 7 indicates total independence and a score of 1 indicates total dependence on caregiver [15,16]. Total score and subset score of FIM was used to describe the domain of functions. Frequency count was obtained using SPSS 10.0 and level of significance was set at $p<0.05$.

Results

Tables I and II illustrate the demographic and clinical profile of the subjects respectively.

Demographic

A total of fifty-one patients (27 males and 24 females) were seen. The age range was 38 to 83 years old with mean age of 60.2 years. Study population was predominantly Malay (45%) and followed by Chinese (35%). Forty-eight patients (94%) live with their immediate family prior to stroke. Thirty–seven patients (72%) were married, twelve patients (24%) were widows and two (4%) were divorcees. On discharge from hospital, forty-nine patients (96%) were sent home to their family whilst 2 patients (4%) were sent to nursing home.

Majority of patients had their immediate family members as their main caregiver/s. At discharge, sixteen patients identified their wife as the main caregiver, thirteen patients had their daughter as the caregiver, five patients had their husband as the caregiver and eleven patients had their son as the main caregiver. Daughter in laws was identified as the primary caregiver for two patients.

Clinical Characteristics

Thirty-six patients (71%) were found to be first stroke sufferers. Forty-two patients (82%) had ischaemic stroke. Five patients (10%) who had haemorrhagic stroke were all treated conservatively. Nineteen patients (37%) had subcortical stroke and twenty-eight patients (55%) had cortical stroke. The most common co-morbidity was hypertension (18%) followed by previous stroke (6%). Thirty-seven patients (73%) had a combination of 2 or more co-morbidities. Thirty-nine patients (76%) with ischaemic stroke had multiple co-morbidities. Length of stay in acute ward ranged from 3 to 64 days with mean of 15.2 days. Eleven patients (22%) developed medical complications during the acute stay. Three patients (6%) developed clinical depression requiring antidepressant medication. Two patients (4%) had pneumonia, two patients (4%) had pressure ulcers and one patient (2%) had deep vein thrombosis. No death was noted at discharge.

Measurement on impairments

Eighteen patients (35%) had severe impairment post stroke and thirty-one patients (61%) had mild to moderately severe impairment. Only fifteen patients (30%) were found to have neglect. Thirty–six patients (71%) had no speech difficulties, three patients (6%) had global aphasia, eight patients (16%) had severe dysphasia and four patients (8%) had mild to moderate dysphasia. Twenty-one patients had cognitive impairment and MMSE was not performed in eleven patients (22%) due to severe and global dysphasia. NIHSS score has negative correlation with FIM total score at 3 months post stroke ($r= -0.843$, $p<0.01$, p-c).

Functional Status Measurement

Table III illustrates Functional Independence Measure ™ total score at admission, discharge and 3 months post stroke. Forty-two (82%) out of fifty-one patients showed improvement in overall function at 3 months post stroke. Three patients (6%) had FIM total score of 18 throughout admission, discharge and at 3 months post stroke.

Based on one of the component of subset motor-skill of FIM i.e. locomotion, at discharge from the hospital, it was noted that ten patients (20%) needed total assistance from their caregivers, nine patients (18%) required maximal assistance, eight (16%) needed moderate assistance, twelve (23%) required minimal assistance and five patients (10%) required supervision. Only seven (13%) patients were independent to ambulate using gait aids. None were completely independent in ambulation.

At 3 months post stroke, seventeen patients (33%) were completely independent in ambulation, fourteen (27%) patients needed gait aids to ambulate, two (4%) had to be supervised, four patients (8%) needed minimal assistance, three (6%) had to be moderated assisted and four patients required maximal assistance. Seven patients (14%) however, were still totally dependent on their caregivers.

Table I: Demographic data of patients (n = 51)

Variables	Number (n)	Percentage (%)
Gender		
Male	27	53
Female	24	47
Ethnicity		
Malay	23	45
Chinese	18	35
Indian	7	14
Others	3	6
Marital Status		
Single	0	0
Married	37	72
Widow	11	22
Divorcee	3	6
Pre-morbid function		
Independent	47	92
Dependent in varying degrees	4	8

Table II: Clinical profile of patients (n = 51)

Variables	Number (n)	Percentage (%)
Frequency of stroke		
First stroke	36	71
Recurrent stroke	15	29
Type of stroke		
Ischaemia/infarction	42	82
Haemorrhage	5	10
Combination	4	8
Site of stroke		
Cortical	28	55
Subcortical	19	37
Combination	4	8
Co-morbidities		
Hypertension	9	18
Previous stroke	3	6
Diabetes mellitus	1	2
Others	1	1
Combination (2 or more)	35	73
Neglect		
Partial	10	20
Complete	5	10
Aphasia	3	6
Dysphasia	12	24
NIHSS score		
Severe impairment	18	35
Mild to moderate impairment	31	61

Table III: Descriptive data for mean FIM total score, mean FIM subtotal motor skills total score and mean FIM subtotal cognitive skills total score.

