

Cost effectiveness analysis in the management of stroke in a tertiary care hospital

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ABSTRACT

Background: Stroke has a high economic impact on the society especially in a developing country like India. In India health insurance doesn't cover all people leading to out of pocket expenditure. The objective of the present study was to study the cost of illness and outcome of stroke in a tertiary care hospital.

Methods: Direct medical and nonmedical costs were obtained after 28 days of follow-up. The outcome of the stroke was measured by modified Rankin scale (mRS).

Results: The mean age of the patients was 65.38 ± 13.98 years. Majority of the patients suffered from ischemic stroke and belonged to lower middle socioeconomic group. The mean cost of stroke was INR 39819. There was improvement in the mRS score after 28 days following treatment of acute stroke.

Conclusions: Direct medical costs forms major component of cost of stroke. Early management and hospital discharge can reduce the economic burden of stroke.

Keywords: Cost of illness, Stroke, Direct costs

INTRODUCTION

Stroke is the second most common leading cause of death and third most common cause of disability of disability-adjusted life year.¹ It possesses a high socio-economic burden on the society especially the middle and lower economic group. However, there are few studies on the economic impact of stroke. The health insurance system in India varies from other countries especially for the older age group.² In India, there are many bottlenecks in accessing the government health services, leading to high out of pocket expenditures in seeking private care.² Pharmacoeconomics is the analysis of cost of drug therapy to healthcare systems and society.³ The objectives of the study are to study the cost of illness of stroke that is direct medical and nonmedical costs and to estimate the outcome of stroke.

METHODS

This was a prospective study carried out in the department of medicine of a tertiary care hospital in South India from December 2018 to August 2019. A sample size of 63 was calculated considering the prevalence of stroke as 1.9%.⁴ The study was approved by the institutional ethics committee. Clinical Trials Registry- India (CTRI) acknowledgment number is CTRI/2018/12/016683. Written informed consent was taken from the study subject/legal representatives of all the study subjects (in case patient was not in a position to respond).

Inclusion criteria

The study subjects of either gender aged >18 years with acute stroke of vascular origin diagnosed and confirmed

by radiological investigations and patients with recurrent stroke were included.

Exclusions criteria

Old cases of stroke admitted for co-morbidities and patients with neurological deficit due to other causes were excluded.

Baseline demographic data was taken. The cost related data included direct medical and nonmedical costs. The indirect costs and intangible costs were not estimated. The direct cost was calculated as direct medical costs which include costs of hospitalisation, investigations including laboratory and radiological, drugs, physiotherapy, doctors referral. The direct nonmedical costs such as transportation expenditure for both the subjects and caregivers was calculated. The costs were calculated based on the information provided by the patients and/or their caregivers. The outcome of therapy was assessed using modified Rankin Scale (mRS). The mRS ranges from 0 to 6 is the most widely used scale to measure stroke outcome. The costs and outcome of the therapy were assessed after 28 days of admission. If the

patient was discharged before 28 days, the outcome was assessed through personal telephonic enquiry.

Statistical analysis

The statistical analysis was performed using MS Excel 2013 spreadsheet. Descriptive statistics namely mean, percentage and standard deviation were used for quantitative variables. Paired t-test was used to compare the mRS at the admission and after 28 days of treatment for stroke. P value <0.05 was considered significant in the two tailed analysis.

RESULTS

70 patients were enrolled in the study out of which 50 were included who gave complete information and followed up after 28 days.

Table 1 shows the baseline characteristics of the patients. Of the total patients 33 (66%) were males and 17 (34%) were females. Majority of the patients belonged to lower middle group of socioeconomic status 28 (56%).

Table 1: Baseline characteristics.

Variables	N (%)
Gender	
Men	33 (66)
Women	17 (34)
Socioeconomic status*	
Upper	4 (8)
Upper middle	17 (34)
Lower middle	28 (56)
Upper lower	1 (2)
Lower	0
Type of stroke	
Ischemic	29 (58)
Haemorrhagic	21 (42)
Co-morbidities	
Hypertension	34 (68)
Diabetes mellitus	26 (52)
Ischemic heart disease	5 (10)
Others [§]	4 (8)

*Based on Kuppaswamy socioeconomic status scale (modified for 2007);

§: Chronic obstructive pulmonary disease, hypothyroidism, benign prostatic hyperplasia etc.

