OBSERVATIONAL STUDY

Post-stroke rehabilitation cost with traditional therapy: Evidence from a public hospital

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Abstract

Objective: After surviving from an acute phase of stroke, it is essential for stroke survivors to continue therapies to improve their function and quality of life. The aim of this study was to assess the influence of rehabilitation treatment on the society in economic aspect with evidence from a traditional hospital.

Methods: A prospective cohort study was carried out with patients who were being treated at Traditional Medicine Hospital in Ho Chi Minh City after experiencing a stroke. Patients' relevant medical information was extracted from the hospital's database and placed on a structured questionnaire.

Results: Among 103 eligible patients aged 60.3 ± 11.4 years, 93.2% had experienced a stroke for the first time. Eighty-four patients were diagnosed with ischaemic stroke, while the number of haemorrhagic stroke patients was approximately 4.5 times lower (n = 19). The mean total cost was $3,310.40 USD, which included $1,653.60 USD, $539.90 USD and $1,117.00 USD for direct medical, direct non-medical and indirect cost, respectively. Hospital bed costs accounted for a considerable percentage of direct medical costs (41.0%).

Conclusion: Stroke was determined to be a significant social burden, although patients in this study had already suffered from the acute phase. This study gives decision makers a comparative view about the economic view on the economic burden of the stroke rehabilitation treatment between using traditional national Western and Eastern therapy.

Keywords: Economic cost, Rehabilitation, Stroke, Traditional therapy, Vietnam. (JPMA 69: S-87 (Suppl. 2); 2019)

Introduction

Stroke was found to be the deadliest cardiovascular disease in Vietnam during 2013 and the world's second biggest killer, accounting for more than six million deaths in 2015.[1] Of the three types of stroke such as - ischaemic heart disease stroke, haemorrhagic stroke and transient ischaemic attack (TIA), the ischaemic stroke is the most common at 87%.[2] In addition to its prevalence, stroke is renowned for its abruptness, high mortality and serious sequelae. Despite the fact that advances in the technological and medical treatment of stroke, as well as in the systems for delivering care, have improved stroke mortality rates,[3] many stroke survivors still experience relentless motor symptoms that affect their functional independence in daily life.[4] According to an observation from the Framingham Heart Study of the National Heart, Lung, and Blood Institute in the United States of America (NHLBI), 50% of ischaemic stroke patients who were at least 65 years old had some hemiparesis, 30% were unable to walk without some assistance, 26% were dependent in activities of daily living, 19% had aphasia, 35% had depressive symptoms and 26% were institutionalized in a nursing home.[5]

A 2011 study by Godwin et al. which conducted with 54 patients in five hospitals in Southeast Texas found that the average cost per case of outpatient stroke rehabilitation services (included in physical therapy, occupational therapy, and speech therapy that were delivered in outpatient facilities and in the home) and medications for the first year after inpatient rehabilitation discharge was $17,081 USD (United State Dollars), while the total cost for outpatient expenses such as home healthcare, physician services, drugs, and durable medical equipment in 2010 reached approximately $10.1 billion USD.[6]

Since strokes affect the brain, it is essential for stroke survivors to continue rehabilitation therapies after treatment with the aim of boosting independent movement, because these approaches can help them improve their muscle strength and coordination. In a country like Vietnam with their reputation about traditional therapy, rehabilitation phase using speech therapy, occupational therapy, as well as other experimental therapies, namely massage, acupuncture, herbal therapy, etc can teach patients how to use mobility aids and promote mental and emotional adjustment through. To provide accurate and timely information about the economic impacts of stroke rehabilitation and to estimate the economic burden of stroke recuperation

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with traditional therapy, this study presents the estimates and determinants of specific costs using a societal perspective and based on the findings from a cross-sectional study.

Material/Subjects/Patients and Methods

This study was a prevalence-based cost-of-illness analysis in 2017 from different perspectives. A cross-sectional approach was conducted to estimate the cost per case and the total expense of stroke rehabilitation in Traditional Medicine Hospital in Ho Chi Minh City, which is one of the leading medical centres in using Eastern therapies serving approximately 1,000 patients' visits every day in Ho Chi Minh City and the surrounding provinces in the middle and south regions of Vietnam.

This study considered inpatients who had been admitted to Ho Chi Minh City Traditional Medicine Hospital between Jan 2017 and December 2017 for treatment of post-stroke, according to ICD-10 (International Classification of Diseases, Tenth Revision) with code I69. All eligible participants voluntarily confirmed their consent and agreement after being informed about the content and objective of the research.

All relevant patient data — comprising general information (age, gender, weight, height, locality and health insurance), medical services and medication used — were entered into the hospital database. This research design and methodology was approved by the ethics committee of the hospital, to allow researchers to access the necessary materials. A questionnaire was constructed to accumulate details from both patients and family members for the purpose of calculating the cost that society incurred due to the direct effect of stroke rehabilitation. The questionnaire consisted of two parts: one to record sociodemographic characteristics (occupation, education, monthly income, the number of strokes suffered and the number of caregivers) and one to record direct non-medical component costs (meals, accommodation and travel). Caregivers were divided into unpaid caregivers (who were family members of the patients) and hired caregivers (who were employed to take care of patients). Researchers also defined the amounts for salary and pension in monthly income, to have an accurate appraisal of each cost element.

