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# Patient and treatment related variables as predictors of length of stay in a Nigerian Neuropsychiatric Hospital

Adegoke Oloruntoba Adelufosi<sup>1</sup>, Kehinde Fakorede<sup>2</sup>,  
Ayodeji Obasan<sup>2</sup>, Ibrahim Olajide Opeewe<sup>2</sup>,  
Tunde Masseyferguson Ojo<sup>2</sup>

## ABSTRACT

**Aim:** The aim of this study was to assess the hospital length of stay (LOS) of patients discharged from the acute wards of a psychiatric hospital in Nigeria and to determine its relationship with demographic, illness-related and treatment related variables. **Methods:** This was a retrospective cross-sectional study involving case note review of patients discharged from the acute psychiatric ward of the hospital during 1-year period. A questionnaire was used in collecting data about the socio-demographic variables (e.g. age, gender, distance of place of abode from hospital), clinical characteristics (diagnosis, co-morbid physical illness etc.) and clinical practice or treatment related factors (e.g. frequency of review by consultant psychiatrists, administration of electroconvulsive therapy etc.). **Results:** A total of 93 patients' case notes were analyzed, comprising 87.7% of the total number of discharges during the study period. The hospital LOS was 55 days. Using the median LOS as the cut-off, 49.5% had short LOS (LOS < 55 days), while 50.5% had prolonged LOS (LOS ≥ 55 days). LOS was significantly associated with employment status ( $\chi^2 = 3.871, P = 0.049$ ), distance of patients' residence from the hospital ( $\chi^2 = 4.300, P = 0.038$ ), reported medication side effects while on admission ( $\chi^2 = 3.986, P = 0.046$ ), previous psychiatric hospitalizations ( $\chi^2 = 4.748, P = 0.029$ ) and duration of current illness before admission ( $Z = -4.020, P < 0.001$ ). The result of the binary logistic regression analysis showed that only previous psychiatric hospitalizations made a unique statistically significant contribution to the model (beta = 1.021, wald = 4.433,  $P = 0.035$ , odds ratio = 2.775, 95% confidence interval = 1.073-7.174). **Conclusion:** Despite their significant association with hospital LOS, socio-demographic, illness and treatment related factors explained only a minimal variation in hospital LOS. It is possible that variables "external" to either patients' characteristics or physicians' practice style, are more significant predictors of long hospital LOS. These findings may help guide policy makers in improving the efficiency mental health service delivery in Nigeria.

<sup>1</sup>Department of Psychiatry, LAUTECH Teaching Hospital, Ogbomoso, Oyo State, Nigeria, <sup>2</sup>Neuropsychiatric Hospital, Aro, Abeokuta, Ogun State, Nigeria

### Address for correspondence:

Dr. Adegoke Oloruntoba Adelufosi, Department of Psychiatry, LAUTECH Teaching Hospital, Ogbomoso, Oyo State, Nigeria.  
E-mail: ozotee@gmail.com

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## BACKGROUND

One of the most significant landmarks in the history of psychiatry is the large scale deinstitutionalization of psychiatric hospitals in the 1970s and a shift to community treatment of people with mental illness. This has led to a reduction in the number of hospital beds and even a shorter length of stay (LOS) for patients admitted in psychiatric facilities.

The cost of in-patient psychiatric treatment has been reported to be higher than in-patient treatment cost of physical illnesses [1]. Prolonged hospital stay may isolate a patient from his social network and increases the burden of care on relatives/caregivers as their financial resources and coping mechanisms are stretched to the limit. An unnecessarily

prolonged admission is also a waste of hospital resources as it denies its use by others in much dire need. Because of these reasons, long hospitalization may be unacceptable thus emphasizing the need for psychiatrists to shorten patient's length of hospital stay while making treatment as efficient as possible.

