

Evaluation of the functional independence for stroke survivors in the community

CKC Chan Bsc, DWC Chan Msc, SKM Wong MBA, MAIS, BA, PDOT

ABSTRACT

Purpose. To evaluate the fall incidence and functional independence of stroke survivors, and its associations with sociodemographics and clinical factors during post-discharge 12 months.

Methods. 102 female and 132 male stroke survivors (mean age, 73 years) who admitted to Tai Po Hospital for stroke rehabilitation and completed all 4 telephone interviews were included. The fall incidence, functional independence in activities of daily living (determined by the modified Barthel Index [MBI]), and its associations with sex, age, first or recurrent stroke, discharge destination, and post-discharge rehabilitation in geriatric day hospital were analysed by comparing their MBI scores at admission, discharge, and post-discharge month 1, 3, 6, and 12.

Results. 12 months after discharge, only 23% of stroke survivors could maintain complete independence. Stroke survivors are at risk of falls, especially in the post-discharge month 1. Those who were male, aged below 65 years, had one stroke only, discharged home, or had received post-discharge rehabilitation in geriatric day hospital showed higher MBI scores, but the scores gradually deteriorated during the month 6 to 12, associated with old age, recurrent stroke, and no geriatric day hospital rehabilitation.

Conclusion. More community rehabilitation and home care support services should be developed in Hong Kong, so as to optimise functional independence and community reintegration for stroke survivors.

Occupational Therapy Department, Tai Po Hospital, Hong Kong

Correspondence to: Ms Candy KC Chan, Occupational Therapy Department, Tai Po Hospital, Hong Kong. E-mail: kiukiu@hotmail.com

INTRODUCTION

Stroke is the third leading cause of mortality in Hong Kong, accounting for about 3500 deaths a year and about 10% of all deaths. About 16 000 individuals suffer from a new or recurrent stroke annually,^{1,2} which resulted in an estimated \$1.9 billion economic loss to Hong Kong in 2001.³ Stroke is also the leading cause of long-term disability.⁴⁻⁷ Fewer than 40% of stroke survivors recover completely,⁶ and about 30 to 50% have considerable residual deficits.⁸ Stroke is associated with the risk of fall; 73% (79 out of 108) of stroke survivors fell within 6 months of discharge from hospital, and in all 270 falls were reported.⁹

Post-stroke recovery is most rapid in the first 3 months and becomes slower up to 1 year.⁷ In Hong

Kong, most stroke patients are allowed to stay in hospital for short periods, so pre-discharge planning is important for ongoing rehabilitation. Better understanding of the stages of stroke recovery and its long-term impact enables patients to better adjust their life changes and disability.

This study aimed to evaluate the fall incidence and functional independence of stroke survivors, and its associations with sociodemographics and clinical factors during post-discharge 12 months.

METHODS

Subjects

The sample was drawn from stroke patients who

had functional deficits and were admitted to Tai Po Hospital in 2005 for rehabilitation. The intensive in-patient client-oriented rehabilitation was multidisciplinary, involving medical officers, nurses, occupational therapists, physiotherapists, speech therapists, social workers, and clinical psychologists. Patients received occupational therapy training for hand functions and activities in daily living (ADLs) and physiotherapy training for other physical functions and walking. Only stroke survivors discharged to home or institutions in the community were included for assessment. Those who died in hospital, transferred to other acute hospitals, or had no contact details were excluded.

Measurements

Functional independence was determined using the modified Barthel Index (MBI). It measures performance in 10 basic ADLs, including personal hygiene, feeding, dressing, toileting, bladder and bowel control, bathing and ambulation/wheelchair management, stair climbing, and chair/bed transfer.¹⁰ The items are weighted; a maximum score of 100 indicates independence, 91 to 99 minimal dependence, 75 to 90 mild dependence, 50 to 74 moderate dependence, 25 to 49 severe dependence, and 0 to 24 total dependence.¹¹ The MBI has excellent validity, reliability¹² and internal consistency.¹⁰ The use of the MBI over the telephone has been validated and scores correlate highly ($r > 0.97$) with direct observation.¹³

Procedure

Sociodemographics and clinical variables at admission and discharge were collected retrospectively. The fall incidence and MBI scores were obtained using telephone interviews at post-discharge month 1, 3, 6, and 12. For patients who were cognitively impaired or dysphasic, their caregivers were interviewed. For those who were discharged to old aged homes, the staff was interviewed.

Statistical analysis

Descriptive statistics were used for the clinical and sociodemographic characteristics. General linear model repeated measurements with repeated and simple contrast were used to analyse the changes of ADL functional status during the 12 months of

follow-up.