Economic burden was computed under patient, payer (health insurance company), hospital and social perspective, respectively.[7] The total cost was sum of the direct medical costs, the direct non-medical costs and indirect costs. All cost values were calculated in Vietnamese Dong (VND) currency, then converted to U.S. dollars by using the exchange rate 22,498 VND = $1 USD.[8]

Direct cost included in direct medical cost and direct non-medical cost. Direct medical cost was calculated from the intervention and unit cost which were extracted from data resources to assess the payment required from patients and health insurance companies. The results would measure cost components by grouping them into imaging diagnosis, laboratory tests, hospital beds, medication, herbal remedies, acupuncture, physical therapy and other costs (oxygen, ambulance, etc.).[9] Regarding direct non-medical cost, based on the answers of patients or their caregivers, accommodation and travelling cost were computed (Figure-1).

This study calculated direct costs according to the following equation:

$$DC = \sum_{k=1}^{p} QI_k . UI_k + \sum_{i=1}^{n} MP_i . LS_i + \sum_{j=1}^{m} MP_j . CD_j + AC + TV$$

The variables n, m and p represented the number of patients, caregivers and interventions.

QI, UI, MP, LS and CD were abbreviations for quantities of interventions, unit cost of intervention, meal cost per day, length of stay and caregivers' nursing day, respectively.

AC represents the accommodation of caregivers, and TV represents the travel costs for patients and caregivers.[9]

Absenteeism was defined as the amount of salary missed because of patients' hospitalization, which was calculated by multiplication between the length of stay (LS) and monthly income (MI). Reduced productivity from non-salary patients was estimated based on expenses per month (EX). The population included retired people and adults who were in the typical workforce age range but who did not have a regular monthly income, such as unemployed workers, housewives, etc. The caregiver burden was computed using a summary of the hired caregivers' income lost because of dropping out of the workforce to provide care. For unpaid caregivers it was calculated by the amount of their salary missed from days off attributed to taking care of post-stroke patients.

The indirect cost was computed by the formula below (Elliott & Payne, 2005)[9]:

$$IDC = \sum_{i=1}^{n} \frac{LS_i . MI_i}{30} + \sum_{i=1}^{n} \frac{LS_i . EX_i}{30} + \sum_{j=1}^{m} \frac{PCD_j . HMI_j}{30} + \sum_{l=1}^{q} \frac{PD_l . CMI_l}{30}$$

The variables n, m and q were the number of patients, paid caregivers and unpaid caregivers.

