Relationship between the Ability to Change from a Supine to a Sitting Position at Admission and Mobility Outcomes after Stroke Rehabilitation

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Background: *Regarding observations, stroke patients able to change their basic body position from supine to sitting at admission usually could walk by the end of rehabilitation. However, there was not yet supported by any research evidence.*
Objective: *To study the relationship between the patient's ability at admission to change basic body position from a supine to a sitting position and the mobility outcome after stroke rehabilitation.*
Material and Method: *Data were gathered and analyzed from the case record forms (including the Barthel ADL Index assessment sheets) of 327 stroke patients in nine tertiary in-patient rehabilitation settings in Thailand between March and December 2006.*
Results: *On admission, 58.7% of the patients were able to change their basic position from supine to sitting. At the end of rehabilitation, the group which was able to sit had a higher mobility sub-score (OR = 6.15; 95% CI 3.24 -11.67) and total Barthel ADL index score (OR = 9.64; 95% CI 5.74-16.18) than the group which was unable to sit.*
Conclusion: *The ability at admission to change from a supine to a sitting position was significantly related to a better mobility outcome after stroke rehabilitation.*

Keywords: *Stroke, Rehabilitation, Mobility, Functional outcomes*

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After acute stroke, medically stable stroke survivors with significant impairments and disabilities are usually referred for stroke rehabilitation. The initial rehabilitation assessment is necessary as it may reveal some positive and negative prognostic factors that help in predicting rehabilitation outcomes. According to previous studies[1-4], negative prognostic factors include a prolonged-onset admission interval, prior stroke, greater age, persistent urinary and fecal incontinence, visuo-spatial deficits, and loss of consciousness at onset, severity of paralysis, poor sitting balance, a low admission ADL score, and level of social support.

According to the authors' observations at stroke rehabilitation admission, patients able to change their basic body position from supine to sitting at admission usually could walk by the end of rehabilitation. There was no research evidence, however, to support the authors' assumption that such ability is a reliable prognostic indicator of a mobility outcome. The authors' objective, therefore, was to investigate the relationship between the ability at admission to change from a supine to a sitting position and mobility outcomes after stroke rehabilitation.

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Materials and Method

Demographic, clinical and rehabilitative data of stroke patients from nine rehabilitation settings participating in the Thai Stroke Rehabilitation Registry (TSRR)[5] were accessed, then analyzed using SPSS version 10. The Chi-square test and logistic regression were used to identify the relationship between the ability at admission to change from a supine to a sitting

position and the mobility outcome, based on the Barthel ADL Index after stroke rehabilitation.

Results

Among the 327 stroke patients, the mean age was 62.24 ± 12.13 years. There were 193 males and 134 females. A total of 192 patients (58.7%) were able to change their basic body position on admission. On admission to rehabilitation the *"able to sit" group* were significantly younger and had less motor impairment (based on the Brunnstrom recovery stage), had no visual deficits or cognitive impairment (based on the Thai Mental State Examination (TMSE) less than or equal to 23 indicating cognitive impairment) (Table 1).

At discharge from rehabilitation, the "*able to sit at admission*" group had a significantly greater proportion of independent and dependent mobility scores (3:0-2) (OR = 6.15; 95% CI 3.24-11.67) and a total Barthel ADL index score (>12: ≤ 12) (OR = 9.64; 95% CI 5.74-16.18) than the "*unable to sit group"* . Moreover, 87% of the *"able to sit"* group, and only 40% of the *"unable to sit"* group, had good functional outcomes

Table 1. Demographic data and body function impairments of stroke patients on admission to rehabilitation (n = 327)

Variables	Able to sit	Unable to sit	p-value
Age (60 or less / over 60 years old)	101/91	45/90	0.001
Sex (male/female)	119/73	74/61	0.195
Previous stroke (no/yes)	25/167	23/112	0.312
Weakness side (right/left)	104/85	72/57	0.890
Hemianopia (no/yes)	161/11	86/15	0.022
Type of stroke (Hemorrhage/Infarction)	53/138	39/96	0.685
Underlying disease			
Hypertension (no/yes)	53/139	29/106	0.209
Diabetes (no/yes)	149/43	91/44	0.040
Dyslipidemia (no/yes)	91/101	58/77	0.428
Cardiac disease (no/yes)	162/30	106/29	0.175
Visual neglect (no/yes)	167/9	91/14	0.015
Cognitive impairment (no/yes)	93/85	33/83	0.000
Brunnstrom recovery stages* (over 3 / 1 to 3)			
- Arm	64/128	25/110	0.003
- Hand	71/121	25/111	0.000
- Leg	80/112	21/114	0.000

* Motor recovery scoring range from 0 (no recovery) to 6 (normal recovery)