Table 2: Direct medical and nonmedical cost at 28 days of follow up.

Variables	Mean±S.D
Direct medical cost (in INR)	
Hospitalisation costs	35660±13855
Total drugs costs	3099±204
Outpatient department charges	25±8
Direct non-medical cost (in INR)	
Travel costs	581±134
Other expenditures	454±128

Table 3: Mean change in outcome after 28 days.

Change in mRS score	Day 0	Day 28	P value
mRS score	3.48±1.33	2.61±1.9	0.24

Ischemic stroke 29 (58%) constituted majority of stroke than haemorrhagic 21 (42%). Most common comorbidities were hypertension 34 (68%) and diabetes mellitus 26 (52%). Patients also had more than one comorbidities. The mean age of the patients was 65.38±13.98 years. The average length of hospital stay was 14.9±5.1 days.

Table 2 depicts the direct medical and nonmedical costs. The direct medical costs which include hospitalisation, drugs and outpatient department costs about INR 38784. The direct non-medical cost which is the travel and other expenditure costs of the patients and caregivers was about INR 1035.

Table 3 shows the outcome of stroke. There is decline in the mRS score over 28 days which favours the outcome though the difference is not significant.

DISCUSSION

Stroke is found to be more common in males (66%) than females (34%). This stands similar to the by Himaja et al in which 71.4% were males and 28.6% females.⁵ The male preponderance can be due to the reason that in developing countries like India males seek more medical attention than females due to low socioeconomic status, cultural restraints, social deprivation etc.⁶ This can also be due to prevalence of risk factors like smoking and drinking are more common in India in men. Majority of the patients belong to lower middle class (56%). This is in line with the study in India by Sharma et al which showed 90% of the patients belonged to lower socioeconomic class.⁷ Study by Kumar et al also suggested that low economic status was independently associated with the risk of ischemic stroke in North India.⁸ Our study findings of prevalence of ischemic stroke (58%) more than haemorrhagic (42%) is in similar line with study by Mudhaliar et al; ischemic stroke 65.56% and haemorrhagic stroke 32.22%.⁴ The mean age of 65.38 years suggests prevalence of stroke in the older age group. The average hospital stay was 14.9±5.1 days. One of the factors of short hospital stay is early discharge requested by the patients/caregivers who can afford the inpatient costs or loss of wages since the hospital being a private teaching hospital in a metro city.

In our study the overall cost of stroke is INR 39819 mainly contributed by the direct medical costs. This study showed the cost of 1 month whereas other studies in India² and other Asian countries like Japan and Taiwan had longer follow up.^{9,10} Patients who stayed for longer period of time >10 days due to poor prognosis had higher

cost. This includes intensive care unit charges in addition to routine services charges.

The cost of stroke can be saved by adopting home-based rehabilitation especially for people from rural areas who do not have easy access to tertiary care hospitals.¹¹ Study by Kwatra et al also concluded that home-based rehabilitation can reduce the length of hospital stay and hence the cost.² Reducing the stay in hospital by empirical antibiotic therapy (which was given in our hospital) to prevent infections, cutting down on unnecessary tests and efficient diagnosis of stroke can reduce the acute care cost.¹²

The improvement in mRS over 1 month suggests relative feasibility in the management of stroke. With early intervention by drug therapy and physical rehabilitation, regular follow up the economic burden of the stroke can be reduced.¹³

Strength

The study provides short term cost for management of acute stroke.

Limitation

Since stroke is a chronic neurological disease and requires permanent dependence long term follow up for at least 3 months is required.

CONCLUSION

Direct medical cost has a major impact on the overall cost of the stroke. Majority of the burden falls on the lower income group of patients. Early management and rehabilitation can reduce the length of stay, therefore the cost of stroke.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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