

Investigating Factors Affecting the Length of Patients' Stay in Hospitals

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Abstract

Nowadays, the length of hospital stay index is utilized to analyze the use of services and the performance and efficiency of hospital activities. The current study was done to investigate the factors affecting the length of patients' stay in hospitals. The current study is descriptive-analytical and cross-sectional, and the research samples were selected by random sampling. The necessary data were extracted from the files of hospitalized patients. One-way ANOVA and T-test statistical tests were used to analyze the data, and regression analysis was used to investigate the simultaneous impact of independent variables on the average length of hospitalization. According to the obtained results, the factors of age, reasons for hospitalization, gender, type of insurance, marital status, type of referral, place of residence, and the condition at discharge were effective on the average duration of hospitalization. With increasing age, the average length of hospitalization increases. Also, the stay average length in men was longer than that of women, and the stay average length was shorter in people with recovery and partial recovery at the time of discharge. According to the findings of this study, measures are suggested to decrease the presence of elderly people in the hospital through nursing homes and home care development. Creating a referral system and developing a family doctor in the cities will also facilitate faster diagnosis of diseases, decrease unnecessary stays in the hospital, and shorten the treatment period.

Keywords: Patients, Hospital, Duration of hospitalization, Services

Introduction

Healthcare is one of the basic needs of every society. Since paying attention to health and treatment and investing in this field increases labor productivity and increases production, therefore, the allocation of sufficient resources and the optimal use of resources in this sector is very important [1]. Hospital is one of the components. It is a healthcare system whose performance in coordination with a set of other factors causes the provision of people's health [2]. Hospitals are the main and key units in a country and play a vital role in providing healthcare services. Due to this importance, hospitals have a significant effect on the health system efficiency [3]. Hospitals consume about half of the national expenditures in the health sector [4, 5] and usually between 50-80% of government expenditures in the health sector are allocated to hospitals [6-8]. The demand for hospital services is increasing day by day. One of the methods that governments have used to manage this increasing demand for the use of hospital services is to measure and analyze the use of hospital services [9-11]. Analyzing information related to hospital performance and service utilization helps managers in planning and making decisions.

Hospital indicators are the main tools to show the performance and utilization of hospital services. The stay length in the hospital is a vital index that is widely applied today, and it is also one of the most appropriate indicators for hospital activity. This index is utilized for various aims such as management, quality control, hospital care,

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hospital planning, and appropriateness of using hospital services. Length of stay index is an indirect indicator of resource consumption and management efficiency of hospital beds [12, 13]. This index is one of the most useful hospital indicators that shows the performance and efficiency of hospital activities and is one of the basic components of hospital performance analysis [14, 15]. Taking advantage of hospital care is a social behavior form, which in turn is caused by complex factors [16]. Hospital admission and length of stay are influenced by several factors, including income, age, disease severity, health status, gender, marital status, education, and race [17-19]. Martin and Smith's study shows that the characteristics of the hospital and the demographic characteristics of the patient are two important factors that determine the duration of the patient's stay in the hospital [20, 21]. Several studies that have been conducted in this field show that the characteristics of the hospital and factors related to the patient are influential in the stay length in the hospital, but despite this importance, less attention has been paid to the investigation and analysis of the effective factors in the length of the hospital stay.

Stay length is often utilized as an efficiency indicator. From the hospital's point of view, reducing the stay length increases efficiency [22]. Reducing the unnecessary stay of patients in hospitals will provide more services to more patients and will decrease the investment pressure and building of new medical centers. In hospitals, even if the bed occupancy is low, by decreasing the stay length, productivity can be increased, costs can be decreased, and the consumption of hospital resources can be reduced [6]. Accurate and comprehensive usable information about this index should be a high priority for managers and planners in the strategic planning of the physical, human, and financial resources of the hospital [23]. Examining and analyzing the stay length in the hospital will be useful for hospital management, especially in setting priorities and improving the appropriate allocation of resources, considering the differences in the stay length of different patients and demographic factors [24]. This study was done to investigate and analyze the factors affecting the stay length of patients in hospitals, and its results will be useful for policymakers and managers, especially in the hospital sector, to plan and make decisions to improve and modify hospital services.

