Original Article

Length of Hospital Stay During Stroke Rehabilitation at a Tertiary Care Rehabilitation Center in Saudi Arabia

Stroke Rehabilitation

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ABSTRACT

Objectives: To analyze the factors associated with length of inpatient stay of individuals with stroke at a tertiary care rehabilitation hospital in Saudi Arabia.

Study Design: Retrospective Cohort Study.

Place and Duration of Study: This study was conducted at the Inpatient Department of Physical Medicine & Rehabilitation, King Fahad Medical City, Riyadh Saudi Arabia at King Fahad Medical City, Riyadh from June 2010 to June 2011.

Materials and Methods: The rehabilitation data of sixty stroke patients discharged from inpatient stroke rehabilitation unit was collected retrospectively. Patients who were not able to complete their rehabilitation either due to death or discharge against medical advice, were excluded from the study. Patients who were difficult to be discharged or who were shifted to other medical service due to medical instability were not included in the study. Complex Statistical analysis was carried out using SPSS version 17.

Results: Our study included 60 patients with 62% males and 38% females. Mean descriptive analysis for age, Length of stay in acute (LOSa), Length of stay in rehab (LOSr), Functional status at admission (FIMa) and Functional status at discharge (FIMd) are 63.4 years, 22.1 days, 48.8 days, 59.7 and 80.8 respectively. LOSr was more in hemorrhagic stroke patients. FIMd has a strongly positive correlation with FIMa and has a negative correlation with age and LOSa. LOSr has a negative correlation with FIMa and age. In a multivariate linear regression model the only significant variable was age.

Conclusion: Earlier rehabilitation interventions during acute stroke care should be emphasized as it can not only improve the functional outcomes of patient during inpatient rehabilitation but also shorten the length of stay in rehabilitation unit.

Key Words: Stroke, Length of Stay, Rehabilitation, Outcome Measures, Saudi Arabia

INTRODUCTION

Cerebrovascular accident (stroke) is one of the major causes of disability in human beings. With an incidence of 600,000 new cases per year in the U.S., stroke stands out as the third leading cause of death, the leading cause of paralysis, and a major cause of disability.[1] As a result, identifying factors that predict functional recovery after stroke has been the subject of much research. It has been argued that certain subgroups of the stroke population may benefit more than others from comprehensive rehabilitation. Hence it is important to identify predictors that discriminate between stroke patients with good and poor prognoses.

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One such factor is length of stay (LOS) which has been repeatedly used as an indicator of efficiency for inpatient care, probably due to its clear meaning as one of the main sources of hospital costs and because LOS can be also deemed an indicator of quality.[2,3] The prediction of inpatient rehabilitation outcome is relevant for rehabilitation specialists to maximize the preparation of stroke patients for a return home.

From previous studies done in Saudi Arabia, the incidence and prevalence of strokes were low when compared to those reported from Western countries, but this was mainly due to the younger age of the population.[4] The overall distribution of stroke types was not different from that reported in other communities with some exceptions.[4] Data suggests that stroke is not an uncommon neurological problem in Saudi Arabia. Al Rajeh reported that the annual crude incidence rate of stroke was 43.8 per 100 000 population.[5] This was similar to preliminary results of an ongoing stroke registry in the Eastern Province of Saudi Arabia, in which the crude stroke incidence rate was approximately 40 per 100 000 per year with a male female ratio of approximately 2:1. In two community-based studies in the Eastern Province of Saudi Arabia, the prevalence rate for stroke was found to be

178/100,000.[6] The demand of acute management followed by inpatient rehabilitation as an active medical service continues to grow in Saudi Arabia. Hence determination of risk factors for stroke remains an important consideration. The results of one study suggest that gender, age, and ethnic differences were risk factors of LOS of stroke patients in Saudi Arabia.[7] Prediction of LOS has become increasingly important for policy makers in health care administration. Fourteen studies reported that age negatively correlates with function on or after discharge, and four studies showed no correlation.[8] Brosseau et al. found that the LOS for stroke rehabilitation also involved the process of functional recovery in stroke patients.[9] Galski et al. revealed that higher-order cognitive impairment is important in extended LOS.[10] Lin et al. reported that the functional independence measure score at admission was useful in the prediction of functional outcome for the stroke survivors after rehabilitation therapy.[11] Keeping in view all the previously cited variables for LOS and importance of the topic, we decided to conduct a study of LOS in inpatient rehabilitation after stroke at a tertiary care rehabilitation centre in Saudi Arabia, where there were no such studies conducted earlier.