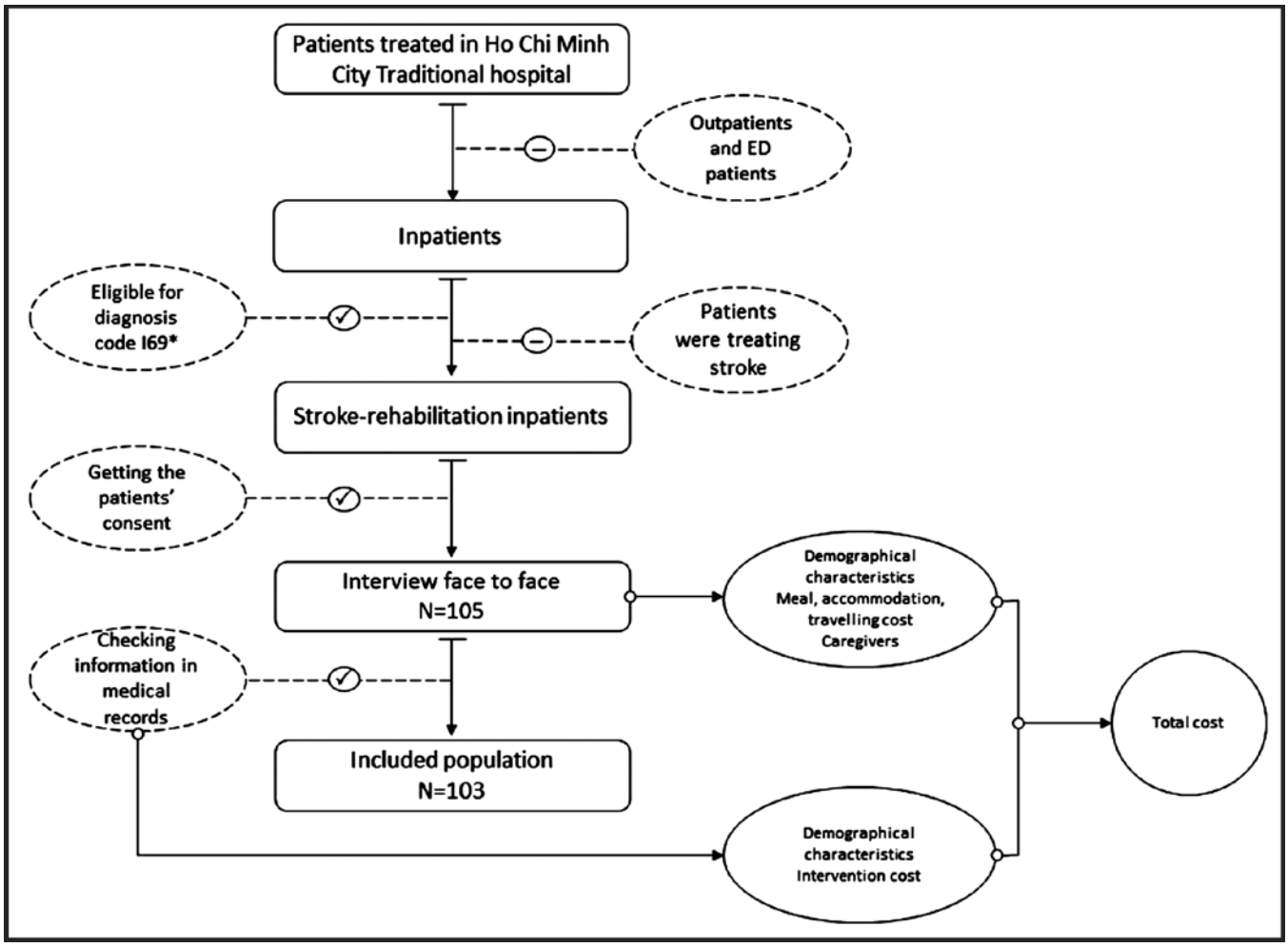

Figure-1: Flowchart of survey design.

LS is an abbreviation for length of stay, MI refers to monthly income and EX refers to expenses.

PCD are PMI are abbreviations for paid caregivers' nursing days and monthly income, respectively; CD and CMI represent unpaid caregivers' nursing days and monthly income, respectively.

Statistical Analysis: Data management and analysis was completed using the statistical software R version 3.4.3. Descriptive statistics handled the output of demographical characteristics. Bootstrap method with 95% CI (confident intervals) was used to control the natural skewness of cost data to increase the accuracy of the average cost per patient. The study applied t-tests and ANOVA when appropriate to evaluate the association between the mean cost and general features (age range, gender, location, education, BMI range, occupation, type of stroke, the number of strokes suffered and the number of comorbidities), which were arranged as categorical variables.

Ethics Statement: The Ho Chi Minh City Traditional Medicine Hospital Ethical Committee reviewed the study protocol, the questionnaire and the information letter for participants, and approved them in 2017 (No. 24/2017/YHCT). Data were analysed anonymously. Verbal informed consent was obtained from all persons that complied with our inclusion criteria and agreed via telephone to participate in the survey. Verbal consent was considered sufficient, as the survey was conducted without any physical or psychological intervention.

Results

Table-1 illustrates the demographic information of after-stroke rehabilitation patients who took part in the survey. It is clearly shown that more than half of the 103

Table-1: Demographic characteristics of post-stroke rehabilitation patients [n=103, n(%)].

Sign	Characteristics	n(%)	Characteristics	n(%)
	Age		Health insurance (%)	
	Mean ± SD[1]	60.3 ± 11.4	48	35 (34.0)
	Median (Q1-Q3)[2]	61 (52-69)	60	4 (3.9)
	Range (Min-Max)	26-81	80	13 (12.6)
A1	<60	46 (44.7)	95	7 (6.8)
A2	≥60	57 (55.3)	1005	44 (42.7)
	Gender		Length of stay (days)	
G1	Male	61 (59.2)	Mean ± SD	137.0 ± 94.6
G2	Female	42 (40.8)	Median (Q1-Q3)	106 (60-215.5)
	Location		Number of caregivers	
L1	Rural	33 (32.0)	None	62 (60.2)
L2	Urban	70 (68.0)	One	33 (32.1)
	BMI range[3]		Two	9 (8.7)
B1	<18.5	4 (4.2)	Comorbidity	
B2	18.5-<23	46 (44.7)	I10[6]	88 (85.4)
B3	23-<27	46 (44.7)	E75, E78[7]	79 (76.7)
B4	≥27	7 (6.4)	I25, I47, I48, I61, I63, I67[8]	70 (68.0)
	Occupation		E11[9]	29 (28.2)
O1	Farmers	18 (17.5)	F06, F28, F48, F51[10]	24 (23.3)
O2	Officers	15 (14.6)	J00, J02, J20, J40[11]	20 (19.4)
O3	Businessman	31 (30.1)	M13, M15, M17, M24.4, M47[12]	20 (19.4)
O4	Housewives	18 (17.5)	G40, G47[13]	11 (10.7)
O5	Others[4]	21 (20.3)	K29, K30, K59.0, K75[14]	11 (10.7)
	Education		N18, N20, N40, N42.9[15]	9 (8.7)
E1	Primary school	13 (12.6)	Others[16]	48 (46.6)
E2	Secondary school	31 (30.1)		
E3	High school	35 (34.0)		
E4	College	13 (12.6)		
E5	University or higher	11 (10.7)		
	History of stroke			
H1	Yes	7 (6.8)		
H2	No	96 (93.2)		
	Type of stroke			
T1	Ischemic stroke	84 (81.6)		
T2	Hemorrhagic stroke	19 (18.4)		
	Monthly income (USD)			
	<150	43 (41.7)		
	150-<250	22 (21.4)		
	250-<350	20 (19.4)		
	≥350	18 (17.5)		

