

Economic evaluation of rehabilitation services for inpatient with stroke in 2 regional hospitals in Thailand

Orathai Khiaocharoen
Yot Teerawattananon
Supasit Pannarunothai
Wachara Riewpaiboon

Objectives:

- ◆ To evaluate cost-utility of inpatient rehabilitation for stroke patients under Thai settings

Intervention:

- Inpatient rehabilitation services to stroke patients in the sub-acute and non-acute phase (SNAP)

Utility:

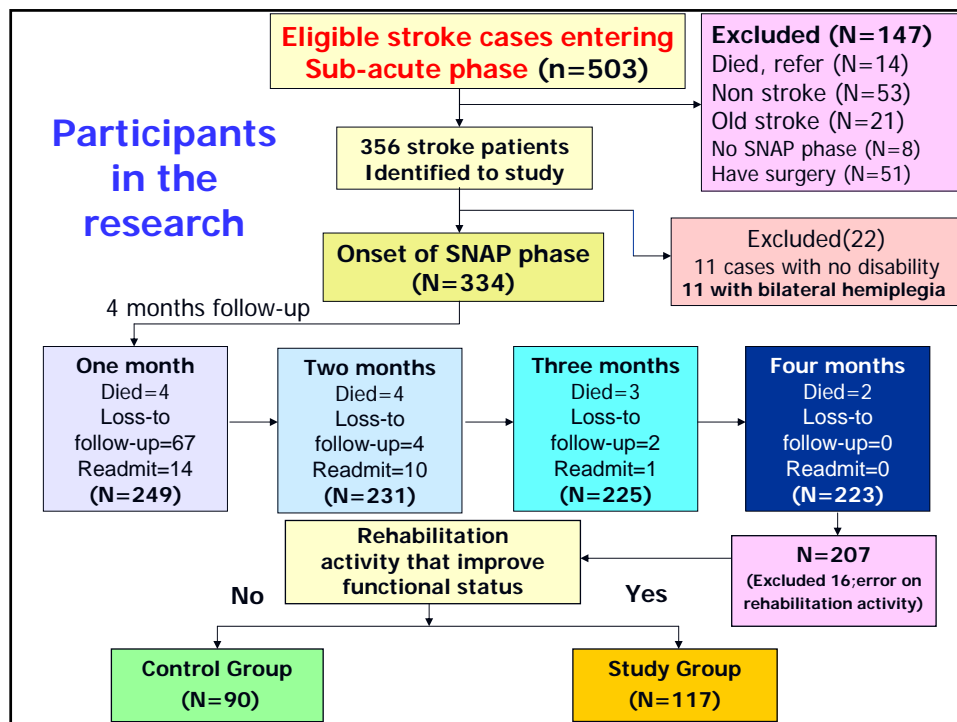
- Improved quality adjusted life year (QALY)

Methodology:

- Study design:
 - Prospective observational cohort study with 4 months follow-up
- Data collection:
 - Cost: societal perspective
 - Outcome:
 - QALY using Euro-Quality of life (EQ-5D)
 - Outcome evaluation schedules:
Admission to sub-acute phase, at discharge, and once a month after discharge up to 4 months

Statistical analysis:

- Descriptive statistics, inferential statistics (χ^2 , t-test)
- Multivariate Analysis of Variance (MANOVA)
- Multiple regression analysis
- Economic evaluation statistics:
 - Quality adjusted life year (QALY)
 - Incremental cost-effectiveness ratio (ICER)
 - Probability sensitivity analysis
 - Acceptability curve



Result:

- Patient characteristics
- Outcome of rehabilitation service
- Cost for stroke
- Cost-utility analysis of rehabilitation

Patient characteristics (1)

N (%)	Control group (N=90)	Study group (N=117)	Total (N=207)
Sex			
Male	53 (58.9%)	67(57.3%)	120(58.0%)
Female	37(41.1%)	50(42.7%)	87(42.0%)
Pathology			
Infarction	45(50.0%)	72(61.5%)	117(56.5%)
Haemorrhage	45(50.0%)	45(38.5%)	60(43.5%)
Initial Barthel- Index score			
Bi score 0-4 (very severe)	30(33.3%)	54(46.2%)	84(40.6%)
Bi score 5-9 (severe)	31(34.4%)	35(29.9%)	66(31.8%)
Bi score 10-14 (moderate)	21(23.3%)	22(18.8%)	43(20.8%)
Bi score 15-19 (mild)	8(8.9%)	6(5.1%)	14(6.8%)
P>0.05			

