



Comparative Analysis of Length of Stay in Neurology, Cardiology, and Endocrinology Facilities: A Data-driven Exploration

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ABSTRACT

Length of stay (LOS) is an important indicator of hospital resource utilization and quality of care. This study aimed to compare the LOS in three different facilities (cardiology, neurology, and endocrinology) at a hospital using a statistical analytic test. Length of stay (LOS) is an important indicator of hospital resource utilization and quality of care. This study aimed to compare the LOS in three different facilities (cardiology, neurology, and endocrinology) at a hospital using a statistical analytic test. **Methods:** A data set of 120 patients (40 in each facility) was analyzed to determine the difference in LOS among the facilities. To determine the P-value for more than 2 groups of continuous variables, we use ANOVA or the non-parametric Kruskal-Wallis test. **Results:** The mean LOS for cardiology was 7.05 days, for neurology was 5.53 days, and for endocrinology was 3.68 days. The Kruskal-Wallis test generated a P-value of < 0.001, indicating a statistically significant difference in LOS among the facilities. **Discussion:** The findings suggest that there are variations in LOS among the facilities that may be related to the type and complexity of the medical conditions, the availability and efficiency of the diagnostic and therapeutic interventions, and the discharge planning and coordination of care.

INTRODUCTION

- The article aims to identify the factors associated with LOS (Length of Stay) BMR (Beyond Medical Readiness) and the associated costs and outcomes for neurosurgical patients. (Linzey et al., 2019)
- The primary goal of this study is to identify the key factors responsible for the rise in hospital stays for inpatient pediatric neurology cases and assess the connection between these extended stays and the likelihood of readmissions. (Roliz et al., 2021)
- The aim of this article is to determine if there is a relationship between LOS and readmission rates for neurology. (Ansari et al., 2018)
- The objective of this research is to construct a predictive model, utilizing machine learning, for estimating the duration of hospital stays for cardiac patients. (Daghistani et al., 2019)
- This study investigates the characteristics of elderly diabetes patients admitted to a Singapore hospital due to severe hypoglycemia and explores factors affecting their length of stay (LOS) in the hospital. (Chua et al., 2019)
- This study examined the impact of inpatient diabetology consultations within 48 hours of admission on the length of stay for patients with diabetes admitted to a general medicine service. (Sheahan et al., 2021)

METHODS

Participants

- A total of 120 patients participated in the study, with each department (Cardiology, Neurology, and Endocrinology) consisting of 40 patients. Demographic factors (age, gender, race, etc.) were not recorded.

Procedure

- The HIM Director of a hospital conducted an experimental study. Length of stay was collected from 120 patients from 3 different facilities (Facility 1 = Cardiology, Facility 2 = Neurology, Facility 3 = Endocrinology). Length of stay was collected from 40 patients from each facility.
- Once the values were inputted, normality for each group was checked by generating a histogram that displays frequency and length of stay. The histogram was then compared to a normal bell curve to determine normality.
- To support the findings, we do a Shapiro-Wilk test to check for Normality.
- After the normality was determined, the ANOVA test was run along with descriptive statistics (which included the N value for each group) and homogeneity of variances. An ANOVA test was conducted because three groups were being compared.
- However, after the ANOVA test, the Kruskal-Wallis test was performed on the data because the pretest checklist was not satisfied. One group (facility 3) had a substantial departure from the normal distribution criteria. The p-value generated from this test was then compared to the alpha value of 0.05 to determine if there was a difference among the 3 facilities.