[1]SD: Standard deviation. [2]Q1-Q3: 25th and 75th quartile. [3]BMI: Body mass index.
[5]Students, workers, freelancers, and etc. [5]Free of charge . [6]Hypertension.
[7]Disorders of lipid. [8]Chronic ischemic heart disease and other cardiovascular diseases.
[9]Diabetes type-2. [10]Mental, behavioral and neurodevelopmental disorders.
[11]Diseases of the respiratory system. [12]Diseases of the musculoskeletal system.
[13]Episodic and paroxysmal disorders. [14]Diseases of the digestive system.
[15]Diseases of the genitourinary system
[16]Sequelae of malnutrition and other nutritional deficiencies (E61), Hypokalemia (E87.6), Mononeuropathies of upper limb (G56), Disorders of vestibular function (H81), Atherosclerosis (I70), Varicose veins of lower extremities (I83), Atopic dermatitis (L20, L20.8), Nonspecific elevation of levels of transaminase and lactic acid dehydrogenase [LDH] (R74.0), Other and unspecified allergy (T78.4).

participants were male (n = 61), with the mean age of 60.3 ± 11.4 years. In addition, 68% of patients (n = 70) came from urban areas, and most of them were sellers (n = 31, 30.1%). In terms of the clinical record, 93.2% of the patients had no prior history of stroke, and 84 out of 103 people were diagnosed with ischaemic stroke. Although all the recorded patients had health insurance, the coverage percentages varied among them. It was recorded that the mean length of stay was 137.0 ± 94.6 days. Regarding patients' comorbidity, the data depicts that most of the patients (n = 88) were also treated for hypertension (Table-1).

Our conducted survey also collected data on the economic burden of post-stroke rehabilitation in Traditional Medicine Hospital, which are shown in Table-2 and illustrated within Figure-2. The economic burden was computed as $342,303.50 USD, and the average total expenditure per case was $3,310.40 USD.

Economic burden of post-stroke from social perspective [2017, USD, Arithmetic mean (Bootstrap 95% CI) (Table-2).

Table-2: Economic burden of post-stroke in Traditional hospital from social perspective [2017, USD, Arithmetic mean (Bootstrap 95% CI)].

Cost component	Arithmetic mean (Bootstrap 95% CI)	Economic burden	Median (IQR)
Direct medical cost	1,653.6 (1,359.5-1,963.6)	170,978.6	1,301.9 (936.3-2,192.5)
Diagnostic imaging	17.0 (13.7-21.0)	1,756.0	14.6 (10.7-18.1)
Laboratory test	48.0 (39.0-58.0)	4,959.9	45.6 (30.2-56.7)
Hospital bed	675.8 (538.4-817.2)	69,873.8	556.7 (334.4-794.8)
Medication	114.7 (89.8-141.1)	11,858.9	96 (62.1-115.5)
Traditional medication	216.3 (166.4-249.5)	22,367.0	216.3 (57.6-367.8)
Acupuncture	377.4 (310.7-448.4)	39,026.9	322.3 (215.9-474.5)
Physical therapy	166.1 (132.0-204.3)	17,172.1	135.4 (91.1-164.3)
Others*	38.3 (29.4-47.7)	3,964.0	29.9 (9.7-62.5)
Direct non-medical cost	539.9 (427.0-676.3)	55,827.0	436.7 (348.7-635.8)
Travel	17.0 (8.7-28.3)	1,758.5	4.0 (2.6-6.2)
Meal	441.7 (336.5-570.4)	45,673.5	369.6 (264.0-468.6)
Accommodation	81.2 (53.4-113.2)	8395.0	7.9 (0.1-68.6)
Indirect cost	1,117.0 (760.3-1,543.0)	115,498.0	631.4 (220.0-1,249.6)
Lost productivity for patients	874.4 (529.7-1,296.0)	90,411.8	176.0 (66.0-1,249.6)
Lost productivity for caregivers	242.6 (171.8-323.5)	25,086.2	176.0 (88.0-264.0)
Total	3,310.4 (2,624.3-4,014.5)	342,303.5	2,755.9 (1,436-4,853.8)

*Oxygen, ambulance, nursing and etc.