Materials and Methods

This research is a descriptive-analytical and applied research that was done in a cross-sectional way. The study samples were selected for the study using a random sampling method (662 cases). The data required for the study were extracted from the patient's files and entered into a special data collection form. These forms were completed with the direct presence of the researcher in the medical records archive of the studied hospitals. To analyze the research data, descriptive statistics methods and One-Way ANOVA T-Test statistical tests, as well as multivariate regression analysis, have been used. The significant level in all tests of this research is considered less than 0.05. The commitment to the confidentiality of the collected information and the commitment to respect trust and honesty in the use of information are among the ethical considerations of the research.

Results and Discussion

The results of the study on the demographic characteristics of hospitalized patients showed that 69.6% of patients were women and 30.4% were men. 26.7% were in the age group below 20 years, 30.8% in the age group 21-30 years, 17.7% in the age group 31-40 years, and 24.8% in the age group above 40 years. The findings of the study on the discharge status of hospitalized patients show that 51.2% of patients recovered, 37.5% recovered partially, 5.3% were discharged by personal choice, and 1.5% died.

Table 1 shows the reasons for going to the hospital, most hospitalizations are due to pregnancy and childbirth complications (40.8%). The reasons for referral were grouped into 17 categories based on the ICD classification. The average length of stay index is the number of occupied beds in a hospital at a given time divided by the total number of discharged and deceased patients at the same time, the average length of stay in hospitals. The average length of stay for men was 4.71 days (Standard deviation = 6.85) and for women was 2.31 days (Standard deviation = 2.27).

Table 1. Reasons for hospitalized patients.

Reason	N	%
Parasitic infection	23	3.5
Neoplasm	6	0.9
Metabolic glands	4	0.6
Blood	1	0.2
Neurology and psychiatry	17	2.6
Nervous system	28	4.2
The circulatory system	75	11

Respiratory System	55	8.3
Digestive	57	8.6
Genitourinary	38	5.7
Complications of pregnancy and childbirth	270	40.8
Skin	5	0.8
Musculoskeletal	1	0.2
Perinatal period	16	2.4
Injuries and poisoning	49	7.4
Uncertain signs	17	2.6
Total	662	100

There was a statistically significant relationship between the variables of age, gender, reasons for hospitalization, occupation, place of residence, marital status, and discharge status with the average length of patient stay in the hospital ($p < 0.05$). To investigate the simultaneous effect of independent variables on the average length of stay, multivariate regression analysis was used, the findings of which are presented in **Table 2**. The findings of this analysis reveal that the average length of hospitalization increases with age. Also, the average length of stay in men is longer than that of women, and the average length of stay is shorter in people with recovery and partial recovery at the time of discharge.

Table 2. The findings of regression analysis with the dependent variable average length of hospitalization (in days).

Variable	Regression coefficient	Standard error	Standardized regression coefficients	t	p
Age	0.28	0.008	0.170	3.552	<0.001
Gender	1.363	0.372	0.177	3.665	<0.001
Job	0.795	0.593	0.059	1.340	0.181
Marital status	1.142	1.993	0.024	0.573	0.567
Place of residence	0.464	0.351	0.076	1.323	0.187
Referral type	0.550	0.348	0.090	1.583	0.114
Discharge status	-2.002	0.466	-0.188	-4.298	<0.001

The findings of the study show that the average length of stay in hospitals is 3.03 days. The results of this study show that there is a significant relationship between gender and the average length of stay. In this study, the majority of hospitalized patients are women. The results of numerous studies indicate that women consume more healthcare services than men. In the study of health services, it was also found that women seek health care services more than men [25]. In similar studies, it was found that the majority of hospitalized cases were women. However, the average length of stay of men in the hospital is longer than that of women, which is consistent with previous studies [26-28].

There is a significant relationship between the age of the patient and the average length of stay in the hospital. In similar studies, it has been determined that age is an important factor in the rate of hospitalization and hospital stay [14, 24, 29]. Also, the findings of this research indicate that the average length of hospitalization increases with age. Older patients need more time to recover. In addition, most of them have chronic diseases, while younger patients are more likely to suffer from acute diseases whose treatment period is shorter [24].

