

Unit Cost of Stroke Rehabilitation

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Background: Rehabilitation costs borne by the service institution are part of the total cost incurred when a patient is admitted to hospital. The total costs cannot directly represent the rehabilitation costs. When considering the funding allocated for specific services, it is useful to have figures that represent the actual costs of those services.

Objective: Study the unit cost of rehabilitation.

Material and Method: The data were collected from March to December 2006. Three hundred twenty seven patients from nine collaborating centers, including 18 patients from Sirindhron National Medical Rehabilitation Center (SNMRC) participated in this study. Descriptive analysis produced results in percent, mean standard deviation, and *p*-value. One unit of rehabilitation treatment is equal to twenty minutes.

Results: The average unit cost of rehabilitation treatment among the nine collaborating centers was 94.56 units per week and 33.78 from rehabilitation nursing. At SNMRC, the average rehabilitation unit was 32.67 units per week and the cost for rehabilitation was 11,170.56 ± 5641.73 baht.

Conclusion: The calculated unit cost was 60 baht/20minutes service time.

Keywords: Unit cost, Stroke rehabilitation

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Sirindhron National Medical Rehabilitation Center (SNMRC) is the national medical rehabilitation center in Thailand. Stroke is the main cause of disability⁽¹⁾ seen. Eighty percent of stroke patients have neurological impairment and need rehabilitation. Medical rehabilitation care in hospital is provided by a team composed of a physiatrist, rehabilitation nurse, physical therapist, and occupational therapist. In the present study, "unit cost" refers to the expense per unit of treatment; currently the national insurance allocates 150 baht per visit for out-patient treatment. One unit is equal to twenty minutes of service time provided by the rehabilitation professional. The principle is that the patient should receive rehabilitation directly from the professionals all the time⁽²⁾. Previous

research, such as Kongkert's studies at SNMRC were based on financial principals for calculating rehabilitation cost. Both indirect and direct rehabilitation services were included in the calculations for average cost per patient. The present study presents the rehabilitation cost at SNMRC and at seven university hospitals, one national rehabilitation center, and one Neurological Institute.

Hospitals and rehabilitation centers are expected to use resources to provide effective rehabilitative services at minimum cost. The demands of patients and their families for the best care and state of the art services are increasing while resources remain limited. Cost containment is also an important issue in health care reform. Efficient cost management requires precise information on actual unit-of-service costs. Thus, the authors aimed to collect data on many rehabilitation service units and calculate the expenditure on each patient during rehabilitation admission

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(patient service). Previous studies have calculated the total cost during admission in the hospital even though some of these patients may not receive rehabilitation services. Some patients may have acute medical conditions that require a longer hospital stay. Results from the present study may be useful in providing evidence-based data for government policy/fiscal planning on rehabilitation services.

Objective

The primary objective of the present study was to determine whether the current allowance of 150 Baht per visit is sufficient for the rehabilitation of stroke patients.

Material and Method

The present cross-sectional study was a part of the Thai Stroke Rehabilitation Registry (TSRR), a multi-center and hospital-base registry, with data collected prospectively in 2006⁽³⁾. It was approved by the ethics committee on human research of each center and informed consent was obtained from all participating subjects. The present study was conducted between March and December 2006. The eligible subjects were stroke patients aged more than 18 years, who had stable medical signs within 48 hours, could follow one-step commands, could co-operate with the program, and sit without vertigo or dizziness for at least 30 minutes. The exclusion criteria included severe medical conditions, including dementia, uncontrolled heart disease, schizophrenia, and multiple disabilities.

The present study used confidential hospital-based data. Three hundred twenty seven patients, including 18 patients from SNMRC, participated in this study. All patients received services from a rehabilitation team until their progression reached their maximum goal. Units of treatment including medical, nursing, physical therapy, occupational therapy, etc. were collected each day. Other assessments used were Thai mini-mental status examination (TMSE)⁽⁴⁾, World Health Organization quality of life brief (WHOQOL-BREF)⁽⁵⁾, Hospital Anxiety and Depression Scale (HADS)⁽⁶⁾, Barthel score⁽⁷⁾, Brunnstrom stage. The expenditure in rehabilitation and non-rehabilitation were collected separately. Unit cost was calculated from the collecting data.

Statistical analysis

The data was presented in mean, standard deviation, p-value, and percents. The comparison between SNMRC and multi-center data was performed

by using Chi-square test, Independent t-test and Pair t-test.