Although factors that determine length of hospital stay has been a subject of intense concern for hospitals and bill payers [2,3], various studies have shown differing results regarding the predictive value of clinical and socio-demographic factors on patients' LOS in psychiatric hospitals [2-5]. However, some factors predicting LOS have been found consistently in several studies. For example, the simple GAF rating or other measures of illness severity have been found to be predictive

of LOS, with greater illness severity associated with longer LOS [6,7]. LeGris *et al.* reviewed the charts of 85 patients with psychosis on admission to an urban community general hospital, and found a significantly longer mean LOS in secluded patients compared to non-secluded patients [8]. Incidents of physical aggression during hospitalization have also been associated with longer LOS [9]. A number of studies have demonstrated that the presence of a substance use disorder is related to shorter psychiatric LOS [7,10-13]. Interestingly, while psychotic disorders and severe affective disorders are associated with longer LOS, the presence of a co morbid substance use disorder decreases LOS [11,12].

Hospital LOS has been used as an indicator of efficiency of in-patient care, quality of care and as an important factor in the planning and distribution of hospital resources [14]. Psychiatric hospital admission in Nigeria is expensive, a cost estimated at \$3675 per admission and equivalent to the cost of 90 outpatient visits [15]. Therefore, hospital LOS studies in a developing country like Nigeria may provide new directions in psychiatric service provision, more so as studies have shown that treatment outcome in patients with long LOS are not necessarily better than in those with short LOS [16,17].

Previous studies in Nigeria have examined socio-demographic and clinical variables associated psychiatric hospital LOS [18,19]. However, none to our knowledge have examined the influence of treatment practices, specifically frequency of psychiatric review while on admission on the hospital LOS. In addition, the amount of variance in hospital LOS explained by the socio-demographic, illness and clinical practice variables – an indication of their utility in service planning and formulation of admission policies - has not been examined by previous studies. In this study, we sought to answer the following questions:

1. What is the average hospital LOS among patients discharged from the acute wards of the Neuropsychiatric hospital, Aro, Abeokuta?
2. If we control for the possible effects of socio-demographic and illness related factors, is the frequency of review by consultant psychiatrists able to predict a significant variance in hospital LOS?

It was hypothesized based on clinical observation, that practice pattern, specifically frequent psychiatric review will be associated with shorter length of hospital stay.

## METHODOLOGY

### Study Setting

The study was carried out at the Neuropsychiatric Hospital, Aro Abeokuta. The hospital was established in 1954 and is a 526-bed specialized tertiary institution. It provides mental health services for residents of Ogun state and at least four neighboring states in Southwest Nigeria, including residents from neighboring Benin Republic. Presently the hospital has 5 firms supervised by 14 consultant psychiatrists. Most

admissions in the hospital are informal with patients being brought by their family members. Psychiatric services in the hospital are provided on a fee-for-service basis as there are no government subsidies for treatment. As part of the hospital's policies, all patients admitted into the acute psychiatric wards are reviewed within 24 hours of admission by the resident doctors, followed by the consultant psychiatrists' review at the next scheduled ward round following admission. Subsequent reviews by the consultant psychiatrist are usually scheduled based on patients' needs, but generally are done either weekly or two weekly, depending on the preferences of the managing consultant psychiatrist.

### Study Design

This was a retrospective cross sectional study involving case note review of patients discharged from the acute psychiatric ward of the hospital during 1-year period (from June 2008 to June 2009). There were a total of 326 admissions into the acute psychiatric ward of the hospital during this period. For patients with multiple admissions during this period, only the last admission was used for data collection and analysis.

A data collection form developed by the authors was used in obtaining information about the socio-demographic variables (e.g. age, gender, marital status, occupation, distance of place of abode from hospital), clinical characteristics (diagnosis, co-morbid physical illness, family history of mental illness, number of previous hospitalization, report of medication side effects, duration of illness before current admission etc.) and clinical practice or treatment related factors (e.g. frequency of review by consultant psychiatrists, administration of electroconvulsive therapy [ECT] etc.). The level of education was classified as "none/low" (for those without formal education and those who had up to secondary school education) or "high" (for those with tertiary education or postgraduate degrees). Marital status was categorized as either single (for those divorced, separated or widowed who were currently not in a partner relationship and those cohabiting) or married (for those currently in a partner relationship). Patients' diagnosis was broadly classified into affective psychosis (bipolar disorder, schizoaffective disorder, major depressive illness etc.) and non-affective psychosis (schizophrenia, delusional disorders etc). This method of classification was preferred as the case note diagnoses were not confirmed with diagnostic instruments.