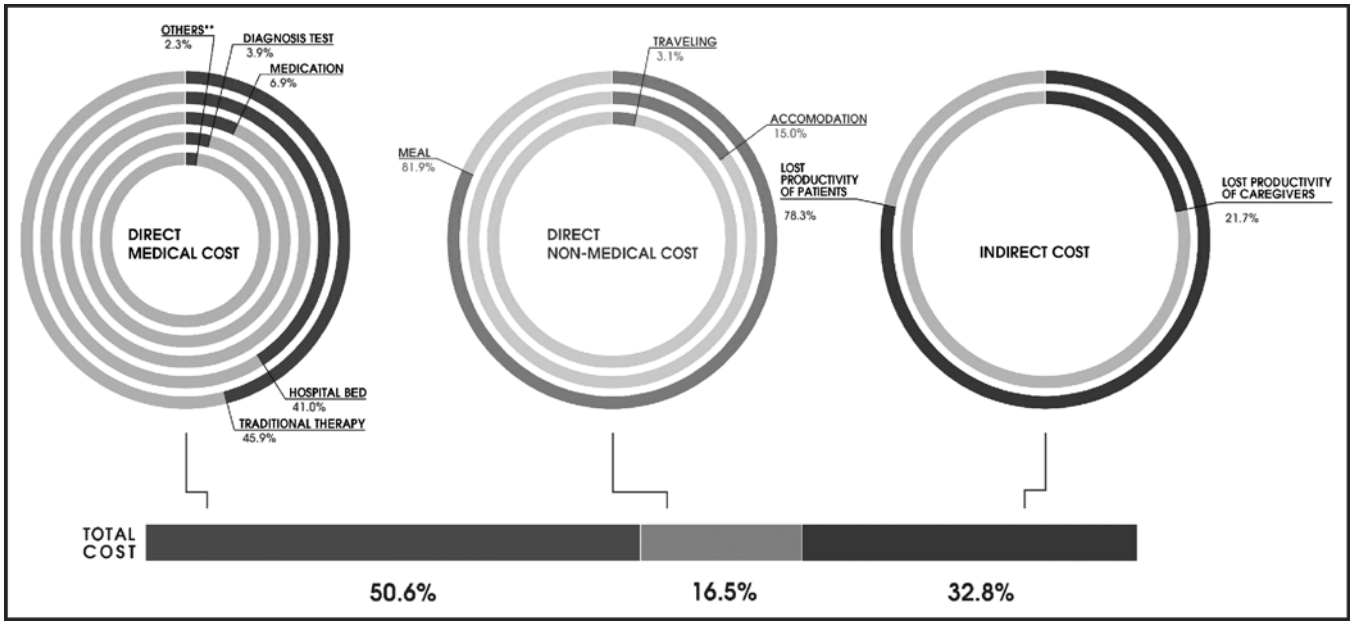

Figure-2: Effect of cost components on total cost of stroke rehabilitation patients.

Effect of Cost Components on Total Cost of Stroke Rehabilitation Patients

Table-3 depicts the average expenditure according to the demographic figures mentioned in the Table-1, Figure-3 describes the direct medical costs determined by the mentioned social demographic characteristics (Table-3).

Cost per case by demographical characteristics [n=103, 2017, USD, Arithmetic mean (Bootstrap 95% CI)] (Figure-3).

Direct medical cost by demographic characteristics is shown in Figure-4 which illustrates costs from patient, payer, hospital and society perspectives. Society witnessed the economic burden of post-stroke rehabilitation with the total recorded cost of $342,303.00 USD, approximately two times higher than the hospital's cost.

Economic burden under distinguished perspective can be seen in Figure-4.

