Functional improvement of stroke patients at Thai Red Cross Rehabilitation Center

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Objective : *To determine functional outcome as well as correlations between functional status at admission and length of hospital stay (LOHS) of stroke patients who completely attended rehabilitation program at Thai Red Cross Rehabilitation Center from year 2006 to 2008.*

Method : *Reviewed medical record of stroke patients admitted during August 1, 2006 to December 31, 2008. LOHS, location after discharge and functional status as the following; modified Barthel activity of daily living index (BAI), household and community ambulation were obtained. BAI at admission and discharge were compared. The correlations between functional status at admission and LOHS were determined.*

Result : *Two hundred twenty seven medical records of stroke patients were reviewed. There were 24 patients who were not complete rehabilitation program and need to refer compose of 17 medical complications, 6 surgical complications and one financial problem. The average age of patients is 60.61 ± 13.05 years. 61.1% of the patients (n = 124) were men. 67.48% of the patients (n = 137) were covered by health insurance. The most common cause of stroke was cerebral infarction (56.2%, n = 114). The median LOHS was 58 days. LOHS had significantly inverse correlations with functional status*

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at admission (BAI, household and community ambulation) (p <0.001). All patients could stay at home after discharge. There was significantly functional improvement in activity of daily living and ambulation level after complete rehabilitation program.

Conclusion : *Stroke patients who completely attended rehabilitation program at Thai Red Cross Rehabilitation Center showed significant functional improvement. Functional status at admission is a predictive factor of LOHS. All patients can stay with their families after discharge.*

Keyword : *Activity of daily living, rehabilitation, LOHS, Barthel ADL index, stroke.*

วัตถุประสงค์ : *เพื่อประเมินความสามารถในการช่วยเหลือตนเองและความสัมพันธ์ระหว่าง*
ความสามารถในการทำกิจวัตรประจำวันเมื่อแรกรับผู้ป่วยกับจำนวนวันนอนพัก
รักษาตัวในศูนย์เวชศาสตร์ฟื้นฟูของผู้ป่วยโรคหลอดเลือดสมองที่ได้รับโปรแกรม
การฟื้นฟูอย่างเต็มที่ ณ.ศูนย์เวชศาสตร์ฟื้นฟูระหว่างปีพ.ศ.2549 - 2551

วิธีการศึกษา : *เก็บข้อมูลจากเวชระเบียนผู้ป่วยหลอดเลือดสมองที่เข้ารับการฟื้นฟูตั้งแต่*
1 สิงหาคม 2549 ถึง 31 ธันวาคม 2551 โดยเก็บข้อมูลเกี่ยวกับจำนวนวันนอนพัก
รักษาตัว, สถานที่ที่ผู้ป่วยพักอาศัยภายหลังการจำหน่าย และระดับความสามารถ
ในการทำกิจวัตรประจำวันโดยใช้ modified Barthel activity of daily living index
(BAI), ความสามารถในการเคลื่อนที่ของร่างกายในบ้านและนอกบ้าน เปรียบ
เทียบระดับความสามารถทำกิจวัตรประจำวันระหว่างแรกรับและจำหน่ายออก
และหาความสัมพันธ์ระหว่าง BAI, ความสามารถในการเคลื่อนที่ของร่างกาย
ในบ้านและนอกบ้าน ณ.เวลาแรกรับกับจำนวนวันนอนพักรักษาตัว

ผลการศึกษา : *ผลการทบทวนข้อมูลเวชระเบียนผู้ป่วยหลอดเลือดสมองจำนวน 227 ราย พบว่า*
ผู้ป่วยจำนวน 24 รายไม่ได้รับโปรแกรมการฟื้นฟูอย่างครบถ้วน และจำเป็นต้อง
ส่งต่อไปรับการรักษาที่อื่นอันเนื่องจากภาวะแทรกซ้อนทางอายุรกรรมจำนวน
17 ราย ภาวะแทรกซ้อนทางศัลยกรรมจำนวน 6 ราย และปัญหาทางด้านการเงิน
จำนวน 1 ราย เหลือผู้ป่วยจำนวนทั้งหมด 207 รายมีอายุเฉลี่ย 60.61 ± 13.05 ปี
เป็นเพศชายร้อยละ 61.1 (124 ราย) มีประกันสุขภาพคิดเป็นร้อยละ 67.48
(137 ราย) ผู้ป่วยร้อยละ 56.2 (114 ราย) เป็นโรคหลอดเลือดสมองสาเหตุจาก
หลอดเลือดสมองตีบ ค่ามัธยฐานของจำนวนวันนอนคิดเป็น 58 (10 - 173) วัน
พบว่าจำนวนวันนอนมีความสัมพันธ์กับ BAI แรกรับ, ความสามารถในการเคลื่อน
ที่ของร่างกายในบ้าน และนอกบ้านแบบผกผันอย่างมีนัยสำคัญทางสถิติ (p <0.001)
หลังจำหน่ายพบว่าผู้ป่วยทุกรายสามารถกลับไปพักที่บ้าน ผู้ป่วยมีระดับความ
สามารถในการทำกิจวัตรประจำวัน และความสามารถในการเคลื่อนที่ของร่างกาย
ในบ้านและนอกบ้านที่เพิ่มขึ้นอย่างมีนัยสำคัญทางสถิติภายหลังการได้รับ
โปรแกรมการฟื้นฟูอย่างเต็มที่