RESULTS

Between January 2005 and December 2005, 665 consecutive stroke patients were admitted to Tai Po Hospital for stroke rehabilitation. 43 of them died in hospital and 29 were transferred to other acute hospitals. Of 593 patients discharged to home or institutions in the community, 77 could not be contacted. Follow-up telephone interviews were conducted for the remaining 516 patients at 1, 3, 6, and 12 months. Among these, 156 could not be contacted on one or more occasions, 58 were readmitted to hospitals, and 68 died.

234 (45%) patients completed all 4 interviews (**FIGURE 1**). There were 102 (44%) females and 132 (56%) males. Their mean age was 73 (standard deviation [SD], 12) years. Their mean length of hospital stay was 29 (SD, 15) days. 184 (79%) patients aged ≥ 65 years and 50 (21%) were younger. The mean age of the females was about 6.5 years more than the males. It was the first stroke in 162 (69%) patients, and it was a recurrent stroke in 72 (31%) patients (**TABLE 1**).

193 (83%) patients lived at home before having stroke. At discharge, 106 (45%) returned home and 128 (55%) lived in old aged homes. 100 (43%) received post-discharge rehabilitation in geriatric day hospitals (GDH), and 134 (57%) did not.

Fall incidence

87 falls were reported within the post-discharge first year, most frequently in the first month ($n=31$), and fewer ($n=20$) in month 3, and remained at about that frequency from month 6 to 12.

Functional independence in the activities of daily living

182 (78%) patients were ADL independent before having stroke. At discharge, only 3 were fully independent, 70 mildly to minimally dependent, 92 moderately to severely dependent, and 69 totally dependent. 12 months after discharge, 54 became fully independent, 81 were mildly to minimally dependent, 33 moderately to severely dependent, and 66 totally dependent (**TABLE 2**).