FIM	Mean		
	Admission	Discharge	3 months post stroke
Total Score	65.2 ± 28.3	71.8 ± 30.0	93.3 ± 34.0
Subtotal motor skill	42.9 ± 19.5	49.1± 21.6	67.9 ± 26.1
Subtotal cognitive skill	21.7 ± 10.5	23.1 ± 10.5	25.2 ± 10.0

Discussion

This preliminary study was conducted with the main objective of documenting functional status of acute patients with stroke who were managed in an acute setting hospital where they received some form of inpatient and outpatient rehabilitation programme. Changes in function at discharge and at 3 months post stroke were described and association with initial severity of stroke was studied. To date no similar study was conducted to addressed the above issue in Malaysia.

The number of subjects were relatively small. However, percentage of male and female subjects were almost similar. The mean age was less than 70 years. Incidence of stroke in individual between age 50 and 64 years in most studies is about 3 in 1000 person[3]. Data from University Hospital, Kuala Lumpur's Stroke Registry for the year 1994 showed 50% out of 413 acute stroke patients seen were 62 years or below and 19% were 50 years old and below[13].

Forty-nine patients were discharged home to their family. This could be due to Malaysian culture which still encourage children to look after their elders. Options in getting paid helpers are also relatively affordable compared to nursing home charges. Range of length of stay in the ward was between 3 to 64 days. Majority of patients stayed between 3 to 10 days and ten patients stayed for between 20 to 64 days. Rehabilitation management was instituted whilst patients stayed for acute treatment.

The commonest co-morbidity was hypertension. Seven out of nine patients had preexisting hypertension and two patients were newly diagnosed. Majority of patients in this study had a combination of co-morbidities. A combination of co-morbidities are related to higher incidence of ischaemic stroke whish is associated with both large and small vessel disease[15].

NIHSS score was negatively correlated to FIM at 3 months post stroke. This means the more severe the initial impairment, the less is the function of the patients. Improvement was noted in both subset of FIM. Forty-two patients (82%) showed improvement in overall function at 3 months post stroke. However, improvement was slight in cognitive subset compared to motor subset. This could imply that cognitive impairment needed longer time to improve and should be explored in greater dimension in future studies.

At discharge, based on locomotion component of motorskills subset of FIM, most patients required assistance from their caregivers. This implied the burden of care borne by the caregivers at that time. At 3 months post stroke, although seventeen patients (33%) were independent in ambulation and fourteen patients (27%) were able to ambulate using aids, twenty patients (40%) still needed assistance in varying degree from their caregivers.

Conclusion

Functional status of acute stroke patients in this study has improved at 3 months post stroke and significant correlation was seen between the initial severity of stroke and functional status at 3 months post stroke. 96% of patients were discharged home to their family. Forty-two (82%) out of fifty-one patients showed improvement in overall function at 3 months post stroke.

It is recommended that follow up study is required to further assess the functional status in a larger group of patients in Malaysia to reflect the true population. It should preferably be done in a dedicated rehabilitation setting or dedicated wards. Functional outcome measures should be routinely done to assess patients in all disciplines of rehabilitation practice which enables the team to assess the level of disability and burden of care.

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Appendix 1

DEMOGRAPHIC DATA

Name: UHRN:

Address: Age:

Date of Admission:

Date of Discharge:

Date at 3 months post stroke:

1. Gender:
- ❑ Male
- ❑ Female

2. Ethnicity:
- ❑ Malay
- ❑ Chinese
- ❑ Indian
- ❑ Others

3. Marital Status:
- ❑ Single
- ❑ Married
- ❑ Widow
- ❑ Divorcee.

4. Status of living:
- ❑ Alone
- ❑ With Immediate family
- ❑ Friends
- ❑ Nursing Home.

Appendix 2

CLINICAL CHARACTERESTIC DATA

1. Frequency of stroke:
- ❑ First
- ❑ Recurrent

2. Nature of Stroke:
- ❑ Ischaemic
- ❑ Haemorrhagic
- ❑ Combination

3. Site of Stroke:
- ❑ Cortical
- ❑ Subcortical
- ❑ Combination
- ❑ Others

4. Side of Stroke/Hemispheric
- ❑ Right
- ❑ Left
- ❑ Bilateral

5. Comorbidities/Risk factors:
- ❑ Hypertension
- ❑ Diabetes Mellitus
- ❑ Atrial fibrillation
- ❑ Hypercholesterolemia
- ❑ Cardiac Disorders
- ❑ Cigarette smoking
- ❑ Previous stroke
- ❑ Others
- ❑ Combination of the above (2 or more)

6. Diagnosis:

7. Treatment:

8. Complication/s:
- ❑ Deep Vein Thrombosis
- ❑ Pneumonia
- ❑ Pressure Sore
- ❑ Incontinence
- ❑ Seizure
- ❑ Angina Pectoris
- ❑ Depression
- ❑ Others
- ❑ Combination of the above

9. Premorbid Function:
- ❑ Independent
- ❑ Dependent.

10. Duration of stay:

11. Discharge Disposition:
- ❑ Home
- ❑ Nursing Home
- ❑ Died

Appendix 3

Stroke Impairment Scale (NIHSS)

1. Level of Consciousness
0= Alert, keenly responsive
1= Not alert/drowsy but rousable by minor stimulation to obey, answer or respond.
2= Not alert, requires repeated stimulation to attend or lethargic or obtunded, requiring strong or painful stimulation to make response.
3= Coma respond only with reflex motor or autonomic effects or unresponsive.