Results

All data was analyzed by the Data Management Unit, Faculty of Tropical Medicine, Mahidol University. The ratio of male: female SNMRC subjects was 3:1 (multi-center = 3:2). Average age of subjects of multi-center was higher than SNMRC (+ 6 yrs). Cause of stroke was equal between infarction and hemorrhage at SNMRC (multi-center; infarction > hemorrhage = 2.6: 1.2). The data on principal supporter, TMSE score and average hospital stay were not different.

The QOL score on admission of patients at SNMRC was statistically significantly higher than the score of those at multi-center but the score at discharge showed no difference. The HADS and Barthel score was not statistically significantly different on admission and discharge. Brunnstrom Stage was not statistically significantly different at admission while the score at discharge of multi-center was higher (+ 1-1.5).

Total rehabilitation cost of SNMRC was higher than those at the multi-center but the difference is not statistically significant. The cost for occupational therapy at SNMRC was higher than those of the multi-center. The cost for the services of rehabilitation physicians, physical therapists, nursing, occupational therapists and speech therapists at SNMRC and the multi-center was not statistically significantly different. With regard to non-rehabilitation costs including drug, lab and bed costs, and costs at other hospitals was higher than SNMRC (+ 11,528.26 baht).

Time for service of patients at the multi-center was greater than that of SNMRC. The authors were unable to compare time of rehabilitation psychologist and social worker because SNMRC have no personal in charge.

Discussion

SNMRC shows differences in sample size, average ages, cause of stroke, average hospital stay, and TMSE score (Table 1). Because SNMRC patients were in the sub-acute phase, it was essential that the patients be able to follow one-step commands such as raise the sound hand. All patients who were unable to live normal lives due to inabilities to perform normal daily task, should be provided with caregivers. Patients' families should be included in all aspects of rehabilitation programs, including provision of home-care and basic physiotherapy, where possible. Multi-centers usually service acute phase stroke patients. When the

Table 1. Characteristics of stroke subjects evaluated for inclusion

	Multi center		SNMRC		p-value
	No.	percents	No.	percents	
Number of subjects	309		18		0.24
Male	180	58.3	13	72.2	
Female	129	41.7	5	27.8	
Average age (yr)	62.5 (12.1)		56.6 (12.3)		
Cause of stroke					0.28
Infarction	224	72.5	10	55.6	
Hemorrhage	84	27.2	8	44.4	
Not known	1	0.3	-	-	
Principal supporter					0.026
Family support					
None	1	0.3	1	5.6	
Spouse	146	47.2	6	33.3	
Sibling	125	40.5	7	38.9	
Offspring	22	7.1	1	5.6	
Parent	5	1.6	1	5.6	
Caregiver	10	3.2	2	11.1	
	Mean	SD	Mean	SD	
Average age (yr)	62.57	12.06	56.61	12.33	0.043*
Average hospital stay (week)	4.30	2.49	5.67	2.06	0.023*
TMSE score	20.39	7.30	18.89	7.81	0.400

authors compared the present study with the Watchara study⁽⁸⁾ at SNMRC in 1995-1999, the causes of stroke and gender ratio were the same. On admission, there was no significant difference between HADS, Barthel, and Brunnstrom score of SNMRC with multi-center. SNMRC seem to have a higher QOL score than multi-center compared with the sub-acute period, and patients receiving short-term rehabilitation. At discharge, score data was not different because the patients had reached the goal (Table 2)^(9,10). In previous studies in Thailand and other countries, the assessment of patients should measure personal and environmental factors simultaneously. The assessment example refers to functional ability, Quality of Life Index, and satisfaction. Social activities should also be followed-up (Frenchay Activities Index and geriatric health status: SF36) rather than using only daily living measurement activities. As seen in Tables 3 and 4 (total rehabilitation cost and unit), multi-center patients spent more time with physical therapists while those of SNMRC spent more time with occupational therapists. Multi-center patients spent more time under nursing care, in bed. This may explain why the total non-rehabilitation cost of multi-centers was higher than SNMRC costs. The rehabilitation cost at SNMRC is $11,170.56 \pm 5641.73$ baht.

