

Outcomes of Short-Course Inpatient Stroke Rehabilitation Program in Tertiary Hospital: A Pilot Study

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Background: Stroke is one of the most common cause of disabilities in Thailand. Full-course comprehensive rehabilitation to achieve maximum goal for each patient was uncommon in secondary and tertiary hospitals because of limited resources and budget, so short-course inpatient stroke rehabilitation program was developed for service in these circumstances.

Objective: To evaluate the efficiency and cost of the short-course inpatient stroke rehabilitation in Maharat Nakhon Ratchasima Hospital.

Material and Method: This prospective study included stroke patients with aged over 18 years old, able to follow one-step command and admitted in rehabilitation ward for short-course rehabilitation program between January 1 and December 31, 2014. Patient's characteristic data, Barthel Index (BI) scores, BI effectiveness, BI efficiency, length of stay (LOS), Thai Hospital Anxiety and Depression Scale (THAI HADS), WHOQOL-BREF-THAI, cost, and details of training were recorded.

Results: Fifty stroke patients were included in the present study. The mean interval from onset of stroke to admission for this program was 29.9 days (1-143, SD 31.18). The mean age was 57 years (19-86, SD 12.7). Seventy-two percent of cases were ischemic stroke. The impairments of the patients were hemiparesis (100%), aphasia (36%), dysarthria (32%), incontinence (14%), cognitive problem or neglect (12%), and dysphagia (10%). The mean LOS was 9.38 days (3-27, SD 5.31). Mean BI score on admission and at discharge were 8.12 (0-18, SD 4.52) and 13.12 (2-20, SD 4.28). The mean of BI score change was 5 (2-10, SD 2.25). The BI efficiency was 0.56 points/day. Eight cases (22%) had anxiety and 10 cases (28%) had depression. The mean total cost was 7,729 baht (1,828-22,450, SD 4,330) or about 240 US dollar.

Conclusion: The short-course inpatient rehabilitation program could improve functional ability in stroke patients with low cost but high efficiency. This program is suitable for subacute stroke patients in hospitals with limited resources and budget.

Keywords: Stroke, Rehabilitation, Treatment outcome

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Stroke is one of the most common cause of disabilities⁽¹⁾. Rehabilitation programs that aim to improve function and decrease disabilities were proposed in stroke guideline⁽²⁾. Many previous researches showed rehabilitation could improve function, quality of life with cost effectiveness⁽³⁻⁸⁾. The Thai Stroke Rehabilitation Registry (TSRR) studied in stroke patients at nine tertiary hospitals including six university hospitals, and found that inpatient stroke rehabilitation helps to improve function, decrease anxiety, depression, and improve quality of life^(3,5,6). Subacute stroke is the best period for rehabilitation^(6,7). In Thailand, there are some limitations of rehabilitation service in subacute comprehensive rehabilitation.

There are only few rehabilitation wards in secondary and tertiary hospitals outside Bangkok. Maharat Nakhon Ratchasima Hospital is the 1,300 patient's beds tertiary hospital in northeastern part of Thailand. Rehabilitation ward has 12 beds for patients who need comprehensive rehabilitation training by an interdisciplinary team, which consists of physiatrists, rehabilitation nurses, physical therapists, occupational therapists, and speech-language pathologist. There are about 3,000 stroke patients admitted in Maharat Nakhon Ratchasima Hospital each year⁽⁹⁾. Full-course inpatient rehabilitation programs for stroke patients to achieve maximum goal could not be possible in 12 beds rehabilitation ward, so short-course inpatient stroke rehabilitation in subacute phase has been developed for service in this limited circumstance. The purpose of the present study was to evaluate the outcomes of the short-course inpatient stroke rehabilitation program in Maharat Nakhon Ratchasima Hospital.