Marital status is another factor affecting the average length of stay in the hospital, and the length of stay of married patients is less than that of unmarried patients. The negative effect of marriage on the duration of hospital stay is probably because married people need fewer days of hospital stay than single people due to having family support and care in the family environment [30, 31].

The findings of this research reveal that there is a significant relationship between the average length of stay in the hospital and occupation. Inpatients who are housewives have a shorter stay than patients with other occupations. The reason for this is the short average length of hospitalization in maternity ward patients, who are the largest group of hospitalized patients. The reasons for patients' hospitalization also affect the average length of stay. The results of various studies show that the type and severity of the disease affect the length of the patient's stay in the hospital [29, 31, 32]. The results of this study show that hospitalized patients due to nervous system diseases have a longer average length of stay than other patients, which is because of the long duration of treatment for these diseases.

There was also a statistically significant relationship between the patient's condition at discharge and the average length of stay in the hospital. Patients who were in remission at discharge had a shorter average length of stay than patients with other conditions. The possible cause of this issue can be timely action and quick treatment of the disease, as well as the nature of the disease, the investigation of the cause of which requires a detailed study in this field.

Conclusion

The analysis of factors affecting the stay length of patients in hospitals showed that demographic factors as well as factors related to the disease affected the average length of stay of patients in the hospital. Among the investigated factors, age, gender, and the patient's status at the discharge time had a significant impact on the length of stay in the hospital. According to the findings of this study, measures are suggested to decrease the presence of elderly people in the hospital through nursing homes and home care development. Creating a referral system and developing a family doctor in the cities will also facilitate faster diagnosis of diseases, decrease unnecessary stays in the hospital, and shorten the treatment period. For managers and healthcare policymakers, such studies can provide insight into the factors affecting the duration of hospital stay and provide the information needed to track the changes in those factors. Also, the detailed and comprehensive information of the average length of hospital stay index study can be used for planners and managers in financial strategic planning, and physical and human resources of hospitals. By using the information obtained from the analysis of the index of stay length in hospitals, it is possible to achieve the goal of optimal efficiency of the existing beds and better allocation of resources.

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References

1. Phelps CE. Health economics. Routledge; 2017.
2. Bastani P, Mohammadpour M, Bahmaei J, Ravangard R, Mehralian G. Hospital management by health services management graduates: The change paradigm in Iran. *Heliyon*. 2021;7(11):e08414.
3. Ersoy K, Kavuncubasi S, Ozcan YA, Harris JM 2nd. Technical efficiencies of Turkish hospitals: DEA approach. *J Med Syst*. 1997;21(2):67-74.
4. Mills A. The economics of hospitals in developing countries. Part I: Expenditure patterns. *Health Policy Plann*. 1990;5(2):107-17.
5. Peters DH, Garg A, Bloom G, Walker DG, Brieger WR, Rahman MH. Poverty and access to health care in developing countries. *Ann N Y Acad Sci*. 2008;1136:161-71.
6. Barnum H, Kutzin J. Public hospitals in developing countries. Baltimore MD: Johns Hopkins University Press; 1993.
7. De Geyndt W. Does autonomy for public hospitals in developing countries increase performance? Evidence-based case studies. *Soc Sci Med*. 2017;179:74-80.
8. Koushki MS, Nekoei Moghaddam M, Amiresmaili M, Goudarzi R, Yazdi-Feyzabadi V. How is the cost structure of hospital in developing countries? A case of public university hospitals in Iran. *Health Manag Inf Sci*. 2020;7(3):179-86.
9. Heartfield M. Regulating hospital use: Length of stay, beds and whiteboards. *Nurs Inq*. 2005;12(1):21-6.
10. Gokhale S, Taylor D, Gill J, Hu Y, Zeps N, Lequertier V, et al. Hospital length of stay prediction tools for all hospital admissions and general medicine populations: Systematic review and meta-analysis. *Front Med (Lausanne)*. 2023;10:1192969.
11. Eskandari M, Alizadeh Bahmani AH, Mardani-Fard HA, Karimzadeh I, Omidifar N, Peymani P. Evaluation of factors that influenced the length of hospital stay using data mining techniques. *BMC Med Inform Decis Mak*. 2022;22(1):280.
12. Atienza N, García-Heras J, Muñoz-Pichardo JM, Villa R. An application of mixture distributions in modelization of length of hospital stay. *Stat Med*. 2008;27(9):1403-20.
13. Williford E, Haley V, McNutt LA, Lazariu V. Dealing with highly skewed hospital length of stay distributions: The use of Gamma mixture models to study delivery hospitalizations. *PLoS One*. 2020;15(4):e0231825.