Patient characteristics (2)

N (%)	Control group (N=90)	Study group (N=117)	Total (N=207)
Cognitive problem			
Has cognitive problems	37(58.9%)	53(54.7%)	117(56.5%)
Good cognitive	53(41.1%)	64(45.3%)	90(43.5%)
Mean (SD)			
Patient's age	60.8 (12.9)	61.1(12.5)	60.9(12.6)
LOS in sub-acute phase*	4.5(5.9)	7.0(8.2)	5.9(7.4)
Baseline utility score*	0.112(0.447)	-0.005(0.371)	0.056(0.409)
* P<0.05			

Intervention: The intensity of rehabilitation activity

Mean (SD)	Control group (N=90)	Study group (N=117)	Total (N=207)
Pt1 exercise**	0.47(1.04)	5.40(6.00)	3.08(5.06)
Pt2 trunk training**	0.69(1.59)	8.61(7.77)	4.88(6.97)
Pt3 walk**	0.25(0.66)	3.36(3.31)	1.90(2.90)
Ot1 exercise**	0.22(0.81)	5.12(8.88)	2.80(6.91)
Ot2 self-care training**	0.10(0.33)	0.83(1.16)	0.49(0.94)
Ot3 cognitive training	0.06(0.27)	0.32(1.89)	0.20(1.39)
Ot4 communication training	0.06(0.27)	0.16(0.56)	0.11(0.45)
Ot5 swallow training	0.03(0.21)	0.21(1.06)	0.13(0.79)

** P<0.01

Outcome: Quality of life (MANOVA)

Multivariate Testsc						
Effect	Statistics	Value	F	Hypothesis df	Error df	Sig.
Intercept	Wilks' Lambda	0.581805	32.34544	2	90	0.000
	Roy's Largest Root	0.718788	32.34544	2	90	0.000
age	Wilks' Lambda	0.33287	1.293981	102	180	0.067
	Roy's Largest Root	1.167687	2.083519	51	91	0.001
snlos	Wilks' Lambda	0.5335	1.277629	52	180	0.122
	Roy's Largest Root	0.451117	1.578911	26	91	0.059
Bi score**	Wilks' Lambda	0.308203	4.006409	36	180	0.000
	Roy's Largest Root	1.669724	8.441381	18	91	0.000
Rehab*	Wilks' Lambda	0.912006	4.341783	2	90	0.016
	Roy's Largest Root	0.096484	4.341783	2	90	0.016

Dependent variable = Utility score from EQ-5D at baseline & Utility score at 4months

Estimating mean of quality of life score:

■ Utility score (Multiple regression)

$$\text{Utility score} = 0.928 + 0.548(\text{Utility score at SNAP}) \\ + 0.220(\text{rehabilitation group}) - 0.008(\text{age})$$

Outcome gained controlled for baseline utility:

Outcome	Control group	Study group	Incremental outcome
Utility score gained in 4 months	0.419	0.672	0.253**
QALY gained	0.140	0.224	0.084**