RESULTS

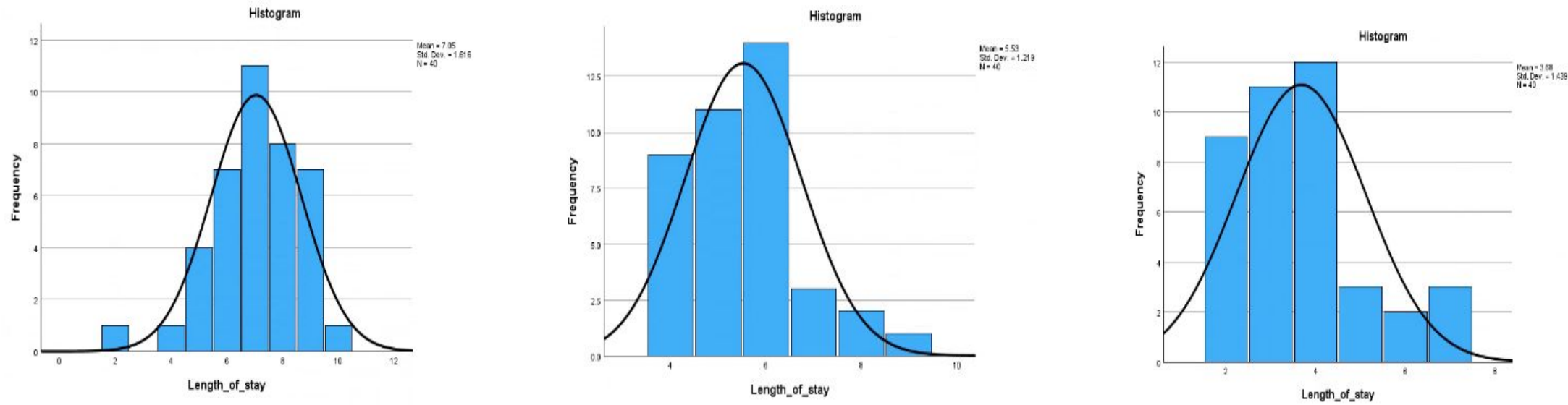


Figure 1. The histogram for facility 1 (left) yields a normal distribution. The histogram for facility 2 (center) yields a normal distribution. The histogram for facility 3 (left) yields a skewed distribution (skews towards the left). The normality criteria is not met due to the skewed distribution in facility 3.

Tests of Normality							
Length_of_stay	facility	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
	cardiology	.163	40	.009	.936	40	.026
	neurology	.198	40	< .001	.889	40	< .001
	endocrinology	.211	40	< .001	.874	40	< .001

a. Lilliefors Significance Correction

Table 1. The table above depicts the results of the Shapiro-wilk test, one of the tests of normality.

Descriptives							
Length_of_stay		95% Confidence Interval for Mean					
	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	
cardiology	40	7.05	1.616	.256	6.53	7.57	2
neurology	40	5.53	1.219	.193	5.14	5.91	4
endocrinology	40	3.68	1.439	.228	3.21	4.14	2
Total	120	5.42	1.986	.181	5.06	5.78	10

Table 2. The table shows the descriptives for each facility including N value, mean, and standard deviation. All three groups have N=40.

Test Statistics ^{a,b}	
Length_of_stay	
Kruskal-Wallis H	59.231
df	2
Asymp. Sig.	< .001

a. Kruskal Wallis Test
b. Grouping Variable: facility

Table 3. This table displays the p value generated which was <0.001 with 2 degrees of freedom.

Groups	P value
$\mu(\text{cardiology})=7.05:\mu(\text{neurology})=5.53$	<0.001
$\mu(\text{cardiology})=7.05:\mu(\text{endocrinology})=3.68$	<0.001
$\mu(\text{neurology})=5.53:\mu(\text{endocrinology})=3.68$	<0.001

Table 4. The table lists the mean and p-value for each pair possible.

CONCLUSIONS

- The health information management (HIM) Director of a hospital would like to know whether the length of stay of patients at three different facilities within the hospital differs. Facility 1 (Cardiology), Facility 2 (Neurology), Facility 3 (Endocrinology). In this study, the normality distribution for the Neurology facility and Endocrinology facility looks positively skewed with no standard bell curve. To support the findings, we do a Shapiro-Wilk test to check for Normality. The Shapiro-Wilk for all three departments had a significance value of <0.050 which proves that there is a significant difference in the normality distribution.
- The Kruskal-Wallis test produced a P-value of < 0.001 between the comparisons of cardiology - neurology, cardiology - endocrinology, and neurology – endocrinology facility patients, which is < 0.05, suggesting that there is a statistically significant difference in the length of stay among the facilities at the hospital. We can see a significant difference in the mean length of stay between the three facilities. Hence we reject the null hypothesis and accept the alternate hypothesis.
- The findings suggest that there are variations in LOS among the facilities that may be related to the type and complexity of the medical conditions, the availability and efficiency of the diagnostic and therapeutic interventions, and the discharge planning and coordination of care.

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