สรุป : *ผู้ป่วยหลอดเลือดสมองที่ได้รับโปรแกรมการฟื้นฟูอย่างเต็มที่ ณ.ศูนย์เวชศาสตร์ ฟื้นฟูมีระดับความสามารถในการช่วยเหลือตนเองเพิ่มขึ้นอย่างมีนัยสำคัญทาง สถิติ ระดับความสามารถในการช่วยเหลือตนเอง ณ.เวลาแรกรับเป็นปัจจัยที่ กำหนดจำนวนวันนอน ภายหลังการจำหน่ายพบว่าผู้ป่วยทุกรายสามารถกลับไป อยู่กับครอบครัวที่บ้าน*

คำสำคัญ : *ระดับความสามารถในการทำกิจวัตรประจำวัน, การฟื้นฟูสมรรถภาพ, จำนวนวัน นอน, Barthel ADL index, โรคหลอดเลือดสมอง*

Stroke is worldwide concerned as the leading cause of disability. The stroke prevalence among Thai elderly is 1.12 percent in 1998.[1] Data from Thai Stroke Rehabilitation Registry (TSRR) indicated that nearly three-quarters of enrolled patients who attended comprehensive rehabilitation program reach their highest rehabilitation potential/goal.[2] Moreover, there was high rate of returning home among Thai stroke patients. Although comprehensive rehabilitation is beneficial for stroke patients, the time is highly consumed. Length of hospital stay (LOHS) is the main factor to determine direct cost of stroke. [3-5] Saxena et al. reported that LOHS and the cost of hospital stay were significantly correlated. Furthermore, admission functional dependence is one of affected factors on LOHS.[6]

Thai Red Cross Rehabilitation Center is the solitary rehabilitation institute which mainly receives patients from the department of Rehabilitation Medicine, King Chulalongkorn Memorial Hospital. The admissions primarily were stroke patients. These patients had longer LOHS than other rehabilitation services. Some patients had LOHS longer than 90 days. The authors hypothesized that LOHS longer than 90 days may not affect on the improvement in functional outcomes. The authors aimed to determine functional outcome as well as relations between functional status at admission and LOHS for stroke patients who completely attended comprehensive rehabilitation program at setting. The functional outcomes were compared by focusing on the LOHS. The LOHS was categorized into 2 groups which were 90 days or less and more than 90 days.

Material and Method

Medical records of stroke patients who completely attended rehabilitation program at Thai Red Cross Rehabilitation Center during year 2006 to 2008 were reviewed. LOHS, location after discharge and functional status as the following; modified Barthel activity of daily living index (BAI), household and community ambulation were obtained twice by attending physicians which were at the admission and discharge. BAI scores was categorized into 5 classes: 0 - 4 = total dependence, 5 - 8 = severe dependence, 9 - 12 = moderate to severe dependence,> 12 = mildly severe dependence. Household and community ambulation was categorized into 6 classes: 0 = total dependent, 1= maximal assistance, 2 = moderate assistance, 3 = minimal assistance, 4 = under supervision, 5 = total independent. These scores were assessed and record by attending physicians.

Statistical analysis

Wilcoxon Sign Ranks Test was used to compare functional status at admission and discharge. Spearman's rank correlation was used to determine the relations between functional status and LOHS. Mann-Whitney Test was used to compare difference between two categorized LOHS groups.

Results

From 227 reviewed medical records, there were 203 stroke patients who completely attended comprehensive rehabilitation program. There were 24 patients who were not complete rehabilitation program and need to refer compose of 17 medical complications, 6 surgical complications and one

financial problem. The average age of patients was 60.61 $\pm$ 13.05 years. There were 61.1% men and 38.9% women. Payment for rehabilitation cost was categorized into 4 groups; Civil Servant Medical Benefit 51.2 %, self payment 32.5%, National health security 15.3% and Social security 1.5% . The causes of stroke were cerebral infarction (56.2%, n = 114) and cerebral hemorrhage (43.8%, n = 89). Most patients had hemiplegia/ hemiparesis (88.2%, n = 179) ,whereas patients who had double hemiparesis and no motor deficit were 19 patients (9.4%) and 5 patients (2.4%) respectively. The average LOHS was 61.78 $\pm$ 31.79 days, as well as median LOHS was 58 days (min = 10, max = 173). All patients were discharged to their own homes. Functional status compared between admission and discharge and shown in Table 1. The authors compared functional status between admission and discharge as presented in Table 2 - 4. Most patients (82.13%, n = 170) had LOHS less than 90 days. There were 39 patients (19.2%), 68 patients (33.5%), 83 patients (40.9%) who had unchanged in BAI, household ambulation and community ambulation

respectively. Both LOHS groups had no significant difference in gained functional status as in Table 4.