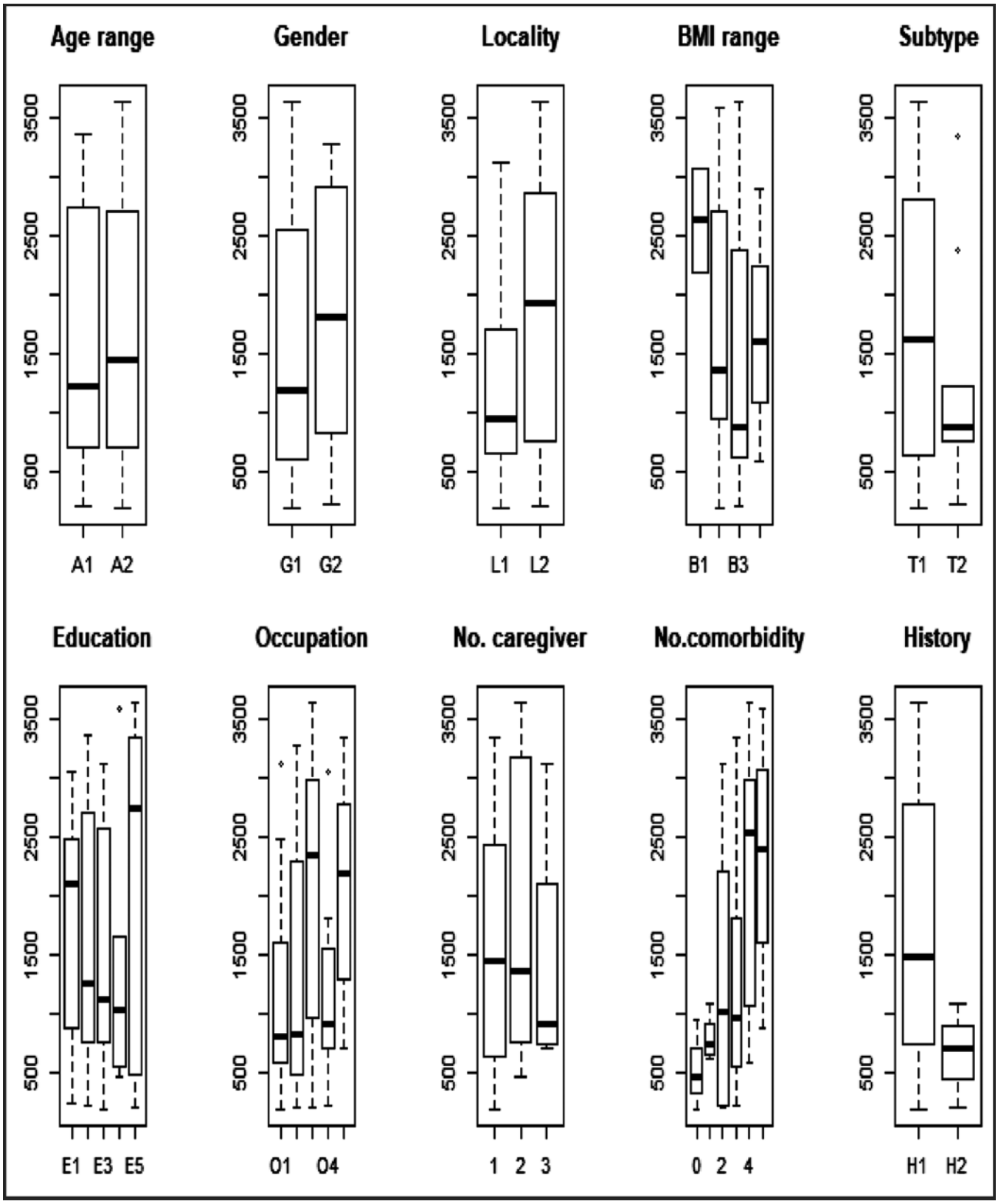

Figure-3: Direct medical cost by demographical characteristics.

Table-3: Cost per case by demographical characteristics [n=103, 2017, USD, Arithmetic mean (Bootstrap 95% CI)].

	Direct medical cost		Direct non-medical cost		Indirect medical cost		Total cost	
	Mean (bootstrap 95% CI)	p-value	Mean (bootstrap 95% CI)	p-value	Mean (bootstrap 95% CI)	p-value	Mean (bootstrap 95% CI)	p-value
Age								
A1	1,581.5 (1,124.4-2,045.3)	0.695	532.2 (363.0-707.7)	0.913	1,205.5 (556.9-1,928.2)	0.686	3,319.2 (2,176.0-4,403.1)	0.977
A2	1,711.7 (1,269.1-2,170.6)		546.2 (389.0-717.2)		1,045.6 (620.9-1,491.7)		3,310.5 (2,606.9-3,986.2)	
Gender								
G1	1,540.5 (1,124.6-1,934.0)	0.405	543.3 (383.5-712.0)	0.949	1,427.2 (886.0-2,016.6)	0.045*	3,510.9 (2,467.0-4,561.3)	0.462
G2	1,820.2 (1,323.9-2,344.5)		535.0 (374.6-702.4)		659.9 (356.4-1,057.1)		3,015.1 (2,230.4-3,810.6)	
Location								
L1	1,240.5 (836.0-1,780.2)	0.082	414.7 (336.7-501)	0.174	550.6 (360.1-759.3)	0.045*	550.6 (360.1-759.3)	0.03
L2	1,874.2 (1,438.7-2,227.2)		598.6 (432.7-773.3)		1,382.5 (878.8-1,945.1)		1,382.5 (878.8-1,945.1)	
Education								
E1	1,804.1 (853.9-2,610.5)	0.856	633 (321.2-954)	0.959	804.3 (219.4-1,408)	0.239	3,241.4 (1,567.3-4,735.8)	0.78
E2	1,696.4 (1,143.3-2,298.2)		522.4 (350.2-723.5)		942.5 (481.4-1,538.8)		3,161.3 (2,103.6-4,407.7)	
E3	1,530.1 (1,039.5-2,004.2)		495.3 (334.2-668.7)		876.2 (379.4-1,440.2)		2,892.5 (1,974.3-3,919.7)	
E4	1,380.1 (569.5-2,545.4)		616.8 (28.6-1464.4)		2,234.2 (187.0-4,259.1)		4,231.1 (1,146.4-8,042.5)	
E5	2,076.4 (381.6-3,456.7)		527.9 (98.1-859.5)		4,043.8 (1,165.1-6,537.8)		4,043.8 (1,165.1-6,537.8)	
BMI range								
B1	2,631.3 (2,192.5-3,070.1)	0.402	521.8 (436.7-606.8)	0.442	959.2 (316.8-1,601.6)	0.912	4,112.3 (3,823.6-4,400.9)	0.952
B2	1,807.1 (1,304.9-2,281.6)		640.1 (441.3-852.8)		985.8 (493.2-1,525.9)		3,433 (2,385.4-4,504.2)	