The objective of this study was to analyze the factors associated with length of stay at a tertiary care rehabilitation hospital in Saudi Arabia. This will help to predict the rehabilitation outcome of patients after stroke and suggest measures in improving rehabilitation strategies for stroke patients.

MATERIALS AND METHODS

The medical rehabilitation data of 60 stroke patients discharged from inpatient stroke rehabilitation unit at King Fahad Medical City was collected retrospectively from medical records during the period from June 2010 to June 2011. This excluded patients who were not able to complete their rehabilitation either due to death or discharge against medical advice. Patients who were difficult to be discharged or who were shifted to other medical service due to medical instability were not included in the study.

Variables included in the study were age of the patient, length of stay in acute care (LOSa), length of stay in rehabilitation (LOSr), functional independence measure on admission (FIMa) and discharge (FIMd).[13] FIM data was taken from the first and last case conferences for each patient. Patients were grouped by impairments defined by cause as ischemic or hemorrhagic stroke, and right or left body side deficit. No identifiable patient information was included. Complex Statistical analysis was carried out using SPSS 17.0 statistical package. Descriptive analysis was done for continuous as well as categorical variables. Pearson correlation coefficient was used to see association between the continuous variables. Regression analysis was performed to see predictor variables for dependent variable (LOSr). A p value of 0.05 was considered to be a statistically significant level.

RESULTS

The study included 60 stroke patients with an age range of 20-95 years. The distribution of qualitative characteristics is shown in Table 1. 62% of our patients were males and left side of body was mostly affected. Though 80% of patients had ischemic strokes, but LOS in rehab was greater for hemorrhagic stroke patients, who had a mean stay of 60 days. Nearly one-third of patients were retired, while only 16% of patients had paid jobs. 95% of patients were married and 22 out of 23 females were housewives. The descriptive statistics of variables included in the study are shown in Table 2. Mean length of stay in both acute stay and inpatient rehabilitation is shown along with mean FIM at admission to rehab and at discharge from rehab.

Table No.1: Distribution of Qualitative Characteristics in the Sample (N=60)

Variables	Category	N
Gender	Male	37
	Female	23
Side of body affected	Right	20
	Left	37
	Bilateral	3
Cause	Hemorrhage	12
	Ischemia	48
Occupation	Paid employment	10
	Self-Employed	5
	Student	2
	Homemaker	22
	Retired	18
	Unemployed	3
Marital Status	Married	57
	Single	3
	Separated	0
	Divorced	0

Table No.2: Descriptive Statistics of Included Variables in the Study   **Mean + SD**

Variable	Mean + SD
Age (years)	63.4 + 14.5
FIMa (%)	59.7 + 19.6
FIMd (%)	80.8 + 24.2
LOSa (days)	22.7 + 21.3
LOSr (days)	48.8 + 21.3

Associations of FIMa with other variables is presented in Table 3 which shows that there was a strongly positive correlation between FIMa and FIMd and a weakly negative correlation between FIMa and age. Associations of LOSr with different variables is shown in Table 4. It was found that there is a strong negative correlation between LOSr and age and a weakly negative correlation between LOSr and FIMa. Data

analysis did not demonstrate any association between LOSr and age. In a multivariate linear regression model the only significant variable was age as shown by a negative correlation between age and LOSr.

Table No.3: Association of FIMa with Different Variables in the Study

Variables	r	p(Two Tailed)
FIMd	0.764	0.00
LOSa	- 0.167	0.203
Age	- 0.223	0.086

Table No.4: Association of LOSr with Different Variables in the Study

Variables	r	p(Two Tailed)
FIMa	- 0.229	0.079
Age	- 0.307	0.017

DISCUSSION

Determination of prognosis and an expected length of rehabilitation stay is of critical importance for management of stroke patients. It is also a major concern for the patients and their families. In this study, the functional status upon discharge has a strongly positive correlation with the functional status upon admission to rehabilitation. Hence, patients entering rehabilitation initially with greater amounts of function tended to leave rehabilitation with greater total function at the end of the rehabilitation course. It is reported that patients who are admitted for comprehensive stroke care within thirty days of their stroke were both admitted and discharged with higher functional scores than those admitted after thirty days, and the length of stay was significantly shorter. [13]