Discussion

    Modified Barthel index (BAI) was routinely used for activity of daily living (ADL) evaluation in stroke patients in Thai Red Cross Rehabilitation Center. It is one of activity daily living (ADL) outcome measurements and was proven for its reliability and validity.[9] Thai Red Cross Rehabilitation Center is the tertiary care providing the comprehensive rehabilitation program to stroke patients who have clinical stable and potential for intensive rehabilitation. All stroke patients were in subacute to chronic phase. Moreover, TSRR study reported that discharge BAI index score predicted the discharge locations of patients having stroke.[2] Most stroke patients who completely attended rehabilitation program in Thai Red Cross Rehabilitation Center had signification improvement in BAI index score as well as ambulation status. Therefore all patients can stay with their families after discharged from Thai Red Cross Rehabilitation Center.

Table 1. Functional status compared between admission and discharge by using Wilcoxon Sign Ranks Test.

Functional status	Admission Median Mean $\pm$ SD [Median (IQL)]	Discharge Median Mean $\pm$ SD [Median (IQL)]	
BAI	8.90 $\pm$ 5.82 [9.00 (4-13)]	13.70 $\pm$ 6.25 [15.00(10-19)]	p < 0.001
Household ambulation	1.29 $\pm$ 1.59 [1.00 (0-2)]	3.05 $\pm$ 1.87 [4.00 (1-5)]	p < 0.001
Community ambulation	0.95 $\pm$ 1.58 [0(0-1)]	2.67 $\pm$ 2.05 [3.00(0-5)]	p < 0.001

BAI (Modified Barthel index), Ambulation level: 0 = total dependence, 1= maximal assistance, 2 = moderate assistance, 3 = minimal assistance, 4 = under supervision, 5 = total independence

Table 2. Demographic data was presented in two LOHS groups.

	LOHS group	
	90 days or less **(n = 170)**	**More than 90 days** **(n = 33)**
Age (mean ± sd)	60.92 (12.33)	59.03 (16.42)
LOHS		
Mean(sd)	50.94 (19.83)	117.67 (21.35)
Median (min-max)	53.00(10-89)	108.00(92-173)
Male n(%)	106 (62.35%)	18 (54.55%)
Cerebral infarction n (%)	100 (58.82%)	14 (42.42%)
Cerebral hemorrhage n (%)	70 (41.18%)	19 (57.58%)
Weakness		
Double hemiparesis n (%)	15 (8.82%)	4 (12.12%)
Hemiparesis n(%)	152 (89.41%)	27(81.82%)
No motor weakness n (%)	3 (1.76%)	2 (6.06%)
Payment		
Civil Servant Medical Benefit n (%)	86 (50.59%)	17 (51.52%)
Self payment n (%)	54 (31.76%)	11 (33.33%)
National health security n (%)	26 (15.29%)	5 (15.15%)
Social security	3 (1.76%)	-
Unchanged functional status		
BAI n (%)	37 (21.76%)	2 (6.06%)
Household ambulation n (%)	61(35.88%)	7 (21.21%)
Community ambulation n (%)	69 (40.59%)	14(42.42%)

Table 3. Functional status compared between admission and discharge in two LOHS group.

	Admission		Discharge	
	90d or less	**91-180**	**90d or less**	**91-180**
BAI				
Total depedence	43 (25%)	11 (33%)	22 (13%)	4 (12%)
Severe dependence	30 (18%)	12 (36%)	11 (6%)	4 (12%)
Moderate severe dependence	41 (24%)	5 (15%)	19 (11%)	5 (15%)
Mildly dependence	56 (33%)	5 (15%)	118 (69%)	20 (61%)
Total	170 (100%)	170 (100%)	170 (100%)	170 (100%)

Table 3. Functional status compared between admission and discharge in two LOHS group. (continued)