Compared with the Watchara study⁽¹¹⁾ that found a rehabilitation service cost of 22,140 baht in 1999, the authors cost per hospital visit was 1,089 baht, with an Operating Unit Cost of in-patient units of 18,080 baht/patient and 890 baht/day. As noted in the present study, a rehabilitation unit is 32.67unit/week and the average hospital stay was 5.67 weeks. The total cost/rehabilitation unit was 60 baht/unit at SNMRC. Each multi-center rehabilitation unit is 94.56 unit/week, but 33.78 for nursing units. The authors decided to use the SNMRC data to represent rehabilitation cost because they are direct rehabilitation services. However, SNMRC data is not sufficient to calculate validity; the authors must collect more data to calculate narrow standard deviation⁽¹²⁻¹⁴⁾. In previous studies, rehabilitation services varied by type of program and expenditure⁽¹²⁾. Roderick in 2001 reported that hospital rehabilitation programs had no statistically significant difference from home rehabilitation programs, because social expenditure was equal to hospital expenditure. To determine which program is most appropriate, the provider should consider suitability for each service unit. The authors suggest that each rehabilitation service should calculate the benefit of cost. The unit cost program may or may not be suitable for every hospital.

Table. 2 Assessment score at hospital admittance and following discharge from study

QOL			Mean	SD	n	p-value
Physical	SNMRC	admit	20.65	4.015	17	0.911
		discharge	20.76	3.882	17	
	Multi-center	admit	17.93	3.749	278	<0.001*
		discharge	21.45	3.653	278	
Psycho	SNMRC	admit	20.29	2.974	17	0.900
		discharge	20.41	4.331	17	
	Multi-center	admit	17.98	3.835	278	<0.001*
		discharge	20.32	3.381	278	
Social	SNMRC	admit	9.82	1.380	17	0.805
		discharge	9.88	1.166	17	
	Multi-center	admit	8.95	2.323	265	<0.001*
		discharge	9.65	2.051	265	
Environment	SNMRC	admit	27.53	3.859	17	0.285
		discharge	26.59	5.063	17	
	Multi-center	admit	24.29	4.194	278	<0.001*
		discharge	26.22	3.985	278	
QOL 1	SNMRC	admit	2.94	1.197	17	0.163
		discharge	3.18	1.074		
	Multi-center	admit	2.44	0.984	278	<0.001*
		discharge	3.22	0.823	278	
QOL 26	SNMRC	admit	3.41	0.507	17	1.000
		discharge	3.41	0.507	17	
	Multi-center	admit	2.88	0.893	278	<0.001*
		discharge	3.39	0.751	278	
HADS			Mean	SD	n	p-value
Anxiety	SNMRC	admit	6.06	3.112	17	0.554
		discharge	6.47	3.793	17	
	Multi-center	admit	7.71	3.934	234	<0.001*
		discharge	5.73	3.177	234	
Depress	SNMRC	admit	7.41	3.447	17	0.385
		discharge	6.82	3.909	17	
	Multi-center	admit	8.94	4.171	234	<0.001*
		discharge	7.07	3.874	234	
Barthel index			Mean	SD	n	p-value
Barthel index	SNMRC	admit	5.72	2.927	18	<0.001*
		discharge	13.28	4.099	18	
	Multi-center	admit	7.58	3.990	309	<0.001*
		discharge	13.27	4.908	309	
Brunnstrom stages			Mean	SD	n	p-value
Arm	SNMRC	admit	2.33	0.907	18	0.029*
		discharge	2.67	1.029	18	
	Multi-center	admit	2.82	1.645	309	<0.001*
		discharge	3.37	1.646	309	
Hand	SNMRC	admit	2.28	0.826	18	0.104
		discharge	2.50	0.857	18	
	Multi-center	admit	2.59	1.729	309	<0.001*
		discharge	3.12	1.770	309	
Leg	SNMRC	admit	2.28	0.958	18	0.016*
		discharge	2.72	1.179	18	
	Multi-center	admit	2.88	1.409	309	<0.001*
		discharge	3.65	1.451	309	

Table 3. The average total expenditure per patient (Baht)