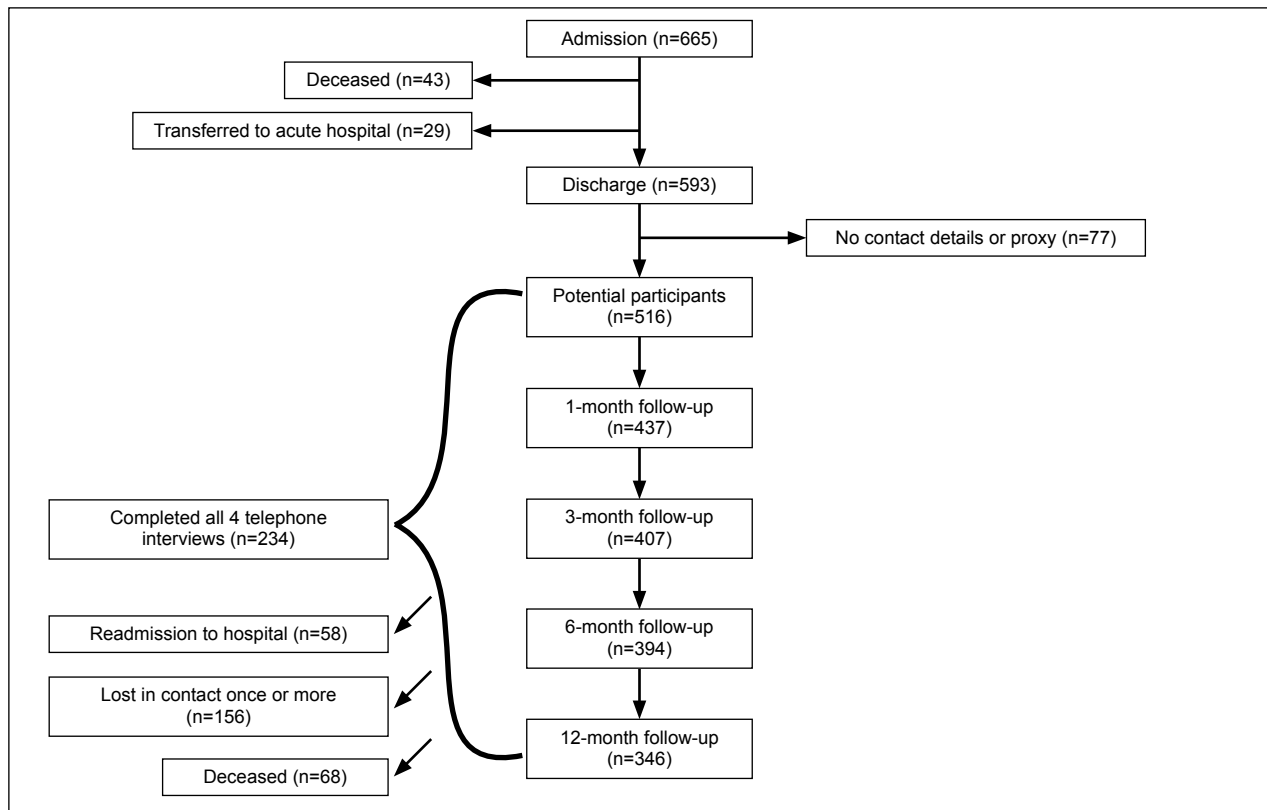


FIGURE 1. Flowchart for patients eligible for inclusion

The mean MBI score increased significantly from 32.6 (SD, 26.3) at admission to 49.4 (SD, 33.6) at discharge ($p < 0.001$). Over 12 months of post-discharge follow-up, the mean MBI score increased significantly ($F(2.178, 507.513) = 172.906$, $p < 0.001$, **FIGURE 2**) to 62.8 (SD, 37.2) at 3 months ($p = 0.001$), especially over the first month ($p < 0.001$). It then increased slightly to 63.6 (SD, 38.1) at month 6 ($p = 0.260$) and reached a plateau, and then decreased significantly to 61.9 (SD, 39.2) at month 12 ($p = 0.029$).

Association of sociodemographics with functional changes

Sex

At admission, the mean MBI scores for male and female patients were similar (34.3 [SD, 25.9] vs 30.3 [SD, 26.7]). At discharge, the score was better in male than female patients (53.3 [SD, 32.6] vs 44.2 [SD, 34.3]), as was after 12 months of post-discharge follow-up ($F(2.226, 516.454) = 165.635$, $p < 0.001$; 68.3 [SD, 36.9] vs 53.5 [SD, 40.6]).

Age

At admission, the mean MBI score was higher in

stroke survivors aged < 65 than ≥ 65 years (40.5 [SD, 27.4] vs 30.4 [SD, 25.6]). At discharge, younger stroke survivors had significantly better scores (72.4 [SD, 26.4] vs 43.1 [SD, 32.6]). After 12 months of post-discharge follow-up, younger stroke survivors maintained significantly higher scores ($F(2.180, 507.764) = 166.021$, $p < 0.001$), with the mean being 86.2 (SD, 25.6). In older stroke survivors, the score decreased significantly at month 6 ($p < 0.05$), and was 61.9 (SD, 39.2) at month 12.

First or recurrent stroke

At admission, the mean MBI score was slightly higher in stroke survivors having their first rather than recurrent stroke (34.9 [SD, 26.6] vs 27.2 [SD, 24.9]). At discharge, survivors of first stroke showed significantly higher scores (54.4 [SD, 32.2] vs 38.1 [SD, 34.2]), as did over 12 months of post-discharge follow-up ($F(2.210, 512.782) = 128.917$, $p < 0.001$), with the score being maintained at 69.2 (SD, 36.0). In survivors of recurrent strokes, the score decreased significantly at month 6 ($p < 0.05$) and was 45.3 (SD, 41.3) at month 12.

Discharge destination

At discharge, the mean MBI score of stroke survivors

TABLE 1
Demographics of the study patients

Demographics	No. (%) of patients (n=234)
Sex	
Female	102 (44)
Male	132 (56)
Age	
≥65 years	184 (79)
<65 years	50 (21)
Mean (SD) age (years)	
Female	76 (12)
Male	70 (11)
Onset of stroke	
First	162 (69)
Recurrent	72 (31)
Discharge destination	
Home	106 (45)
Old age homes	128 (55)
Post-discharge rehabilitation in geriatric day hospital	
Yes	100 (43)
No	134 (57)

TABLE 2
Degrees of functional independence for the activities of daily living

Dependence level (modified Barthel Index)	No. (%) of patients (n=234)	
	At discharge	12 months after discharge
Independence (100)	3 (1)	54 (23)
Minimal dependence (91-99)	30 (13)	20 (9)
Mild dependence (75-90)	40 (17)	61 (26)
Moderate dependence (50-74)	52 (22)	14 (6)
Severe dependence (25-49)	40 (17)	19 (8)
Total dependence (0-24)	69 (30)	66 (28)

discharged to old aged homes was 33.1 (SD, 30.6) and remained low at 42.7 (SD, 38.7) at month 12. Those discharged to home had significantly higher mean MBI scores in the ensuing 12 months ($F(2.295, 532.501)=197.255, p<0.001$), with a mean score of 85.0 (SD, 24.8) at month 12.

Post-discharge rehabilitation in geriatric day hospital

At post-discharge month 3, the mean MBI score increased more rapidly for those having GDH rehabilitation than those not having (from 64.9 [SD, 23.2] to 82.7 [SD, 21.9] vs from 37.7 [SD, 35.4] to 48.0

[SD, 39.3]).