The LOS was determined by calculating the difference between the dates of admission and dates of discharge. The median LOS during the study period was used to classify hospital stay as either prolonged (for those with hospital stay greater than or equal to median LOS) or short (for those with hospital stay lesser than the median LOS).

### Ethical Approval

Ethical approval for the study was obtained from the ethical and research committee of the Neuropsychiatric hospital, Aro, Abeokuta, Ogun State, Nigeria.

## Data Analyses

The data was analyzed using SPSS for Windows, version 15 (SPSS, 2008). The distribution of the outcome measure (LOS) was skewed and so data obtained was analyzed using non-parametric tests. The distribution of the independent variables was presented using frequency tables. The relationship between the independent variables and LOS was examined using Chi-square test of independence (for categorical variables) and Mann-Whitney U-test (for continuous variables). Variables which were significantly associated with LOS were entered into a logistic regression model to determine the predictors of LOS. The amount of variation in the LOS explained by the independent variables was determined by entering all the variables into a multiple linear regression analysis while controlling for the predictors of LOS earlier obtained. Level of significance was set at  $P < 0.05$ .

## RESULTS

Data from 93 (87.7%) patients' case notes out of 106 discharged from the hospital during the study period were examined. Thirteen (12.3%) participants were excluded from the study due to incomplete information in their case notes.

### Socio-demographic Characteristics

The mean age ( $\pm$ SD) of our sample was 35.31 (10.07), with most of them in the 30-44 years age range. They were mostly male (60.2%), unemployed (52.7%), currently not in a relationship (67.7%) and had none/low levels of education (55.9%). Majority (89.4%) lived more than 20 km away from the hospital and had no family history of mental illness (78.5%).

### Clinical and Practice Characteristics

Sixty eight percent of our sample had a diagnosis of non-affective psychosis, and 49.5% had previous hospitalizations due to mental illness. Majority (92.5%) had no comorbid physical illness. While on admission, 3.8% of participants had ECT while 44.1% reported having antipsychotic medication side effects. Regarding the frequency of review by the consultant psychiatrists, 77.4% were reviewed twice weekly while 22.6% were reviewed on weekly basis.

### Length of Stay

The hospital length of ranged from 4 days to 296 days with a median of 55 days. Using the median LOS as the cut-off, 49.5% had short LOS (LOS <55 days), while 50.5% had prolonged LOS (LOS  $\geq$ 55 days).

### Relationship between Length of Stay, Socio-demographic and Illness related Variables

As Table 1 shows, significant relationships were found between LOS and employment status ( $\chi^2 = 3.871, P = 0.049$ ), distance of patients' residence from the hospital ( $\chi^2 = 4.300, P = 0.038$ ),