14. Xiao J, Douglas D, Lee AH, Vemuri SR. A Delphi evaluation of the factors influencing length of stay in Australian hospitals. *Int J Health Plann Manage.* 1997;12(3):207-18.
15. Singh K, Joshi A, Venkateshmurthy NS, Rahul R, Huffman MD, Tandon N, et al. A Delphi study to prioritize evidence-based strategies for cardiovascular disease care in India. *Glob Implement Res Appl.* 2023;1-12.
16. Young M, Smith MA. Standards and evaluation of healthcare quality, safety, and person-centered care. 2022.
17. Toyabe S, Cao P, Abe T, Uchiyama M, Akazawa K. Impact of sociocultural factors on hospital length of stay in children with nephrotic syndrome in Japan. *Health Policy.* 2006;76(3):259-65.
18. Sepehri A, Simpson W, Sarma S. The influence of health insurance on hospital admission and length of stay—the case of Vietnam. *Soc Sci Med.* 2006;63(7):1757-70.
19. Chu YH, Jiang GH, Zhang H, Luan XR. Effects of medical insurance system on the hospitalization cost of acute myocardial infarction patients. *Cost Eff Resour Alloc.* 2022;20(1):8.
20. Martin S, Smith P. Explaining variations in inpatient length of stay in the national health service. *J Health Econ.* 1996;15(3):279-304.
21. Zhao Y, Paschalidis IC, Hu J. The impact of payer status on hospital admissions: Evidence from an academic medical center. *BMC Health Serv Res.* 2021;21(1):930.
22. Borghans I, Heijink R, Kool T, Lagoe RJ, Westert GP. Benchmarking and reducing length of stay in Dutch hospitals. *BMC Health Serv Res.* 2008;8:220.
23. Lee AH, Gracey M, Wang K, Yau KK. A robustified modeling approach to analyze pediatric length of stay. *Ann Epidemiol.* 2005;15(9):673-7.
24. Lim A, Tongkumchum P. Methods for analyzing hospital length of stay with application to inpatients dying in Southern Thailand. *Glob J Health Sci.* 2009;1(1):27-32.
25. Westgard CM, Rogers A, Bello G, Rivadeneyra N. Health service utilization, perspectives, and health-seeking behavior for maternal and child health services in the Amazon of Peru, a mixed-methods study. *Int J Equity Health.* 2019;18(1):155.
26. Shi L. Patient and hospital characteristics associated with average length of stay. *Health Care Manage Rev.* 1996;21(2):46-61.
27. Bertranou F. Argentina's health care sector and the demand for health services: Three essays on health economics. Ph.D. dissertation. University of Pittsburgh, Pittsburgh, PA, USA: 1998.
28. Lee KS, Min HS, Moon JY, Lim D, Kim Y, Ko E, et al. Patient and hospital characteristics predict prolonged emergency department length of stay and in-hospital mortality: A nationwide analysis in Korea. *BMC Emerg Med.* 2022;22(1):183.
29. McMullan R, Silke B, Bennett K, Callachand S. Resource utilisation, length of hospital stay, and pattern of investigation during acute medical hospital admission. *Postgrad Med J.* 2004;80(939):23-6.
30. Meer J, Rosen HS. Insurance and the utilization of medical services. *Soc Sci Med.* 2004;58(9):1623-32.
31. Mawajdeh S, Hayajneh Y, Al-Qutob R. The effect of type of hospital and health insurance on hospital length of stay in Irbid, North Jordan. *Health Policy Plan.* 1997;12(2):166-72.
32. Dosselman LJ, Pernik MN, El Tecle N, Johnson Z, Barrie U, El Ahmadieh TY, et al. Impact of insurance provider on postoperative hospital length of stay after spine surgery. *World Neurosurg.* 2021;156:e351-8.