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Material and Method

The present prospective study was approved by the Ethics Committee of Maharat Nakhon Ratchasima Hospital. The data were recorded in all stroke patients admitted in rehabilitation ward for short-course inpatient stroke rehabilitation program between January 1 and December 31, 2014. The inclusion criteria were aged over 18 years old, able to follow one-step command, had impairment that need rehabilitation, had stable vital signs, and started this program not later than six months from onset of stroke. The exclusion criteria were patients who had serious complications, cognitive impairments or other causes that made patients could not cooperate with rehabilitation program. The patient's characteristic data recorded included age, sex, diagnosis, and interval from onset of stroke to start of this program, comorbidities, treatment in acute phase, stroke-related impairments, complications during hospitalize, length of stay (LOS), and costs (medicine, lab, rehabilitation training, nursing, bed, and others). Rehabilitation in each program (physical therapy, occupational therapy, and speech-language therapy) was recorded included time, sessions, and details of treatment.

The functional level of all patients was evaluated using Barthel Index (BI) scores⁽¹⁰⁾. It was categorized in five levels, very severely disabled (score 0-4), severely disabled (score 5-9), moderately disabled (score 10-14), mild disabled (score 15-19), and independently (score 20). BI on admission and discharge were collected and calculated for BI effectiveness (the difference of BI on admission and at discharge) and BI efficiency (BI effectiveness/LOS)⁽³⁾.

Anxiety and depression were evaluated using Thai Hospital Anxiety and Depression Scale (THAI HADS)⁽¹¹⁾. It has 14 items, which seven items of odd number represents anxiety and the other seven items of even number represents depression. The score range from 0 to 21 for each dimension. The patients who had a score greater than 11 for each dimension were considered as having anxiety or depression. Quality of life was evaluated using WHOQOL-BREF-THAI⁽¹²⁾. WHOQOL-BREF-THAI is a 26 items self-report subjective questionnaire. It has four domains, which are physical health, psychological health, social relationship, and environment satisfaction. The questionnaires were evaluated using 5-point Likert scale ranging from 1 to 5. The scores were categorized in three levels, which are high, middle, and low quality of life in each domain. Higher score represents higher quality of life. In the present study, THAI HADS and

WHOQOL-BREF-THAI were collected once during admission because of short LOS. If the patients had abnormal THAI-HADS, psychological intervention will be performed.

The short-term goal setting and training duration of each patient were discussed by physiatrist, patients, and their family in the first day of the short-course stroke inpatient rehabilitation program. All patients received conventional stroke rehabilitation programs as needed. Physical therapy, occupational therapy, and speech-language therapy were performed without any intervene. The patients were discharged when short-term goals were reached instead of maximum goals were reached as in full-course comprehensive rehabilitation program. During follow-up period, the patients might be readmitted for rehabilitation if they still had impairments that need rehabilitation.

The data were compared between the present study and the TSRR⁽³⁾, which represent full-course comprehensive rehabilitation program in Thailand.

Statistical analysis

Descriptive analysis was used in patient's characteristic data, THAI HADS, WHOQOL-BREF-THAI, BI scores, LOS, cost, and rehabilitation training. BI scores were compared between BI on admission and at discharge by paired t-test with *p*-value was set at 0.05 for significant difference.

Results

Fifty stroke patients were included in the present study. The clinical characteristics of the patient population were shown in Table 1. The mean interval from onset of stroke to start the short-course inpatient stroke rehabilitation program was 29.9 days (1-143, SD 31.18). The mean age was 57.14 years (19-86, SD 12.7). Fifty-six percent were male gender. Seventy-two percent of the patients were ischemic stroke and 28% were hemorrhagic stroke. All patients who had surgical treatment were hemorrhagic stroke. Comorbidities of the patients were hypertension (66%), dyslipidemia (30%), diabetes mellitus (16%), heart disease (8%), and epilepsy (8%). Nine patients (18%) had a history of previous stroke. The stroke-related impairments were hemiparesis (100%), aphasia (36%), dysarthria (32%), incontinence (14%), cognitive problem or neglect (12%), and dysphagia (10%). No complication was detected during admission for the present program.