There was also a negative correlation between the length of stay in rehabilitation and FIMa, indicating that patients with higher function on admission had shorter LOS in the rehabilitation unit. A study reports that a high ADL measure identifies patients who will be home at one month post inpatient rehabilitation.[14] Given this, the functional status upon admission of the patient to the rehabilitation unit is the most outstanding variable in our study as a prognostic factor and determinant of length of stay in rehabilitation. It could also serve as a parameter for improving outcomes for our patients. Meiner reported that the mean FIM values at admission and at discharge were significantly higher in stroke patients after inpatient rehabilitation program. Rehabilitation therapy services are routinely provided upon referral from the stroke unit during the acute hospitalization phase. Considering the importance of FIM upon admission to a rehabilitation unit, initiating the comprehensive integrated interdisciplinary rehabilitation program in the acute stroke unit could be of significant benefit. A rehabilitation physician can assess and initially screen the acute stroke patients so that effective earlier rehabilitation interventions can help in improving the functional prognosis. Later, upon transfer to the rehabilitation unit, the patient will continue the rehabilitation care under the same team. This may not only facilitate appropriate selection, transfer and discharge planning, but also may lead to higher functional outcomes and decreased length of stay.

Another important consideration for outcomes and length of stay is patient age. The care of elderly stroke patients constitutes a major bulk in stroke rehabilitation in our patient group. Mean age of the patients is around 63 years and one third of the patients were retired. Functional status on discharge had a negative correlation with age, indicating that older individuals tended to leave rehabilitation at a lower functional level. Interestingly, our analysis shows that there is also a negative correlation between age and LOSr, as older patients tended to have a shorter length of stay on the rehabilitation unit. This is a unique finding; as generally older patients are reported to stay longer in rehabilitation post stroke.[16] This may be due to cultural reasons, as older patients are uncomfortable in the hospital setting, seek earlier discharges because there is considerable caregiver support available at home.

The qualitative characteristics of the study show that the left side of the body is more commonly affected, which may be a good prognostic factor as most of the general population is right-handed. Ischemic strokes were more common, but hemorrhagic stroke patients were found to have a longer LOSr. This emphasizes secondary preventive measures for both types of strokes, with special measures to focus on decreasing the LOSr for hemorrhagic stroke patients. some studies found better functional prognosis in survivors with hemorrhagic CVA after inpatient rehabilitation.[17,18] Hypertension and diabetes were present in nearly half of our patients, which endorses the need for primary and secondary prevention of stroke. With exception of one female student, all other females were housewives and married. This highlights the occupational needs of these patients as homemakers.

Most of our patients were discharged home with moderate handicap requiring little assistance with ADLs. This may be due to a bias towards only allowing patients who continue to improve to stay longer in the inpatient stroke programme, which is reported in literature before.[19] This improves the impact of the LOSr on the functional outcomes Similarly, the majority of patients were able to walk with aids at the time of discharge, while the activities of significant percentage of patients (35%) were confined to bed or wheelchair at the time of discharge. This necessitates the early involvement of family in caregiver training for ensuring continued care of patients at home, and the substantial role that social workers need to play in our population.

Limitations in our study include some indistinctness in the term "length of stay." The LOS for stroke

rehabilitation patients was around 48 days with standard deviation of 21.3, though we propose that the actual active days of rehabilitation may be less, as the length of stay in rehabilitation does not include the number of days that the patient was unable to participate in an active rehabilitation program. This endorses the importance of investigating the factors which could result in inactive days and add to the length of stay. In our opinion, 'difficult discharge' patients are a unique group of patients as they are not undergoing rehabilitation but still occupy a bed and receive nursing and medical care. Thus a separate study would be more appropriate to highlight factors involved in their length of stay. Another limitation in our study is the lack of discernment between patients with varying functional levels on admission. A patient's FIMa could vary depending on the severity of neurological insult, comorbid conditions, or the amount of rehabilitation obtained on the acute service. Further study would seek to determine factors influencing FIMa and their outcomes in rehabilitation. The sample size in this study was relatively small, and we recommend a similar study including a larger patient group with additional variables to explore further details and obtain pertinent data.

CONCLUSION

Earlier rehabilitation interventions during acute stroke care should be emphasized as it can not only improve the functional outcomes of patient when admitted on rehabilitation floor but also shorten the length of stay during rehabilitation. Specific rehabilitation interventions can be considered for hemorrhagic stroke patients as they tend to have a longer length of stay. Decreasing the length of stay in stroke unit during acute stroke management can reduce length of stay on the rehabilitation floor and improve functional outcomes after rehabilitation. These measure may help in reducing the cost of health care for stroke patients during acute and rehabilitation phase by decreasing their hospital stay and achieving better functional outcomes.

Author's Contribution:

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Conflict of Interest: The study has no conflict of interest to declare by any author.

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