B3	1,402.5 (938.3-1,915.1)		480.3 (329.9-625.1)		1,253.6 (672.4-2,026.1)		3,136.4 (2,147.6-4,334.9)	
B4	1,684.1 (572.1-2,890.3)		268.1 (13.2-396.2)		1,184.2 (631.4-2,065.1)		3,136.4 (1,599.7-4,968.6)	
Occupation								
O1	1,186.4 (536.2-1,843.8)	0.160	374.9 (191.4-593.7)	0.569	378.9 (191.4-593.7)	0.107	1,939.9 (1,178-2,591.2)	0.064
O2	1,399.7 (491.4-2,432.8)		541.9 (221.0-874.5)		1,273.1 (242.0-3,032.9)		3,214.7 (1,292.5-5,550.8)	
O3	2,081.5 (1532.9-2,628.2)		649.8 (409.4-955.3)		1,643.7 (998.7-2,352)		4,375 (3,141.5-5,773)	
O4	1,197.4 (668.1-1,846.9)		439.3 (198.0-723.9)		576.1 (165.7-857)		2,112.8 (1,104.7-3,378.3)	
O5	2,051.1 (1,283.7-2,803.3)		614.5 (319.0-867.2)		1,438.5 (508.8-2,398.7)		4,104.1 (2,450.5-5,791.4)	
Type of stroke								
T1	1,749.8 (1,395.3-2,130.3)	0.228	565.7 (429.6-711.3)	0.403	1,178.6 (734.0-1,685.0)	0.503	3,494.1 (2,726.9-4,346.2)	0.283
T2	1,247.3 (719.3-1,943.3)		430.9 (261.4-606.6)		857.0 (3,68.9-1,461.0)		2,535.2 (1,604.9-3,605.6)	
History of stroke								
H1	1,721.6 (1,378.6-2,071.7)	0.110	556.0 (437.7-689.4)	0.332	1,120.9 (743.7-1,531.6)	0.958	3,398.4 (2,694.0-4,093.2)	0.356
H2	655.7 (193.5-1,075.7)		304.6 (33.9-531.1)		1,060.3 (372.2-2,412.7)		2,020.5 (623.3-3,641.6)	
Number of comorbidity								
0	525.8 (182.6-936.3)	0.007*	274.1 (220.4-355.5)	0.111	214.1 (88.0-290.4)	0.526	1,014.1 (719.4-1,379.8)	0.071
1	784.7 (618.1-1,075.7)		506.3 (348.7-706.2)		458.3 (239.5-739.2)		1749.2 (1,256.4-2,145.7)	
2	1,271.2 (498.1-2,118.2)		319.2 (145.9-508.1)		1,455.6 (277.3-3,248.6)		3,046 (1,154.3-5,441.4)	
3	1,289.5 (692.2-1,975.8)		399.6 (174.2-637.2)		815.0 (339.6-1,503.2)		2,504.1 (1,282.2-3,880.1)	
4	2,186.8 (1,530.7-2,772.0)		767.2 (603.1-938.1)		1,265.2 (707.1-1,821.8)		4,219.2 (3,115.3-5,265.7)	
>4	2,369.5 (1,794.3-2,910.3)		677.2 (314.2-1137.8)		1,504.6 (592.5-2,579.7)		4,551.4 (2,926.4-6,406.1)	