The functional outcomes, LOS, and cost of the present study compared with the TSRR⁽³⁾ were shown in Table 2. The mean BI scores on admission

Table 1. Clinical characteristics of the patient population (n = 50)

Characteristics	Value
Age (years), mean (min-max)	57 (19-86)
Gender: male, n (%)	28 (56)
Interval from onset of stroke to admission (days), mean (min-max)	29.9 (1-143)
Diagnosis, n (%)	
Ischemic stroke	36 (72)
Hemorrhagic stroke	14 (28)
Treatment, n (%)	
Non operative	46 (92)
Operative	4 (8)
Comorbidities, n (%)	
Hypertension	33 (66)
Dyslipidemia	15 (30)
Previous stroke	9 (18)
Diabetes mellitus	8 (16)
Heart disease	4 (8)
Epilepsy	4 (8)
Atrial fibrillation	3 (6)
Psychiatric disorder	1 (2)
Stroke-related impairments, n (%)	
Hemiparesis	50 (100)
Aphasia	18 (36)
Dysarthria	16 (32)
Incontinence	7 (14)
Other cognitive problem/neglect	6 (12)
Adhesive capsulitis	6 (12)
Dysphagia	5 (10)
Shoulder subluxation	4 (8)
Complex regional pain syndrome (reflex sympathetic dystrophy)	4 (8)
Pressure ulcer	1 (2)
Complication during admission for this program, n (%)	0 (0)
Depression (THAI HADS), n (%)	10 (27.8)
Anxiety (THAI HADS), n (%)	8 (22.2)

THAI HADS = Thai Hospital Anxiety and Depression Scale

and at discharge were 8.12 (0-18, SD 4.52) and 13.12 (2-20, SD 4.28) respectively. The scores at discharge was significantly higher than the admission scores (p -value <0.001). The effectiveness of the present program (discharge BI scores-admission BI scores) was 5 (2-10, SD 2.25). The efficiency of the present program was 0.56 points/day. The mean LOS was 9.38 days (3-27, SD 5.31).

Concerning about the emotion and quality of life of the patients, 14 patients could not be evaluated with THAI HADS and WHOQOL-BREF-THAI questionnaires because of communication or cognitive impairments. Eight from 36 patients (22.22%) had anxiety and 10 patients (27.78%) had depression. The mean anxiety score was 7.22 (0-17, SD 4.21) and the mean depression score was 8.06 (0-14, SD 3.55). The mean WHOQOL-BREF-THAI score was 79.57 (53-102, SD 11.19). Most of the patients (88.57%) were in middle level, 2.86% in high level, and 8.57% in low level of quality of life.

The mean cost of rehabilitation admission was 7,729 baht (1,828-22,450, SD 4,330) or about 240 US dollar. The cost per day was 910 baht (255-2,397, SD 417). The average training time was 619.74 minutes (85-1,900, SD 387). The average training session was 12.6 sessions (2-32, SD 7.27). The average day which patients received training was 6.52 days (1-16, SD 3.45). The average training sessions in each program were 6.43 (1-16, SD 3.48) of physical therapy, 5.48 (1-16, SD 3.38) of occupational therapy, and 1.17 (1-4, SD 1.04) of speech-language therapy. The average training time in each session were 51.47 minutes (35-73, SD 9.59) of physical therapy, 47.27 minutes (25-69, SD 10.65) of occupational therapy, and 28.14 minutes (17-40, SD 5.97) of speech-language therapy.

Discussion

The aim of short-course inpatient stroke rehabilitation program was to provide rehabilitation

Table 2. Barthel index (BI) score and LOS comparing between this study and the TSRR⁽³⁾, mean (SD)

	Present study	TSRR
Admission BI score	8.12 (4.52)	7.48 (3.96)
Discharge BI score	13.12 (4.28)	13.27 (4.86)
Effectiveness (discharge BI score-admission BI score)	5.00 (2.25)	5.79 (3.89)
Efficiency (change score/LOS)	0.56 (0.33)	0.28 (0.30)
LOS (days)	9.38 (5.31)	27.00 (18.00)
Cost (Baht)	7,729 (4,330)	28,399 (22,511)