2. Level of Consciousness-Question (Ask patient month and his/her age)
0= Answers both correctly
1= Answers one correctly
2= Incorrect

3. Level of Consciousness-Command (Ask patient to open/close eyes and hand)
0= Obeys both correctly
1= Obeys one correctly
2= Incorrect

4. Pupillary Response
0=Both reactive
1=One reactive
2=Neither reactive

5. Best Gaze
0= Normal
1= Partial gaze palsy, abnormal but not forced deviation in one or both eyes
2= Forced deviation/total gaze paresis

6. Best Visual (confrontation testing using finger counting including double simultaneous stimulation)
0= No Visual loss
1= Partial Hemianopia
2= Complete Hemianopia
3= Bilateral hemianopia (blind including cortical blindness)

7. Facial palsy
0= Normal symmetrical movement
1= Minor paralysis
2= Partial paralysis (total or near total paralysis of lower face)
3= Complete paralysis of one or both sides (absence of facial movements in the upper and lower face)

8. Best motor –Arm (the limb is held for 10 seconds at 90degrees if sitting, at 45 degrees if lying).Place limb in position if comprehension is reduced.
0= No drift in 10 seconds
1= Drift after brief hold
2= Cannot resist gravity, falling immediately but some effort made
3= No effort against gravity
4= No movement

9. Best motor-Leg (when lying patient to hold weaker leg raised 30 degrees for 5 seconds). Place leg is comprehension is reduced.
0= No drift in 5 seconds
1= Drift lowering within 5 seconds
2= Cannot resist gravity falling to bed but some effort made
3= No effort against gravity
4= No movement

10. Plantar reflex
0= Normal
1= Equivocal
2= One extensor
3= Bilateral extensor

11. Limb Ataxia (finger- nose and heel- shin tests performed), if total paralysis score as absent
0= Absent
1= Pesent in one arm/leg
2= Pesent in two limbs

12. Sensory (tested with pin;only hemisensory loss scored). If comprehension or consciousness is reduced only score the obvious evidence.
0= Normal, no sensory loss
1= Mild to moderate loss but aware of touch
2= Severe-total loss, unaware of touch

13. Neglect
0= No abnormality
1= Partial neglect (visual, tactile, spatial or auditory)
2= Complete inattention affecting more than one modality

14. Dysarthria
0= Normal
1= Mild to moderate, some slurring
2= Severe, unintelligible words

15. Best language (assessed from response during evaluation)
0= Normal, no aphasia
1= Mild to moderate aphasia
2= Severe aphasia
3= Mute, global aphasia (no usable speech or auditory comprehension)

Appendix 4

Cognitive Function Assessment

Mini Mental State Test (MMSE)	Point
1. Orientation	
a. Year, month, day, date. time	____/5
b. Country, town, district, hospital, ward	____/5
2. Registration	
a. Name 3 names (ask patient to repeat) (patient to learn till correct)	____/3
3. Attention and Calculation	
Subtract 7 from 100, repeat from result, etc. Stop after 5. (100,93,86,79,72,65). Alternative: spell WORLD backwards	____/5
4. Recall	
a. Ask for 3 objects learnt earlier	____/3
5. Language	
a. Name a pencil and a watch	____/2
b. Repeat 'no ifs, ands or buts'	____/1
c. Give a three stage command. Score one for each stage	____/3
d. Ask patient to read and obey a written command	____/1
e. Ask patient to write a sentence	____/1
f. Copying (a pair of intersecting pentagon)	____/1

Appendix 5

FUNCTIONAL INDEPENDENCE MEASURE (FIM)

SELF-CARE	ADMISISON	DISCHARGE	3 MONTHS POST STROKE
A. Eating			
B. Grooming			
C. Bathing			
D. Dressing-Upper			
E. Dressing-Lower			
F. Toiletting			
SPHINCTER CONTROL			
G. Bladder			
H. Bowel			
TRANSFERS			
I. Bed, Chair, Wheelchair			
J. Toilet			
K. Tub, Shower			
LOCOMOTION			
L. Walk/Wheelchair			
M. Stairs			
COMMUNICATION			
N. Comprehension			
O. Expression			
SOCIAL COGNITION			
P. Social Interaction			
Q. Problem Solving			
R. Memory			

Leave no blanks. Enter 1 if not testable due to risk.

FIM levels

No helper

7. Complete Independence
6. Modified Dependence

Helper- Modified Dependence

5. Supervision (Subject=100%)
4. Minimal Assistance (subject=75%)
3. ModerateAssistance Subject=50% or more)

Helper- Complete Dependence

2. Maximal Assistance (Subject=25%)
1. Total Dependence or not testable (subject less than 25%)