Table 2. Total Barthel ADL Index and mobility scores at discharge (n = 327)

Barthel ADL Index At discharge	Supine to sitting		Odds ratio (95% CI)	p-value
	Able	Unable		
Mobility (score 3 / 0-2)*	76/116	13/122	6.15 (3.24, 11.67)	<0.001
Total Barthel ADL Index score** (over 12 / less than or equal to 12)	159/33	45/90	9.64 (5.74, 16.18)	<0.001

* Mobility score; 0 = immobile, 1 = wheelchair independent, 2 = walks with the help of one person (verbal or physical), 3 = independent but may make use of a walking aid

** Barthel index consists of 10 functional evaluation; bowel, bladder, grooming, toilet use, feeding, transfer, mobility, dressing, stairs and bathing, score range from 0 (dependent in all items) to 20 (totally independent)

(based on a total Barthel ADL index score greater than 12).

Discussion

The present study shows that on admission to rehabilitation, more than half of the authors' stroke patients were able to change their basic body position from supine to sitting and this ability was related to good discharge functional outcomes based on the total Barthel ADL Index score and mobility independence (*i.e.*, those with the admission ability) were six times more likely to walk independently with or without gait aids and nine times more likely to have good functional outcomes (*i.e.*, a total Barthel ADL Index score greater than 12) after rehabilitation than those without such an ability.

Despite the many studies[6-12] showing a correlation between admission ability in maintaining sitting balance and mobility outcome at the end of rehabilitation, changing from supine to sitting is an initial task or step needed before maintaining a sitting position. The latter seems easier to achieve than the former according to the study of Smith and Baer[13], in which 93% of stroke patients had good sitting balance within six days after onset of stroke. Notwithstanding, on initial rehabilitation assessment only 60% of the authors' stroke patients were able to change basic body position from supine to sitting. The present study, therefore, suggest, an initial stroke rehabilitation assessment by physiatrists should include both ability to maintain a sitting position and the ability to change from a supine to a sitting position; *i.e.*, to verify that stroke patients are able to do it without assistance.

Additionally, the ability at admission to change basic body position from a supine to a sitting position was associated with being younger (under 60 years of age), having fewer motor and cognitive impairments and having no visual impairments. These factors enhanced the likelihood of functional recovery after stroke rehabilitation.

Conclusion

The ability to change basic body position from a supine to a sitting position without assistance is a function that could easily be assessed on admission to rehabilitation and would serve as a good predictor of mobility and functional outcomes.

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ความสัมพันธ์ระหว่างความสามารถในการเปลี่ยนท่าทาง และความสามารถทางการเคลื่อนไหวของผู้ป่วยโรคหลอดเลือดสมองหลังการฟื้นฟูสมรรถภาพ

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วัตถุประสงค์*: เพื่อศึกษาความสัมพันธ์ระหว่างความสามารถในการเปลี่ยนท่าทางเมื่อแรกรับกับความสามารถทางการเคลื่อนไหวของผู้ป่วยโรคหลอดเลือดสมองหลังจากการฟื้นฟูสมรรถภาพ*

วัสดุและวิธีการ*: เก็บรวบรวมข้อมูลจากแบบบันทึกข้อมูลของผู้ป่วย โรคหลอดเลือดสมอง ที่เข้ารับการฟื้นฟูสมรรถภาพจาก 9 สถาบัน จำนวน 327 ราย โดยเก็บข้อมูลพื้นฐาน และ ใช้แบบประเมิน Bathel index เพื่อประเมินความสามารถในการทำกิจวัตรประจำวันของผู้ป่วยเมื่อแรกรับและ ก่อนจำหน่ายจากโรงพยาบาลระหว่างเดือนมีนาคมถึงธันวาคม พ.ศ. 2549*

ผลการศึกษา*: เมื่อแรกรับร้อยละ 58.7 ของผู้ป่วยสามารถเปลี่ยนท่าจากนอนเป็นนั่งได้เอง โดยพบว่าเมื่อออกจากโรงพยาบาลผู้ป่วยกลุ่มนี้มีความสามารถทางการเคลื่อนไหวดีกว่า (OR = 6.15; 95% CI: 3.24, 11.67) และมีค่าคะแนน Barthel index สูงกว่า (OR = 9.64; 95% CI: 5.74, 16.18) กลุ่มที่ไม่สามารถลุกขึ้นนั่งได้*

สรุป*: ความสามารถในการเปลี่ยนท่าทางเมื่อเริ่มเข้ารับการรักษาของผู้ป่วยมีความสัมพันธ์กับความสามารถทางการเคลื่อนไหวของผู้ป่วยเมื่อออกจากโรงพยาบาลอย่างมีนัยสำคัญ*