		Admission		Discharge	
		90d or less	**91-180**	**90d or less**	**91-180**
Household Ambulation					
Totally dependence		73 (42.94%)	21 (63.64%)	30 (17.65%)	4 (12.12%)
Maximal assistance		36 (21.18%)	5 (15.15%)	14 (8.24%)	3 (9.09%)
Moderate assistance		20 (11.76%)	6 (18.18%)	17 (10%)	8 (24.24%)
Minimal assistance		13 (7.65%)	0	15 (8.82%)	6 (18.18%)
Under supervision		14 (8.24%)	1 (3.03%)	36 (21.18%)	4 (12.12%)
Totally independence		14 (8.24%)	0	58 (34.12%)	8 (24.24%)
	Total	170 (100%)	170 (100%)	170 (100%)	170 (100%)
Community ambulation					
Totally dependence		106 (62.35%)	25 (75.76%)	46 (27.06%)	13 (39.39%)
Maximal assistance		22 (12.94%)	3 (9.09%)	15 (8.82%)	2 (6.06%)
Moderate assistance		10 (5.88%)	4 (12.12%)	9 (5.29%)	1 (3.03%)
Minimal assistance		8 (4.71%)	0	13 (7.65%)	6 (18.18%)
Under supervision		9 (5.29%)	1 (3.03%)	36 (21.18%)	7 (21.21%)
Totally independence		15 (8.82%)	0	51 (30%)	4 (12.12%)
	Total	170 (100%)	170 (100%)	170 (100%)	170 (100%)

BAI (Modified Barthel index)

Table 4. Functional status was compared between two LOHS groups by Mann-Whitney test.

Group 1- Group 2	Z	Asymp.Sig. (2-tailed)
Admission		
BAI	-2.451	.014*
Household Ambulation	-2.474	.013*
Community Ambutation	-1.694	.090
Discharge		
BAI	-1.864	.062
Household Ambulation	-.993	.320
Community Ambutation	-1.964	.050
Difference		
BAI	-1.549	.121
Household Ambulation	-1.682	.093
Community Ambutation	-.184	.854

Group 1: LOHS = 90 days or less, Group 2: LOHS more than 90 days

The authors found that stroke patients had varied LOHS between 10 days to 173 days whereas most patients (n = 170, 82.13%) had LOHS within 90 days. Rehabilitation cost mostly was paid by Civil Servant Medical Benefit and patient themselves (83.57%, n = 173). There were few patients (16.42%, n = 34) who were paid by National Health Security and Social Security which could be explained by their referring system and payment policy. As LOHS could reflect rehabilitation cost, the authors categorized the LOHS into two groups based which were within 90 days and more than 90 days based on the hypothesis as above. The patients who were classified into longer LOHS group had lower functional status at admission than another group. This could be the factor that lengthen rehabilitation period. However patients that were classified into the longer LOHS group did not have significant improvement in functional outcome in comparison with another LOHS group. This means that rehabilitation period longer than 90 days might not change functional status. Although functional status could affect and determine the appropriate LOHS, there is other important stroke-related impairments affecting the LOHS such as; balance, cognitive impairments and the total number of impairments. [10]

The studies in Thai stroke patients recently indicated that comprehensive rehabilitation program had provided benefit for them.[2,8] Previous living areas (urban vs. rural) did not have impact on functional outcome, psychological outcome and quality of life among stroke patients.[8] According to these studies, stroke patients had improvement in both functional status and quality of life. The authors found that LOHS were longer than the previous study. Kuptniratsaikul

et al. presented that the average LOHS from multi-center inpatient rehabilitation services were 29.4 days.[2] These LOHS was varied from 3 to 74 days and derived from multi-center, which mostly provide rehabilitation program after acute stroke. The authors focused on the Sirindhron National Medical Rehabilitation Center (SNMRC) which was tertiary rehabilitation center as Thai Red Cross Rehabilitation Center. Archongka Y et al. present that 18 stroke patients from SNMRC have shorter LOHS (The average LOHS was 5.67 weeks).[11] However number of patients from SNMRC was smaller than Thai Red Cross Rehabilitation Center.

Although comprehensive rehabilitation program is beneficial but treatment duration is longer than acute medical care. In comparison with tertiary rehabilitation center in Canada, Thai Red Cross Rehabilitation Center had longer average LOHS (37 ± 22 days VS. 65.15 ± 39.87 days), although Thai Red Cross Rehabilitation Center had higher rate of home discharge than tertiary rehabilitation center in Canada (100% VS. 79.5%).[10] The study had limitation in assessment of functional status which were only at admission and discharge period. The author believed that regular functional status assessment during rehabilitation period could reduce LOHS and cost. Information from this study could be beneficial to our rehabilitation team for improving program.

Conclusion

Stroke patients who completely attended rehabilitation program at Thai Red Cross Rehabilitation Center showed significant functional improvement. All patients could stay at homes with their families after discharged from Thai Red Cross Rehabilitation Center.

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