Sub-acute care cost (Baht) at 4 months follow-up

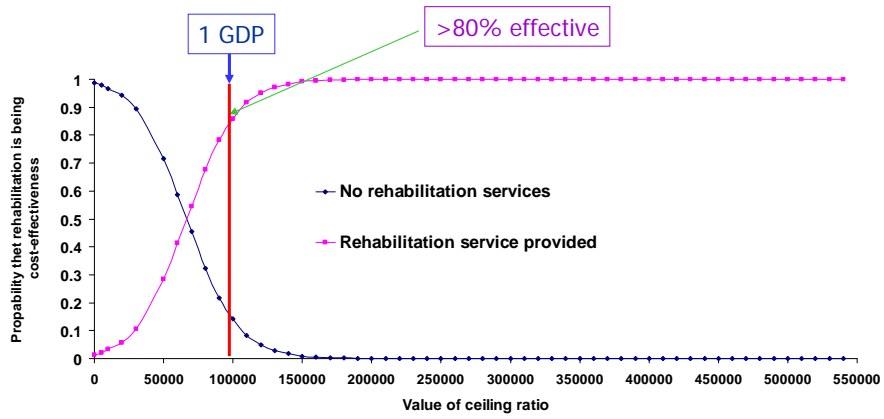
Actual cost, mean(SD)	Control group	Study group	Incremental cost
Hospital cost*	11,401(16,480)	16,993(19,509)	5,593
Patient cost at hospital*	4,114(3,560)	5,830(7,455)	1,716
•Loss working	1,729(2,305)	2,588(5,460)	859
•Foods, transfer cost, accommodations	2,386(2,305)	3,242(3,204)	856
Patient cost after discharge			
Direct medical cost*	6,162(18,460)	4,276(5,433)	-1,886
•Medical cost	4,178(18,172)	2,599(4,242)	-1579
•Alternative medicine	572(1,325)	590(1,450)	18
•Massage	632(1,962)	690(1,112)	58
•Rehabilitation	781(1,356)	397(1,356)	-384
Indirect cost	6,562(10,956)	7,162(10,051)	599
•Loss working	1,395(5,029)	1,056(3,383)	-339
•Foods, transfer cost, accommodations	5,167(8,711)	6,105(8,077)	938
All Patient Cost	16,839(24,037)	17,268(15,354)	429
Societal cost at 4 month	28,240(29,704)	34,262(25,725)	6,021
Societal cost in 1 year	61,918(74,635)	68,798(50,355)	6,879

Economic evaluation
of rehabilitation services between
rehabilitation group and do-nothing group

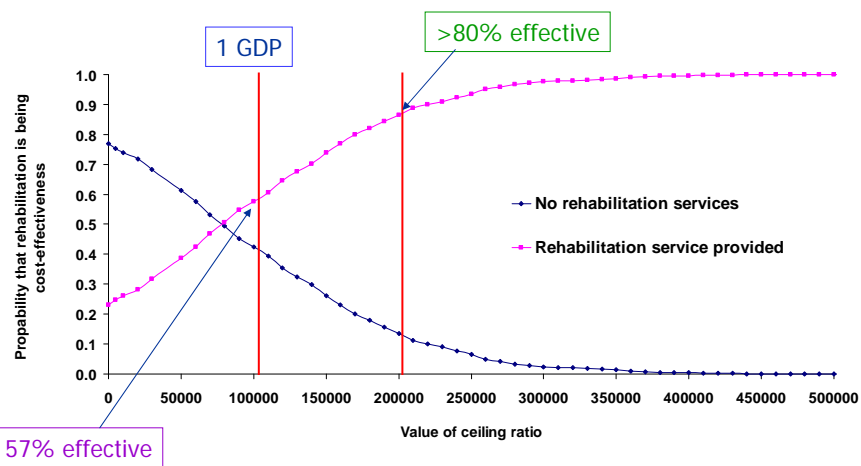
Cost-utility analysis

Do-nothing vs rehabilitation	Government perspective	Societal perspective
Incremental cost at 1 year	5,592	6,880
Incremental QALY gained	0.084	0.084
Baht per QALY gained	66,571	81,905

Acceptability curves using net benefit approach under government perspective



Acceptability curves using net benefit approach under societal perspective



Discussion

- **Methodology:**
 - Randomised controlled trial is considered unethical to compare between rehabilitation and do-nothing.
 - The observational design better represents actual conditions of practice, costs less and takes less time.
 - MANOVA and multiple regression are used to increase validity of outcome estimation from observation study
- **Limitation:**
 - Non-comparability between study and control groups
 - Missing data in acute phase (the severity of stroke), and sub-acute phase (high loss to follow-up 20%)
 - The study area, high number of excluded patients, and study duration

Discussion

- **Findings:**
 - **Outcome:** rehabilitation significantly improved of patient's utility and quality of life
 - **Intervention:** only 43.5 % of stroke patients received rehabilitation services and the intensity of services provided was minimal.
 - **ICER:** in societal threshold, 200,000 Baht per QALY gained was higher than recent recommendation for considering a new technology, but considering only government cost, the cost per QALY gained was lower.

Conclusion

- Rehabilitation is expensive but likely to be more cost-effective by providing better outcomes in terms of reducing disability, maximizing functional ability, and quality of life.

Recommendations

- The policy makers on health system development should consider investing in rehabilitation service delivery system in response to the needs of people with disability.
- More attention should be paid on rehabilitation manpower development in terms of production, distribution and the incentive system.
- These findings are based on the study in 2 regional hospitals. The larger study should include all types of hospitals in Thailand.

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Thank you...

Home