Total cost per patient	SNMRC		Multi-center		p-value
	Mean	SD	Mean	SD	
Drug	449.94	893.51	4,266.83	6,477.08	0.013
Lab	362.50	443.89	2,307.77	3,050.24	0.007
Bed	6,525.44	6,526.37	10,902.45	14,061.03	0.018
Rehabilitation Physician (RP)	168.89	706.62	144.84	512.34	0.851
Physical Therapist (PT)	1,612.56	1,360.64	2,215.66	2,490.63	0.100
Occupational Therapist (OT)	4,423.33	2,748.25	1,290.08	1,281.39	<0.001*
Nursing	4,346.67	2,653.13	3,086.18	4,593.97	0.251
Speech Therapist (ST)	155.56	339.94	200.21	454.76	0.683
Social worker (SW)	0	0	0.69	11.76	0.803
Rehabilitation Psychologist (RPs)	0	0	55.71	124.90	<0.001*
Others	1,118.75	815.01	2,810.23	9,813.12	0.627
Total cost of rehabilitation care	11,170.56	5,641.73	8,545.39	7,690.36	<0.001*
Total cost of non-rehabilitation care	7,337.89	6,776.65	18,866.15	19,403.31	0.155
No. of patient	18		309		

Table 4. Total unit is used in each patient

Unit	SNMRC		Multi-center		p-value
	Mean	SD	Mean	SD	
Rehabilitation Physician; RP	2.72	10.161	4.75	3.719	<0.001*
Physical Therapist; PT	10.72	20.418	18.16	15.100	<0.001*
Occupational Therapist; OT	9.17	20.584	11.69	7.461	0.007
Nursing	9.64	5.509	63.39	30.814	<0.001*
Speech Therapist; ST	0.421	0.7441	0.600	1.2156	0.029
Social worker; SW	0	0	0.27	0.611	<0.001*
Rehabilitation Psychologist; RP	0	0	0.42	0.931	<0.001*
Other	10.150	11.4771	1.929	1.7033	<0.001*

* Significant at p-value = 0.05

Conclusion

The total rehabilitation cost at SNMRC is 11,170.56 ± 5641.73 baht. Each rehabilitation unit is 32.67units/week. Unit cost is 60 baht/unit.

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หน่วยค่าใช้จ่ายในการฟื้นฟูสมรรถภาพทางการแพทย์ของโรคหลอดเลือดสมอง

ยิ่งสุมาลย์ อัจจงค์, ณัฐเศรษฐ์ มนินนากร, วิไล คุปต์นิรติศัยกุล, ศุภิพันธ์ ไสลินดา, ประภา ยีเฮ็ง

ค่าใช้จ่ายในการฟื้นฟูที่เกิดที่สถานบริการเป็นส่วนหนึ่งของค่าใช้จ่ายที่เกิดขึ้นเมื่อผู้ป่วยอยู่ในโรงพยาบาล ค่าใช้จ่ายทั้งหมดไม่สามารถเป็นตัวแทนของค่าใช้จ่ายของการฟื้นฟูได้ เมื่อพิจารณาการกระจายเงินกองทุนต่าง ๆ สำหรับการบริการฟื้นฟู การได้มาซึ่งหน่วยค่าใช้จ่ายสำหรับบริการฟื้นฟู ดังกล่าวจึงเป็นประโยชน์ ในการศึกษาวิจัยมีวัตถุประสงค์เพื่อหาหน่วยค่าใช้จ่ายสำหรับบริการฟื้นฟู โดยกำหนดหนึ่งหน่วยการให้บริการฟื้นฟูเท่ากับ 20 นาที ข้อมูลเก็บตั้งแต่เดือนมีนาคมถึงธันวาคม พ.ศ. 2549 ผู้ป่วยทั้งหมด 327 คนจาก 9 สถาบันที่ร่วมงานวิจัย โดยเป็นผู้ป่วยในศูนย์สรีรวิทยาเพื่อการฟื้นฟูสมรรถภาพทางการแพทย์แห่งชาติ 18 คน การศึกษาเชิงพรรณนาบอผลเป็นร้อยละ ค่ากลาง ค่าเบี่ยงเบนมาตรฐาน และค่านัยสำคัญทางสถิติ หน่วยค่าใช้จ่ายเฉลี่ยของบริการฟื้นฟูของ 9 สถาบันเท่ากับ 94.56 หน่วยต่อสัปดาห์ และ 33.78 เป็นหน่วยที่เกิดการฟื้นฟูทางการแพทย์ ขณะที่ศูนย์สรีรวิทยาเพื่อการฟื้นฟูฯ มีหน่วยค่าใช้จ่ายการฟื้นฟูเท่ากับ 32.67 หน่วยต่อสัปดาห์และค่าใช้จ่ายในการฟื้นฟูเท่ากับ $11,170.56 \pm 5,641.73$ บาท คำนวณเป็นค่าใช้จ่ายต่อหน่วยได้เท่ากับ 60 บาทต่อ 20 นาทีที่ให้บริการฟื้นฟู