In stroke survivors having GDH rehabilitation, the mean MBI score increased significantly across the ensuing 12 months ($F(2.383, 552.845)=213.619, p<0.001$), and maintained at 83.8 (SD, 22.5) at month 12. However, in those not having GDH rehabilitation, the mean MBI score decreased significantly at month 6 ($p=0.019$) and at 45.5 (SD, 41.0) at month 12.

DISCUSSION

One year after discharge, 77% of stroke survivors

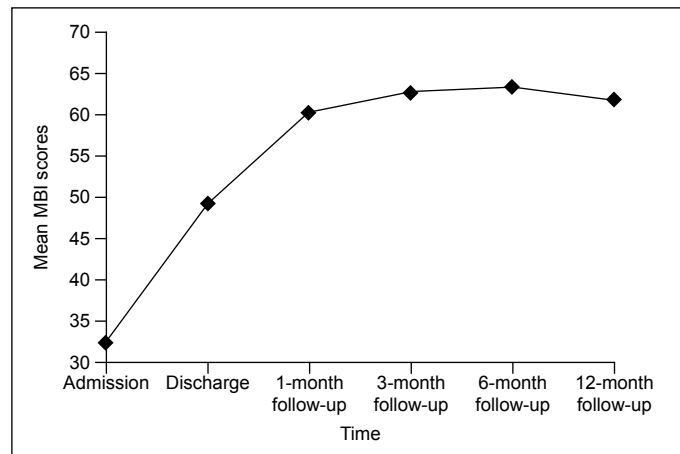


FIGURE 2. Modified Barthel Index (MBI) scores of stroke survivors

in the community still had considerable residual deficits with regard to self-care abilities. Only 23% could maintain complete independence. Stroke is the leading cause of long-term disability, usually resulting in a dysfunctional life and inactive lifestyle. In addition, approximately 37% of stroke survivors moved out of their homes to old aged homes (totalling 55%), compared to only 12% of Australian stroke survivors who lived in the cared accommodation.¹⁴ This difference may be due to the crowded living environment, lack of attendants, and inadequate community social and home care support services in Hong Kong. Thus, more community home care support services and day care centres are needed to facilitate stroke survivors to return home and reintegrate into the community.

Because of residual hemiparesis and functional deficits, stroke survivors are at risk of falls, especially in the post-discharge first month, which is a transitional period to reintegrate into the community. Pre-discharge home environment assessment and fall prevention programme are recommended. Pre-discharge caregiver education and training are also suggested to empower caregivers to take care of the stroke survivors in the community.

Those who were male, aged below 65 years, had one stroke only, discharged home, or had received GDH rehabilitation showed higher MBI scores, but the scores gradually deteriorated during the month 6 to 12, associated with old age, recurrent stroke, and no GDH rehabilitation. Thus, in order to facilitate long-term functional independence in the community, community home help and support services are recommended, especially after month 6.

Stroke survivors receiving GDH rehabilitation demonstrated more rapid improvement in ADL functions in the first month and could maintain their functional gains until month 12. In the absence of GDH rehabilitation, there was a marked deterioration in functional independence after month 6. Therefore, further GDH rehabilitation should be commenced within 3 months of being discharged to optimise the functional independence of stroke survivors in the community.

In Hong Kong, stroke survivors are allowed to stay in hospital for rehabilitation for a short period only. In Tai Po Hospital it averaged 29 days in 2005 and decreased to 20 days in 2008. Thus, more community or day rehabilitation services are recommended to provide adequate opportunities to optimise functional independence.

Limitations

The retrospective design of this study was hampered by missing data; only 45% of the discharged patients completed all 4 telephone interviews. Only those treated at one rehabilitation hospital were included, which limits generalisation of its findings. Also, staff of old age homes usually underestimate the functional ability of their residents. Different raters were responsible for the telephone interview, which may have affected the reliability of the results.

Future research

Future research is recommended to investigate long-term ADL function, community reintegration, and quality of life in Hong Kong stroke survivors.

The effect of shorter hospital stay on the functional status of these survivors should also be investigated. Prospective studies and replication of studies in various settings would enable generalisation of results to a broader population.

CONCLUSION

This study provided preliminary information on the post-discharge functional independence for stroke survivors in Hong Kong. It enables health professionals to help stroke survivors better adjust to life changes and disability after transition from hospital to the community. It also provides a reference for the reallocation of rehabilitation and related community resources for stroke survivors with different levels of dependence.

In Hong Kong, approximately 16 000 people suffer from a new or recurrent stroke every year and 77% of the survivors were left with considerable residual functional deficits. The number of stroke survivors and demand for community home care and support services will increase in future. This will lead to a heavier burden on Hong Kong health care systems. More community rehabilitation and home care support services should be developed, so as to optimise functional independence and community reintegration for stroke survivors.

ACKNOWLEDGEMENT

The authors gratefully acknowledge Cynthia MY Wong for her contributions on the research design.

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