**Table 1: Relationship between length of stay, socio-demographic and treatment related variables**

Variable value	Length of stay		Test statistic	P value
	Short	Long		
Age; mean	46.7	47.3	$Z = -0.119$	0.905
Gender				
Male	25 (44.6)	31 (55.4)	$\chi^2 = 0.868$	0.351
Female	21 (56.8)	16 (43.2)		
Employment status				
Employed	27 (61.4)	17 (38.6)	$\chi^2 = 3.871$	0.049
Not employed	19 (38.8)	30 (61.2)		
Educational level				
None/low	25 (48.1)	27 (51.9)	$\chi^2 = 0.008$	0.972
High	21 (51.2)	20 (48.8)		
Marital status				
In a relationship	16 (53.3)	14 (46.7)	$\chi^2 = 0.086$	0.769
Not in a relationship	30 (47.6)	33 (52.4)		
Distance of residence from hospital				
<20 km	11 (78.60)	3 (21.4)	$\chi^2 = 4.300$	0.038
>20 km	35 (44.3)	44 (55.7)		
Diagnosis				
Non-affective psychoses	28 (44.4)	35 (55.6)	$\chi^2 = 1.394$	0.238
Affective psychoses	18 (60.0)	12 (40.0)		
Duration of illness (in weeks); mean	35.66	58.10		
Physical illness co-morbidity			$Z = -4.020$	<0.001
Yes	2 (28.6)	5 (71.4)	$\chi^2 = 0.572$	0.449
No	44 (51.2)	42 (48.8)		
ECT administration during admission				
Yes	0 (0)	3 (100)	$\chi^2 = 1.334$	0.248
No	46 (51.1)	44 (48.9)		
Reported medication side effects				
Yes	15 (36.6)	26 (63.4)	$\chi^2 = 3.986$	0.046
No	31 (59.6)	21 (40.4)		
Frequency of ward round review				
Weekly	14 (66.7)	7 (33.3)	$\chi^2 = 2.384$	0.123
Two weekly	32 (44.4)	40 (55.6)		
Family history of mental illness				
Yes	14 (70.00)	6 (30.0)	$\chi^2 = 3.316$	0.069
No	32 (43.8)	41 (56.2)		
Previous psychiatric hospitalization				
Yes	17 (37.0)	29 (63.0)	$\chi^2 = 4.748$	0.029
No	29 (61.7)	18 (38.3)		

SD: Standard deviation, ECT: Electroconvulsive therapy

reported medication side effects while on admission ( $\chi^2 = 3.986, P = 0.046$ ), previous psychiatric hospitalizations ( $\chi^2 = 4.748, P = 0.029$ ) and duration of current illness before admission ( $Z = -4.020, P < 0.001$ ).

### Predictors of Length of Stay

Logistic regression analysis was performed to determine the independent correlates of hospital LOS [Table 2]. The model contained four categorical independent variables (distance of residence from the hospital, employment status, previous psychiatric hospitalizations, reported medication side effects) and one continuous independent variable (duration of current illness), while prolonged hospital

**Table 2: Logistic regression analysis showing the predictors of prolonged LOS**

Variable	Beta	Wald	P value	OR	95% CI
Previous psychiatric hospitalizations (yes)	1.021	4.433	0.035	2.775	1.073-7.174
Duration of current illness (in weeks)	0.009	3.800	0.051	1.009	1.00-1.019

OR: Odds ratio, CI: Confidence interval, LOS: Length of stay

LOS was the dependent variable. The result showed that only previous psychiatric hospitalizations made a unique statistically significant contribution to the model (beta = 1.021, wald = 4.433,  $P = 0.035$ , odds ratio = 2.775, 95% confidence interval = 1.073-7.174), with those having previous hospitalizations thrice more likely to have prolonged LOS compared with those without previous hospitalization.

### Variation in LOS Explained by Socio-demographic, Illness Related Variables and Frequency of Review

Hierarchical multiple regressions were used to assess the ability of the frequency of review to predict the hospital LOS after controlling for the influence of socio-demographic and illness related variables. The result showed that socio-demographic and illness related variables, entered in the first step of the regression analysis, explained 20.1% of the variance in hospital LOS. After entry of frequency of review in the second step of the regression analysis, the total variance in LOS explained by the model as a whole was 23.1%,  $F(14, 78) = 1.676$ ,  $P = 0.078$ . Frequency of review explained an additional 2.3% of the variance in LOS, after controlling for socio-demographic and illness related variables,  $R^2$  change = 0.030,  $F$  change (1, 78) = 3.032,  $P = 0.086$ . In the final model, frequency of patient review did not make any statistically significant contribution to the variations in hospital LOS (beta = 0.190,  $P = 0.086$ ).

## DISCUSSION

This study examined the hospital LOS of patients discharged from the acute wards of a Nigerian Neuropsychiatric hospital and the relationship of hospital practice, specifically frequency of patient review by consultant psychiatrists with hospital LOS.