*p-value<0.05.

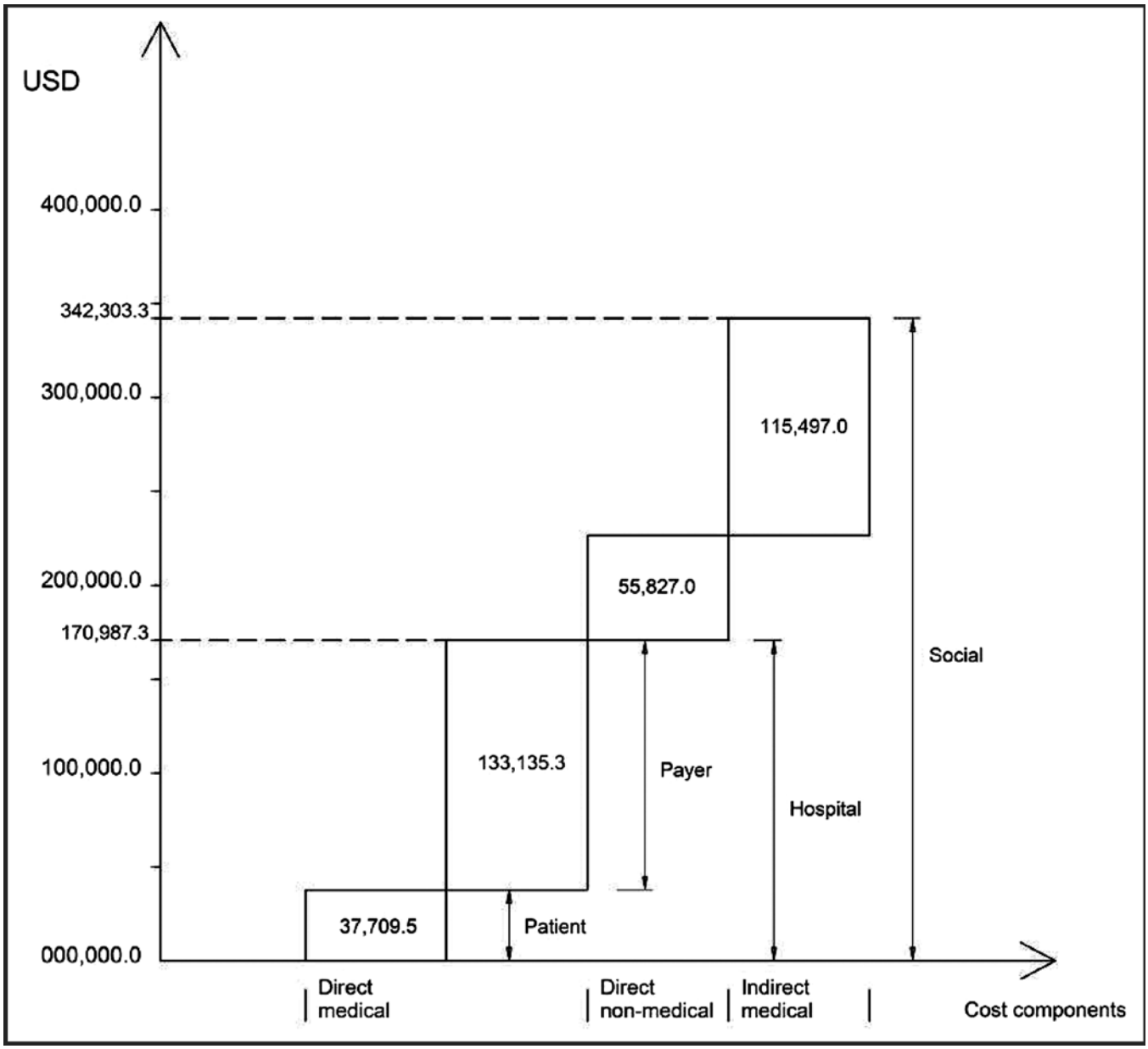

Figure-4: Economic burden under distinguished perspective.

Discussion

The mean age of patients in this study was 60.3 ± 11.4 years, with 44.7% patients being younger than 60 years old, which is a lower age range than in previous studies on this topic. For example, the age ranges in Giovanni Fattore et al.,[10] M van Eeden et al.[11] and Charles Ellis et al.[12] were 69.0 ± 12.9, 66.8 ± 12.3 and 78.1 ± 6.9, respectively. In 2012, the AHA (American Heart Association) presented statistics showing that stroke patients were often more than 80 years old.[13] The average length of stay of inpatient rehabilitation was 137.0 ± 94.6 days. In other studies, patients were hospitalized from two to seven weeks after a stroke.[6,10,12] The significant difference could be explained by the fact that the populations of the other studies were mostly outpatients or patients evaluated after discharge, and this study was conducted in a traditional hospital. In this study, 84% of the patients were diagnosed with ischaemic stroke, and this percentage was at least 75% in a majority of stroke publications.[6,10-12,14]

Stroke rehabilitation had a direct impact on society with a cost of $342,303.50 USD, or $3,310.40 USD per patient. Because not only was there a variety of cost-analysis methodology in the study design, but also this study was conducted in a hospital

that uses both Eastern and Western therapy, it was incommensurable with the estimated values of the economic burden as presented in other articles. Akhavan Hejazi SM et al.[14] showed that the direct cost for outpatient rehabilitation during the first three months was $547.10 USD, corresponding with $548.38 USD in our results (which consisted of $1,653.60 USD for direct medical and $539.90 USD for direct non-medical costs). Moreover, traditional therapy mentioned as an additional treatment outside the hospital for 69.4% patients amounted to $14.60 USD per session, which was more than double the price of a treatment session in hospital ($5.67 USD), whereas, it accounted for 45.9% direct medical cost in our assessment.[14] An Italian study[10] computed a cost of €4,112 EUR (euro) ($4,701 USD) in healthcare services for rehabilitation in the first twelve months. Some publications considered indirect cost to summarize the society's economic burden. M van Eeden et al. claimed that a post-stroke Dutch patients had productivity losses of €3,003.10 EUR (3,434 USD) and inability to do unpaid labour of €3,000.00 EUR (3,430 USD)[11] while an Italian patient lost €792 EUR (905.68 USD) per stroke survivor because of the decrease of production,[10] and the corresponding figure of Vietnamese patients from our results was $874.80 USD.

Although the methodology was constructed carefully, there were some limitations in this study. The cost calculated was based on the information supplied by family members or patients, so some mistakes or missing values could be identified in estimating the economic burden. In spite of being cautious, the cost elements that belong to comorbidities could not be eliminated completely. Moreover, traditional therapy is very common in Vietnamese medical centres, but our study solely researched a small population in one hospital, although it has a strong reputation for Eastern treatment in Vietnam. An idea for future researchers is to expand the sample size in multiple centres to more accurately appraise economic burden. Another approach would be to assess the cost and effectiveness of stroke rehabilitation and the quality of life for patients in both modern and traditional hospitals to have a comparative view for policymakers.

Conclusion

The study concluded that strokes had a significant effect on patients and caregivers, although in this case patients had already overcome the acute phase. Treatment and rehabilitation were a social burden not only in terms of the reduction of human source, but also in terms of the great amount of treatment cost. The method of this research was designed in a traditional hospital, and it could give decision makers a new perspective about economic burden of post-stroke patients who followed traditional regiments.

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