TSRR = Thai Stroke Rehabilitation Registry; LOS = length of stay

training in limited resources. To our knowledge, the present study was the first, showing outcomes of this program in Thailand. The mean age of the study group was 57 years, 72% were ischemic stroke, and 18% had previous stroke. These data were consistent with the previous study by TSRR, which conducted in the year 2006 in Thailand^(3,5). Approximately 10% of patients had incontinence, cognitive problem or neglect, adhesive capsulitis, dysphagia, and shoulder subluxation, which is similar from the study of Kuptniratsaikul et al⁽¹⁴⁾. No complication was detected during admission for this program, which is different from the previous study of Kitisomprayoonkul et al⁽¹⁵⁾. They found some complications such as urinary tract infection (17.8%), pneumonia (4.2%), cardiovascular complications (4.2%), falls (4.2%), and upper GI bleeding (3.2%) happened during full-course comprehensive rehabilitation program.

Regarding the functional outcomes, the present study showed improved BI score after this program significantly. The authors compared the results of the present study with the TSRR⁽³⁾ as shown in Table 2. The interval from stroke onset to start rehabilitation in the present study (29.9 days) was similar to the TSRR⁽³⁾ (24 days). There were slightly higher BI scores on admission and lower BI scores at discharge in the present study that resulted in lower BI effectiveness when compared with the TSRR. However, the present study had significantly shorter LOS that resulted in higher BI efficiency. The total cost of this program was 7,729 baht, which cheaper when compared with 28,399 baht in the TSRR⁽¹⁶⁾ and 18,507 baht in Sirindhron National Medical Rehabilitation Centre (SNMRC)⁽¹⁷⁾.

Most of the patients in the present study were in middle level of quality of life. The mean WHOQOL-BREF-THAI scores in each domain and overall scores were comparable with the study of Piravej et al⁽⁶⁾. Because of short LOS, the present study could not demonstrate the improvement of quality of life after rehabilitation training. Concerning about the abnormal emotional impairments, the present study showed lower anxiety (22%) and depression (28%) when compared with the TSRR⁽³⁾. Abnormal mood may affect recovery, rehabilitation participation, and outcomes⁽¹⁸⁾. Psychological problems should be considered in stroke patients during rehabilitation.

The training durations of the present program were about 255 minutes per week for physical therapy and 235 minutes per week for occupational therapy, it is slightly higher than the previous study⁽¹⁶⁾. There

were smaller number of sessions and shorter duration of speech-language therapy because of limited number of speech-language pathologists in the hospital, which was similar to the previous study⁽¹⁷⁾.

Conclusion

The short-course inpatient rehabilitation program could improve functional ability in stroke patients with low cost but high efficiency. This program is suitable for subacute stroke patients in hospitals with limited resources and budget.

What is already known on this topic?

Rehabilitation in stroke patients helps us to improve functional ability, decreased psychological impairments, long-term complications, and improve quality of life of patients and family. Full-course inpatient stroke rehabilitation was uncommon in almost secondary and tertiary hospitals in ministry of public health.

What this study adds?

The short-course inpatient stroke rehabilitation program could improve functional ability in stroke patients with high efficiency but low cost and short length of stay. This program is suitable for subacute stroke patients in hospitals with limited resources and budget.

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Potential conflicts of interest

None.

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ผลการฟื้นฟูสมรรถภาพผู้ป่วยโรคหลอดเลือดสมองระยะสั้นแบบผู้ป่วยในของโรงพยาบาลระดับตติยภูมิ: การศึกษาเบื้องต้น

รัชวรรณ สุขเสถียร, เยาวลักษณ์ ไชยพันธ์, ฉันทนา รุ่งอยู่ศิริ, ภูวดล เมืองคำ

ภูมิหลัง: โรคหลอดเลือดสมองเป็นสาเหตุของความพิการที่พบบ่อยในประเทศไทย การฟื้นฟูสมรรถภาพอย่างเข้มข้นจนถึงเป้าหมายสูงสุดของผู้ป่วยแต่ละรายยังมีจำกัด ไม่ใช่บริการทั่วไปในโรงพยาบาลระดับตติยภูมิและตติยภูมิเนื่องจากทรัพยากรและงบประมาณมีจำกัด การฟื้นฟูสมรรถภาพระยะสั้นแบบผู้ป่วยในจึงถูกพัฒนาขึ้นเพื่อให้บริการในสถานการณปัจจุบัน