Recent studies in Nigeria have reported psychiatric hospital LOS ranging from 23 days to 28 days [18-20]. The longer LOS obtained in our study (70 days) may be explained by the type of psychiatric inpatient facility where our study was conducted, being a large specialist psychiatric hospital with a high number of hospital beds. Previous authors have reported that larger hospitals and psychiatric hospitals have longer hospital LOS [21,22]. In contrast, psychiatric units in teaching hospitals often have fewer admission beds and face a constant pressure to discharge patients home when the wards are full to make bed-space available for more admissions [18], hence their shorter LOS.

The wide catchment area covered by the study center raises the possibility of patients travelling long distances in order to

receive treatment. In this study, a significant association was found between the distance of patients' place of residence and prolonged hospital stay. A similar finding has been reported by previous authors [23]. Logistic challenges associated with transportation to the hospital and financial constraints experienced by relatives of such patients may make regular hospital visits difficult, delaying patients' discharge, as relatives may not be available when vital decisions about patients' rehabilitation are to be taken by the managing team.

In this study, patients with longer duration of illness before admission had significantly prolonged LOS, a finding consistent with previous studies [24,25]. Furthermore, increasing illness severity, interplaying with other factors such as poor social support by patients' relatives due to increasing burden of care, may also be accountable for the prolonged hospital stay observed among patients' with previous psychiatric hospitalizations observed in this study [26,27], as they were thrice as likely to have prolonged hospital stay compared with those with no previous hospitalization.

Contrary to our hypothesis, the practice pattern of consultant psychiatrists at the study center, specifically their frequency of patients' review, had no association with hospital LOS. The result of the hierarchical multiple regression analysis also showed that after controlling for the effects of socio-demographic and illness related variables, frequency of review did not make any significant contribution to the hospital LOS. In fact, the model as a whole (including frequency of review, socio-demographic and illness related variables) did not significantly explain the variation in the hospital LOS. From economic point of view, this result perhaps demonstrates their limited value as predictors of psychiatric hospital LOS. We hypothesize that several other factors not related to patients' characteristics, hospital policies or attending physicians' pattern of practice modify LOS. Therefore, policy makers in Nigeria should look beyond demographic, illness and practice related variables when formulating guidelines for planning psychiatric services and determining hospital LOS, and consider also "external" factors such as those related to patients' relatives (e.g. the level of burden experienced in patients' care, available social support etc.). Our result showing no significant relationship between hospital LOS and frequency of review or even good clinical practice is consistent with published data [27].

This study has a number of limitations which should guide the interpretation of the results. First, it is a retrospective study with up to 12.3% of missing data. Second, the period covered by this study is shorter and the sample size is smaller when compared with previous studies on LOS in Nigeria. Third, the results from this study which was conducted in just one center cannot be generalized to all psychiatric treatment facilities in Nigeria, due to differences in hospital admission policies and nature of psychiatric service facility. Fourth, the diagnoses used in this study were based on case file documentation and no standardized instruments were used to validate them. In addition, the diagnostic groups in this study were broad and important differences in LOS among the individual diagnostic entities could not be examined. These

limitations notwithstanding, this study improved on previous LOS studies in Nigeria by examining the predictive ability of socio-demographic, illness related and practice related variable variables, in addition to their implication for service planning and policy formulation. One of the reasons for inconsistency in LOS studies is that most authors report the mean LOS rather than the median, which is more accurate because of the skewed nature of LOS data. In our study we reported the median LOS.

## CONCLUSION

The longer hospital LOS observed in this study compared to previous findings in Nigeria may be explained by the nature of the psychiatric facility where the study was conducted. Good clinical practice such as the frequency of patient review was not significantly associated with hospital LOS. Despite the significant association of hospital LOS with socio-demographic, illness and treatment related variables, the variation in hospital LOS explained by these variables was minimal. It is possible that variables “external” to patients or physicians are more significant predictors of long psychiatric hospital LOS. These findings may help guide policy makers and psychiatric hospital managements in Nigeria in improving the efficiency mental health service delivery.

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