วัตถุประสงค์: เพื่อประเมินประสิทธิผลและค่าใช้จ่ายของการฟื้นฟูสมรรถภาพผู้ป่วยโรคหลอดเลือดสมองระยะสั้นแบบผู้ป่วยในของโรงพยาบาลมหาวิทยาลัย

วัสดุและวิธีการ: เป็นการศึกษาแบบไปข้างหน้าในผู้ป่วยโรคหลอดเลือดสมองที่อายุมากกว่า 18 ปี ทำตามคำสั่งได้อย่างน้อยหนึ่งขั้น นอนรักษาในหอผู้ป่วยเวชกรรมฟื้นฟูสำหรับการฟื้นฟูสมรรถภาพระยะสั้น ระหว่างวันที่ 1 มกราคม ถึง 31 ธันวาคม พ.ศ. 2557 บันทึกข้อมูลทั่วไปของผู้ป่วย, Barthel Index (BI) scores, ประสิทธิภาพและประสิทธิผลของค่า BI, วันนอน, Thai Hospital Anxiety and Depression Scale (THAI HADS), WHOQOL-BREF-THAI, ค่าใช้จ่าย และรายละเอียดการฝึก

ผลการศึกษา: ผู้ป่วยโรคหลอดเลือดสมองจำนวน 50 ราย มีระยะเวลาจากวันที่เป็นโรคหลอดเลือดสมองจนถึงวันเข้ารับการฟื้นฟูสมรรถภาพระยะสั้นเฉลี่ย 29.9 วัน (1-143, SD 31.18) อายุเฉลี่ย 57 ปี (19-86, SD 12.7) 72% เป็นโรคหลอดเลือดสมองตีบตัน ผู้ป่วยทั้งหมดมีภาวะอ่อนแรงครึ่งซีก 36% มีปัญหาการสื่อสารแบบ aphasia 32% พูดไม่ชัด 14% มีภาวะกลืนปัสสาวะไม่ได้ 12% มีปัญหาด้าน cognitive problem หรือ neglect และ 10% มีปัญหาการกลืน กลุ่มศึกษามีวันนอนเฉลี่ย 9.38 วัน (3-27, SD 5.31) คะแนน BI score เฉลี่ยแรกรับและก่อนกลับคือ 8.12 (0-18, SD 4.52) และ 13.12 (2-20, SD 4.28) คะแนน BI มีการเปลี่ยนแปลงเฉลี่ย 5 คะแนน (2-10, SD 2.25) และ BI efficiency คือ 0.56 คะแนนต่อวัน ผู้ป่วย 8 ราย (22%) มีภาวะวิตกกังวล และ 10 ราย (28%) มีภาวะซึมเศร้า ส่วนคะแนน WHOQOL-BREF-THAI เฉลี่ยคือ 79.57 (53-102, SD 11.19) ซึ่งบ่งถึงคุณภาพชีวิตระดับกลางๆ ค่าใช้จ่ายเฉลี่ย 7,729 บาท (1,828-22,450, SD 4,330) หรือประมาณ 240 US dollar

สรุป: ผลการฟื้นฟูสมรรถภาพผู้ป่วยโรคหลอดเลือดสมองระยะสั้นแบบผู้ป่วยในสามารถเพิ่มระดับความสามารถของผู้ป่วยโดยมีค่าใช้จ่ายต่ำแต่ประสิทธิผลสูง การให้บริการฟื้นฟูสมรรถภาพแบบนี้เหมาะสมสำหรับผู้ป่วยโรคหลอดเลือดสมองระยะสั้นที่เจ็บป่วยหนักในโรงพยาบาลที่มีข้อจำกัดด้านทรัพยากรและงบประมาณ
